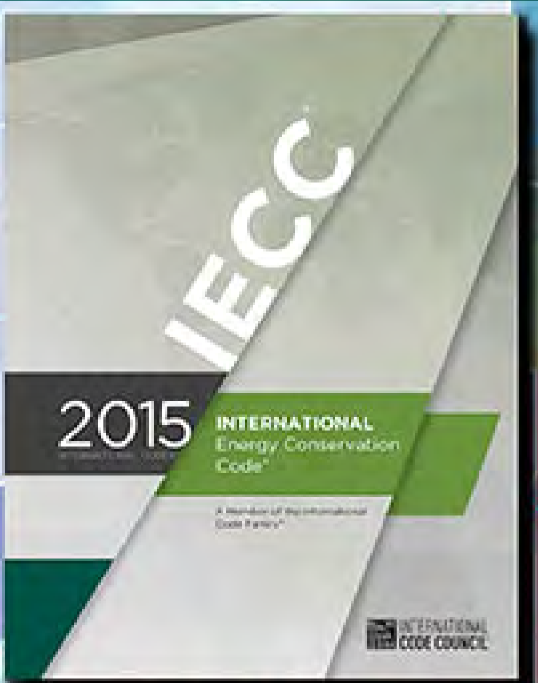
COMPLETE REVISION HISTORY TO THE 2015 I-CODES®

Successful Changes and Public Comments



ICC
INTERNATIONAL CODE COUNCIL®

Complete Revision History to the 2015 I-Codes: Successful Changes and Public Comments: 2015 IECC

First Printing

Publication Date: September 2014

PRINTED IN THE U.S.A

INTRODUCTION

Why did IECC/2015 section C402.5change from the 2012 edition? This Complete Revision History to the 2015 I-Codes: Successful Changes with Public Comments: 2015 IECC has been compiled to provide the answers to such questions.

This Complete Revision History to the 2015 I-Codes: Successful Changes and Public Comments: 2015 IECC provides the published documentation for each successful code change in the IECC/2015 since the 2012 edition. Each changed code section is listed in the Table of Changes which contains three headings. The first heading is "2015 IECC" which lists the section number in the 2015 code. If (new) appears after the section number it indicates that the section is new in 2015. If (deleted) is indicated in 2015 it means that the section no longer exists and the second column 2012 IECC will show the section number that was deleted. Also, the second heading will indicate if a section number has changed from 2012 to 2015. If there is nothing indicated in the 2012 column, the section number remained the same. The third heading lists the code change number(s) which affected that particular section. The published material for each change is contained in the Documentation section.

HOW TO USE THE HANDBOOK

This Complete Revision History to the 2015 I-Codes: Successful Changes and Public Comments: 2015 IECC makes it possible for the reader to examine, in one location, all published information about a particular code change. For any given change, the text of the proposed change, committee actions and modifications, assembly actions, successful public comments, and final action can be found by using the following steps:

1. Locate the code section in the Table of Changes using the 2015 IECC section number.
2. Note the corresponding proposed code change number(s) from the list.
3. Locate the proposed code change number (listed in numerical order under the appropriate year and letter designation) in the Documentation section to read the complete chronological documentation of the proposed change.

SOURCE DOCUMENTS

The code development cycle (see page vii) involves the publication of four documents, the result of 1) public submittal of proposed changes, 2) Report of Committee Action, 3) Public Comment Hearing Agenda, and 4) final action results. Under each code change number in the Documentation section of this handbook, material corresponding to that individual proposed change has been drawn from each of the four publications. One code change cycle occurred between published editions of the 2012 and 2015 IECC; therefore, the Documentation section of this handbook contains material collected from the following published documents:

2013 Documentation

2013 Proposed Changes to the International Codes
2013 Report of the Public Hearing on the International Codes
2013 Final Action Agenda on the International Codes
Final Action on 2013 Proposed Changes to the International Codes

Unsuccessful proposed changes have not been included since they do not directly affect the final content of the code section.

Code Change No: CE24-13

Code change numbers are identified with a letter and a year designation. For instance, **CE24-12** is proposed change number **24** to the International Energy Conservation Code – Commercial Provisions (CE) and was submitted in the **13** (2013) code change cycle. (See Code Change Numbers on page v for a discussion of code committees)

Original Proposal

This is the proposal as published in the 2013 Proposed Changes to the International Codes. It includes the section number(s), proponent's name, who they are representing, the text of the proposed change and their reason for the change.

Public Hearing Results

This is the result of the Committee Action Hearing held to consider the change, as published in the 2013 Report of the Committee Action Hearing to the International Codes. It includes the committee's action (Approved as modified) and reason for the action and also identifies if there was an assembly motion (none).

Public Comments

This is text of the submitted public comments, as published in the 2013 Public Comment Agenda. It includes the public commenter's name and affiliation, the requested action to be considered at the Final Action Hearing (Approved as Modified) and the reason.

Final Hearing Results

This is the action taken by the eligible voting members of the ICC at the Final Action Hearing, as published in the Final Action on 2013 Proposed Changes to the International Codes. The Final Action was AMPC1,2 which means the eligible voting members of ICC further modified the committee's modification and approved the change based on the submitted public comments.

CODE CHANGE NUMBERS

The following is the legend for code change numbers, along with the applicable committee and the committee's primary area of responsibility relative to the IECC.

Prefix	Code Committee	Primary IECC Chapters Affected
ADM	Administrative Code Committee	Chapter 1 [CE] and Chapter 1 [RE]
CE	IECC Commercial Energy Code Development Committee	[CE] Provisions
RE	IECC Residential Energy Code Development Committee	[RE] Provisions

Although most changes to the IECC are found under proposed change numbers beginning with an RB, RM, RP or FG, some changes to the IECC are published within a proposed change to the other *International Codes,* and therefore are found under a proposed code change number beginning with one of the other letters listed above. See page vii for discussion on the IECC fuel gas and electrical provisions.

CODE SECTION NUMBER DIFFERENCES

For editorial reasons, some code section numbers in the 2015 edition have changed from the 2012 edition. The numbering of code sections is an editorial task which takes place outside of the normal code development cycle, and is necessary to avoid duplicate or non-sequential section numbers.

The Table of Changes typically references the 2012 code section numbers that have been deleted. (See Introduction)

In most cases the section numbers have not changed from the 2012 to the 2015 edition. However, the reader should remember that it is always the 2009 code section numbers which appear in the material contained in the Documentation section. This is due to proposed changes which have as their basis, a section number in the 2012 edition. Since an attempt to correlate code sections by number may lead to confusion, the user is advised to rely on the section content rather than the numbers to locate and compare parallel sections in the two editions.

ABBREVIATIONS FOR ACTIONS

In the Documentation section, the following abbreviations are used to signify committee or final action:

Legend for 2013 Documentation:

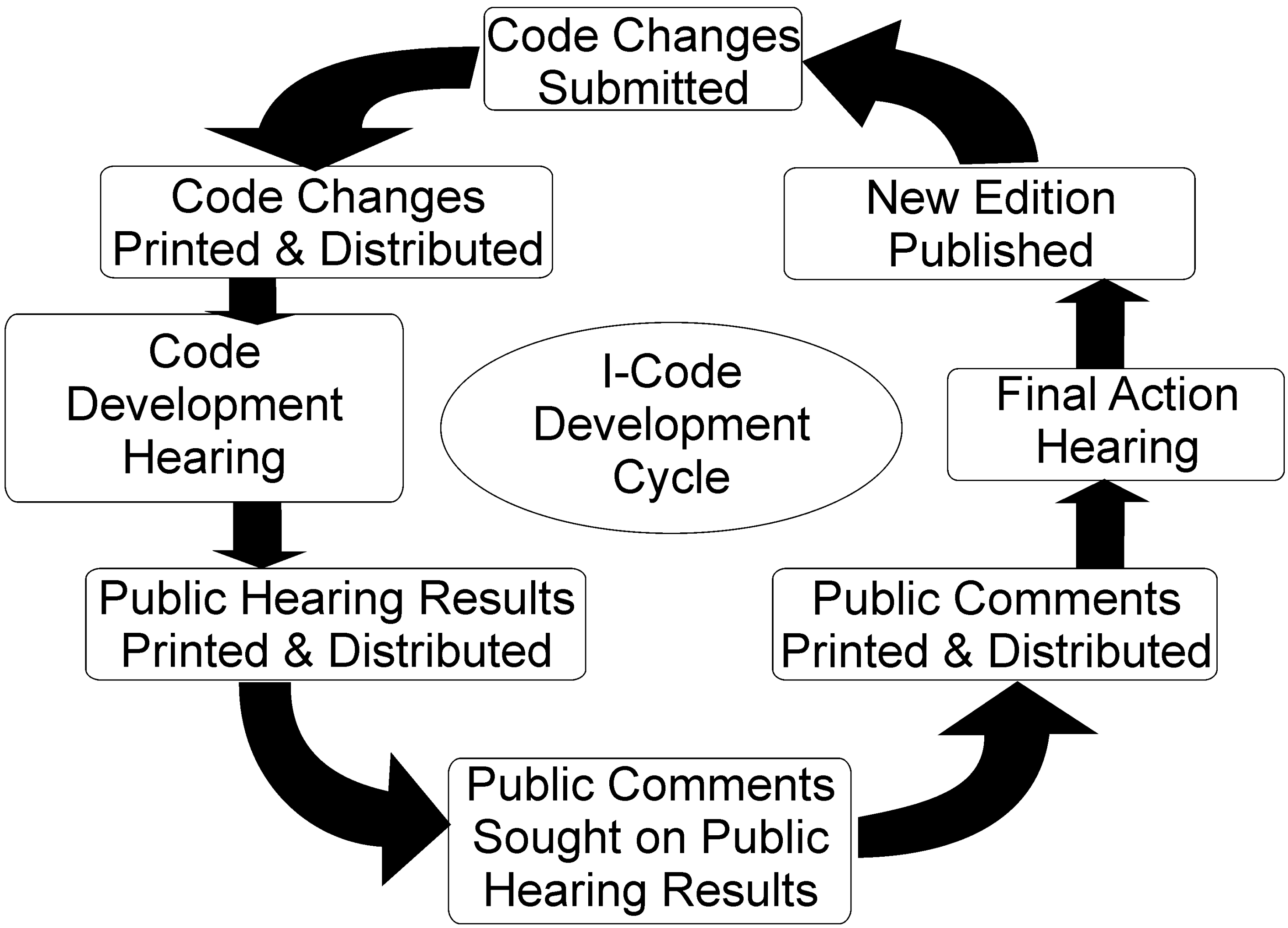
AS	=	Approved as Submitted
D	=	Disapproved
AM	=	Approved as Modified by the Code Committee
AMPC	=	Approved as Modified by a Public Comment
WP	=	Withdrawn by Proponent

CODE CORRELATION COMMITTEE

During the course of the code development process, there are editorial issues, issues related to code correlation problems arising from code changes, and issues related to the appropriate committee that should consider certain topics. These issues are placed before the ICC Code Correlation Committee for resolution. During the development of the 2015 Code, from 2012 to 2014, the Code Correlation Committee met 2 times to discuss and resolve these issues. Code Correlation Committee actions are posted on the ICC website in the Code Development Section.

ICC CODE DEVELOPMENT PROCESS

The following depicts the key steps in ICC's Code Development Process:



The procedures governing ICC Code Development are entitled Code Development Process for the International Codes. These procedures are updated periodically and therefore not included here. To obtain the current version, visit ICC's website at www.iccsafe.org.

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TABLE OF CHANGES

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C104.2.4 (New)		CE38-13 Part I
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CHAPTER 2 [CE]
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Deleted	C405.5.1.1	CE309-13
Deleted	C405.5.1.2	CE309-13
Deleted	C405.5.1.3	CE309-13
Deleted	C405.5.1.4	CE309-13
Table C405.5.2(1)	Table C405.6.2(1)	CE320-13
Table C405.5.2(2)	Table C405.6.2(2)	CE321-13
C405.6	C405.7	CE322-13
C405.7 (New)		CE329-13
Table C405.7 (New)		CE329-13
C405.8 (New)		CE331-13
Table C405.8(1) (New)		CE331-13

CHAPTER 4 [CE] - continued

2015 IECC	2012 IECC	CODE CHANGE NUMBER(S)
Table C405.8(2) (New)		CE331-13
Table C405.8(3) (New)		CE331-13
Table C405.8(4) (New)		CE331-13
C405.9 (New)		CE333-13
C405.9.1 (New)		CE333-13
C405.9.2 (New)		CE333-13
C405.9.2.1 (New)		CE332-13
C406.1		CE337-13 AMPC1
C406.1.1 (New)		CE336-13, CE337-13 AMPC1
C406.2		CE337-13 AMPC, CE339-13
Deleted	Table C406.2(1)	CE337-13 AMPC1
Deleted	Table C406.2(2)	CE337-13 AMPC1
Deleted	Table C406.2(3)	CE337-13 AMPC1
Deleted	Table C406.2(4)	CE337-13 AMPC1
Deleted	Table C406.2(5)	CE337-13 AMPC1
Deleted	Table C406.2(6)	CE337-13 AMPC1
Deleted	Table C406.2(7)	CE337-13 AMPC1, CE339-13
Deleted	C406.3	CE337-13 AMPC1
Deleted	Table C406.3	CE337-13 AMPC1
C406.3	C406.3.1	CE337-13 AMPC1
C406.4 (New)		CE337-13 AMPC1
C406.5	C406.4	CE337-13 AMPC1
C406.6 (New)		CE337-13 AMPC1
C406.7 (New)		CE337-13 AMPC1
C406.7.1 (New)		CE337-13 AMPC1
C407.4.1		CE345-13
Table C407.5.1(1)		CE283-13 Part I, CE347-13, CE348-13
C407.6		CE345-13
C407.6.3 (New)		CE349-13
C408.2		CE284-13, CE351-13, CE352-13, CE353-13
C408.2.1		CE351-13
C408.2.2.1		CE351-13, CE354-13
C408.2.2.2		CE351-13
C408.2.3.2		CE284-13
C408.2.4		CE284-13
C408.2.4.1		CE284-13, CE335-13
C408.2.5.2		CE284-13, CE356-13
C408.2.5.4		CE284-13
C408.3.1		CE137-13, CE351-13, CE357-13 AMPC1,2
C408.3.1.1 (New)		CE137-13, CE351-13, CE357-13 AMPC1,2
C408.3.1.2 (New)		CE137-13, CE351-13, CE357-13 AMPC1,2
C408.3.1.3 (New)		CE137-13, CE351-13, CE357-13 AMPC1,2
C408.3.2 (New)		CE137-13, CE351-13, CE357-13 AMPC1,2

CHAPTER 5 [CE]
EXISTING BUILDINGS (NEW)

2015 IECC	2012 IECC	CODE CHANGE NUMBER(S)
C501.1 through C501.5 (New)		CE4-13 Part I
C501.6 (New)		CE7-13 Part I
C502 through C502.1 (New)		CE4-13 Part I
C502.2 through C502.2.6.2 (New)		CE4-13 Part II
C503 (New)		CE4-13 Part I
C503.1 (New)		CE4-13, Part I, CE11-13 Part I, CE5-13, CE165-13
C503.2 (New)		CE4-13 Part I
C503.3 through C503.6 (New)		CE5-13
C504 (New)		CE15-13, CE165-13 AMPC
C504.2 (New)		CE4-13 Part I, CE5-13, CE165-13
C505 through C505.1 (New)		CE4-13 Part I

CHAPTER 6 [CE]
REFERENCED STANDARDS

2015 IECC	2012 IECC	CODE CHANGE NUMBER(S)
CHAPTER 6	CHAPTER 5	ADM62-13
AHAM		CE239-13
AHRI		CE239-13
AMCA		CE192-13 AMPC, CE234-13
APSP		SP19-13 AMPC
ASHRAE		CE201-13 AMPC
ASME (New)		CE333-13
ASTM		CE67-13 Part I, CE104-13
CRRC (New)		CE119-13, CE121-13
CSA		CE283-13 Part I
CTI (New)		CE200-13 AMPC
DASMA (New)		CE65-13 Part I
DOE (New)		CE331-13
IEEE (New)		CE279-13 Part I
NEMA (New)		CE331-13

IECC- RESIDENTIAL PROVISIONS

Part I — Scope and Application

CHAPTER 1[RE]
SCOPE AND ADMINISTRATION

2015 IECC	2012 IECC	CODE CHANGE NUMBER(S)
R101.4.1	R101.4.6	CE4-13 Part II
Deleted	R101.4.2	CE4-13 Part II
Deleted	R101.4.3	CE4-13 Part II
Deleted	R101.4.4	CE4-13 Part II
Deleted	R101.4.5	CE4-13 Part II
Deleted	R101.5.2	CE23-13 Part II
Deleted	R102.1	CE33-13 Part II
R102.1 (New)		CE33-13 Part II
R103.1		ADM40-13 Part III
R103.2		RE3-13
R103.2.1 (New)		CE37-13 Part II
R103.3		CE38-13 Part II AMPC
R103.4		ADM30-13 Part III
R104.1		CE38-13 Part II AMPC
R104.2 thru R104.2.4 (New)		CE38-13 Part II AMPC
R104.2.5	R104.3	CE38-13 Part II AMPC
R104.2.5.1 (New)		CE40-13
Deleted	R106.2	CE43-13 Part II
R108.2		ADM22-13 Part III
R108.4		CE44-13 Part II

CHAPTER 2[RE]
DEFINITIONS

2015 IECC	2012 IECC	CODE CHANGE NUMBER(S)
ALTERATION		ADM51-13 Part III
APPROVED AGENCY (New)		ADM57-13 Part III
CIRCULATING HOT WATER SYSTEM (New)		CE49-13 Part III
CLIMATE ZONE (New)		CE50-13 Part II
COMBUSTION APPLIANCE ZONE (CAZ) (New)		RE193-13
CONDITIONED SPACE		CE51-13 Part II
CONTINUOUS INSULATION (ci)		CE52-13 Part II
DRAFT (New)		RE193-13
Mechanical or induced draft		RE193-13
Natural draft		RE193-13
Deleted	ENTRANCE DOOR	RE5-13
ERI REFERENCE DESIGN		RE188-13
HISTORIC BUILDINGS (New)		CE4-13 Part II
INSULATED SIDING (New)		RE6-13
RATED DESIGN (New)		RE188-13
REPAIR		ADM60-13 Part III, CE4-13 Part II
REROOFING (New)		CE15-13 Part II
ROOF RECOVER (New)		CE15-13 Part II
ROOF REPAIR (New)		CE15-13 Part II
ROOF REPLACEMENT (New)		CE15-13 Part II

CHAPTER 2 [RE] - continued

2015 IECC	2012 IECC	CODE CHANGE NUMBER(S)
SKYLIGHT		CE59-13 Part II AMPC1
SPILLAGE (New)		RE193-13
VERTICAL FENESTRATION	FENESTRATION	CE59-13 Part II AMPC1

CHAPTER 3[RE] GENERAL REQUIREMENTS

2015 IECC	2012 IECC	CODE CHANGE NUMBER(S)
Figure R301.1		CE62-13 Part II
Table R301.1		CE61-13 Part II, CE62-13 Part II
R301.4 (New)		CE66-13 Part II AMPC1
R303.1.1		CE63-13 Part II
R303.1.3		CE65-13 Part II
R303.1.4.1 (New)		CE67-13 Part II

CHAPTER 4[RE] RESIDENTIAL ENEGY EFFICIENCY

2015 IECC	2012 IECC	CODE CHANGE NUMBER(S)
R401.2		RE12-13, RE188-13
R401.2.1		CE66-13 Part II
R401.3		RE14-13, RE16-13
R402.1		CE23-13 Part II, RE18-13
R402.1.1 (New)		RE18-13
Table R402.1.1	Table R402.1.2	RE63-13
R402.1.3	R402.1.2	RE43-13, RE195
Table R402.1.4	Table R402.1.3	RE45-13, RE50-13
R402.2.1		RE53-13
R402.2.4		RE58-13 AMPC2
R402.2.7 (New)		RE63-13
R402.2.8	R402.2.7	RE60-13
Deleted	R402.3.6	CE4-13 Part II
R402.4.1.2 (New)		CE177-13 Part II AMPC
R402.4.2	R402.3.2	CE161-13 Part II
R402.4.5	R402.3.5	RE68-13
Table R402.5.1.1	Table R402.4.1.1	CE179-13 Part II, RE60-13, RE83-13 RE84-13, RE86-13 Part II, RE85-13
R402.5.1.2	R402.4.1.2	RE91-13
R402.5.2	R402.4.2	RE86-13
R403.1.1		RE103-13, RE105-13
R403.2 (New)		CE362-13 Part II
R403.3	R403.2	RE109-13
R403.3.1	R403.2.1	RE107-13

CHAPTER 4 [RE] - continued

2015 IECC	2012 IECC	CODE CHANGE NUMBER(S)
R403.3.2	R403.2.2	RE109-13, RE111-13, RE117-13(E), RE118-13
R403.3.3 (New)		RE109-13
R403.3.4 (New)		RE109-13
R403.5.1	R403.5.1	RE125-13 Part I
R403.5.1.1 (New)		RE125-13 Part I
R403.5.1.2 (New)		RE125-13 Part I
R403.5.2 (New)		RE136-13 Part I AMPC2
R403.5.3	R403.4.2	RE132-13 AMPC
Deleted	Table R403.4.2	RE132-13
R403.5.4 (New)		CE283-13 Part II
R403.7	R403.6	RE142-13
R405.4.2		RE163-13
R405.4.2.1 (New)		RE163-13
R405.4.2.2 (New)		RE163-13
Table R405.5.2(1)		RE167-13, RE173-13
R406 through R406.7.3 (New)		RE188-13

CHAPTER 5[RE] EXISTING BUILDINGS (NEW)

2015 IECC	2012 IECC	CODE CHANGE NUMBER(S)
R501 through R501.6 (New)		CE4-13 Part II
R502 through R502.1 (New)		CE4-13 Part II
R503 through R503.3 (New)		CE4-13 Part II
R504 through R504.2 (New)		CE4-13 Part II
R505 through R505.1 (New)		CE4-13 Part II

CHAPTER 6[RE] REFERENCED STANDARDS

2015 IECC	2012 IECC	CODE CHANGE NUMBER(S)
CHAPTER 6	CHAPTER 5	ADM62-13
ASTM		CE67-13, Part I, RE91-13
CSA		CE283-13, Part II
IEEE		RE125-13 Part I
DASMA (New)		CE65-13 Part II
UL		RE125-13 Part I

APPENDIX A (NEW)
RECOMMENDED PROCEDURE FOR WORST CASE TESTING OF ATMOSPHERIC VENTING SYSTEMS UNDER R402.4 OR R405 CONDITIONS ≤ $5ACH_{50}$

2015 IECC	2012 IECC	CODE CHANGE NUMBER(S)
A101 through A301.1		RE193-13 AMPC1

APPENDIX B (NEW)
SOLAR READY PROVISIONS – DETACHED ONE- AND TWO-FAMILY DWELLINGS, MULTIPLE SINGLE FAMILY DWELLINGS (TOWNHOUSES)

2015 IECC	2012 IECC	CODE CHANGE NUMBER(S)
B101 through B103.8 (New)		RE9-13 AMPC2

Code Change No: CE4-13, Part I

Original Proposal

Section(s): C101.4.1 through C101.4.5, C202, C401.2.1, Chapter 5 (CE) (NEW), R101.4, R202 (IRC N1101.9); R402.3.6 (IRC N1102.3.6), Chapter 5 (RE) (NEW) (IRC N1106 (NEW))

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC – COMMERICAL PROVISIONS

Delete without substitution as follows:

~~**C101.4.1 Existing buildings.** Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.~~

~~**C101.4.2 Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

~~**C101.4.3 Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.~~

~~**Exception:** The following need not comply provided the energy use of the building is not increased:~~

1. ~~Storm windows installed over existing fenestration.~~
2. ~~Glass only replacements in an existing sash and frame.~~
3. ~~Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
4. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
6. ~~Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,~~
7. ~~Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~

8. ~~Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.~~

~~**C101.4.4 Change in occupancy or use.** Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or (2) to another use in Table C405.5.2(1) or (2), the installed lighting wattage shall comply with Section C405.5.~~

~~**C101.4.5 Change in space conditioning.** Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.~~

Delete without substitution as follows:

~~**C401.2.1 Application to existing buildings.** Additions, alterations and repairs to existing buildings shall comply with one of the following:~~

1. ~~Sections C402, C403, C404 and C405; or~~
2. ~~ANSI/ASHRAE/IESNA 90.1.~~

Add new text as follows:

CHAPTER 5 CE
EXISTING BUILDINGS

SECTION C501
GENERAL

C501.1 Scope. The provisions of this chapter shall control the *alteration*, *repair*, *addition* and change of occupancy of existing buildings and structures.

C501.2 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

C501.3 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or and systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

C501.4 Compliance. *Alterations*, *repairs*, *additions* and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for *alterations*, *repairs*, *additions* and changes of occupancy or relocation, respectively, in the *International Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code* and NFPA 70.

C501.5 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs, provided no hazard to life, health or property is created. Hazardous materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

C501.6 Historic buildings. *Historic buildings* are exempt from this code.

SECTION C502
ADDITIONS

C502.1 General. Additions to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Additions complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

SECTION C503
ALTERATIONS

C503.1 General Alterations to any building or structure shall comply with the requirements of the code for new construction. Alterations shall be such that the existing building or structure is no less conforming with the provisions of this code than the existing building or structure was prior to the alteration. Alterations to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building systems.

Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

Exception: The following alterations need not comply with the requirements for new construction provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

C503.2 Change in space conditioning. Any nonconditioned or low energy space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

SECTION C504
REPAIRS

C504.1 General. Buildings and structures, and parts thereof, shall be repaired in compliance with Section C501.3 and this section. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C501.3, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section.

Where a building was constructed to comply with ANSI/ASHRAE/IESNA 90.1. repairs shall comply with the standard and need not comply with Sections C402, C403, C404 and C405.

C504.2 Application. For the purposes of this code, the following shall be considered repairs.

1. Glass only replacements in an existing sash and frame.
2. Roof repairs where neither the sheathing nor the insulation is exposed~~.~~

3. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided however that an existing vestibule that separates a conditioned space from the exterior shall not be removed.
4. Repairs where only the bulb and/or ballast within the existing luminaires in a space are replaced provided that the replacement does not increase the installed interior lighting power.

SECTION C505
CHANGE OF OCCUPANCY OR USE

C505.1 General. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or C405.5.2 (2) to another use in Table C405.5.2(1) or C405.5.2 (2), the installed lighting wattage shall comply with Section C405.5.

Add new definitions as follows:

HISTORIC BUILDINGS. Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

Reason: (PART I) This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The primary purpose of this proposal is to move the regulation of existing buildings under the IECC out of Chapter 1 and into its own Chapter. Chapter 1 should be reserved for administrative provisions of the code and not the technical standards applicable to renovating or expanding existing buildings. For the Commercial IECC there are additional provisions for existing buildings found in Section C401.2.1. Therefore the primary purpose is editorial. But the purpose is also forward looking. The vast majority of our building stock is existing. If more energy savings is to be found, a significant route is the upgrade of existing buildings. This change anticipates a growth in detail of such provisions, and the SEHPCAC fells that having a distinct existing buildings chapter will better accommodate the growth of such standards.

The committee used the general format of Chapter 34 of the IBC. It compared existing language in the IBC with that in the IECC and either chose language from one code or the other, or occasionally melded the two codes. The following table lists for each new section the source of the text.

Proposed Chapter Sections	Source code and Section
C501.1 Scope	IBC 3401.1
C501.2 Existing Buildings	IECC C101.4.1
C501.3 Maintenance	IBC 3401.2
C501.4 Compliance	IBC 3401.3
C501.5 New and replacement materials	IBC 3401.4
C501.6 Historic buildings	IECC C101.4.2
C502, Additions C502.1 General	IECC C101.4.3
C502.1 – General exception	IECC C401.2.1
C503 Alterations C503.1 General	IBC 3404.1 and IECC CC101.4.3
C503.2 Change in space conditioning	IECC 101.4.5
C504 Repairs C504.1 General	IBC 3405.1 IECC C101.4.3
C504.2 Application	IECC C101.4.3
C505 Change of Occupancy or Use C505.1 General	IECC C101.4.4

The proposal does simplify the language of the historic building section to a simple exemption, but at the same time proposes a definition Historic Buildings to be added to the IECC. Most of the current text of Section C101.4.2 is actually definition. The Committee noted that there is a difference between the definitions of historic buildings in the IBC versus the IEBC. It chose the IBC version, for consistency with the lead code. The IRC does not define historic buildings.

Another substantive change – or perhaps clarification is regarding a potential of a low energy space becoming a fully conditioned space. The current text of the IECC does not address such a conversion. This proposal treats such changes the same as that of creating a conditioned space from a non-conditioned space.
Section C101.4.3 includes a list of 8 actions which are exempt from compliance with the code. Since C101.4.3 addresses all three actions (additions, alterations and repairs) it is unclear where the 8 exceptions applies. The Committee reviewed each and felt that 4 belonged in the alteration section and 4 in the repairs section.

Finally the provisions currently found in Section 401.2.1 allowing the use of ASHRAE 90.1 is translated into an alternate compliance path. for additions in Section C502. The assumption is that the design of an addition can comply with the IECC or the ASHRAE 90.1 regardless of the requirements applied to the original building. For Alterations a similar exception is provided allowing use of either IECC or ASHRAE 90.1. These are simply shown as text allowing alternate compliance and not exception. The term exception implies a lesser standard; ASHRAE 90.1 should not be viewed as a lesser standard. However for repairs, the proposal only allows use of ASHRAE 90.1 for repairs if the original design was per ASHRAE 90.1.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is an editorial relocation of existing text. There will be no impact on the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Approved as Modified

Modify the proposal as follows:

REPAIR. The reconstruction or renewal of any part of an existing building ~~for the purpose of its maintenance~~.

(Portions of the code change not shown remain unchanged.)

Committee Reason: The proposal makes the existing building provisions of the IECC easier to use. It provides a future platform for other existing building provisions by allowing them to be in one place in the code rather than scattered in multiple locations. There was discussion that proposed Section C501.3 Maintenance did not belong in the IECC based on a lack of specific existing text requiring maintenance. The Committee modified the definition of repair because it felt the added text was not needed because it was simply adding a reason for 'repair'.

Assembly Action: None

Public Comments

Public Comment 1:

Maureen Traxler, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

C501.3 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or and systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's ~~designated~~ <u>authorized</u> agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This modification makes these 2 sections of the IECC consistent with ADM22-13, all 5 parts of which were approved as submitted at the Committee Action Hearings. ADM22 consistently replaced "designated agent" with "authorized agent" throughout the International Codes.

Public Comment 2:

Maureen Traxler, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

REPAIR. The reconstruction or renewal of any part of an existing building <u>for the purpose of its maintenance</u> <u>or to correct damage</u>.

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This modification makes the IECC-Commercial language identical to the definition of "repair" approved for almost all the codes in ADM60-13. (The proposal was disapproved by the ISPSC Committee; a public comment is submitted asking for approval.) Part IV of ADM60 revised the definition in the residential portion of the IECC so without this modification, the definition will be different in IECC-Commercial as compared to IECC-Residential.

As approved by the IECC-CE Committee, a "repair" is indistinguishable from an alteration. Alteration is defined in part as "Any construction or renovation to an existing structure…" How would a code official or building owner distinguish "construction or renovation" which is alteration, from "reconstruction" which is repair? The purpose of the proposed work is the only way to make a reasonable distinction between alteration and repair. The pertinent code provisions support this conclusion. Other parts of CE4 create a separate section for repairs, Section C504, which states "Work on nondamaged components that is necessary for the required *repair* of damaged components…" Note that repair of damage is explicitly included in this provision.

Final Hearing Results

CE4-13, Part I	**AMPC1, 2**

Code Change No: CE4-13, Part II

Original Proposal

Section(s): C101.4.1 through C101.4.5, C202, C401.2.1, Chapter 5 (CE) (NEW), R101.4, R202 (IRC N1101.9); R402.3.6 (IRC N1102.3.6), Chapter 5 (RE) (NEW) (IRC N1106 (NEW))

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC – RESIDENTIAL PROVISIONS

Revise as follows:

R101.4 Applicability. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

~~**R101.4.1 Existing buildings.** Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.~~

~~**R101.4.2 Historic buildings.** Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~

~~**R101.4.3 (N1101.3) Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.~~

~~**Exception:** The following need not comply provided the energy use of the building is not increased:~~

1. ~~Storm windows installed over existing fenestration.~~
2. ~~Glass only replacements in an existing sash and frame.~~
3. ~~Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
4. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~

5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
6. ~~Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,~~
7. ~~Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~
8. ~~Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.~~

~~**R101.4.4 Change in occupancy or use.** Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code.~~

~~**R101.4.5 (N1101.4) Change in space conditioning.** Any nonconditioned space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.~~

~~**R101.4.6**~~ **R101.4.1 Mixed occupancy.** Where a building includes both *residential* and *commercial* occupancies, each occupancy shall be separately considered and meet the applicable provisions of the IECC—Commercial and Residential Provisions.

Delete without substitution as follows:

~~**R402.3.6 (N1102.3.6) Replacement fenestration .** Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for *U*-factor and SHGC in Table R402.1.1.~~

Add new text as follows:

CHAPTER 5 (RE)
EXISTING BUILDINGS

SECTION R501 (N1106)
GENERAL

R501.1 (N1106.1) Scope. The provisions of this chapter shall control the *alteration*, *repair*, *addition* and change of occupancy of existing buildings and structures.

R501.2 (N1106.2) Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

R501.3 (N1106.3) Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or and systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

R501.4 (N1106.4) Compliance. *Alterations*, *repairs*, *additions* and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for *alterations*, *repairs*, *additions* and changes of occupancy or relocation, respectively, in the *International Residential Code, International Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code* and NFPA 70.

R501.5 (N1106.5) New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs, provided no hazard to life, health or property is created. Hazardous materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

R501.6 (N1106.6) Historic buildings. *Historic buildings* are exempt from this code.

SECTION R502 (N1107) ADDITIONS

R502.1 (N1107.1) General. Additions to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

SECTION R503 (N1108) ALTERATIONS

R503.1 (N1108.1) Alterations. *Alterations* to any building or structure shall comply with the requirements of the code for new construction. *Alterations* shall be such that the existing building or structure is no less conforming with the provisions of this code than the existing building or structure was prior to the *alteration*. Alterations to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building systems.

> **Exception:** The following alterations need not comply with the requirements for new construction provided the energy use of the building is not increased:
>
> 1. Storm windows installed over existing fenestration.
> 2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
> 3. Construction where the existing roof, wall or floor cavity is not exposed.
> 4. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

R503.2 (N1108.2) Change in space conditioning. Any nonconditioned or low energy space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

R503.3. (N1108.3) Replacement fenestration . Where some or all of an existing fenestration unit is replaced with a new fenestration product, including sash and glazing, the replacement fenestration unit shall meet the applicable requirements for *U*-factor and SHGC in Table R402.1.1.

SECTION R504 (N1109) REPAIRS

R504.1 (N1109.1) General. Buildings and structures, and parts thereof, shall be repaired in compliance with Section C501.3 and this section. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C501.3, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section.

R504.2 (N1109.2) Application. For the purposes of this code, the following shall be considered repairs.

1. Glass only replacements in an existing sash and frame.
2. Roof repairs where neither the sheathing nor the insulation is exposed.
3. Repairs where only the bulb and/or ballast within the existing luminaires in a space are replaced provided that the replacement does not increase the installed interior lighting power.

SECTION R505 (N1110)
CHANGE OF OCCUPANCY OR USE

R505.1 (N1110.1) General. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code.

Add new definitions as follows:

HISTORIC BUILDINGS. Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

(PART II): This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

See the Reason statement for Part I of this proposal.

When the IECC was divided into two parallel documents, the provisions for existing buildings were copied nearly word for word into both C104 and R104. Therefore the IECC residential proposal mirrors the IECC Commercial proposal with 3 distinct differences.

1. ASHRAE 90.1 is not address as the standard is not applicable to 'residential' buildings.
2. Section R402.3.6 on replacement fenestration is added as it only applies to residential.
3. What is Item 3 in Section C504.2 does not appear in the residential version. This Item addresses maintaining door vestibules and/or revolving doors where such doors separate conditioned from non-conditioned space. Vestibules are a requirement in the IECC Commercial new construction provisions – but are not found in the residential. Therefore requiring maintenance under the residential provisions is inappropriate.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is an editorial relocation of existing text. There will be no impact on the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This code change proposal creates a needed framework for energy conservation requirements for existing buildings. This consolidates all existing building requirements in a single location and provides a framework for future development of regulations for existing buildings.

Assembly Action: **None**

Public Comments

Public Comment 2:

Maureen Traxler, City of Seattle Department of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R501.3 (N1106.3) Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or and systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's ~~designated~~ authorized agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

(Portions of the code change proposal not shown remain unchanged.)

Commenter's Reason: This modification makes these 2 sections of the IECC consistent with ADM22-13, all 5 parts of which were approved as submitted at the Committee Action Hearings. ADM22 consistently replaced "designated agent" with "authorized agent" throughout the International Codes.

Final Hearing Results

CE4-13, Part II	**AMPC2**

Code Change No: CE5-13

Original Proposal

Section(s): C202, C101.4.3, C409 (NEW)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com)

Delete and substitute as follows:

~~**C101.4.3 Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.~~

~~**Exception:** The following need not comply provided the energy use of the building is not increased:~~

1. ~~Storm windows installed over existing fenestration.~~
2. ~~Glass only replacements in an existing sash and frame.~~
3. ~~Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
4. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
6. ~~Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed.~~
7. ~~Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~
8. ~~Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.~~

C101.4.3 Additions, alterations, or repairs. Additions, alterations, or repairs to an existing building, building system or portion thereof shall comply with Section C409.

Add new text as follows:

SECTION C409
ADDITIONS, ALTERATIONS, OR REPAIRS

C409.1 Scope. The provisions of this chapter shall control the *alteration*, *repair,* and *addition* of existing buildings and structures for compliance with the *International Energy Conservation Code*.

C409.2 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration,* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

C409.3 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and/or systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

C409.4 Additions, alterations, or repairs. Additions, alterations, or repairs to an existing building, building system, or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building supply system to comply with this code. Additions, alterations, or repairs shall not create an unsafe or hazardous condition or overload existing building systems.

C409.4.1 Additions. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply as a single building. Additions shall comply with Section C409.4.1.1.

> **Exception:** Additions complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404, and C405.

C409.4.1.1 Prescriptive compliance. Additions shall comply with Sections C409.4.1.1.1 through C409.4.1.1.5.

C409.4.1.1.1 Building envelope. New building envelope assemblies that are part of the addition shall comply with Sections C402.1 through C402.4.

C409.4.1.1.1.1 Vertical Fenestration. New vertical fenestration area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with vertical fenestration that results in a total building fenestration area greater than C402.4.1 shall comply with Section C402.3.1.1 for the addition only. Additions that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407 or ASHRAE 90.1.

C409.4.1.1.1.2 Skylight area. New skylight area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with skylight area that result in a total building skylight area greater than C402.3 shall comply with Section C402.3.1.2 for the addition only. Additions that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407 or ASHRAE 90.1.

C409.4.1.1.2 Building mechanical systems. New mechanical systems and equipment serving the building heating, cooling or ventilation needs, that are part of the addition, shall comply with Section C403.

C409.4.1.1.3 Service water heating systems. New service water-heating equipment, controls and service water heating piping shall comply with Section C404.

C409.4.1.1.4 Pools and inground permanently installed spas. New pools and inground permanently installed spas shall comply with Section C404.7.

C409.4.1.1.5 Electrical power and lighting systems. New lighting systems that are installed as part of the addition shall comply with Section C405.

C409.4.1.1.5.1 Interior lighting power. The total interior lighting power for the addition shall comply with Section C405.5.2 for the addition alone or if the existing building and the addition complies as a single building.

C409.4.1.1.5.2 Exterior lighting power. The total exterior lighting power for the addition shall comply with Section C405.6.2 for the addition alone or if the existing building and the addition complies as a single building.

C409.4.2 Alterations. Alterations to existing buildings shall comply with Section C409.4.2.1 through C409.4.2.4. *Alterations* shall be such that the existing building or structure is no less complying with the provisions of this code than the existing building or structure was prior to the *alteration*.

> **Exception:** Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404, and C405.

C409.4.2.1 Building envelope. New building envelope assemblies that are part of the alteration shall comply with Sections C402.1 through C402.4.

C409.4.2.1.1 Vertical Fenestration. The addition of vertical fenestration that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of vertical fenestration that results in a total building fenestration area greater than C402.4.1 shall comply with Section C405.2.2.3.2 for the space adjacent to the new fenestration only. Alterations that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407 or ASHRAE 90.1.

C409.4.2.1.2 Skylight area. The addition of skylight area that results in a total building skylight area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of skylight area that results in a total building skylight area greater than C402.3 shall comply with Section C402.3.1.2 for the space adjacent to the new skylights. Alterations that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407 or ASHRAE 90.1.

> **Exceptions:** The following building envelope alterations are exempt from Section C409.4.2.1.
>
> 1. Storm windows installed over existing fenestration.
> 2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
> 3. Construction where the existing roof, wall or floor cavity is not exposed.

C409.4.2.2 Heating and cooling systems. New heating, cooling, and duct systems that are part of the alteration shall comply with Sections C403.

C409.4.2.2.1 Economizers. New cooling systems that are part of alteration shall comply with section C403.3.1 or C403.4.1.

C409.4.2.3 Service hot water systems. New service hot water systems that are part of the alteration shall comply with Section C404.

C409.4.2.4 Lighting. New lighting systems that are part of the alteration shall comply with Section C405.

> **Exceptions.**
>
> 1. Alterations that replace less than 10 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
> 2. Alterations that replace on the bulb and ballast within the existing luminaires in a space provided that the alteration does not increase the installed interior lighting power.

C409.4.3 Repairs. Buildings and structures, and parts thereof, shall be repaired in compliance with Section C409.3 and this section. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C409.3, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section. Where a building was constructed to comply with ANSI/ASHRAE/IESNA 90.1. repairs shall comply with the standard and need not comply with Sections C402, C403, C404 and C405.

Exceptions: The following alterations are exempt from Section C409.4.3.

1. Glass only replacements in an existing sash and frame this is a repair.
2. Reroofing for roofs where neither the sheathing nor the insulation is exposed this is a repair.

Revise definition as follows:

IECC SECTION C202
GENERAL DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

Reason: The commercial provisions of the 2012 IECC require that additions, alterations, renovations, or repairs comply with the provisions of the energy code without providing a clear "roadmap" on the specific requirements that apply to these projects. The goal of this code change proposal is to provide clear direction to the code user on what provisions must be complied with based on the type of project. Increasing the clarity of the code will increase the compliance rate and result in increased energy savings for these projects.

This proposal places all of the requirements for additions, alterations, renovations, and repairs into a new section in the commercial provisions of the IECC and builds off the work conducted by the ICC SEHPCAC in the development of their existing building proposal. The additions portion of the proposal provides direction on what options are available for demonstrating compliance for projects up to 30% window to wall ratio and for those projects up to 40% window to wall ratio. References into the code are also provided when HVAC, water heating, and lighting systems are included in the project. The alteration portion of the proposal provides clear guidance on how to address alterations that increase fenestration area for the building that exceeds the prescriptive fenestration limits for the building as defined in the code. Exceptions currently included in Section C101.4.3 of the 2012 IECC have been moved into this new section and linked to the applicable references to the building envelope, HVAC, or lighting section. Repairs have been clearly identified and essentially exempted from the requirements of the IECC if they fall within certain defined parameters.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: There was initial support of this proposal by the committee. They saw this as complimentary to the action taken to approve CE4-13 to create a new Existing Buildings chapter, with the elements of CE5 being added to provide additional guidance. The committee made modifications to the definition of repair as made in CE4 and also modified the proposal to remove the provisions on maintenance. Further modifications were discussed, but the committee felt that it would be better to address multiple modifications by public comment how CE5 would meld with CE4. There was also concern that ASHRAE 90.1 should not be referenced as a option within the existing building provisions, but that these provisions should stand on their own.

Assembly Action: **None**

Public Comments

Public Comment:

Name: Eric Makela, Britt/Makela Group, representing Northwest Energy Codes Group, requests Approval as Modified by this Public Comment.

Revise as follows:

~~**REPAIR.** The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.~~

~~**Section C101.4.3 Additions, alterations, or repairs.** Additions, alterations, or repairs to an existing building, building system or portion thereof shall comply with Section C409.~~

~~SECTION C409~~
~~ADDITIONS, ALTERATIONS, OR REPAIRS~~

~~**C409.1 Scope.** The provisions of this chapter shall control the *alteration*, *repair,* and *addition* of existing buildings and structures for compliance with the IECC.~~

~~**C409.2 Existing buildings.** Except as specified in this chapter, this code shall not be used to require the removal, *alteration,* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.~~

~~**C409.3 Maintenance.** Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices and/or systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.~~

~~**C409.4 Additions, alterations, or repairs**~~ **C502.1 General.** Additions~~, alterations, or repairs~~ to an existing building, building system, or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion~~(s)~~ of the existing building or building~~ supply~~ system to comply with this code. An ~~A~~addition~~s, alterations, or repairs~~ shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building. Additions shall comply with Section C502.2.

~~**C409.4.1 Additions**. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply as a single building. Additions shall meet the specific requirements in Section C409.4.1.1.~~

> ~~**Exception:** Additions complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404, and C405.~~

~~**C409.4.1.1**~~ **C505.2 Prescriptive compliance.** Additions shall comply with Section C402 and Sections ~~C409.4.1.1.1 to C409.4.1.1.5~~ C502.2.1 through C502.2.6.2 when applicable.

~~**C409.4.1.1.1 Building envelope**. New building envelope assemblies that are part of the addition shall comply with Sections C402.1 to C402.4.~~

~~**C409.4.1.1.1.1**~~ **C502.2.1 Vertical Fenestration**. New vertical fenestration area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with vertical fenestration that results in a total building fenestration area greater than C402.4.1 shall comply with Section C402.3.1.1 for the addition only. Additions that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407. ~~or ASHRAE 90.1.~~

~~**C409.4.1.1.1.2**~~ **C502.2.2 Skylight area.** New skylight area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with skylight area that result in a total building skylight area greater than C402.3 shall comply with Section C402.3.1.2 for the addition only. Additions that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407. ~~or ASHRAE 90.1.~~

~~**C409.4.1.1.2**~~ **C502.2.3 Building mechanical systems**. New mechanical systems and equipment serving the building heating, cooling or ventilation needs, that are part of the addition, shall comply with Section C403.

~~**C409.4.1.1.3**~~ **C502.2.4 Service water heating systems.** New service water-heating equipment, controls and service water heating piping shall comply with Section C404.

~~**C409.4.1.1.4**~~ **C502.2.5 Pools and inground permanently installed spas**. New pools and inground permanently installed spas shall comply with Section C404.7.

~~**C409.4.1.1.5**~~ **C502.2.6 Electrical power and lighting systems.** New lighting systems that are installed as part of the addition shall comply with Section C405.

~~**C409.4.1.1.5.1**~~ **C502.2.6.1 Interior lighting power.** The total interior lighting power for the addition shall comply with Section C405.5.2 for the addition alone or if the existing building plus the addition complies as a single building.

~~**C409.4.1.1.5.2**~~ **C502.2.6.2 Exterior lighting power.** The total exterior lighting power for the addition shall comply with Section C405.6.2 for the addition alone or if the existing building plus the addition complies as a single building.

~~**C409.4.2 Alterations.** Alterations to existing buildings shall comply with Section C409.4.2.1 to C409.4.2.4. *Alterations* shall be such that the existing building or structure is no less complying with the provisions of this code than the existing building or structure was prior to the *alteration*.~~

~~**Exception:** Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404, and C405.~~

~~**C409.4.2.1**~~ **C503.2.1 Building envelope**. New building envelope assemblies that are part of the alteration shall comply with Sections C402.1 to C402.4 as applicable.

~~**C409.4.2.1.1**~~ **C503.2.1.1 Vertical Fenestration**. The addition of vertical fenestration that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of vertical fenestration that results in a total building fenestration area greater than C402.4.1 shall comply with Section C405.2.2.3.2 for the space adjacent to the new fenestration only. Alterations that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407. ~~or ASHRAE 90.1.~~

~~**C409.4.2.1.2**~~ **C503.2.1.2 Skylight area.** The addition of skylight area that results in a total building skylight area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of skylight area that results in a total building skylight area greater than C402.3 shall comply with Section C402.3.1.2 for the space adjacent to the new skylights. Alterations that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407. ~~or ASHRAE 90.1.~~

~~**Exceptions:** The following building envelope alterations are exempt from Section C409.4.2.1.~~

1. ~~Storm windows installed over existing fenestration.~~
2. ~~Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
3. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~

~~**C409.4.2.2**~~ **C503.2.2 Heating and cooling systems.** New heating, cooling, and duct systems that are part of the alteration shall comply with Sections C403 as applicable.

~~**C409.4.2.2.1**~~ **C503.2.2.1 Economizers.** New cooling systems that are part of alteration shall comply with Section C403.3.1 or C403.4.1, as applicable.

~~**C409.4.2.3**~~ **C503.2.3 Service hot water systems**. New service hot water systems that are part of the alteration shall comply with Section C404, as applicable.

~~**C409.4.2.4**~~ **C503.2.4 Lighting.** New lighting systems that are part of the alteration shall comply with Section C405 as applicable.

Exceptions.

1. Alterations that replace less than 10 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
2. ~~Alterations that replace on the bulb and ballast within the existing luminaires in a space provided that the alteration does not increase the installed interior lighting power.~~

~~**C409.4.3 Repairs.** Buildings and structures, and parts thereof, shall be repaired in compliance with Section C409.3 and this section. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C501.3, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section. Where a building was constructed to comply with ANSI/ASHRAE/IESNA 90.1. repairs shall comply with the standard and need not comply with Sections C402, C403, C404 and C405.~~

~~**Exceptions:** The following alterations are exempt from Section C409.4.3.~~

1. ~~Glass only replacements in an existing sash and frame this is a repair.~~
2. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed this is a repair.~~

Commenter's Reason: The IECC Code Development Committee saw CE5 as complementary to CE4 that was approved as modified. CE4 provided the framework for a new chapter in the IECC and CE5 provided guidance necessary to determine compliance for additions, alterations and repairs. There was initial support on CE5 except for two primary issues that the committee felt were best addressed through the Public Comment process. The main issues focused on the definition of repair and also to the number of references to ASHRAE 90.1.

This Public Comment modifies the format and language in CE5 so it can merge seamlessly into CE4. The end result is the format from CE4 with the guidance provided in CE5 to increase the understanding on how to demonstrate compliance for additions, alterations and repairs. The two code change proposals have been merged together at the end of this reason statement to demonstrate how the finished code will appear in the 2015 IECC if approved.

The commercial provisions of the 2012 IECC require that additions, alterations, renovations, or repairs comply with the provisions of the energy code without providing a clear "roadmap" on the specific requirements that apply to these projects. The goal of this code change proposal is to provide clear direction to the code user on what provisions must be complied with based on the type of project. Increasing the clarity of the code will increase the compliance rate and result in increased energy savings for these projects.

The additions portion of the proposal provides direction on what options are available for demonstrating compliance for projects up to 30% window to wall ratio and for those projects up to 40% window to wall ratio. References into the code are also provided when HVAC, water heating, and lighting systems are included in the project. The alteration portion of the proposal provides clear guidance on how to address alterations that increase fenestration area for the building that exceeds the prescriptive fenestration limits for the building as defined in the code. Exceptions currently included in Section C101.4.3 of the 2012 IECC have been moved into this new section and linked to the applicable references to the building envelope, HVAC, or lighting section. Repairs have been clearly identified and essentially exempted from the requirements of the IECC if they fall within certain defined parameters.

The following code text will be published in the 2015 IECC if this public comment is approved. The underlined areas show where the CE5 language fits into the CE4 code change proposal.

CHAPTER 5 CE
EXISTING BUILDINGS
SECTION C501
GENERAL

C501.1 Scope. The provisions of this chapter shall control the *alteration*, *repair*, *addition* and change of occupancy of existing buildings and structures.

C501.2 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

C501.3 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or and systems which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's designated agent shall be responsible for the maintenance of buildings and structures. The requirements of this chapter shall not provide the basis for removal or abrogation of energy conservation, fire protection and safety systems and devices in existing structures.

C501.4 Compliance. *Alterations*, *repairs*, *additions* and changes of occupancy to, or relocation of, existing buildings and structures shall comply with the provisions for *alterations*, *repairs*, *additions* and changes of occupancy or relocation, respectively, in the *International Building Code, International Fire Code, International Fuel Gas Code, International Mechanical Code, International Plumbing Code, International Property Maintenance Code, International Private Sewage Disposal Code* and NFPA 70.

C501.5 New and replacement materials. Except as otherwise required or permitted by this code, materials permitted by the applicable code for new construction shall be used. Like materials shall be permitted for repairs, provided no hazard to life, health or property is created. Hazardous materials shall not be used where the code for new construction would not permit their use in buildings of similar occupancy, purpose and location.

C501.6 Historic buildings. *Historic buildings* are exempt from this code.

SECTION C502
ADDITIONS

C502.1 General. Additions to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion of the existing building or building system to comply with this code. Additions shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building. <u>Additions shall comply with Section C502.2.</u>

Additions complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

<u>**C502.2 Prescriptive compliance.** Additions shall comply with Sections C502.2.1 through C502.2.6.2.</u>

<u>**C502.2.1 Vertical Fenestration**. New vertical fenestration area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with vertical fenestration that result in a total building fenestration area greater than C402.3.1, or additions that exceed the fenestration area greater than C402.3.1 shall comply with Section C402.3.1.1 for the addition only. Additions that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407.</u>

<u>**C502.2.2 Skylight area.** New skylight area that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. Additions with skylight area that result in a total building skylight area greater than C402.3.1, or additions that exceed the skylight area shall comply with Section C402.3.1.2 for the addition only. Additions that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407.</u>

<u>**C502.2.3 Building mechanical systems**. New mechanical systems and equipment serving the building heating, cooling or ventilation needs, that are part of the addition, shall comply with Section C403.</u>

C502.2.4 Service water heating systems. New service water-heating equipment, controls and service water heating piping shall comply with Section C404.

C502.2.5 Pools and inground permanently installed spas. New pools and inground permanently installed spas shall comply with Section C404.7.

C502.2.6 Electrical power and lighting systems. New lighting systems that are installed as part of the addition shall comply with Section C405.

C502.2.6.1 Interior lighting power. The total interior lighting power for the addition shall comply with Section C405.5.2 for the addition alone or if the existing building and the addition complies as a single building.

C502.2.6.2 Exterior lighting power. The total exterior lighting power for the addition shall comply with Section C405.6.2 for the addition alone or if the existing building and the addition complies as a single building.

SECTION C503
ALTERATIONS

C503.1 General Alterations to any building or structure shall comply with the requirements of the code for new construction. Alterations shall be such that the existing building or structure is no less conforming with the provisions of this code than the existing building or structure was prior to the alteration. Alterations to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Alterations shall not create an unsafe or hazardous condition or overload existing building systems.

Alterations complying with ANSI/ASHRAE/IESNA 90.1. need not comply with Sections C402, C403, C404 and C405.

Exception: The following alterations need not comply with the requirements for new construction provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
3. Construction where the existing roof, wall or floor cavity is not exposed.
4. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

C503.2 Change in space conditioning. Any nonconditioned or low energy space that is altered to become *conditioned space* shall be required to be brought into full compliance with this code.

C503.2.1 Building envelope. New building envelope assemblies that are part of the alteration shall comply with Sections C402.1 through C402.4.

C503.2.1.1 Vertical Fenestration. The addition of vertical fenestration that results in a total building fenestration area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of vertical fenestration that results in a total building fenestration area greater than C402.3.1 shall comply with Section C402.3.1.1 for the space adjacent to the new fenestration only. Alterations that result in a total building vertical glass area exceeding that specified in Section C402.3.1.1 shall comply with Section C407.

C503.2.1.2 Skylight area. The addition of skylight area that results in a total building skylight area less than or equal to that specified in Section C402.3.1 shall comply with Section C402.3. The addition of skylight area that results in a total building skylight area greater than C402.3.1 shall comply with Section C402.3.1.2 for the space adjacent to the new skylights. Alterations that result in a total building skylight area exceeding that specified in Section C402.3.1.2 shall comply with Section C407.

C503.2.2 Heating and cooling systems. New heating, cooling, and duct systems that are part of the alteration shall comply with Sections C403.

C503.2.2.1 Economizers. New cooling systems that are part of alteration shall comply with section C403.3.1 or C403.4.1.

C503.2.3 Service hot water systems. New service hot water systems that are part of the alteration shall comply with Section C404.

C503.2.4 Lighting. New lighting systems that are part of the alteration shall comply with Section C405.

Exceptions.

1. Alterations that replace less than 10 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

<u>SECTION C504</u>
<u>REPAIRS</u>

C504.1 General. Buildings and structures, and parts thereof, shall be repaired in compliance with Section C501.3 and this section. Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter. Routine maintenance required by Section C501.3, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *repairs* in this section.

Where a building was constructed to comply with ANSI/ASHRAE/IESNA 90.1. repairs shall comply with the standard and need not comply with Sections C402, C403, C404 and C405.

C504.2 Application. For the purposes of this code, the following shall be considered repairs.

1. Glass only replacements in an existing sash and frame.
2. Roof repairs where neither the sheathing nor the insulation is exposed.
3. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided however that an existing vestibule that separates a conditioned space from the exterior shall not be removed.
4. Repairs where only the bulb and/or ballast within the existing luminaires in a space are replaced provided that the replacement does not increase the installed interior lighting power.

SECTION C505
CHANGE OF OCCUPANCY OR USE

C505.1 General. Spaces undergoing a change in occupancy that would result in an increase in demand for either fossil fuel or electrical energy shall comply with this code. Where the use in a space changes from one use in Table C405.5.2(1) or C405.5.2 (2) to another use in Table C405.5.2(1) or C405.5.2 (2), the installed lighting wattage shall comply with Section C405.5.

Add new definitions as follows:

HISTORIC BUILDINGS. Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

REPAIR. The reconstruction or renewal of any part of an existing building.

Final Hearing Results

CE5-13 **AMPC**

Code Change No: CE7-13, Part I

Original Proposal

Section(s): C101.4.2, C202 (NEW), R101.4.2, R202 (NEW) (IRC N1101.9 (NEW))

Proponent: Jim Edelson, New Buildings Institute (jedelson@comcast.net), Ric Cochrane, National Trust for Historic Preservation, David Collins, The Preview Group representing The American Institute of Architects

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.2 Historic buildings. ~~Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~ The provisions of this code relating to the construction, *repair*, *alteration*, restoration and movement of structures, and *change of occupancy* shall not be mandatory for *historic buildings*. No provision of this code shall be used to require the *alteration* of an *historic building*.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places
2. Designated as historic under an applicable state or local law; or
3. Certified as a contributing resource within a National Register listed or locally designated historic district.

Reason: The current language for Historic Buildings in the IECC-Commercial, the IECC-Residential and the IEBC is confusing, inconsistent with I-Code conventions for definitions, and does not clearly describe how buildings and districts are listed or determined to be eligible to be listed as historic. The charging language in C101.4.2 contains no fewer than three semi-colons and nine instances of the word "or". This makes the language very difficult to parse. The sentence structure in the current language that addresses eligibility is confusing and obfuscates who does the determinations.

The IECC mixes the definition of "historic building" with the charging language for historic buildings. Not only does this further make the charging language difficult to understand, it makes the language inconsistent with the way the I-Codes deal with definitions. Generally, the I-Codes keep definitions out of the code language and gather all definitions together into a definitions section.

Finally, the language does not align with how buildings and districts are officially designated by the governing authorities as eligible for listing as historic.

This proposal solves these three problems. First, it moves the definition of an historic building to the definitions sections in the IECC and edits the charging language of C101.4.2 to simply refer to that definition. It remedies the confusion caused by the sheer complexity of the defining language by converting the running list of qualifications into a clearly delineated numbered list. Finally, the proposal gives the language clarity and specificity as to how a building is officially determined to be eligible for the various lists of historic buildings. In accordance with the Code of Federal Regulations, Title 36, Chapter I, Part 63, determinations of eligibility for listing in the National Register of Historic Places are made by State Historic Preservation Offices in coordination with the Keeper of the National Register of Historic Places. This is an official process conducted in accordance with federal standards. This proposal aligns the code language with the language of this official process and removes any ambiguity as to who can make determinations of eligibility.

The charging language in the IECC also creates a rather large loophole. Historic buildings as defined by Section C101.4.1 are exempted completely from the code in its entirety. This means that no work being done on an historic building has to comply with the IECC at all - not alterations, not changes of use, not even additions. The definition of "historic building" is rather broad. It includes buildings that are certified as contributing to a local, state or national historic district. These are buildings that generally do not have enough historical significance/character to merit designation on their own, but do have enough to help define the overall significance/character of a district. Yet they are completely exempted from the energy code.

Buildings with historic significance may have social and aesthetic values, and the energy code should not be written in a way that will degrade these values. But rather than wholly exempting historic buildings like the current language in the IECC does, other I-Codes, especially the IBC and IFC, have balanced the protection of historic buildings with the intended goals of the codes. The IECC should follow this example and balance the competing values of historic preservation and energy conservation, rather than granting a wholesale exemption to historic buildings.

This proposal narrows the historic building loophole by eliminating the most egregious part, the exemption for additions to historic buildings. Additions to historic buildings are new construction, and in this case there is no historic character or historic fabric to protect. This change will make additions subject to the provisions of the IECC. However, it ensures that only the addition is subject to the IECC and exempts the historic building itself from any requirements that might be triggered by the addition.

This proposal is one of four proposals in Cycle B to create this consistency for Historic Buildings across the I-codes. The other three proposals are being made to the IECC-Commercial, the IEBC and the IPMC.

Cost Impact: The code change proposal will not increase the cost of construction.

Note: The term 'historic building' currently defined in the IBC, IEBC and IgCC. The definition in the IBC and IgCC is:

> **Historic buildings.** Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

The definition in the IEBC is:

> **Historical Building.** Any building or structure that is listed in the State or National Register of Historic Places: designated as a historic property under local or state designation law or survey; certified as a contributing resource within a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Register of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places.

These proponents have submitted proposals to add this definition to the *International Property Maintenance Code* (PM2-13) and to the *International Existing Buildings Code* (EB1-13)

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Modified**

Modify the proposal as follows:

C101.4.2 Historic buildings. The provisions of this code relating to the construction, repair, alteration, restoration and movement of structures, and change of occupancy shall not be mandatory for historic buildings. ~~No provision of this code shall be used to require the alteration of an historic building~~.

Section 202

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed, or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places;
2. Designated as historic under an applicable state or local law; or
3. Certified as a contributing resource within a National Register listed, state designated, or locally designated historic district.

Committee Reason: The revision provides a better format by providing an inclusive definition of historic buildings in Section 202 - definitions and then leaves the regulation of those historic buildings in active provisions of the code. The definition was modified to clarify that a historic district could also be created by a state in additional to a National or local designation. The second sentence of C101.4.2 was deleted because it was retained in CE4-13 and didn't need to be repeated in this section.

Assembly Action: **None**

Public Comments

Public Comment:

Jim Edelson, New Buildings Institute, Lee Kranz, Washington Association of Building Officials, David Collins, American Institute of Architects, Ryan Meres, Institute for Market Transformation, request Approval as Modified by this Public Comment.

Further modify the proposal as follows:

C101.4.2 Historic buildings. ~~The~~ No provisions of this code relating to the construction, *repair*, *alteration*, restoration and movement of structures, and *change of occupancy* shall ~~not~~ be mandatory for *historic buildings* provided a report has been submitted to the code official and signed by a *registered design professional*, or a representative of the State Historic Preservation Office or the historic preservation authority having jurisdiction, demonstrating that compliance with that provision would threaten, degrade or destroy the historic form, fabric or function of the *building*.

Commenter's Reason: Two different committees heard the residential and commercial portions of the IECC. The two committees took different action on R and C Section 101.4.2, the charging language for historic buildings. The Residential committee approved CE8(II)-13 and the Commercial committee approved CE7(I)-13. These disparate actions leave the IECC with inconsistent approaches to Historic Buildings.

CE7(I&II) restructured the historic building definition and requirement for clarity, but did little to narrow the historic building exemption. CE8(I&II) restructured for clarity, but also narrowed the exemption through only exempting historic buildings from provisions that would "compromise the historic nature and function of the building." Both committees liked the idea of narrowing the Historic Buildings exemption. The Residential committee preferred CE8 as a reasonable way to limit the missed opportunity for energy savings the historic buildings exemption creates. However, the Commercial committee heard much more testimony and came to a different conclusion. By default, CE8 leaves the determination of impact on the historic building up to the building official, even though the building department is not the agency authorized by most preservation legislation to designate historic buildings or make determinations about impact on historic buildings. The committee heard testimony from preservationists about the problems of making the building department responsible for this determination, and even discussed among themselves about the difficulties for building officials. Though the Commercial committee liked the idea of reasonably narrowing the exemption, they preferred CE7 because of the implications of enforcement of CE8.

The proponents of CE7 and CE8 have come together to submit joint comments to reconcile the two approaches, bring consistency to the residential and commercial sections of the IECC, and address the concerns of the Commercial Committee. Unlike CE7 this approach narrows the exemption for historic buildings in the IECC; however, it does not require the building official to make a determination of impact as in CE8. It hinges exemption on the submission of a report detailing how the provision would damage the historic significance of the building. The report mechanism is already a part of the I-Codes; it is utilized in the IEBC (Section 1101.2 Report) to deal with historic buildings unable to comply with accessibility provisions without harming the integrity of the historic building. A report is only required for **non-compliance** with code provisions; any work in compliance with IECC provisions would not require a report. The comment provides three options for a report signatory, the architect, the State Historic Preservation Office (SHPO) or the local preservation authority, providing both flexibility and reliability for the reporting requirement. The building official simply has to receive the report, but the creation of the report requires the project to substantiate the need for exemption from a given provision of the IECC.

This comment is being submitted to CE7(I), which prevailed in the Commercial section. Another corresponding comment is being submitted to CE8(II), which prevailed in the Residential section.

Final Hearing Results

CE7-13, Part I AMPC

Code Change No: CE8-13, Part II

Original Proposal

Section(s): C101.4.2, C202 (NEW), R101.4.2, R202 (NEW) (IRC N1101.9 (NEW))

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD) (lkranz@bellevuewa.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.2 Historic buildings. ~~Any building or structure that is listed in the State or National Register of Historic Places; designated as a historic property under local or state designation law or survey; certified as a contributing resource with a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the National or State Registers of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, are exempt from this code.~~ Alterations and repairs to *historic buildings* shall comply with this code to the extent that such compliance does not compromise the historic nature and function of the building.

Add new definition as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

HISTORIC BUILDING. Any building or structure that is:

1. Listed in the State or National Register of Historic Places
2. Designated as a historic property under local or state designation law or survey
3. Certified as a contributing resource within a National or State Register listed or locally designated historic district, or
4. Determined or certified by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places to be eligible to be listed in the State or National Register of Historic Places either individually or as a contributing resource in an historic district.

Reason: The existing requirement exempts historic buildings from all energy efficiency requirements, even those that do not impact the historic value of the building at all, such as lighting controls, attic insulation, or mechanical equipment efficiency. This modification requires energy efficiency measures only where they will leave the historic value of the building undisturbed.

Cost Impact: The code change proposal will increase the cost of construction.

Note: The term 'historic building' currently defined in the IBC, IEBC and IgCC. The definition in the IBC and IgCC is:

> **Historic buildings.** Buildings that are listed in or eligible for listing in the National Register of Historic Places, or designated as historic under an appropriate state or local law.

The definition in the IEBC is:

> **Historical Building.** Any building or structure that is listed in the State or National Register of Historic Places: designated as a historic property under local or state designation law or survey; certified as a contributing resource within a National Register listed or locally designated historic district; or with an opinion or certification that the property is eligible to be listed on the

National or State Register of Historic Places either individually or as a contributing building to a historic district by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places.

In addition to this proposal, definitions of historic building are proposed in CE7-13, CE9-13 being heard by this committee, PM2-13 being heard by the Property Maintenance Committee and EB1-13 being heard by the Existing Buildings Committee..

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This change will allow some increases in energy efficiency in historic buildings when the installation does not affect the historic nature of the building.

Assembly Action: **None**

Public Comments

Public Comment 1:

Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee, Jim Edelson, New Buildings Institute, David Collins, American Institute of Architects, Ryan Meres, Institute for Market Transformation, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R101.4.2 Historic buildings. ~~Alterations and repairs to *historic buildings* shall comply with this code to the extent that such compliance does not compromise the historic nature and function of the building.~~ No provision of this code relating to the construction, *repair*, *alteration*, restoration and movement of structures, and *change of occupancy* shall be mandatory for *historic buildings* provided a report has been submitted to the code official and signed by the owner, a *registered design professional*, or a representative of the State Historic Preservation Office or the historic preservation authority having jurisdiction, demonstrating that compliance with that provision would threaten, degrade or destroy the historic form, fabric or function of the *building*.

Commenter's Reason: Two different committees heard the residential and commercial portions of the IECC. The two committees took different action on R and C Section 101.4.2, the charging language for historic buildings. The Residential committee approved CE8(II)-13 and the Commercial committee approved CE7(I)-13. These disparate actions leave the IECC with inconsistent approaches to Historic Buildings.

CE7(I&II) restructured the historic building definition and requirement for clarity, but did little to narrow the historic building exemption. CE8(I&II) restructured for clarity, but also narrowed the exemption through only exempting historic buildings from provisions that would "compromise the historic nature and function of the building." Both committees liked the idea of narrowing the Historic Buildings exemption. The Residential committee preferred CE8 as a reasonable way to limit the missed opportunity for energy savings the historic buildings exemption creates. However, the Commercial committee heard much more testimony and came to a different conclusion. By default, CE8 leaves the determination of impact on the historic building up to the building official, even though the building department is not the agency authorized by most preservation legislation to designate historic buildings or make determinations about impact on historic buildings. The committee heard testimony from preservationists about the problems of making the building department responsible for this determination. Though the Commercial committee liked the idea of reasonably narrowing the exemption, they preferred CE7 because of the implications of enforcement of CE8.

The proponents of CE7 and CE8 have come together to submit joint comments to reconcile the two approaches, bring consistency to the residential and commercial sections of the IECC, and address the concerns of the Commercial Committee. Unlike CE7 this approach narrows the exemption for historic buildings in the IECC; however, it does not require the building official to make a determination of impact as in CE8. It hinges exemption on the submission of a report detailing how the provision would damage the historic significance of the building. A report is only required for **non-compliance** with code provisions; any work in compliance with IECC provisions would not require a report. The comment provides four options for a report signatory, the architect, the State Historic Preservation Office (SHPO), the local preservation authority or the building owner. The building official simply has to receive the report, but the creation of the report requires the report signatory to substantiate the need for exemption from a given provision of the IECC.

The only difference between the residential and commercial proposals is that the owner can sign the report in the residential section. This reflects the reality that, unlike in commercial projects, a large portion of residential projects do not have an architect involved. Although it is good to have the SHPO or the local preservation commission available as options for signing the report, it could be problematic to make the large portion of residential projects without architects dependent on those organizations' capacity or willingness to participate in the codes process.

This comment is being submitted to CE8(II), which prevailed in the Residential section. Another corresponding comment is being submitted to CE7(I), which prevailed in the Commercial section.

Final Hearing Results

CE8-13, Part II **AMPC1**

Code Change No: CE11-13, Part I

Original Proposal

Section(s): C101.4.3, R101.4.3, (IRC N1101.3)

Proponent: Vickie Lovell, InterCode Incorporated, representing The International Window Film Association (vickie@intercodeinc.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building in not increased.

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing single pane fenestration assemblies with surface applied window film to reduce solar heat gain.
~~3.~~ 4. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
~~4.~~ 5.Construction where the existing roof, wall or floor cavity is not exposed.
~~5.~~ 6. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
~~6.~~ 7. Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a conditioned space from the exterior shall not be removed,
~~7.~~ 8. Alterations that replace less than 50 percent of the luminares in a space, provided that such alterations do not increase the installed interior lighting power.
~~8.~~ 9. Alterations that replace only the bulb and ballast within the existing luminares in a space provided that the alteration does not increase the installed interior lighting power.

Reason: The IECC Section C401.2.1 requires compliance with Sections C402, C403, and C405 for existing buildings that are undergoing alternations and repairs. However, this section of the code (C C101.4.3) clarifies that certain features of the existing building are exempt from the requirements of the IECC.

Surface applied window film to existing fenestration has been added to the list because it can enhance the performance of existing single pane fenestration products for protection from injuries and property damage due to broken glass, reduces ultraviolet transmittance and glare, and improves performance when impacted. The foremost benefit of applied window film to existing windows is reduced solar heat gain and reduced energy use.

Without this addition to the list of exceptions, the code could be interpreted to unnecessarily require replacements of all existing windows to be with new materials and systems as for new construction.

This provision does not change the requirement for new windows when it is cost effective or otherwise desirable for older windows to be totally replaced. However, on some projects for additions, alternations, renovations or repairs simply and inexpensively improving the performance of the existing windows that are still fully functional can contribute to improved and more efficient total building energy use. Not recognizing this alternative to total window replacement in the code can also be a disincentive to make other needed improvements due to the cost of total replacement.

Buildings account for 16 percent of the world's energy consumption, and nearly 40 percent of this total is consumed by the United States. While roughly two percent of commercial floorspace is newly constructed each year, and a comparable amount renovated, the majority of opportunities to improve efficiency over the next several decades will be in existing building stock. Improving the energy efficiency of existing buildings through retrofitting and other measures will create a high-volume, low-cost approach to reducing energy use and greenhouse gas emissions.

Building owners must decide where to rank efficiency projects within a list of competing priorities—social, financial and environmental. Improving energy efficiency through retrofitting existing buildings certainly benefits the environment; however, it also benefits building owners from a cost standpoint. Allowing building owners to have the option to use window film on existing fenestration in order to improve the energy efficiency will create an incentive for reducing energy consumption and greenhouse emissions.

Cost Impact: The proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial

Committee Action: **Approved as Modified**

Modify the proposal as follows:

3. ~~Existing single pane fenestration assemblies with surface applied window film to reduce solar heat gain~~. Surface applied window film installed on existing single pane fenestration assemblies to reduce solar heat gain provided the code does not require the glazing or fenestration to be replaced.

Committee Reason: The modification revises the format of the exception to be similar to other exceptions and further clarifies that its only the application of film to existing fenestration that would be exempt. This alteration of adding film to existing fenestration should improve energy performance of existing assemblies. It should be allowed and not trigger full compliance for the fenestration when it is applied.

Assembly Action: **None**

Final Hearing Results

CE11-13, Part I **AM**

Code Change No: CE11-13, Part II

Original Proposal

Section(s): C101.4.3, R101.4.3, (IRC N1101.3)

Proponent: Vickie Lovell, InterCode Incorporated, representing The International Window Film Association (vickie@intercodeinc.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.3 (N1101.3) Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building in not increased.

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. <u>Existing single pane fenestration assemblies with surface applied window film to reduce solar heat gain.</u>

~~3.~~ <u>4</u>. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.

~~4.~~ <u>5</u>.Construction where the existing roof, wall or floor cavity is not exposed.

~~5.~~ <u>6</u>. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.

~~6.~~ <u>7.</u> Replacement of existing doors that separate conditioned space from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a conditioned space from the exterior shall not be removed,

~~7.~~ <u>8.</u> Alterations that replace less than 50 percent of the luminares in a space, provided that such alterations do not increase the installed interior lighting power.

~~8.~~ <u>9.</u> Alterations that replace only the bulb and ballast within the existing luminares in a space provided that the alteration does not increase the installed interior lighting power.

Reason: The IECC Section C401.2.1 requires compliance with Sections C402, C403, and C405 for existing buildings that are undergoing alternations and repairs. However, this section of the code (C C101.4.3) clarifies that certain features of the existing building are exempt from the requirements of the IECC.

Surface applied window film to existing fenestration has been added to the list because it can enhance the performance of existing single pane fenestration products for protection from injuries and property damage due to broken glass, reduces ultraviolet transmittance and glare, and improves performance when impacted. The foremost benefit of applied window film to existing windows is reduced solar heat gain and reduced energy use.

Without this addition to the list of exceptions, the code could be interpreted to unnecessarily require replacements of all existing windows to be with new materials and systems as for new construction.

This provision does not change the requirement for new windows when it is cost effective or otherwise desirable for older windows to be totally replaced. However, on some projects for additions, alternations, renovations or repairs simply and inexpensively improving the performance of the existing windows that are still fully functional can contribute to improved and more efficient total building energy use. Not recognizing this alternative to total window replacement in the code can also be a disincentive to make other needed improvements due to the cost of total replacement.

Buildings account for 16 percent of the world's energy consumption, and nearly 40 percent of this total is consumed by the United States. While roughly two percent of commercial floorspace is newly constructed each year, and a comparable amount renovated, the majority of opportunities to improve efficiency over the next several decades will be in existing building stock. Improving the energy efficiency of existing buildings through retrofitting and other measures will create a high-volume, low-cost approach to reducing energy use and greenhouse gas emissions.

Building owners must decide where to rank efficiency projects within a list of competing priorities—social, financial and environmental. Improving energy efficiency through retrofitting existing buildings certainly benefits the environment; however, it also benefits building owners from a cost standpoint. Allowing building owners to have the option to use window film on existing fenestration in order to improve the energy efficiency will create an incentive for reducing energy consumption and greenhouse emissions.

Cost Impact: The proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Approved as Modified

Modify the proposal as follows:

3. Surface applied window film installed on existing single pane fenestration assemblies ~~with surface applied window film~~ to reduce solar heat gain provided the code does not require the glazing or fenestration assembly to be replaced.

Committee Reason: Surface applied window film can enhance solar heat gain reduction. This clarifies that, when it is used, the full compliance with the energy code is not required. The modification was necessary to make it clear that, when the code would require replacement windows, the requirements for new windows apply, and surface applied window film would not suffice in that scenario.

Assembly Action: None

Final Hearing Results

CE11-13, Part II AM

Code Change No: CE15-13 Part I

Original Proposal

Section(s): C101.4.3, C202 (NEW), C402.2.1.1, R101.4.3 (IRC N1101.3), R202 (NEW) (IRC N1101.9 (NEW))

Proponents: Michael. D. Fischer, Kellen Company, representing Center for the Polyurethanes Industry (mfischer@kellencompany.com); Michael D. Fischer, Kellen Company, representing Polyisocyanurate Insulation Manufacturers Association; Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed.~~ Roof recover or roof repair.
6. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
~~6~~7. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,
~~7~~8. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
~~8~~9. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

Add new text as follows:

C402.2.1.1 Roof replacement. For roof replacements, where the existing roof assembly is part of the *building thermal envelope* and contains insulation entirely above deck, roof replacement shall include compliance with the requirements of Table C402.1.2 or Table C402.2.

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

[B] REROOFING. The process of recovering or replacing an existing *roof covering*. See "Roof recover" and "Roof replacement."

[B] ROOF RECOVER. The process of installing an additional *roof covering* over a prepared existing *roof covering* without removing the existing *roof covering*.

[B] ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

[B] ROOF REPLACEMENT. The process of removing the existing *roof covering*, repairing any damaged substrate and installing a new *roof covering*.

Reason: Fischer (Part I) The current requirements that govern envelope performance requirements during reroofing do not utilize definitions contained in the building codes. The use of the term reroofing in and of itself is overly broad and subject to confusion. Roof replacement, which is the specific condition intended for envelope compliance, provides an important opportunity to decrease building energy use in US buildings. This proposal provides needed clarity to ensure that buildings are evaluated for compliance to current energy code requirements when the roof is replaced. The proposal also improves the exception to ensure that roof repair and recover projects are clearly not intended to bear additional expense that could be burdensome.

Reason: Dean, Harris, Misuriello, Prindle, Stone: The purpose of this code change is to clarify code requirements related to roofs on existing buildings by distinguishing between roof repairs, roof recovering, and roof replacement. The proposal creates new definitions for each of these actions (Chapter 2), clarifies that repair and recover are exceptions to the code (section C101.4.3), and clarifies that when certain roof replacements occur (new section C402.2.1.1), that the roof must meet the roof insulation requirements in Table C402.1.2 or C402.2.

While the code generally requires additions, alterations, renovations or repairs to comply with the code, the specific application in many instances may not be entirely clear or consistently interpreted and enforced. Roof replacements are a good example of this issue. This code proposal is intended to resolve any interpretation issues related to roof replacement and ensure that proper insulation is installed when the opportunity is presented. It is important that opportunities to improve the efficiency of existing buildings are seized when presented and the replacement of roofs is one such important opportunity.

Cost Impact: The code change proposal will not increase the cost of construction.

Note: The four proposed definitions are terms defined in the IBC, the term 'roof replacement' is also found in the IgCC. The definitions found in the other codes are the same as proposed here.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The committee felt that the proposal didn't bring sufficient clarity to the exceptions and might allow a large area of a roof to be 'reconstructed' without taking advantage of an opportunity to achieve energy conservation improvements. The committee encouraged the SEHPCAC to try to bring consensus to this issue for the public comments.

Assembly Action: None

Public Comment

Public Comment 1:

Michael D. Fischer, Kellen Company, representing the Center for the Polyurethanes Industry of the American Chemistry Council, requests Approval as Submitted.

Commenter's Reason: During the deliberation on a series of proposals related to the exceptions and clarifications to the scope and applicability of the IECC to existing buildings, the committee was unable to come to agreement regarding what concepts to take forward. In its reasoning statements on these proposals, the IECC-C committee directed the parties to work with the ICC Sustainability, Energy & High Performance Building Code Action Committee (SEHPCAC) on a potential public comment. CPI reviewed the technical issues with the SEHPCAC, and the SEHPCAC decided not to submit a public comment on CE13. Part II of this proposal was approved by the IECC-R committee, which felt the addition of definitions from the building code added clarity to the code. Part I is essentially the same, except that it also includes a clear requirement to address those conditions where roof replacement occurs - as part of the building thermal envelope - and where there is insulation entirely above deck. Because the code as written contains exceptions to exceptions from requirements, the code is not always clearly interpreted. This proposal uses definitions from the building code to clarify the current requirements.

Public Comment 2:

Michael D. Fischer, Kellen Company, representing the Polyisocyanurate Insulation Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: Each year about 2.5 billion square feet of roof coverings are installed on existing buildings. The opportunity to upgrade the insulation levels on these roof systems occurs just once in several decades- or longer when roofs are "recovered". When existing roofs (that are part of the building's thermal envelope) are removed and replaced, and when the roof assembly includes above-deck insulation, the energy code requires that the insulation levels comply with the requirements for new construction. Unfortunately, this requirement is prescribed using vague and confusing language. For example, the requirement does not utilize the terms defined in the IBC, and it does not correlate the requirements and exceptions to the definitions and the prescriptive insulation tables.

The IECC-R Committee recommended Part II of this proposal for approval as submitted. Part I contains the same definitions from the IBC, and provides clear unambiguous direction on how the energy code provisions apply to roof repair, roof recover, and roof replacement. The proposal does not change the requirements and does not increase the insulation levels for existing buildings. What it does provide is clarity.

In a survey of building departments in many states and regions in the US, we found that online roofing permit application forms rarely included any information on the energy code and required insulation levels. With this change, it will be easier for building departments to correlate the building code- and energy code- requirements for roof replacements.

This proposal will not increase the cost of construction; what it will do is make the code easier to interpret and enforce. Along the way, it will help ensure that the opportunity to save energy when replacing roofs is not lost.

Public Comment 3:

Brian Dean, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC; Donald J. Vigneau, Northeast Energy Efficiency Partnerships Inc., request Approval as Submitted.

Commenter's Reason: We recommend approval of CE15 Part I as submitted. Roofing replacement represents an important opportunity to increase the energy efficiency of our existing building stock. Because most roofs are designed to last for decades, it is important that the opportunity is not missed because the code requirements are vague. The IECC residential committee recommended Part II of CE15 for approval because it added clarity to the code; we believe that Part I should be approved for the same reason.

CE15 has a narrow scope, focusing only on the need to address insulation levels when the roof is part of the thermal envelope and the insulation is entirely above deck. When the roof is replaced as described in the definition of roof replacement and in related building code provisions, this proposal will improve the clarity of the code without increasing the current requirements.

Final Hearing Results

CE15-13 Part I **AS**

Code Change No: CE15-13 Part II

Original Proposal

Section(s): C101.4.3, C202 (NEW), C402.2.1.1, R101.4.3 (IRC N1101.3), R202 (NEW) (IRC N1101.9 (NEW))

Proponents: Michael. D. Fischer, Kellen Company, representing Center for the Polyurethanes Industry (mfischer@kellencompany.com); Michael D. Fischer, Kellen Company, representing Polyisocyanurate Insulation Manufacturers Association; Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R101.4.3 (N1101.3) Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed.~~ Roof recover or roof repair.
6. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
~~6~~7. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,
~~7~~8. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
~~8~~9. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

Add new definitions as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

[B] REROOFING. The process of recovering or replacing an existing *roof covering*. See “Roof recover” and “Roof replacement.”

[B] ROOF RECOVER. The process of installing an additional *roof covering* over a prepared existing *roof covering* without removing the existing *roof covering*.

[B] ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

[B] ROOF REPLACEMENT. The process of removing the existing *roof covering*, repairing any damaged substrate and installing a new *roof covering*.

Reason: Fischer (Part II) The exceptions to applicability of the IECC for reroofing are unclear, and include confusing language. This proposal includes definitions used in the roofing chapter of the IBC in order to better scope the appropriate exceptions to the envelope requirements in the IECC.

The proposed language clarifies that roof replacement triggers the envelope requirements, but only when the roof assembly is part of the thermal envelope and the insulation is entirely above the roof deck. If the insulation is located within an attic cavity, roof replacement itself does not trigger insulation upgrades. The proposal also makes it clear that recover and repairs are not intended to trigger energy upgrades, while ensuring that the opportunity to add roof insulation when the roof is replaced is not missed.

Reason: Dean, Harris, Misuriello, Prindle, Stone: The purpose of this code change is to clarify code requirements related to roofs on existing buildings by distinguishing between roof repairs, roof recovering, and roof replacement. The proposal creates new definitions for each of these actions (Chapter 2), clarifies that repair and recover are exceptions to the code (section C101.4.3), and clarifies that when certain roof replacements occur (new section C402.2.1.1), that the roof must meet the roof insulation requirements in Table C402.1.2 or C402.2.

While the code generally requires additions, alterations, renovations or repairs to comply with the code, the specific application in many instances may not be entirely clear or consistently interpreted and enforced. Roof replacements are a good example of this issue. This code proposal is intended to resolve any interpretation issues related to roof replacement and ensure that proper insulation is installed when the opportunity is presented. It is important that opportunities to improve the efficiency of existing buildings are seized when presented and the replacement of roofs is one such important opportunity.

Cost Impact: The code change proposal will not increase the cost of construction.

Note: The four proposed definitions are terms defined in the IBC, the term ‘roof replacement’ is also found in the IgCC. The definitions found in the other codes are the same as proposed here.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This language improves the clarity of the code regarding roofing repair and replacement.

Assembly Action: **None**

Final Hearing Results

CE15-13 Part II **AS**

Code Change No: CE23-13 Part I

Original Proposal

Section(s): C101.5.2, C402.1, R101.5.2 (IRC N1101.6), R402.1 (IRC N1102.1)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Delete without substitution as follows:

~~**C101.5.2 Low energy buildings.** The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code shall be exempt from the *building thermal envelope* provisions of this code:~~

1. ~~Those with a peak design rate of energy usage less than 3.4 Btu/h ft^2 (10.7 W/m^2) or 1.0 watt/ft^2 (10.7 W/m^2) of floor area for space conditioning purposes.~~
2. ~~Those that do not contain *conditioned space*.~~

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1.

Exception: The following low energy buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this section shall be exempt from the *building thermal envelope* provisions of Section C402.

1. Those with a peak design rate of energy usage less than 3.4 Btu/h ft^2 (10.7 W/m^2) or 1.0 watt/ft^2 (10.7 W/m^2) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The proposal moves an existing exception found in each Administration chapter to the building thermal envelop provisions in C402 and R402. Chapter 1 should not be the location of specific code requirements nor exceptions to such requirements. Chapter 1 will be the location where exceptions to the scope of the code are provided. However such is not the case with these exceptions. These exceptions are for only the envelope and these buildings still need to comply with the requirements for lighting and HVAC systems.

Locating the exceptions at the beginning of the building envelope provisions places the exception immediately with the relevant requirements. This location does reduce the potential for people to interpret that low energy buildings are exempt from the code.

The proposed text is reworded slightly to reflect its location as an exception with Section 402. The change is editorial.

Cost Impact: This code change proposal will not increase the cost of construction. This is editorial in nature.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: The proposal removes a regulatory provision from the administration chapter and places it properly in the section regulating building envelope. The provision is an exception to compliance to the envelope standards for fully conditioned buildings.

Assembly Action: **None**

Final Hearing Results

CE23-13 Part I **AS**

Code Change No: CE23-13 Part II

Original Proposal

Section(s): C101.5.2, C402.1, R101.5.2 (IRC N1101.6), R402.1 (IRC N1102.1)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

~~**R101.5.2 (N1101.6) Low energy buildings.** The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code shall be exempt from the *building thermal envelope* provisions of this code:~~

1. ~~Those with a peak design rate of energy usage less than 3.4 Btu/h ft^2 (10.7 W/m^2) or 1.0 watt/ft^2 (10.7 W/m^2) of floor area for space conditioning purposes.~~
2. ~~Those that do not contain *conditioned space*.~~

Revise as follows:

R402.1 (N1102.1) General (Prescriptive). The building thermal envelope shall meet the requirements of Sections R402.1.1 through R402.1.4.

> **Exception:** The following low energy buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this section shall be exempt from the *building thermal envelope* provisions of Section R402.
>
> 1. Those with a peak design rate of energy usage less than 3.4 Btu/h ft^2 (10.7 W/m^2) or 1.0 watt/ft^2 (10.7 W/m^2) of floor area for space conditioning purposes.
> 2. Those that do not contain *conditioned space*.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The proposal moves an existing exception found in each Administration chapter to the building thermal envelop provisions in C402 and R402. Chapter 1 should not be the location of specific code requirements nor exceptions to such requirements. Chapter 1 will be the location where exceptions to the scope of the code are provided. However such is not the case with these exceptions. These exceptions are for only the envelope and these buildings still need to comply with the requirements for lighting and HVAC systems.

Locating the exceptions at the beginning of the building envelope provisions places the exception immediately with the relevant requirements. This location does reduce the potential for people to interpret that low energy buildings are exempt from the code.

The proposed text is reworded slightly to reflect its location as an exception with Section 402. The change is editorial.

Cost Impact: This code change proposal will not increase the cost of construction. This is editorial in nature.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: Moving this language from Chapter 1 to Chapter 4 is appropriate, and makes the code organization more logical, and the code easier to understand.

Assembly Action: **None**

Final Hearing Results

CE23-13 Part II **AS**

Code Change No: CE24-13

Original Proposal

Section(s): C101.5.2, C202 (NEW)

Proponent: Vickie Lovell, InterCode Inc., representing National Greenhouse Manufacturers Association (vickie@intercodeinc.com)

Revise as follows:

C101.5.2 Low energy buildings. The following buildings, or portions thereof, separated from the remainder of the building by *building thermal envelope* assemblies complying with this code shall be exempt from the *building thermal envelope* provisions of this code:

1. Those with a peak design rate of energy usage less than 3.4 Btu/h · ft^2 (10.7 W/m^2) or 1.0 watt/ft^2 (10.7 W/m^2) of floor area for space conditioning purposes.
2. Those that do not contain *conditioned space*.
3. <u>Greenhouses.</u>

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

<u>**GREENHOUSE.** A structure or a separate area of a building that maintains a specialized environment essential for the cultivation, protection or maintenance of plants.</u>

Reason: (for 101.5.2) Energy codes and standards have historically applied to buildings intended primarily for human occupancy and use. There are structures, buildings and space uses where strict application of the code poses increasing challenges. All types of agricultural buildings including barns, livestock shelters, sheds, and stables are unique structures in design, construction and operation and different from other commercial buildings in terms of internal loads, schedules, and building usage. Included in those types of structures are greenhouses and separated portions of buildings whose primary function is the cultivation, protection or maintenance of plants.

This proposal exempts greenhouses or separated portions of buildings whose primary function is the cultivation, protection or maintenance of plants from the building thermal envelope of the International Energy Conservation Code. This code change is intended to provide clarity to what the code already says about greenhouses, and what parts of the energy code should be required for compliance.

Strict application of the building envelope provisions of the code in greenhouses is cost prohibitive. Compliance with the building thermal envelope for greenhouses may actually be counterproductive, even detrimental to plant growth, since most plants require controlling the available natural light and highly specialized temperature-controlled conditions. Arbitrarily changing growing conditions can result in reduced output for greenhouse growers, and will have serious negative consequences to the US agricultural/horticultural/floricultural economy. Therefore, this topic merits thoughtful consideration of the implications and ramifications of requiring greenhouses to comply with the entirety of the IECC.

Although the current title of section C101.5.2 is somewhat narrow in scope, it provides for some exemptions to the building thermal envelope provisions in the code. The current provisions in Section C101.5.2 would exempt such buildings from the thermal envelope provisions in the code if they did not contain conditioned space (room or space within the building that is being heated or cooled) or the peak design rate of energy use was less that 1 watt per square foot for space conditioning purposes. However, some greenhouses do contain conditioned space that exceeds the stated peak connected load. In reality, the whole point of a greenhouse is to control a unique environment for the cultivation, protection or maintenance of plants, and <u>such environment is not intended to maintain suitable conditions specifically for human occupancy</u>. Currently such buildings are not exempt from the building thermal envelope provisions of the code. But greenhouses should be exempt.

Other requirements of the IECC and the IBC would still apply to Group U greenhouses. All other building code requirements would still apply for structural, fire, egress, accessibility for such cases where a greenhouse is also used as a retail business, such as garden centers and retail stores that sell plants to the public. This exemption is NOT intended to apply to retail businesses who may display plants and flowers in regular buildings that are not intended to be greenhouses and are environmentally controlled as retail spaces. This would not apply to office buildings and atriums where plants are displayed for aesthetical purpose. But it could capture botanical gardens which also maintain a specialized environment. In such businesses, the plants may be able to survive in the ambient temperature without specifically managing their growing conditions and environment. The proposed definition makes it clear that it is a unique climate controlled environment that defines a greenhouse or similar facility.

Some universities maintain greenhouses for research and studies in horticulture and should be exempt. In these cases, the IBC building, fire structural and other such requirements for mercantile, business and education still apply if the greenhouse is permitted as a Group B, E or M use or occupancy. These IBC provisions based on occupancy are primarily for the comfort and/or protection of people, and appropriately should apply. All Group U provisions of the IBC would still apply. Additionally, the IECC requirements for HVAC would still apply.

The proposed language is based on a current exemption used in the energy code of the State of Wisconsin. A NY Department of State Codes Division opinion on this topic considers all buildings used primarily for agricultural purposes as commercial processes and do not need to comply with the energy codes of the state based upon an ASHRAE 90.1 exemption. This included any greenhouse whether built on a commercial or residential building property site since the greenhouse is not designed for occupancy and falls under their view of a "commercial processes".

The initiatives to make this industry more energy efficient and sustainable are in motion. The USDA and other federal agencies and private organizations are making huge strides in helping growers be more energy efficient and sustainable by using soil amendments, reducing runoff from irrigation, using appropriate methods of reducing energy consumption, using improved pest management methods, reducing potable water or other natural surface or subsurface water resources, reducing waste, and promoting organic growing.

The current IECC requirements that reduce energy use for other aspects of greenhouses are appropriate EXCEPT the requirements that impede or inhibit the growth of plants, which is the primary function of a greenhouse.

(Section 202) The word "greenhouse" conjures up diverse images as to what a greenhouse might look like including the numerous ways plants are cultivated, marketed and sold. However, this definition captures the primary purpose of a greenhouse, which is to create unique environmental conditions inside a structure or a separated portion of a building that are ESSENTIAL for the cultivation, protection or maintenance of plants. This proposed definition is intended to exclude a retail business owner that brings plants indoors temporarily for display or seasonal promotions.

That environment includes control of the available natural or artificial light, managing the temperature and humidity, dispersing and managing water and controlling the growing medium regardless of the outside climate conditions. If that specific environment is not maintained, the plants cannot survive.

Previous code discussions regarding greenhouses have often bogged down because the focus gets shifted to whom or how the plants are being marketed and sold, public access or not, and other conditions. However, that information is irrelevant to this definition. The proposed definition makes it clear that **the primary descriptive feature of a greenhouse is the unique environment that must be maintained in order for the plants inside the greenhouse to survive.**

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

GREENHOUSE. A structure or separate area of a building that maintains a specialized sunlit environment specific to ~~essential for~~ cultivation, protection or maintenance of plants.

(Portions of proposal not shown remain unchanged)

Committee Reason: The committee concluded that greenhouses as defined should be exempt from envelope provisions. Environments needed for plants would be difficult to achieve if full compliance with envelope provisions was mandated. The committee expressed concern that the separation from parts of a building which are conditioned for human use provide thermal isolation, but did not include such modification.

Assembly Action: None

Public Comments

Public Comment 1:

Vickie Lovell, Intercode, Inc. representing National Greenhouse Manufacturers Association, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

GREENHOUSE. A structure or ~~separate~~, thermally isolated area of a building that maintains a specialized sunlit environment specific to and essential for cultivation, protection or maintenance of plants.

Commenter's Reason: The purpose of the greenhouse is to create a unique environment that is essential for the plants to thrive.

Although this proposal was overwhelmingly recommended for approval, some interested parties expressed concern that conditioned portions of buildings used primarily for human occupancy such as sunrooms, atria, lobbies, glass enclosed walkways, and other areas that sometimes feature could be considered to be “greenhouses” by designers trying to take advantage of exceptions to the code provided to commercial growers.

This modification provides additional clarification to the definition that helps the code official identify the intention of the building designer when compared to other buildings that may feature plants for aesthetic purposes. It clarifies that the separated, unique and specialized environment for the intentional cultivation of a particular crop is what defines a greenhouse. Without the specific and essential environment created by the greenhouse, the plants could not thrive.

This modification to the original proposal purposely EXCLUDES those areas or types of buildings such as sunrooms, atria, lobbies, glass enclosed walkways, and similar areas for human occupancy - even if plants are prominently featured.

Public Comment 2:

Eric Makela, Britt/Makela Group, representing Northwest Energy Codes Group, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

GREENHOUSE. A structure or a separate area of a building that maintains a specialized sunlit environment ~~specific to~~ <u>exclusively used</u> for the cultivation, protection or maintenance of plants.

Commenter’s Reason: The current language in CE 24 would allow a greenhouse to be used for both retail and as an area for the cultivation, protection or maintenance or plants as there is no language that would prevent these spaces from serving dual purposes. There is no limit on the quantity of space conditioning in the structure only that what is sufficient to protect the plants. The exemption for commercial greenhouses is needed, as energy codes were not intended to address are glass buildings with this type of specific purpose, but the definition must be clear that the greenhouse should only be used for cultivation, production or maintenance of plants and not for other purposes e.g. retail spaces where the space could be conditioned for human occupancy. The addition of the words “exclusively used” will allow jurisdictions to accurately interpret this exemption.

Final Hearing Results

CE24-13	**AMPC1, 2**

Code Change No: CE27-13

Original Proposal

Section(s): C101.5.3 (NEW)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com)

Add new text as follows:

C101.5.3 Equipment buildings. Buildings that comply with all of the following shall be exempt from the *building thermal envelope* provisions of this code:

1. Are separate buildings with floor area no more than 500 square feet (50 m^2).
2. Are intended to house electronic equipment with installed equipment power totaling at least 7 watts per square foot and not intended for human occupancy.
3. Have heating system capacity is no greater than 5 kW (17,000 Btu/hr) and heating thermostat setpoint is restricted to no more than 50°F (10°C).
4. Have an average wall and roof U-factor less than 0.120 in climate zones 1-5 and less than 0.200 in climate zones 6 through 8.
5. Comply with the roof solar reflectance and thermal emittance provisions for Climate Zone 1.

Reason: The application of energy codes and standards to buildings not intended primarily for human occupancy and use continue to pose increasing challenges to the strict application of the code. Equipment buildings, shelters, or sheds are installed to protect electronic equipment from the weather and provide primarily cooling conditioning. Heating is installed for emergency backup operation and is typically limited to 40°F or less by a setpoint. Due to the high density of electronic equipment installed, heat is rarely needed and cooling predominates. In this situation, less insulation is actually desirable from an annual energy use standpoint. This exemption is limited to stand alone equipment buildings no more than 500 square feet in area. Simplified insulation requirements that apply to an average of the roof and wall insulation are provided. This type of building is often made with 3" concrete, internal foam insulation, and a plywood interior with similar construction for roof and walls. To reduce insulation requirements, the ASHRAE 90.1 option may be pursued, as the building would qualify as a semi-heated space. The U-factors required for semi-heated spaces and available in standard construction are listed below, along with the U-factors required in the proposal. The proposed requirements can be met by readily available concrete, wood, or steel frame construction.

Target U-Factors for Equipment Shelters	U-factor
Semi-heated U-factors from ASHRAE 90.1-2010	
CZ-1 Semi-heated average wall/roof U-factor	0.251
CZ-5 Semi-heated average wall/roof U-factor	0.097
CZ-8 Semi-heated average wall/roof U-factor	0.087
Wall U-factors based on Appendix A, ASHRAE 90.1-2010	
Industry Standard: 3" Concrete with R-10	0.114
Metal studs, R-13, no continuous insulation	0.113
Wood studs, R-11, no continuous insulation	0.096
3" Concrete with R-5 insulation	0.195
Metal studs, R-6 insulation, no continuous insulation	0.184
Proposed Equipment Shelter Average Wall & Roof U-factor	
Climate Zone 1-5; Average U-factor shall be less than	**0.200**
Climate Zone 6-8; Average U-factor shall be less than	**0.120**

The basis of the exemption is that there is significant equipment installed that needs cooling most of the year. In this situation, less insulation reduces annual energy cost because it allows for beneficial heat loss. At around 7 watts per square foot of equipment load, the heat loss is offset by the equipment load, with the proposed insulation resulting in very little heating load.
It is important to note that this exemption applies to the building thermal envelope provisions only. Any HVAC, service water heating, and/or lighting systems in such buildings would still be required to meet the provisions of the code. Through this code change it is hoped that additional clarity can be provided for equipment buildings as to when they are or are not required to meet the building thermal envelope provisions of the code.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

4. Have an average wall and roof U-factor less than ~~0.120~~ 0.200 in climate zones 1 through 5 and less than ~~0.200~~ 0.120 in climate zones 6 through 8.

(Portions of proposal not shown remain unchanged)

Committee Reason: Small equipment buildings are usually not intended for more than intermittent occupancy and such need to be provided with specific provisions. This proposal doesn't fully waive the envelope requirements, but provides a limited and qualified exemption. The modification corrected the U-factor numbers which had been reversed in the published proposal.

Assembly Action: **None**

Public Comments

Public Comment:

Brenda Thompson, Manager Building Inspections, Clark County Development Services, representing ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

~~**C101.5.3**~~ **C402.1.2 Equipment buildings.** Buildings that comply with all of the following shall be exempt from the *building thermal envelope* provisions of this code:

1. Are separate buildings with floor area no more than 500 square feet (50 m^2).
2. Are intended to house electronic equipment with installed equipment power totaling at least 7 watts per square foot and not intended for human occupancy.
3. Have heating system capacity is no greater than 5 kW (17,000 Btu/hr) and heating thermostat setpoint is restricted to no more than 50°F (10°C).
4. Have an average wall and roof U-factor less than 0.200 in climate zones 1-5 and less than 0.120 in climate zones 6 through 8.
5. Comply with the roof solar reflectance and thermal emittance provisions for Climate Zone 1.

Commenter's Reason: The intent of the public comment is to simply relocate the proposed text from Chapter 1 to Chapter 4 of the Commercial IECC. CE23-13 was approved by the committee. It moved provisions for low energy building from Chapter 1 to be located within the envelop provisions of Chapter 4. The low energy provisions are an exception to complying with the envelop requirements which are found in Section C402. CE23 establishes low energy buildings as Section C402.1.1. CE27-13 is a similar concept and is also a detailed exception to the envelop standards. It should be relocated to Chapter 4 and be located after the low energy building provisions.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

Final Hearing Results

CE27-13	**AMPC**

Code Change No: CE33-13, Part II

Original Proposal

Section(s): C102, C102.1.1 (NEW), R102, R102.1.1 (NEW)

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

SECTION R102
~~ALTERNATE MATERIALS—METHOD OF CONSTRUCTION, DESIGN OR INSULATING SYSTEMS~~
APPLICABILITY - DUTIES AND POWERS OF THE BUILDING OFFICIAL

R102.1.1 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. Compliance with the specific performance-based provisions of the International Codes in lieu of specific requirements of this code shall also be permitted as an alternate.

Reason: The proposed new Section R102.1.1 is the exact same language used in IRC Section 104.11, IBC Section 104.11, IFC Section 104.9, IMC Section 105.2, IPC Section 105.2, and IFGC Section 105.2 and this code change proposal is needed to correlate and be consistent with the other I-Codes.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: The proposal installs a provision that is consistent with other I-Codes.

Assembly Action: **Disapproved**

Public Comments

Public Comment 1:

Brian Dean, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Bill Prindle, representing the Energy Efficient Codes Coalition; Garrett Stone, Brickfield, Burchette, Ritts & Stone, PC, request Approval as Modified by this Public Comment.

Revise the proposal as follows:

SECTION R102
APPLICABILITY - DUTIES AND POWERS OF THE ~~BUILDING~~ CODE OFFICIAL

~~**R102.1 General.** This code is not intended to prevent the use of any material, method of construction, design or insulating system not specifically prescribed herein, provided that such construction, design or insulating system has been *approved* by the *code official* as meeting the intent of this code.~~

~~**R102.1.1**~~ **R102.1 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. The *code official* shall be permitted to *approve* an ~~An~~ alternative material, design or method of construction ~~shall be approved~~ where the ~~building~~ *code official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. ~~Compliance with the specific performance-based provisions of the International Codes in lieu of specific requirements of this code shall also be permitted as an alternate.~~

Commenter's Reason: We recommend approval of CE33, Part II, as modified by this public comment. The modification is necessary because the original language of the proposed code change is likely to be confusing to users of the IECC and is inconsistent with defined terms in the IECC. In the IECC, "code official" is a defined term, but "building official" is not. Similarly, consistent with current IECC language (see current section R102.1.1) the code official should be "permitted to approve" the alternative material, ensuring that the code official can exercise discretion in this process. Finally, and most importantly, it is unclear what "specific performance based provisions" are being referenced in the last sentence. Unlike other I-codes, the performance approach for the IECC is not contained in another code. It is found in the IECC itself (see section R401.2 and R405). We are concerned that code users may misinterpret the final sentence in the proposed Section R102, since the reference to "performance-based provisions" is not limited to energy performance, as is the IECC's performance approach. As a result, we believe that this language in the context of the energy code is far too broad, ambiguous and unnecessary and we recommend its deletion.

Final Hearing Results

CE33-13, Part II **AMPC1**

Code Change No: CE36-13

Original Proposal

Section(s): C103.2

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

C103.2 Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, as applicable~~,~~:

1. Insulation materials and their *R*-values;
2. Fenestration *U*-factors and SHGCs;
3. Area-weighted *U*-factor and SHGC calculations;
4. Mechanical system design criteria;
5. Mechanical and service water heating system and equipment types, sizes and efficiencies;
6. Economizer description;
7. Equipment and systems controls;
8. Fan motor horsepower (hp) and controls;
9. Duct sealing, duct and pipe insulation and location;
10. Lighting fixture schedule with wattage and control narrative;
11. Location of *daylight zones* on floor plans; and
12. Air sealing details.

Reason: This proposal serves two purposes. First, this will help code enforcement by reformatting this section as a clear list rather than a cluttered paragraph, and also adding a requirement to show the location of daylight zones on floor plans, which will aid enforcement when daylight zones are used in sections C402.3.1-C402.3.3 (window and skylight area and properties), C405.2.2.3 (daylight controls), and C406.3 (efficient lighting path).

Second, this will encourage the architect to consider daylighting geometry earlier in the design process. While this is already good practice amongst leading architects, it is still common that by the time a lighting / daylighting designer is engaged on a project, the envelope geometry and properties have already been locked in, and are difficult and expensive to change. This change will help bring consideration of daylight zones earlier into the process.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Since the concept of daylight zones was recently added to the code, it needs to be added to the example listing of details to be shown on the submitted construction documents. The list format provides clarity to the code user.

Assembly Action: **None**

Final Hearing Results

CE36-13	**AS**

Code Change No: CE37-13, Part I

Original Proposal

Section(s): C103.2.1 (NEW), R103.2.1 (NEW)

Proponent: Robby Schwarz, EnergyLogic, Inc., (robby@nrglogic.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C103.2.1. Thermal envelope definition. The building's thermal envelope shall be defined on the construction documents as the alignment of the air barrier and insulation systems separating conditioned space from unconditioned space. Where it is not possible to define the alignment of the air barrier and thermal barrier systems on the construction documents inspection shall determine success of accomplishing this requirement.

Reason: The single most important energy and performance aspect of the home is the buildings thermal envelope and the alignment of the air barrier and thermal barrier systems. It is crucial that the design professional demonstrate an understanding of location of the thermal envelope and that they make an effort to draw its location so that the construction personnel can successfully implement the construction of the building in accordance with the code and the specifications that have been drawn. The air sealing details help make this possible but understanding where the details will be implemented helps ensure better implementation and enforcement.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Disapproved**

Committee Reason: The proponent requested disapproval in order to address issues raised by the Residential Energy Code Development Committee in its disapproval of the proposal.

Assembly Action: **None**

Public Comments

Public Comment:

Robby Schwarz, EnergyLogic, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C103.2.1. Building thermal envelope depiction. The building's thermal envelope shall be represented on the construction documents.

Commenter's Reason: Representing the building's thermal envelope on the construction documents ensures that the design professional of the building understands how the thermal envelope will separate conditioned space from unconditioned space. This is a crucial step in ensuring not only the energy efficiency of the building but also the safety, durability, and comfort created in the structure.

The simplification of the requirement allows for flexibility in how the building's thermal envelope is depicted but clearly forces the design professional to understand how what they are drawing will ultimately be constructed.

Final Hearing Results

CE37-13, Part I AMPC

Code Change No: CE37-13, Part II

Original Proposal

Section(s): C103.2.1 (NEW), R103.2.1 (NEW)

Proponent: Robby Schwarz, EnergyLogic, Inc., (robby@nrglogic.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R103.2.1. Thermal envelope definition. The building's thermal envelope shall be defined on the construction documents as the alignment of the air barrier and insulation systems separating conditioned space from unconditioned space. Where it is not possible to define the alignment of the air barrier and thermal barrier systems on the construction documents inspection shall determine success of accomplishing this requirement.

Reason: The single most important energy and performance aspect of the home is the buildings thermal envelope and the alignment of the air barrier and thermal barrier systems. It is crucial that the design professional demonstrate an understanding of location of the thermal envelope and that they make an effort to draw its location so that the construction personnel can successfully implement the construction of the building in accordance with the code and the specifications that have been drawn. The air sealing details help make this possible but understanding where the details will be implemented helps ensure better implementation and enforcement.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: This is confusing language that would serve to make application of the code more difficult.

Assembly Action: None

Public Comments

Public Comment:

Robby Schwarz, EnergyLogic, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

R103.2.1. Thermal envelope depiction. The building's thermal envelope shall be represented on the construction documents.

Commenter's Reason: Representing the building's thermal envelope on the construction documents ensures that the design professional of the building understands how the thermal envelope will separate conditioned space from unconditioned space. This is a crucial step in ensuring not only the energy efficiency of the building but also the safety, durability, and comfort created in the structure.

The simplification of the requirement allows for flexibility in how the building's thermal envelope is depicted but clearly forces the design professional to understand how what they are drawing will ultimately be constructed.

Final Hearing Results

CE37-13, Part II AMPC

Code Change No: **CE38-13, Part I**

Original Proposal

Section(s): C103.3, C104.1, C104.2 (NEW), C104.3, C104.3.1 (NEW), C104.3.2 (NEW), C104.3.3 (NEW), C104.3.4 (NEW), C104.3.5 (NEW), C104.3.6 (NEW), C104.5, R103.3, R104.1, R104.2 (NEW), R104.3, R104.3.1 (NEW), R014.3.2 (NEW), R104.3.3 (NEW), R104.3.4 (NEW), R104.3.5 (NEW), R104.3.6 (NEW), R104.5

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances. In causing the documents to be examined to verify compliance with this code, the *code official* shall be permitted to utilize a registered design professional or other *approved* entity not affiliated with the *building* design or construction in conducting the review of the plans and specifications for compliance with the code.

~~**C104.1 General.** Construction or work for which a permit is required shall be subject to inspection by the *code official*.~~

C104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official* or his designated agent, and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. Approved as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

~~**C104.2 Required approvals.** Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*.~~

C104.2 Preliminary Inspection. Before issuing a permit, the *code official* is authorized to examine or cause to be examined the *building site*, and in the case of work to or on an existing building the *building*, for which an application has been filed.

~~**C104.3 Final inspection.** The building shall have a final inspection and not be occupied until *approved*.~~

C104.3 Required inspections. The *code official* or his designated agent, upon notification, shall make the inspections set forth in Sections C104.3.1 through C104.3.6.

C104.3.1 Footing and foundation inspection. Inspections associated with footings and foundations shall be made before backfilling and shall verify compliance with the code as to R-value, location, thickness, depth of burial and protection of insulation as required by the code and *approved* plans and specifications for:

1. Basement or crawl space walls having insulation applied exterior to or integral with the walls
2. Slabs on grade
3. Buried duct systems associated with HVAC systems
4. Piping systems associated with HVAC or service hot water systems
5. Freeze protection/snow melt systems.

C104.3.2 Framing and rough-in inspection. Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding R-values and their correct location and proper installation, fenestration thermal properties (U-factor, SHGC and VT) and proper installation of fenestration, and air leakage controls as required by the code and approved plans and specifications for:

1. Opaque walls and wall assemblies
2. Floors and floor assemblies
3. Roof/ceilings and roof/ceiling assemblies
4. Fenestration
5. Required vestibules

C104.3.3 Plumbing rough-in inspection. Inspections at plumbing rough-in shall verify compliance as required by the code and *approved* plans and specifications for:

1. The R-value, location, thickness, depth of burial and protection of insulation on hot water piping
2. The existence of required temperature controls on potable hot water systems
3. The installation of automatic time switches on circulating hot water systems or heat trace
4. The installation of heat traps on hot water storage tanks associated with non-circulating systems.

C104.3.4 Mechanical rough-in inspection. Inspections at mechanical rough-in shall verify compliance as required by the code and *approved* plans and specifications for:

1. Installed HVAC equipment type, efficiency and size
2. Installation of gravity and motorized dampers where required and leakage rates of the dampers
3. Installation of required demand control ventilation
4. Required insulation type, R-value, thickness and proper installation of insulation for ducts, plenums and piping associated with the HVAC system
5. Sealing and any required leakage testing of ducts and plenums
6. Installation of required economizers and associated controls
7. Installation of required temperature, humidity and zone controls
8. Required sizing of HVAC system fans and motors
9. Required energy recovery capability
10. Existence of a means to balance HVAC systems
11. Installation of required controls for HVAC and hydronic systems
12. Required limitations on hot gas bypass for cooling systems
13. Installation of radiant heating systems where not allowed

C104.3.5 Electrical rough-in inspection. Inspections at electrical rough-in shall verify compliance as required by the code and *approved* plans and specifications for:

1. Proper installation of all required lighting controls
2. Installation of all lighting system components (fixtures and lamps)
3. Installation of individual electric meters for each dwelling unit in multi-family residential buildings.

C104.3.6 Final inspection. The *building* shall have a final inspection and shall not be occupied until *approved*. The final inspection shall include verification of the installation of all required *building* controls and their proper operation as well as documentation verifying the activities associated with required *building commissioning* have been conducted and the findings of non-compliance corrected. *Buildings*, or portions thereof, shall not be considered for a final inspection until the *code official* has received a letter of transmittal from the building owner acknowledging that the building owner has received the Preliminary Commissioning Report as required in Section C408.2.4.

~~**C104.5 Approved inspection agencies.** The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~

C104.5 Approved Inspection agencies. The *code official* is authorized to accept reports of third party inspection agencies not affiliated with the *building* design or construction, provided such agencies are *approved* as to qualifications and reliability relevant to the building components and systems they are inspecting.

Reason: This proposal improves and enhances the details governing inspections of construction and examination of documents associated with compliance verification.

The current provisions of Sections R 103.1 and C103.3 require the code official to examine the construction documents to verify compliance with the code. Those provisions also allow the code official to delegate that authority to another party (e.g., cause to be examined) but are not specific as to the qualifications of that party. Depending on the type and size of a residential or commercial building, the plans and specifications can be very complex and an appropriate level of review challenging for a jurisdiction that may not see many large commercial projects in a given year and/or have a unique or large residential building. Currently there is no specificity in the code about the qualifications of any third party reviewer, so the permittee could argue against the imposition of a registered design professional requirement by the jurisdiction. The proposed language makes it clear that, should the code official decide to delegate their authority to another party, such third party must be approved (a defined term in the code) by the code official; something very important because that party is acting on behalf of the code official.

The current provisions of Sections R104 and C104 covering inspections are not as specific as they could be with respect to energy efficiency. The proposed revisions to Sections R104 and C104, which are consistent with Section 109 of the International Existing Building Code (IEBC), provide the required detail to better ensure compliance with the code and through compliance delivery of the energy efficiency potential associated with the provisions of the code. It is important to point out that the provisions currently in Sections R104 and C104 are not being eliminated but instead enhanced.

- Sections R104.1 and C104.1 in the current code remain the same but have been enhanced to provide the additional detail provided in Section 109.1 of the IEBC, which is equally relevant to the IECC. In addition an allowance for the code official to have a designated agent conduct inspections has been added to recognize the ability for the code official should they so choose have a designated entity act on their behalf in conducting required inspections.
- New Sections R104.2 and C104.2 are added to the code and covers the issue of preliminary approvals. This provision appears for instance in the IEBC (109.2) and appears equally relevant to the IECC Residential and the IECC Commercial provisions.
- Sections R104.3 and C104.3 currently address a final inspection. There are, however, no provisions in the IECC that address the inspections that are necessary during the course of construction to ensure compliance with the IECC. The proposed Sections R104.3 and C104.3 include a provision for a final inspection but, as is the case in other ICC codes such as the IEBC (109), includes a number of other code-relevant inspections detailing by name what is to be assessed for compliance during key stages of construction. Having this direction, and notification to designers, builders and contractors via publication in the code, is intended to foster increased compliance with the IECC. Note also, as covered in the revisions to Sections R104.1 and C104.1, the code official can also have a designated agent conduct these inspections.
- Sections R104.5 and C104.5 as currently worded are circular in nature. They provide the code official certain authorization to accept reports from approved inspection agencies. The definition of the term approved is such that the end result of this criterion is that the code official is authorizing something based on his authority to authorize it. The proposed revisions provide the additional detail needed as to how approval of such third parties is to be addressed and the general criteria upon which they would be evaluated for acceptability.

Cost Impact: The code change proposal does not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The lists introduce confusion. Not all of the items listed are available for inspection at rough-in. The provision is overall too specific and doesn't allow the jurisdiction to determine its program based on available staffing.

Assembly Action: None

Public Comments

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent ~~laws~~ or ordinances. ~~In causing the documents to be examined to verify compliance with this code~~, The *code official* ~~shall be permitted~~ is authorized to utilize a registered design professional or other *approved* entity not affiliated with the *building* design or construction in conducting the review of the plans and specifications for compliance with the code.

C104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official* or his designated agent, and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. ~~Approved as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid.~~ It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

~~**C104.2 Preliminary Inspection.** Before issuing a permit, the *code official* is authorized to examine or cause to be examined the *building site*, and in the case of work to or on an existing building the *building*, for which an application has been filed.~~

C104.~~3~~ 2 Required inspections. The *code official* or his designated agent, upon notification, shall make the inspections set forth in Sections ~~C104.3.1 through C104.3.6~~ C104.2.1 through 104.2.6.

~~**C104.3.1**~~ **C104.2.1 Footing and foundation inspection.** Inspections associated with footings and foundations ~~shall be made before backfilling and~~ shall verify compliance with the code as to R-value, location, thickness, depth of burial and protection of insulation as required by the code and *approved* plans and specifications. ~~for:~~

1. ~~Basement or crawl space walls having insulation applied exterior to or integral with the walls~~
2. ~~Slabs on grade~~
3. ~~Buried duct systems associated with HVAC systems~~
4. ~~Piping systems associated with HVAC or service hot water systems~~
5. ~~Freeze protection/snow melt systems.~~

~~**C104.3.2**~~ **C104.2.2 Framing and rough-in inspection.** Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding R-values and their correct location and proper installation~~,~~; fenestration ~~thermal~~ properties (U-factor, SHGC and VT) and proper installation ~~of fenestration,~~; and air leakage controls as required by the code and approved plans and specifications. ~~for:~~

1. ~~Opaque walls and wall assemblies~~
2. ~~Floors and floor assemblies~~
3. ~~Roof/ceilings and roof/ceiling assemblies~~
4. ~~Fenestration~~
5. ~~Required vestibules~~

~~C104.3.3~~ C104.2.3 Plumbing rough-in inspection. Inspections at plumbing rough-in shall verify compliance as required by the code and *approved* plans and specifications as to types of insulation and corresponding R-values and protection, required controls and required heat traps. ~~for:~~

1. ~~The R-value, location, thickness, depth of burial and protection of insulation on hot water piping~~
2. ~~The existence of required temperature controls on potable hot water systems~~
3. ~~The installation of automatic time switches on circulating hot water systems or heat trace~~
4. ~~The installation of heat traps on hot water storage tanks associated with non-circulating systems.~~

~~C104.3.4~~ C104.2.4 Mechanical rough-in inspection. Inspections at mechanical rough-in shall verify compliance as required by the code and *approved* plans and specifications as to installed HVAC equipment type and size, required controls, system insulation and corresponding R-value, system and damper air leakage and required energy recovery and/or economizers. ~~for:~~

1. ~~Installed HVAC equipment type, efficiency and size~~
2. ~~Installation of gravity and motorized dampers where required and leakage rates of the dampers~~
3. ~~Installation of required demand control ventilation~~
4. ~~Required insulation type, R-value, thickness and proper installation of insulation for ducts, plenums and piping associated with the HVAC system~~
5. ~~Sealing and any required leakage testing of ducts and plenums~~
6. ~~Installation of required economizers and associated controls~~
7. ~~Installation of required temperature, humidity and zone controls~~
8. ~~Required sizing of HVAC system fans and motors~~
9. ~~Required energy recovery capability~~
10. ~~Existence of a means to balance HVAC systems~~
11. ~~Installation of required controls for HVAC and hydronic systems~~
12. ~~Required limitations on hot gas bypass for cooling systems~~
13. ~~Installation of radiant heating systems where not allowed~~

~~C104.3.5~~ C104.2.5 Electrical rough-in inspection. Inspections at electrical rough-in shall verify compliance as required by the code and *approved* plans and specifications as to installed lighting systems, components and controls and installation of an electric meter for each dwelling unit. ~~for:~~

1. ~~Proper installation of all required lighting controls~~
2. ~~Installation of all lighting system components (fixtures and lamps)~~
3. ~~Installation of individual electric meters for each dwelling unit in multi-family residential buildings.~~

~~C104.3.6~~ C104.2.6 Final inspection. The *building* shall have a final inspection and shall not be occupied until *approved*. The final inspection shall include verification of the installation of all required *building* controls and their proper operation as well as documentation verifying the activities associated with required *building commissioning* have been conducted and the findings of non-compliance corrected. *Buildings*, or portions thereof, shall not be considered for a final inspection until the *code official* has received a letter of transmittal from the building owner acknowledging that the building owner has received the Preliminary Commissioning Report as required in Section C408.2.4.

C104.5 Approved Inspection agencies. The *code official* is authorized to accept reports of third party inspection agencies not affiliated with the *building* design or construction, provided such agencies are *approved* as to qualifications and reliability relevant to the building components and systems they are inspecting.

Commenter's Reason: All this proposal and public comment do is make clear to both code officials and code users the types of inspections that should be expected. At the code development hearing there was considerable testimony in support of the code change proposal from city building departments as well as industry. Supporting testimony mentioned the value of and need for the reorganization provided in addition to the value of the detail provided regarding inspections. Points in opposition focused primarily on the depth of detail provided in the inspection criteria proposed.

No adverse comments were provided regarding examining of documents (e.g. allowing the code official to use approved third parties during this activity just as the code currently allows third parties to conduct inspections). The resulting language covering other than the inspection details shown in the public comment will simply better organize what is currently in the code. These changes are important. They will make it easier for code officials to ensure code compliance. More importantly they more clearly advise code users what to expect and what authority the code official has to ensure compliance.

Regarding inspections, points raised at the first hearing indicated that while the list of inspection items was good commentary and guidance, it went beyond the level of detail that belongs in Chapter 1 of the code. It was also noted that the inspections as outlined in the code change proposal were an unfunded mandate. In response, DOE noted that the inspection items listed came directly from the code, and their listing in Chapter 1 did not add any new criteria or change the current code requirements. As originally proposed, their delineation simply placed what is already required by the code in one location focused on inspections during construction. Whether listed in section 1 or not, the current code requires that compliance with the listed items be verified. It is clearer to have these expectations listed in one location, as opposed to trying to find them throughout the code.

DOE has further reviewed the current code, the code change proposal and the comments at the code development hearing. The current code does not provide sufficient detail for the code official or those responsible for compliance –Section C104.3 essentially provides for code officials to call for inspections when needed, with a final inspection completed before occupancy. DOE believes this is insufficient and does not give code officials what is needed for them to most effectively enforce the code. DOE does agree, however, that the original proposal may have been too detailed, and so has suggested a reduction in detail in this public comment.

- The proposed text associated with a preliminary inspection has been deleted – it is agreed that what was proposed could be construed as beyond the current scope of the energy code.
- The required inspections are retained, but the detail associated with each is significantly reduced. DOE agrees the detail originally provided may have been more appropriate for a commentary. DOE also recognizes that, as was stated at the code development hearing, adopting entities need more detail than is currently in the code in this area and often adopt amendments to the code. It seems more logical for the IECC to provide better guidance in the model code.
- The portion of the code change proposal covering a final inspection, however, has not been revised through this public comment, and remains as originally proposed. The current code simply says to provide a final inspection, but gives no detail about what is within the scope of the inspection.

Without this enhancement to the code regarding inspections, there is nothing in the code that the code official can reference when advising those who are required to comply what they need to do and can expect. Without this additional detail, the code official is powerless, at worst, to enforce compliance with the code, and, at best, has to debate the issue of inspections with those required to comply. DOE believes the appropriate level of detail is provided regarding inspections in this public comment.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

CE38-13, Part I AMPC

Code Change No: CE38-13, Part II

Original Proposal

Section(s): C103.3, C104.1, C104.2 (NEW), C104.3, C104.3.1 (NEW), C104.3.2 (NEW), C104.3.3 (NEW), C104.3.4 (NEW), C104.3.5 (NEW), C104.3.6 (NEW), C104.5, R103.3, R104.1, R104.2 (NEW), R104.3, R104.3.1 (NEW), R014.3.2 (NEW), R104.3.3 (NEW), R104.3.4 (NEW), R104.3.5 (NEW), R104.3.6 (NEW), R104.5

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances. <u>In causing the documents to be examined to verify compliance with this code, the *code official* shall be permitted to utilize a registered design professional or other *approved* entity not affiliated with the *building* design or construction in conducting the review of the plans and specifications for compliance with the code.</u>

~~**R104.1 General.** Construction or work for which a permit is required shall be subject to inspection by the *code official*.~~

<u>**R104.1 General.** Construction or work for which a permit is required shall be subject to inspection by the *code official* or his designated agent, and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. Approved as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.</u>

~~**R104.2 Required approvals.** Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *code official*. The *code official*, upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or notify the permit holder or his or her agent wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *code official*.~~

<u>**R104.2 Preliminary Inspection.** Before issuing a permit, the *code official* is authorized to examine or cause to be examined the *building site*, and in the case of work to or on an existing building the *building*, for which an application has been filed.</u>

~~**R104.3 Final inspection.** The building shall have a final inspection and not be occupied until *approved*.~~

R104.3 Required inspections. The *code official* or his designated agent, upon notification, shall make the inspections set forth in Sections R104.3.1 through R104.3.6.

R104.3.1 Footing and foundation inspection. Inspections associated with footings and foundations shall be made before backfilling and shall verify compliance with the code as to R-value, location, thickness, depth of burial and protection of insulation as required by the code and *approved* plans and specifications for:

1. Basement or crawl space walls having insulation applied exterior to or integral with the walls
2. Slabs on grade
3. Buried duct systems associated with HVAC systems
4. Piping systems associated with HVAC or service hot water systems
5. Freeze protection/snow melt systems .

R104.3.2 Framing and rough-in inspection. Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding R-values and their correct location and proper installation, fenestration thermal properties (U-factor and SHGC) and proper installation of fenestration, and air leakage controls as required by the code and approved plans and specifications for:

1. Opaque walls and wall assemblies
2. Floors and floor assemblies
3. Roof/ceilings and roof/ceiling assemblies
4. Fenestration

R104.3.3 Plumbing rough-in inspection. Inspections at plumbing rough-in shall verify compliance as required by the code and *approved* plans and specifications for:

1. The R-value, location, thickness, depth of burial and protection of insulation on hot water piping
2. The installation of automatic or manual switches on circulating hot water systems

R104.3.4 Mechanical rough-in inspection. Inspections at mechanical rough-in shall verify compliance as required by the code and *approved* plans and specifications for:

1. Installed HVAC equipment type, efficiency and size
2. Installation of require programmable thermostats
3. Required heat pump supplementary heat controls
4. Installation of automatic or gravity dampers on outdoor air intakes and exhausts
5. Required insulation type, R-value, thickness and proper installation of insulation for ducts, air handlers and piping associated with the HVAC system
6. Sealing and any required leakage testing of ducts and plenums
7. Required sealing of and manufacturer's designation for air handlers
8. Required whole house ventilation and minimum fan efficacy

   Exception: Systems serving multiple dwelling units shall be inspected in accordance with Section C104.3.4.

R104.3.6 Final inspection. The *building* shall have a final inspection and shall not be occupied until *approved*. The final inspection shall include verification of the installation of all required *building* systesms, equipment and controls and their proper operation and the required number of high-efficacy lamps and fixtures.

~~**R104.5 Approved inspection agencies.** The *code official* is authorized to accept reports of *approved* inspection agencies, provided such agencies satisfy the requirements as to qualifications and reliability.~~

R104.5 Approved Inspection agencies. The *code official* is authorized to accept reports of third party inspection agencies not affiliated with the *building* design or construction, provided such agencies are *approved* as to qualifications and reliability relevant to the building components and systems they are inspecting.

Reason: This proposal improves and enhances the details governing inspections of construction and examination of documents associated with compliance verification.

The current provisions of Sections R 103.1 and C103.3 require the code official to examine the construction documents to verify compliance with the code. Those provisions also allow the code official to delegate that authority to another party (e.g., cause to be examined) but are not specific as to the qualifications of that party. Depending on the type and size of a residential or commercial building, the plans and specifications can be very complex and an appropriate level of review challenging for a jurisdiction that may not see many large commercial projects in a given year and/or have a unique or large residential building. Currently there is no specificity in the code about the qualifications of any third party reviewer, so the permittee could argue against the imposition of a registered design professional requirement by the jurisdiction. The proposed language makes it clear that, should the code official decide to delegate their authority to another party, such third party must be approved (a defined term in the code) by the code official; something very important because that party is acting on behalf of the code official.

The current provisions of Sections R104 and C104 covering inspections are not as specific as they could be with respect to energy efficiency. The proposed revisions to Sections R104 and C104, which are consistent with Section 109 of the International Existing Building Code (IEBC), provide the required detail to better ensure compliance with the code and through compliance delivery of the energy efficiency potential associated with the provisions of the code. It is important to point out that the provisions currently in Sections R104 and C104 are not being eliminated but instead enhanced.

- Sections R104.1 and C104.1 in the current code remain the same but have been enhanced to provide the additional detail provided in Section 109.1 of the IEBC, which is equally relevant to the IECC. In addition an allowance for the code official to have a designated agent conduct inspections has been added to recognize the ability for the code official should they so choose have a designated entity act on their behalf in conducting required inspections.
- New Sections R104.2 and C104.2 are added to the code and covers the issue of preliminary approvals. This provision appears for instance in the IEBC (109.2) and appears equally relevant to the IECC Residential and the IECC Commercial provisions.
- Sections R104.3 and C104.3 currently address a final inspection. There are, however, no provisions in the IECC that address the inspections that are necessary during the course of construction to ensure compliance with the IECC. The proposed Sections R104.3 and C104.3 include a provision for a final inspection but, as is the case in other ICC codes such as the IEBC (109), includes a number of other code-relevant inspections detailing by name what is to be assessed for compliance during key stages of construction. Having this direction, and notification to designers, builders and contractors via publication in the code, is intended to foster increased compliance with the IECC. Note also, as covered in the revisions to Sections R104.1 and C104.1, the code official can also have a designated agent conduct these inspections.
- Sections R104.5 and C104.5 as currently worded are circular in nature. They provide the code official certain authorization to accept reports from approved inspection agencies. The definition of the term approved is such that the end result of this criterion is that the code official is authorizing something based on his authority to authorize it. The proposed revisions provide the additional detail needed as to how approval of such third parties is to be addressed and the general criteria upon which they would be evaluated for acceptability.

Cost Impact: The code change proposal does not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: This amount of detail is not required in the code. This material would be good for a handbook or commentary.

Assembly Action: None

Public Comments

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R103.3 Examination of documents. The *code official* shall examine or cause to be examined the accompanying construction documents and shall ascertain whether the construction indicated and described is in accordance with the requirements of this code and other pertinent laws or ordinances. ~~In causing the documents to be examined to verify compliance with this code, the~~ The *code official* ~~shall be permitted~~ is authorized to utilize a registered design professional or other *approved* entity not affiliated with the *building* design or construction in conducting the review of the plans and specifications for compliance with the code.

R104.1 General. Construction or work for which a permit is required shall be subject to inspection by the *code official* or his designated agent, and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. ~~Approved as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid.~~ It shall be the duty of the permit applicant to cause the work to remain accessible and exposed for inspection purposes. Neither the *code official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material, product, system or building component required to allow inspection to validate compliance with this code.

~~**R104.2 Preliminary Inspection.** Before issuing a permit, the *code official* is authorized to examine or cause to be examined the *building site*, and in the case of work to or on an existing building the *building*, for which an application has been filed.~~

~~**R104.3**~~ **R104.2 Required inspections.** The *code official* or his designated agent, upon notification, shall make the inspections set forth in Sections R104.2.1 through R104.2.5~~R104.3.1 through R104.3.6~~.

~~**R104.3.1**~~ **R104.2.1 Footing and foundation inspection.** Inspections associated with footings and foundations ~~shall be made before backfilling and~~ shall verify compliance with the code as to R-value, location, thickness, depth of burial and protection of insulation as required by the code and *approved* plans and specifications. ~~for:~~

1. ~~Basement or crawl space walls having insulation applied exterior to or integral with the walls~~
2. ~~Slabs on grade~~
3. ~~Buried duct systems associated with HVAC systems~~
4. ~~Piping systems associated with HVAC or service hot water systems~~
5. ~~Freeze protection/snow melt systems .~~

~~**R104.3.2**~~ **R104.2.2 Framing and rough-in inspection.** Inspections at framing and rough-in shall be made before application of interior finish and shall verify compliance with the code as to types of insulation and corresponding R-values and their correct location and proper installation, fenestration ~~thermal~~ properties (U-factor and SHGC) and proper installation ~~of fenestration~~, and air leakage controls as required by the code and approved plans and specifications. ~~for:~~

1. ~~Opaque walls and wall assemblies~~
2. ~~Floors and floor assemblies~~
3. ~~Roof/ceilings and roof/ceiling assemblies~~
4. ~~Fenestration~~

~~**R104.3.3**~~ **R104.2.3 Plumbing rough-in inspection.** Inspections at plumbing rough-in shall verify compliance as required by the code and *approved* plans and specifications as to types of insulation and corresponding R-values and protection, and required controls. ~~for:~~

1. ~~The R-value, location, thickness, depth of burial and protection of insulation on hot water piping~~
2. ~~The installation of automatic or manual switches on circulating hot water systems~~

~~**R104.3.4**~~ **R104.2.4 Mechanical rough-in inspection.** Inspections at mechanical rough-in shall verify compliance as required by the code and *approved* plans and specifications as to installed HVAC equipment type and size, required controls, system insulation and corresponding R-value, system air leakage control, programmable thermostats, dampers, whole-house ventilation, and minimum fan efficiency. ~~for:~~

1. ~~Installed HVAC equipment type, efficiency and size~~
2. ~~Installation of require programmable thermostats~~
3. ~~Required heat pump supplementary heat controls~~
1. ~~Installation of automatic or gravity dampers on outdoor air intakes and exhausts~~
2. ~~Required insulation type, R-value, thickness and proper installation of insulation for ducts, air handlers and piping associated with the HVAC system~~

~~3. Sealing and any required leakage testing of ducts and plenums~~
~~4. Required sealing of and manufacturer's designation for air handlers~~
~~5. Required whole house ventilation and minimum fan efficacy~~

Exception: Systems serving multiple dwelling units shall be inspected in accordance with Section C104.3.4.

~~R104.3.6~~ R104.2.5 Final inspection. The *building* shall have a final inspection and shall not be occupied until *approved*. The final inspection shall include verification of the installation of all required *building* systems, equipment and controls and their proper operation and the required number of high-efficacy lamps and fixtures.

R104.5 Approved Inspection agencies. The *code official* is authorized to accept reports of third party inspection agencies not affiliated with the *building* design or construction, provided such agencies are *approved* as to qualifications and reliability relevant to the building components and systems they are inspecting.

Commenter's Reason: All this proposal and public comment do is make clear to both code officials and code users the types of inspections that should be expected. At the code development hearing there was considerable testimony in support of the code change proposal from city building departments as well as industry. Supporting testimony mentioned the value of and need for the reorganization provided in addition to the value of the detail provided regarding inspections. Points in opposition focused primarily on the depth of detail provided in the inspection criteria proposed.

No adverse comments were provided regarding examining of documents (e.g. allowing the code official to use approved third parties during this activity just as the code currently allows third parties to conduct inspections). The resulting language covering other than the inspection details shown in the public comment will simply better organize what is currently in the code. These changes are important. They will make it easier for code officials to ensure code compliance. More importantly they more clearly advise code users what to expect and what authority the code official has to ensure compliance.

Regarding inspections, points raised at the first hearing indicated that while the list of inspection items was good commentary and guidance, it went beyond the level of detail that belongs in Chapter 1 of the code. It was also noted that the inspections as outlined in the code change proposal were an unfunded mandate. In response, DOE noted that the inspection items listed came directly from the code, and their listing in Chapter 1 did not add any new criteria or change the current code requirements. As originally proposed, their delineation simply placed what is already required by the code in one location focused on inspections during construction. Whether listed in section 1 or not, the current code requires that compliance with the listed items be verified. It is clearer to have these expectations listed in one location, as opposed to trying to find them throughout the code.

DOE has further reviewed the current code, the code change proposal and the comments at the code development hearing. The current code does not provide sufficient detail for the code official or those responsible for compliance –Section C104.3 essentially provides for code officials to call for inspections when needed, with a final inspection completed before occupancy. DOE believes this is insufficient and does not give code officials what is needed for them to most effectively enforce the code. DOE does agree, however, that the original proposal may have been too detailed, and so has suggested a reduction in detail in this public comment.

- The proposed text associated with a preliminary inspection has been deleted – it is agreed that what was proposed could be construed as beyond the current scope of the energy code.
- The required inspections are retained, but the detail associated with each is significantly reduced. DOE agrees the detail originally provided may have been more appropriate for a commentary. DOE also recognizes that, as was stated at the code development hearing, adopting entities need more detail than is currently in the code in this area and often adopt amendments to the code. It seems more logical for the IECC to provide better guidance in the model code.
- The portion of the code change proposal covering a final inspection, however, has not been revised through this public comment, and remains as originally proposed. The current code simply says to provide a final inspection, but gives no detail about what is within the scope of the inspection.

Without this enhancement to the code regarding inspections, there is nothing in the code that the code official can reference when advising those who are required to comply what they need to do and can expect. Without this additional detail, the code official is powerless, at worst, to enforce compliance with the code, and, at best, has to debate the issue of inspections with those required to comply. DOE believes the appropriate level of detail is provided regarding inspections in this public comment.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

CE38-13, Part II AMPC

Code Change No: CE43-13 Part I

Original Proposal

Section(s): C106.2, R106.2

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Delete without substitution as follows:

~~**C106.2 Conflicting requirements.** Where the provisions of this code and the referenced standards conflict, the provisions of this code shall take precedence.~~

Reason: Section C106.2 is redundant of Section C106.1.1.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Disapproved**

Committee Reason: The committee was unsure that the text was redundant and whether it was this text that needed to be removed, or the text in Section C106.1.1.

Assembly Action: **None**

Public Comment

Public Comment:

Deborah F. Taylor, Principal, Deborah F. Taylor Consulting, LLC, representing self; Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, request Approval as Submitted.

Commenter's Reason:

(Taylor): Sections C106.1.1 and C106.2 have the same meaning. Section C106.1.1 elaborates on Sections C106.1, along with an additional paragraph. Therefore standalone Section C106.2 is redundant and should be eliminated from the code. There is no Part II for this public comment as Part II was approved as submitted in the Code Development Hearing.

(Mozingo): At the Dallas hearings there were several Part I and Part II proposals that rendered different results because of the different committees hearing them. While it is understandable that in rare instances it is ok to have results be different for commercial verses residential, many of these items need to have the same requirement for both applications and we feel that this is one of those items.

We agree with the residential committee when they said that this was redundant language. The commercial committee said that they were confused over this issue and wondered if the language in 106.1.1 should be changed instead. Section 106.1.1 mentions conflicts between the energy code and both the provisions of other codes as well as referenced standards. Section 106.1.2 mentions the conflicts with referenced standards again. It seems as though everything is already covered in both of these sections so why do we need yet another section (106.2) to address standards again?

Final Hearing Results

CE43-13 Part I AS

Code Change No: CE43-13 Part II

Original Proposal

Section(s): C106.2, R106.2

Proponent: Deborah Taylor, RA, LEED AP, Deborah F. Taylor Consulting, LLC, representing self (taylor@dftconsultingny.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Delete without substitution as follows:

~~**R106.2 Conflicting requirements.** Where the provisions of this code and the referenced standards conflict, the provisions of this code shall take precedence.~~

Reason: Section C106.2 is redundant of Section C106.1.1.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This removes redundant language from the code.

Assembly Action: **None**

Final Hearing Results

CE43-13 Part II **AS**

Code Change No: CE44-13 Part I

Original Proposal

Section(s): C108.4, R108.4

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C108.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine ~~of not less than {AMOUNT] dollars or more than [AMOUNT} dollars.~~as set by the applicable governing authority.

Reason: Codes are adopted in various ways by varying entities, federal agencies, states, counties, or municipalities. Often one level of government will adopt the code, while the enforcement is at a different level. Some of the adopting entities do not have the means to insert a specific fine amount, in some instances the enforcement may be by several entities that have fine amounts that vary and in some cases the fine amount may unknown to the adopting agency.

This proposal will also eliminate the need to amend the code ordinance when the fine structure is revised.
This change allows the code to be adopted without relying on the amount to be determined at the time of adoption.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: Simplifies adoption of the code. Often it is not code officials, or even the jurisdiction that sets fine amounts.

Assembly Action: **None**

Final Hearing Results

CE44-13 Part I AS

Code Change No: CE44-13, Part II

Original Proposal

Section(s): C108.4, R108.4

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R108.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine ~~of not less than {AMOUNT] dollars or more than [AMOUNT} dollars~~.as set by the applicable governing authority.

Reason: Codes are adopted in various ways by varying entities, federal agencies, states, counties, or municipalities. Often one level of government will adopt the code, while the enforcement is at a different level. Some of the adopting entities do not have the means to insert a specific fine amount, in some instances the enforcement may be by several entities that have fine amounts that vary and in some cases the fine amount may unknown to the adopting agency.

This proposal will also eliminate the need to amend the code ordinance when the fine structure is revised.
This change allows the code to be adopted without relying on the amount to be determined at the time of adoption.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Modified**

Modify the proposal as follows:

R108.4 Failure to comply. Any person who shall continue any work after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be ~~liable~~ subject to a fine as set by the applicable governing authority.

Committee Reason: This inset by the governing authority is often forgotten at the time of adoption. The language proposed accomplishes the intent of the code. The modification is simply to use language appropriate to the context.

Assembly Action: **None**

Final Hearing Results

CE44-13, Part II **AM**

Code Change No: CE49-13, Part I

Original Proposal

Section(s): C202 (New), R202 (New) (IRC N1101.9 (New)), IPC 202 (New)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Greg Towsley, LEED AP BD+C Grundfos representing Grundfos (gtowsley@grundfos.com)

PART I – IECC-COMMERCIAL PROVISIONS

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

<u>**CIRCULATING HOT WATER SYSTEM.** A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment.</u>

Public Hearing Results

Parts I and II of this code changes were heard by the Commercial Energy Conservation Code Development Committee and Part III was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides a good definition for terms used in the code.

Assembly Action: **None**

Public Comments

Public Comment:

Greg Towsley, Grundfos, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to ~~fixtures~~ <u>the fixture supply</u> and back to the water-heating equipment.

Commenter's Reason: The initial proposal was not intended to mean to recirculate to the actual fixture, but to supply the pipe serving the fixture. This modification clarifies the intent and identifies the correct connecting point ("fixture supply") between the circulation line and the actual fixture which is already defined in the IPC.

Final Hearing Results

CE49-13, Part I	**AMPC**

Code Change No: CE49-13, Part II

Original Proposal

Section(s): C202 (New), R202 (New) (IRC N1101.9 (New)), IPC 202 (New)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Greg Towsley, LEED AP BD+C Grundfos representing Grundfos (gtowsley@grundfos.com)

PART II – IPC

Add new definition as follows:

SECTION 202
GENERAL DEFINITIONS

<u>**CIRCULATING HOT WATER SYSTEM.** A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment.</u>

Public Hearing Results

Parts I and II of this code changes were heard by the Commercial Energy Conservation Code Development Committee and Part III was heard by the Residential Energy Conservation Code Development Committee.

PART II – IPC
Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides a good definition for terms used in the code.

Assembly Action: **None**

Public Comments

Public Comment:

Greg Towsley, Grundfos, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to ~~fixtures~~ <u>the *fixture supply*</u> and back to the water-heating equipment.

Commenter's Reason: The initial proposal was not intended to mean to recirculate to the actual fixture, but to supply the pipe serving the fixture. This modification clarifies the intent and identifies the correct connecting point ("fixture supply") between the circulation line and the actual fixture which is already defined in the IPC.

Final Hearing Results

CE49-13, Part II **AMPC**

Code Change No: CE49-13, Part III

Original Proposal

Section(s): C202 (New), R202 (New) (IRC N1101.9 (New)), IPC 202 (New)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Greg Towsley, LEED AP BD+C Grundfos representing Grundfos (gtowsley@grundfos.com)

PART III – IECC-RESIDENTIAL PROVISIONS

Add new definition as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to fixtures and back to the water-heating equipment.

Reason: A definition of a "circulating hot water system" does not exist in the code, yet it is referenced in the IRC and other ICC codes. This definition brings clarity to how a "circulating hot water system" should be designed and operated. In the codes and sections where "circulating hot water system" is used, this definition would also reduce the probability of confusion between hot water systems used for space heating or tempered water. Currently, the only place that the term CIRCULATING HOT WATER SYSTEM shows up in the code is IECC Section C404.6, IPC [E] 607.2.1 and IECC Section R403.4.1 (IRC N1103.4.1). Other proposals by other proponents will most likely be adding language that uses this term so it is important to have the term defined.

As referenced in CHAPTER 50 - SERVICE WATER HEATING of *ASHRAE Handbook-HVAC Applications* (2011, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.), "Some recirculation-loop systems...are equipped with circulating pumps to force water through the piping and back to the water heater, thus keeping water in the piping hot." Adding this definition in the code will be consistent with industry's understanding.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Parts I and II of this code changes were heard by the Commercial Energy Conservation Code Development Committee and Part III was heard by the Residential Energy Conservation Code Development Committee.

PART III – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This is an important definition to have in the code because these types of systems are used in buildings.

Assembly Action: **None**

Public Comments

Public Comment:

Greg Towsley, Grundfos representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

CIRCULATING HOT WATER SYSTEM. A specifically designed water distribution system where one or more pumps are operated in the service hot water piping to circulate heated water from the water-heating equipment to ~~fixtures~~ the *fixture supply* and back to the water-heating equipment.

Commenter's Reason: The initial proposal was not intended to mean to recirculate to the actual fixture, but to supply the pipe serving the fixture. This modification clarifies the intent and identifies the correct connecting point ("fixture supply") between the circulation line and the actual fixture which is already defined in the IRC.

Final Hearing Results

CE49-13, Part III	**AMPC**

Code Change No: CE50-13, Part I

Original Proposal

Section(s): C202 (NEW), R202 (NEW) (IRC N1101.9 (NEW)), IRC 202 (NEW)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE, PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART III WILL BE HEARD BY THE IRC BUILDING CODE DEVELOPMENT COMMITTEE.

PART I – IECC – COMMERICAL PROVISIONS

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

<u>**CLIMATE ZONE.** A geographical region that has been assigned climatic criteria as specified in this code.</u>

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this specific proposal:

There are increasing numbers of proposals in which the term 'climate zone' is used in the proposed code text. This has primarily occurred in the *International Building Code* and the *International Green Construction Code*. In 2012 at least 8 proposals heard in Dallas included the term. The Code Development Committees generally tried to make sure that each approved action included that it was Climate Zones as established in the IECC.

The SEHPCAC submitted public comments to G147-12 and G149-12 to remove individual references in the text of the IBC stating that Climate Zones 'as established in the IECC' and proposed the inclusion in Chapter 2 of the IBC the following definition of Climate Zone.

CLIMATE ZONE. A geographic region that have been assigned climatic criteria as specified in Chapters 3CE and 3RE of the *International Energy Conservation Code.*

The public comments were approved by the membership and the definition is established in the IBC.

The proposed definition for the IECC is a further simplification of the version in the IBC as the extended reference isn't needed. The SEHPCAC reviewed the other codes which are part of Group B. Only the International Residential Code uses the term Climate Zone. This is addressed in Part III of this proposal. The intent of the public comments to the IBC was to simplify the reference each time Climate Zone is used to those zones 'defined' in the IECC. The issue is that 'Climate Zones' are established in the IECC, but there is no definition.

In Cycle C, the SEHPCAC will submit a code change to the IgCC to add a definition of Climate Zone. This will allow all future references to Climate Zone to be simple and not have to say "as established in the International Energy Conservation Code.

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee; Part II was heard by the Residential Energy Conservation Code Development Committee and Part III was heard by the Residential Building Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Modified**

Modify the proposal as follows:

CLIMATE ZONE. A geographical region ~~that has been assigned~~ based on climatic criteria as specified in this code.

Committee Reason: The proposal was modified to clear state the zones are based on climatic criteria. The definition will provide consistency across the codes and clarifies the distinction between 'climate zone' and 'zone'.

Assembly Action: **None**

Final Hearing Results

CE50-13, Part I	**AM**

Code Change No: CE50-13, Part II

Original Proposal

Section(s): C202 (NEW), R202 (NEW) (IRC N1101.9 (NEW)), IRC 202 (NEW)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE, PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART III WILL BE HEARD BY THE IRC BUILDING CODE DEVELOPMENT COMMITTEE.

PART II – IECC – RESIDENTIAL PROVISIONS

Add new definition as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

CLIMATE ZONE. A geographical region that has been assigned climatic criteria as specified in this code.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this specific proposal:

There are increasing numbers of proposals in which the term 'climate zone' is used in the proposed code text. This has primarily occurred in the *International Building Code* and the *International Green Construction Code*. In 2012 at least 8 proposals heard in Dallas included the term. The Code Development Committees generally tried to make sure that each approved action included that it was Climate Zones as established in the IECC.

The SEHPCAC submitted public comments to G147-12 and G149-12 to remove individual references in the text of the IBC stating that Climate Zones 'as established in the IECC' and proposed the inclusion in Chapter 2 of the IBC the following definition of Climate Zone.

CLIMATE ZONE. A geographic region that have been assigned climatic criteria as specified in Chapters 3CE and 3RE of the *International Energy Conservation Code.*

The public comments were approved by the membership and the definition is established in the IBC.

The proposed definition for the IECC is a further simplification of the version in the IBC as the extended reference isn't needed. The SEHPCAC reviewed the other codes which are part of Group B. Only the International Residential Code uses the term Climate Zone. This is addressed in Part III of this proposal. The intent of the public comments to the IBC was to simplify the reference each time Climate Zone is used to those zones 'defined' in the IECC. The issue is that 'Climate Zones' are established in the IECC, but there is no definition.

In Cycle C, the SEHPCAC will submit a code change to the IgCC to add a definition of Climate Zone. This will allow all future references to Climate Zone to be simple and not have to say "as established in the International Energy Conservation Code.

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee; Part II was heard by the Residential Energy Conservation Code Development Committee and Part III was heard by the Residential Building Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Modified**

Modify the proposal as follows:

CLIMATE ZONE. A geographic region ~~that has been assigned~~ <u>based on</u> climatic criteria as specified in this code.

Committee Reason: This definition is needed in the energy code. The modification is to correct inappropriate implication that climatic criteria is chosen for a region.

Assembly Action: **None**

Final Hearing Results

CE50-13, Part II	**AM**

Code Change No: CE50-13, Part III

Original Proposal

Section(s): C202 (NEW), R202 (NEW) (IRC N1101.9 (NEW)), IRC 202 (NEW)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE, PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART III WILL BE HEARD BY THE IRC BUILDING CODE DEVELOPMENT COMMITTEE.

PART III – IRC

Add new definition as follows:

SECTION 202
GENERAL DEFINITIONS

CLIMATE ZONE. A geographical region that has ~~-~~been assigned climatic criteria as specified in this code.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this specific proposal:

There are increasing numbers of proposals in which the term 'climate zone' is used in the proposed code text. This has primarily occurred in the *International Building Code* and the *International Green Construction Code*. In 2012 at least 8 proposals heard in Dallas included the term. The Code Development Committees generally tried to make sure that each approved action included that it was Climate Zones as established in the IECC.

The SEHPCAC submitted public comments to G147-12 and G149-12 to remove individual references in the text of the IBC stating that Climate Zones 'as established in the IECC' and proposed the inclusion in Chapter 2 of the IBC the following definition of Climate Zone.

CLIMATE ZONE. A geographic region that have been assigned climatic criteria as specified in Chapters 3CE and 3RE of the *International Energy Conservation Code.*

The public comments were approved by the membership and the definition is established in the IBC.

The proposed definition for the IECC is a further simplification of the version in the IBC as the extended reference isn't needed. The SEHPCAC reviewed the other codes which are part of Group B. Only the International Residential Code uses the term Climate Zone. This is addressed in Part III of this proposal. The intent of the public comments to the IBC was to simplify the reference each time Climate Zone is used to those zones 'defined' in the IECC. The issue is that 'Climate Zones' are established in the IECC, but there is no definition.

In Cycle C, the SEHPCAC will submit a code change to the IgCC to add a definition of Climate Zone. This will allow all future references to Climate Zone to be simple and not have to say "as established in the International Energy Conservation Code.

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee; Part II was heard by the Residential Energy Conservation Code Development Committee and Part III was heard by the Residential Building Code Development Committee.

PART III – IRC
Committee Action: Approved as Modified

Modify the proposal as follows:

CLIMATE ZONE. A geographic region ~~that has been assigned~~ based on climatic criteria as specified in this code.

Committee Reason: This adds a needed definition and correlates with the IECC committee actions. The modification is to correct inappropriate implication that climatic criteria is chosen for a region.

Assembly Action: None

Final Hearing Results

CE50-13, Part III AM

Code Change No: CE51-13 Part I

Original Proposal

Section(s): C202, R202 (IRC N1101.9)

Proponent: Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, Inc (smozingo@coloradocode.net), Brent Ursenbach, Salt Lake County, representing Utah Chapter ICC and Utah Association of Plumbing and Mechanical Officials Chapter ICC (bursenbach@slco.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC – COMMERICAL PROVISIONS

Delete and substitute as follows:

SECTION C202
GENERAL DEFINITIONS

~~**CONDITIONED SPACE.** An area or room within a building being heated or cooled, containing uninsulated ducts, or with a fixed opening directly into an adjacent *conditioned space*.~~

CONDITIONED SPACE. An area, room or space that is enclosed within the building thermal envelope and that is directly heated or cooled or that is indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate thru openings with conditioned spaces, where they are separated from conditioned spaces by un-insulated walls, floors or ceilings, or where they contain un-insulated ducts, piping or other sources of heating or cooling.

Reason: (Mozingo) Currently the definition for conditioned space differs in each code. The proposed change to the definition would bring the IECC and IRC in line with what was approved in Group A for the 2015 IMC as proposal M2-12. This proposal shows the modifications that were made by the committee and then went on to the consent agenda as there were no public comments received. This proposed change is similar to the definition in ASHRAE 90.1 – 2010.
(Ursenbach) (**Part I)** Confusion exists between the definitions in the IMC, IRC and IECC. The IECC attempts to define how a space may be indirectly conditioned; however, further clarification is needed. The definition for conditioned space as proposed above is the definition approved in the Group A hearings for the IMC under M2-12. This proposed change is similar to the definition in ASHRAE 90.1 – 2010. **(Part II)** Confusion exists between the definitions in the IMC, IRC and IECC. The IECC attempts to define how a space may be indirectly conditioned; however, further clarification is needed. The definition for conditioned space as proposed above is the definition approved for the IMC in the Group A hearings under M2-12. This proposed change is similar to the definition in ASHRAE 90.1 – 2010.

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Disapproved**

Committee Reason: The proposal doesn't clarify, but was felt to add confusion to the definition. There was concern that the text would have unintended consequences. The committee preferred the current, concise text.

Assembly Action: **None**

Public Comment

Public Comment 1:

Brent Ursenbach, Salt Lake County, representing Utah Chapter ICC and Hope Medina, Cherry Hills Village, CO, representing self, requests Approval as Submitted

Commenter's Reason: This proposal has been submitted to clarify the definition of conditioned space, specifically defining *indirect conditioning.* Consider a storage room or closet, located completely within the interior of an office. These spaces are surrounded by conditioned space, resulting in indirect conditioning through the un-insulated walls surround the room. Based on the previous definition in the IMC, code official often required direct conditioning of these spaces with supply air outlets, return air inlets or other conditioning methods. The alternative has been, insulate the storage room, placing it outside the thermal envelope, considering it unconditioned. The added expense is un-necessary, as these spaces are easily and sufficiently *indirectly conditioned.*

This proposal provides consistency with the definition in other I Codes. This proposal was submitted and approved by final action for the 2015 IMC, likewise approved by the committee for 2015 IRC - R202 and approved by assembly action for the 2015 IECC- R202. The opposition at the commercial hearings was based on a definition read by an opponent from ASHRAE 90.1 for *conditioned space*, when the appropriate similar definition in ASHRAE 90.1 is the definition for *indirectly conditioned space.* ASHRAE 90.1 defines.

indirectly conditioned space: an enclosed space within a building that is not a heated space or a cooled space, which is heated or cooled indirectly by being connected to adjacent space(s) provided:

a. the product of the U-factor(s) and surface area(s) of the space adjacent to connected space(s) exceeds the combined sum of the product of the U-factor(s) and surface area(s) of the space adjoining the outdoors, unconditioned spaces, and to or from semiheated spaces (e.g., corridors) or
b. that air from heated or cooled spaces is intentionally transferred (naturally or mechanically) into the space at a rate exceeding 3 ach.

In essence, 'a.' in ASHRAE 90.1 is stating; *if there is little or no insulation in the components/surfaces surrounding this spaces, compared to that in the thermal envelope, indirect conditioning will occur.*

Final Hearing Results

CE51-13 Part I	**AS**

Code Change No: CE51-13 Part I

Original Proposal

Section(s): C202, R202 (IRC N1101.9)

Proponent: Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, Inc (smozingo@coloradocode.net), Brent Ursenbach, Salt Lake County, representing Utah Chapter ICC and Utah Association of Plumbing and Mechanical Officials Chapter ICC (bursenbach@slco.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC RESIDENTIAL PROVISIONS

Delete and substitute as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

~~**CONDITIONED SPACE.** For energy purposes, space within a building that is provided with heating and/or cooling *equipment* or systems capable of maintaining, through design or heat loss/gain, 50°F (10°C) during the heating season and 85°F (29°C) during the cooling season, or communicates directly with a *conditioned space*. For mechanical purposes, an area, room or space being heated or cooled by any *equipment* or *appliance*.~~

<u>**CONDITIONED SPACE**. An area, room or space that is enclosed within the building thermal envelope and that is directly heated or cooled or that is indirectly heated or cooled. Spaces are indirectly heated or cooled where they communicate thru openings with conditioned spaces, where they are separated from conditioned spaces by un-insulated walls, floors or ceilings, or where they contain un-insulated ducts, piping or other sources of heating or cooling.</u>

Reason: (Mozingo) Currently the definition for conditioned space differs in each code. The proposed change to the definition would bring the IECC and IRC in line with what was approved in Group A for the 2015 IMC as proposal M2-12. This proposal shows the modifications that were made by the committee and then went on to the consent agenda as there were no public comments received. This proposed change is similar to the definition in ASHRAE 90.1 – 2010.
(Ursenbach) (**Part I)** Confusion exists between the definitions in the IMC, IRC and IECC. The IECC attempts to define how a space may be indirectly conditioned; however, further clarification is needed. The definition for conditioned space as proposed above is the definition approved in the Group A hearings for the IMC under M2-12. This proposed change is similar to the definition in ASHRAE 90.1 – 2010. **(Part II)** Confusion exists between the definitions in the IMC, IRC and IECC. The IECC attempts to define how a space may be indirectly conditioned; however, further clarification is needed. The definition for conditioned space as proposed above is the definition approved for the IMC in the Group A hearings under M2-12. This proposed change is similar to the definition in ASHRAE 90.1 – 2010.

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Disapproved**

Committee Reason: The present definition of conditioned space is appropriate for the IECC.

Assembly Action: **None**

Final Hearing Results

CE51-13 Part II **AS**

Code Change No: CE52-13 Part I

Original Proposal

Section(s): C202 (NEW), R202 (NEW) (IRC N1101.9 (NEW))

Proponent: Jay Crandell, ARES Consulting, representing American Chemistry Council- Foam Sheathing Committee (jcrandell@aresconsulting.biz Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (Eric@BrittMakela.com), Steve Ferguson, ASHRAE (sferguson@ashrae.org), Theresa A. Weston, PhD., DuPont Building Innovations (theresa.a.weston@usa.dupont.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC – COMMERICAL PROVISIONS

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

<u>**CONTINUOUS INSULATION (ci):** Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope.</u>

Reason: (Crandell) This proposal provides a needed definition for continuous insulation (a term presently used in the IRC and IECC). The proposed definition is from the 2010 edition of ASHRAE 90.1 and provides an effective definition that is inclusive of all types of continuous insulation materials, including spray foam, insulated siding, foam sheathing, and others.
(Makela) The term continuous insulation was introduced to the commercial provisions of the IECC in 2006. Unfortunately, the term has never been defined in the code. Since its introduction into the code, questions have arisen concerning what is and is not considered continuous insulation. For example, if furring strips are installed on a mass wall and insulation is installed between the furring strips over the face of the wall, is this considered continuous insulation or insulation installed in the cavity? This proposal provides a reasonable definition for continuous insulation that doesn't prohibit different types of materials from being used. The definition uses the term "Insulating material" which can be a variety of products including wood. The R-value requirements for walls in Table C402.2 provides the minimum R-values for the insulating material and as long at as the material can be demonstrated to meet the minimum R-value it can be considered an insulating material. The key to maintaining the effectiveness of continuous insulation is to reduce or eliminate thermal bridging, which this definition achieves.
(Ferguson) In table C402.2, the term continuous insulation has been added, though it is undefined. This adds a definition for the term which is identical to the already existing definition in ANSI/ASHRAE/IES Standard 90.1-2010
(Weston) This proposal adds a definition for continuous insulation. Continuous insulation is used within the code, but the definition is missing. The proposed definition is consistent with that in ASHRAE 90.1

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: The code needs to have a definition of this technique. The identical proposal was submitted independently by four proponents. The definition represents a consensus.

Assembly Action: **None**

Final Hearing Results

CE52-13 Part I AS

Code Change No: CE52-13 Part II

Original Proposal

Section(s): C202 (NEW), R202 (NEW) (IRC N1101.9 (NEW))

Proponent: Jay Crandell, ARES Consulting, representing American Chemistry Council- Foam Sheathing Committee (jcrandell@aresconsulting.biz Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (Eric@BrittMakela.com), Steve Ferguson, ASHRAE (sferguson@ashrae.org), Theresa A. Weston, PhD., DuPont Building Innovations (theresa.a.weston@usa.dupont.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC – RESIDENTIAL PROVISIONS

Add new definition as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

<u>**CONTINUOUS INSULATION (ci):** Insulating material that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior or exterior or is integral to any opaque surface of the building envelope.</u>

Reason: **(Crandell)** This proposal provides a needed definition for continuous insulation (a term presently used in the IRC and IECC). The proposed definition is from the 2010 edition of ASHRAE 90.1 and provides an effective definition that is inclusive of all types of continuous insulation materials, including spray foam, insulated siding, foam sheathing, and others.
(Makela) The term continuous insulation was introduced to the commercial provisions of the IECC in 2006. Unfortunately, the term has never been defined in the code. Since its introduction into the code, questions have arisen concerning what is and is not considered continuous insulation. For example, if furring strips are installed on a mass wall and insulation is installed between the furring strips over the face of the wall, is this considered continuous insulation or insulation installed in the cavity? This proposal provides a reasonable definition for continuous insulation that doesn't prohibit different types of materials from being used. The definition uses the term "Insulating material" which can be a variety of products including wood. The R-value requirements for walls in Table C402.2 provides the minimum R-values for the insulating material and as long at as the material can be demonstrated to meet the minimum R-value it can be considered an insulating material. The key to maintaining the effectiveness of continuous insulation is to reduce or eliminate thermal bridging, which this definition achieves.
(Ferguson) In table C402.2, the term continuous insulation has been added, though it is undefined. This adds a definition for the term which is identical to the already existing definition in ANSI/ASHRAE/IES Standard 90.1-2010
(Weston) This proposal adds a definition for continuous insulation. Continuous insulation is used within the code, but the definition is missing. The proposed definition is consistent with that in ASHRAE 90.1

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: The term "continuous insulation" is used extensively in the code and therefore a definition is needed.

Assembly Action: **None**

Final Hearing Results

CE52-13 Part II	**AS**

Code Change No: CE54-13

Original Proposal

Section(s): 202 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

LINER SYSTEM (Ls). A continuous vapor barrier liner membrane is installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the liner membrane between the purlins. For multilayer installations, the last *rated R-value of insulation* is for unfaced insulation draped over purlins and then compressed when the metal roof panels are attached.

FILLED CAVITY (FC). The first *rated R-value of insulation* represents faced or unfaced insulation installed between the purlins. The second *rated R-value of insulation* represents unfaced insulation installed above the first layer, perpendicular to the purlins and compressed when the metal roof panels are attached. A supporting structure retains the bottom of the first layer at the prescribed depth required for the full thickness of insulation.

Reason: Liner systems and filled cavity metal building roof assemblies can be used for compliance with the Opaque assembles in table C402.2. This adds definitions for the terms, which are identical to the already existing definition in ANSI/ASHRAE/IES Standard 90.1-2010

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Because CE90-13 was not approved, both of these definitions are not needed in the code. In addition, the committee found the proposed text needed improvement to reflect actual practice.

Assembly Action: **None**

Public Comments

Public Comment:

Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

LS = *Liner System*~~—A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.~~

(Balance of the table and original proposal remain unchanged)

Commenter's Reason: Regardless of the action on CE90, the term "Liner System" is used in Table C402.2, and should be defined. It is currently defined in footnote a of table C402.2, but defined terms should be in the definition section, not buried in a footnote of a table. CE90-13 includes the term 'filled cavity'. . If CE90-13 is approved, the term filled cavity needs to be defined.

Analysis: The term 'liner system' is already used in the code. The term 'filled cavity' is not currently in the code, but would be added to the code if CE90-13 is approved. If CE54 is approved, but CE90-13 is not approved, the term 'filled cavity' would not be included in the next code.

Final Hearing Results

CE54-13 AMPC

Code Change No: CE55-13

Original Proposal

Section(s): C202 (New)

Proponent: Steve Ferguson, ASHRAE (sferguson@ashrae.org), Amanda Hickman, InterCode Incorporated, representing AMCA International (amanda@intercodeinc.com)

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

POWERED ROOF/WALL VENTILATORS. A fan consisting of a centrifugal or axial impeller with an integral driver in a weather-resistant housing and with a base designed to fit, usually by means of a curb, over a wall or roof opening.

Reason: This is a companion proposal to the Fan Efficiency Grade (FEG) proposal submitted by AMCA International. Adding this definition for powered roof/wall ventilators to the code will help to clarify this term, which occurs in the list of proposed exceptions to the FEG proposal.

The language was taken from ANSI/AMCA Standard 99-10 *Standards Handbook*, and identical language was used in the ASHRAE 90.1-2010 Addendum u, which added a fan efficiency requirement and which is expected to be in the 2013 version of the Standard.

It is only relevant IF the FEG proposal is approved for addition into the IECC.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides a definition needed to support the provisions added by the approval of CE234-13.

Assembly Action: **None**

Final Hearing Results

CE55-13	**AS**

Code Change No: CE56-13

Original Proposal

Section(s): C202 (New)

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

REROOFING. The process of recovering or replacing an existing roof covering.

ROOF RECOVER. The process of installing an additional roof covering over an existing roof covering without removing the existing roof covering.

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purpose of its maintenance.

ROOF REPLACMENT. The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering.

Reason: This code change proposal is intended to clarify the Code's intent by defining specific roofing-related terms.

The term "reroofing" is not currently defined in the I-codes. The definition proposed here is taken form IBC Section 1510-Reroofing.

The terms and definitions for "roof recover", "roof repair" and "roof replacement" are taken from IBC Section 202-Defintions and are consistent with those understood by the roofing industry.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof ~~for the purpose of its maintenance~~.

(Balance of the proposal is unchanged.)

Committee Reason: The committee voted to disapprove CE13-13 through CE15-13 which were each trying to bring clarity to the roofing exceptions for existing buildings. The committee felt none of the proposals were ready and encouraged the SEHPCAC to help develop a consensus approach for public comment. The committee felt these 4 definitions should be considered as a framework for the discussion. They were approved despite the fact that all the terms are not currently used in the IECC. The definition of roof repair was modified consistent with the committee's earlier modification of the definition of repair.

Assembly Action: **None**

Final Hearing Results

CE56-13 **AM**

Code Change No: CE57-13

Original Proposal

Section(s): C202 (New)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

ROOFTOP MONITOR. A raised section of a roof containing vertical fenestration along one or more sides.

Reason: There is currently no definition of rooftop monitor, yet the term is used in Section C402.3.2.1 (4). This proposal provides a definition of the term "Rooftop Monitor" as used in Section C402.3.2.1 (4). A definition of rooftop monitor is needed to clarify the intent and ensure uniform application of the exception.

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Definition is needed to support approval of CE294-13.

Assembly Action: **None**

Final Hearing Results

CE57-13 **AS**

Code Change No: CE59-13, Part I

Original Proposal

Section(s): C202, R202 (IRC N1101.9)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

SECTION C202
GENERAL DEFINITIONS

Revise definitions as follows:

~~FENESTRATION~~ <u>**VERTICAL FENESTRATION.**</u> ~~Skylights, roof windows, vertical w~~ <u>W</u>indows (fixed or movable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors <u>composed of</u>~~.~~ ~~Fenestration includes products with~~ glass ~~and~~ ~~nonglass~~ <u>or other transparent or translucent</u> glazing materials <u>and installed at a slope of at least 60 degrees from horizontal</u>.

~~SKYLIGHT~~ <u>**SKYLIGHT**</u>. Glass or other transparent or translucent glazing material installed with a slope of less than 60 degrees (1.05 rad) from horizontal. ~~Glazing material in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls is included in this definition.~~

Reason: The code currently has no thermal provisions (U-factor or SHGC) for any fenestration material or product installed at an angle of greater than 0 up to and including 30 degrees from vertical. This proposal clarifies the application of thermal provisions (U-factor or SHGC) for fenestration materials or products installed at an angle greater than 0 up to and including 30 degrees from vertical.

There are a number of commercial and residential building designs in which sloped glazing is used, and as such is clearly not vertical but in addition does not meet the greater than 30 degrees from vertical (at least 60 degrees from horizontal) criterion to consider it a skylight. While it may be inferred that vertical fenestration is intended to include all fenestration other than skylights, technically the code does not apply to the fenestration in question. Vertical fenestration is used in Sections C402.3.1, C402.3.1.1, C402.3.3, C402.3.3.1, C402.3.3.2, R402.5 and Table C402.3. This loophole needs to be corrected and rather than change the term in the code from vertical fenestration to some other term, it is considered more appropriate to define what is intended when using the term "vertical fenestration" even though it is not truly vertical. Another change makes it clear that fenestration can be either glass **or** nonglass glazing materials and does not need to include both glass **and** nonglass glazing materials. The last sentence in the current definition of skylight can be deleted because the terms for the products are added to the previous sentence and it is not necessary to indicate the location of the skylights as they will always be in a roof or wall assembly. The focus of both definitions is simply the angle of the fenestration as installed.

Cost Impact: This code change proposal will not increase the cost of construction.

Note: The IBC, IRC and the IgCC have two defined terms related to skylights. They are 'skylights and sloped glazing' and 'skylight unit' as follows

> **SKYLIGHT, UNIT.** A factory-assembled, glazed fenestration unit, containing one panel of glazing material that allows for natural lighting through and opening in the roof assembly while preserving the weather-resistant barrier of the roof.
> **SKYLIGHTS AND SLOPED GLAZING.** Glass or other transparent or translucent glazing material installed at a slope of 15 degrees (0.26 rad) or more from vertical. Glazing materials in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls, are included in this definition.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: The proposal fills in a gap in the definitions of fenestration.

Assembly Action: **None**

Public Comments

Public Comment 1:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION C202
GENERAL DEFINITIONS

FENESTRATION. <u>Products classified as either vertical fenestration or skylights.</u>

Vertical fenestration. Windows (fixed or movable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of at least 60 degrees from horizontal.

Skylight. Glass or other transparent or translucent glazing material installed with a slope of less than 60 degrees from horizontal.

Commenter's Reason: In the process of creating needed definition of vertical fenestration, the definition of fenestration, while embodied in the definition of vertical fenestration and skylight in the code change, is technically lost. That is, there is nothing to specifically define fenestration or tie that term to the two types of fenestration (vertical and skylights). The Code needs such an introduction, because the code still uses the term 'fenestration' in addition to the terms vertical fenestration and skylight.

By definition, fenestration is essentially anything non-opaque of any material in any location and then a subset of fenestration is a skylight. Then when you get into the technical requirements of the code you find that criteria are provided specifically for vertical fenestration and then for skylights. This public comment takes care of that by retaining the approved definitions of vertical fenestration and skylight, keeps them under the term 'fenestration' but then fills in the missing piece – a leading introductory definition of fenestration since that term is also used in the code in Chapter 2 and Chapter 3.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. <u>EERE-2012-BT-BC-0030</u>) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

CE59-13, Part I **AMPC1**

Code Change No: CE59-13, Part II

Original Proposal

Section(s): C202, R202 (IRC N1101.9)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise definitions as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

~~**FENESTRATION.**~~ **VERTICAL FENESTRATION.** ~~Skylights, roof windows, vertical~~ ~~w~~ Windows (fixed or movable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of~~.~~ ~~Fenestration includes products with~~ glass ~~and~~ ~~nonglass~~ or other transparent or translucent glazing materials and installed at a slope of at least 60 degrees (1.05 rad) from horizontal.

~~**SKYLIGHT**~~ **SKYLIGHT.** Glass or other transparent or translucent glazing material installed with a slope of less than 60 degrees from horizontal. ~~Glazing material in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls is included in this definition.~~

Reason: The code currently has no thermal provisions (U-factor or SHGC) for any fenestration material or product installed at an angle of greater than 0 up to and including 30 degrees from vertical. This proposal clarifies the application of thermal provisions (U-factor or SHGC) for fenestration materials or products installed at an angle greater than 0 up to and including 30 degrees from vertical.

There are a number of commercial and residential building designs in which sloped glazing is used, and as such is clearly not vertical but in addition does not meet the greater than 30 degrees from vertical (at least 60 degrees from horizontal) criterion to consider it a skylight. While it may be inferred that vertical fenestration is intended to include all fenestration other than skylights, technically the code does not apply to the fenestration in question. Vertical fenestration is used in Sections C402.3.1, C402.3.1.1, C402.3.3, C402.3.3.1, C402.3.3.2, R402.5 and Table C402.3. This loophole needs to be corrected and rather than change the term in the code from vertical fenestration to some other term, it is considered more appropriate to define what is intended when using the term "vertical fenestration" even though it is not truly vertical. Another change makes it clear that fenestration can be either glass **or** nonglass glazing materials and does not need to include both glass **and** nonglass glazing materials. The last sentence in the current definition of skylight can be deleted because the terms for the products are added to the previous sentence and it is not necessary to indicate the location of the skylights as they will always be in a roof or wall assembly. The focus of both definitions is simply the angle of the fenestration as installed.

Cost Impact: This code change proposal will not increase the cost of construction.

Note: The IBC, IRC and the IgCC have two defined terms related to skylights. They are 'skylights and sloped glazing' and 'skylight unit' as follows

> **SKYLIGHT, UNIT.** A factory-assembled, glazed fenestration unit, containing one panel of glazing material that allows for natural lighting through and opening in the roof assembly while preserving the weather-resistant barrier of the roof.
> **SKYLIGHTS AND SLOPED GLAZING.** Glass or other transparent or translucent glazing material installed at a slope of 15 degrees (0.26 rad) or more from vertical. Glazing materials in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls, are included in this definition.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: The IECC-Residential Provisions do not use the term "vertical fenestration." In addition, the proposal would remove the definition of "fenestration", which is a term used extensively in the Code.-

Assembly Action: None

Public Comments

Public Comment 1:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R202 (N1101.9)
GENERAL DEFINITIONS

FENESTRATION. Products classified as either *vertical fenestration* or *skylights*.

VERTICAL FENESTRATION. Windows (fixed or movable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of at least 60 degrees from horizontal.

SKYLIGHT. Glass or other transparent or translucent glazing material installed with a slope of less than 60 degrees from horizontal.

Commenter's Reason: The published reason for disapproval from the Committee Action Hearings is that the "IECC-Residential Provisions do not use the term 'vertical fenestration'." This is incorrect, as section R402.5 of the 2012 IECC uses the words "vertical fenestration." The IECC does not define "vertical" and a definition is needed, as fenestration on surfaces such as A-frame houses may not be purely 90 degrees vertical but may be steeper than the 60 degree angle in the skylight definition and therefore not be classified as skylights.

The published reason for disapproval from the Committee Action Hearings also states, "the proposal would remove the definition of 'fenestration'," which is a term used extensively in the Code." This Public Comment resolves this by adding a simple definition of fenestration. The definitions of "vertical fenestration" and "skylight" proposed here are identical to definitions in CE59 Part 1, which was approved by the IECC-Commercial committee in Dallas in April.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

CE59-13, Part II AMPC1

Code Change No: CE61-13 Part I

Original Proposal

Section(s): Table C301.1, Table R301.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

TABLE C301.1
CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

COLORADO
5B Adams
6B Alamosa
5B Arapahoe
6B Archuleta
4B Baca
5B Bent
5B Boulder
5B Broomfield
6B Chaffee

(Portions of Table not shown remain unchanged)

Reason: Broomfield County is a consolidated city-county and a suburb of Denver. Constituted on November 15, 2001, it was apparently missing from the county database(s) used to establish the IECC's county-zone mappings. See http://en.wikipedia.org/wiki/Broomfield, Colorado.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: Broomfield County does exist. It needs to be listed.

Assembly Action: **None**

Final Hearing Results

CE61-13 Part I **AS**

Code Change No: CE61-13 Part II

Original Proposal

Section(s): Table C301.1, Table R301.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

TABLE R301.1
CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

COLORADO
5B Adams
6B Alamosa
5B Arapahoe
6B Archuleta
4B Baca
5B Bent
5B Boulder
<u>5B Broomfield</u>
6B Chaffee

(Portions of Table not shown remain unchanged)
Reason: Broomfield County is a consolidated city-county and a suburb of Denver. Constituted on November 15, 2001, it was apparently missing from the county database(s) used to establish the IECC's county-zone mappings. See http://en.wikipedia.org/wiki/Broomfield, Colorado.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This makes a needed correction on the climate zone maps, to add a county that was missing from the list.

Assembly Action: **None**

Final Hearing Results

CE61-13 Part II AS

Code Change No: CE62-13 Part I

Original Proposal

Section(s): Figure C301.1, Table C301.1, Figure R301.1 (IRC Figure N1101.10), Table R301.1 (IRC Table N1101.10)

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows: End the Warm-Humid white line at the line separating the Dry (B) and Moist (A) moisture zones.

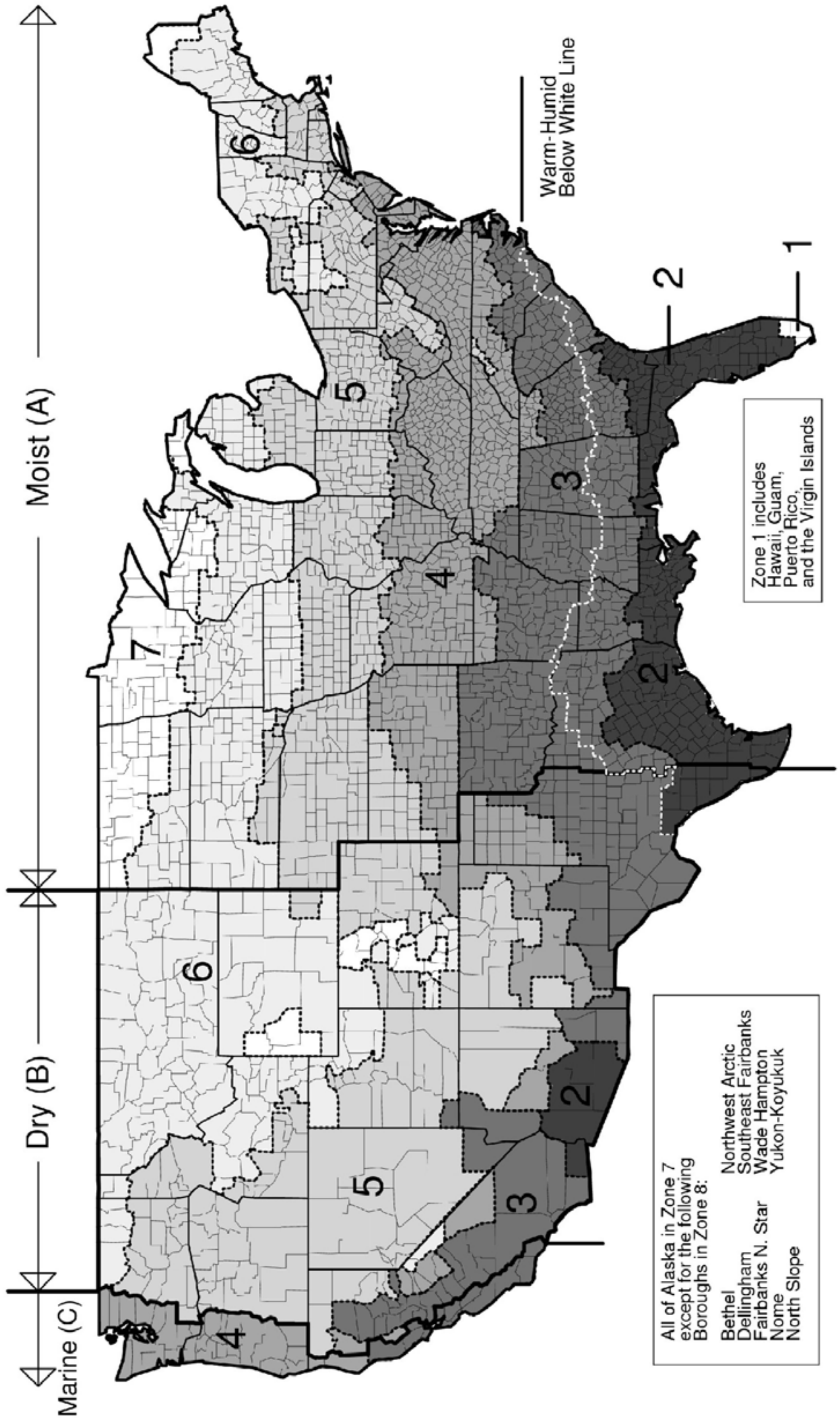
Marine (C)
Dry (B)
Moist (A)
Warm-Humid
Below White Line
Zone 1 includes
Hawaii, Guam,
Puerto Rico,
and the Virgin Islands
All of Alaska in Zone 7
except for the following
Boroughs in Zone 8:
Bethel
Dellingham
Fairbanks N. Star
Nome
North Slope
Northwest Arctic
Southeast Fairbanks
Wade Hampton
Yukon-Koyukuk
1
2
3
4
5
6
7

FIGURE C301.1
CLIMATE ZONES

Revise as follows: Remove the asterisk (*) from the following Counties, thereby removing the warm-humid location designation.

TABLE C301.1
CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

TEXAS

Bandera*
Dimmit*
Edwards*
Frio*
Kinney*
La Salle*
Maverick*
Medina*
Real*
Uvalde*
Val Verde*
Webb*
Zapata*
Zavala*

Reason: These 14 counties are in the Dry (B) moisture zone and therefore do not need to meet the requirements for Warm-Humid locations. This is based on the following studies *Calculation of Precipitation Data and Climate Zones for ASHRAE Standard 169, Prepared by: Sonia Zhang and Didier Thevenard* and *Numerical Logics Inc. and Steve Cornick National Research Council of Canada.* ASHRAE Std 169 is also working on revisions to these Figures and Tables based on the above studies.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: The map inappropriate identifies 14 counties as both warm and 'humid', but at the same time 'dry'. This is a correction to the map.

Assembly Action: **None**

Final Hearing Results

CE62-13 Part I **AS**

Code Change No: CE62-13 Part II

Original Proposal

Section(s): Figure C301.1, Table C301.1, Figure R301.1 (IRC Figure N1101.10), Table R301.1 (IRC Table N1101.10)

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows: End the Warm-Humid white line at the line separating the Dry (B) and Moist (A) moisture zones.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows: End the Warm-Humid white line at the line separating the Dry (B) and Moist (A) moisture zones.

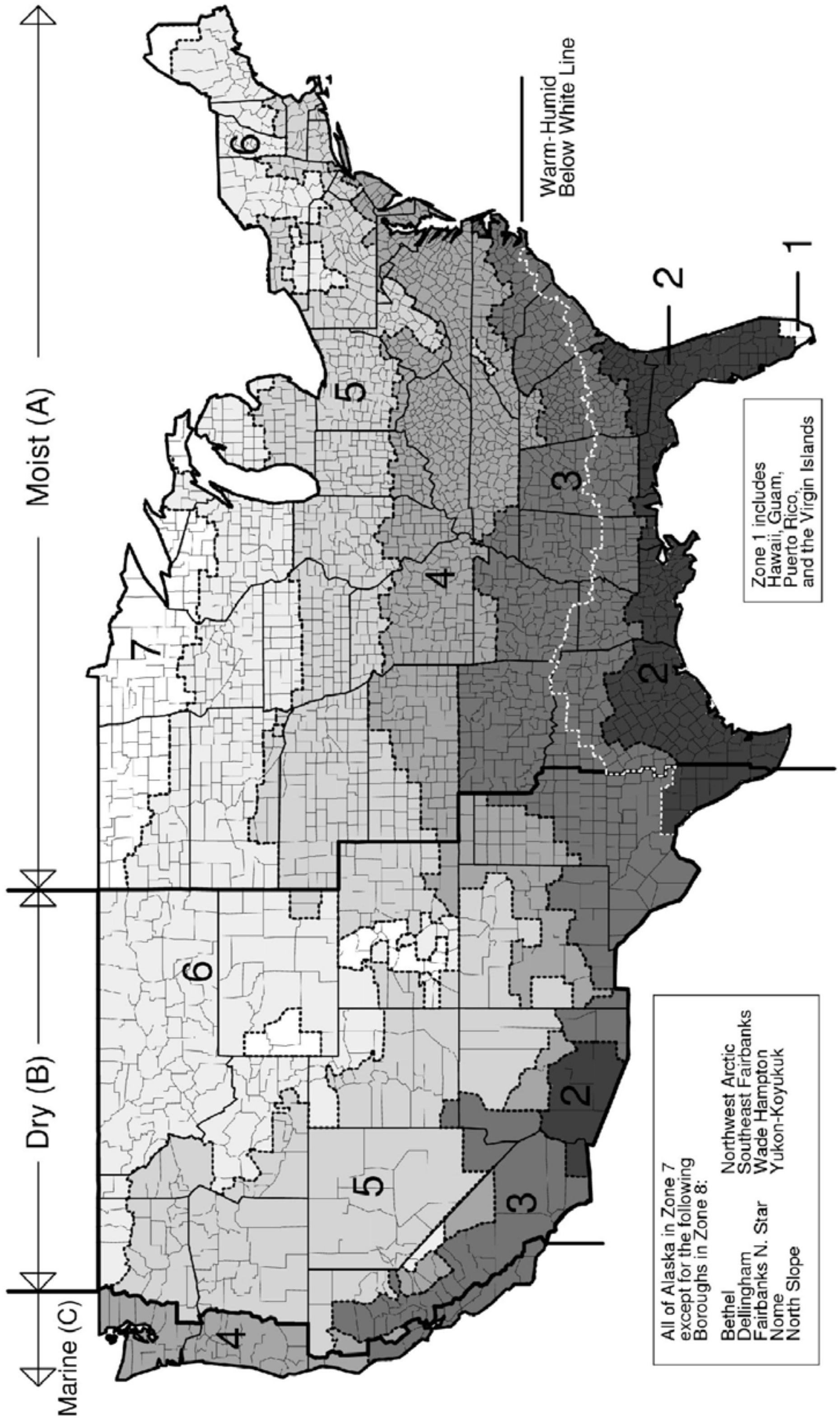

FIGURE R301.1 (N1101.10)
CLIMATE ZONES

Revise as follows: Remove the asterisk (*) from the following Counties, thereby removing the warm-humid location designation.

TABLE R301.1 (N1101.10)
CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID DESIGNATIONS BY STATE, COUNTY AND TERRITORY

TEXAS

Bandera*
Dimmit*
Edwards*
Frio*
Kinney*
La Salle*
Maverick*
Medina*
Real*
Uvalde*
Val Verde*
Webb*
Zapata*
Zavala*

Reason: These 14 counties are in the Dry (B) moisture zone and therefore do not need to meet the requirements for Warm-Humid locations. This is based on the following studies *Calculation of Precipitation Data and Climate Zones for ASHRAE Standard 169, Prepared by: Sonia Zhang and Didier Thevenard* and *Numerical Logics Inc. and Steve Cornick National Research Council of Canada.* ASHRAE Std 169 is also working on revisions to these Figures and Tables based on the above studies.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This makes a needed correction to the climate zone map in Texas, to fix a previous mistake.

Assembly Action: **None**

Final Hearing Results

CE62-13 Part II AS

Code Change No: CE63-13 Part I

Original Proposal

Section(s): C303.1.1, R303.1.1 (IRC N1101.12.1)

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C303.1.1 Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification. <u>For insulated siding the *R-value* shall be labeled on the product's package and shall be *listed* on the certification.</u> The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

Reason: This change will help building officials and energy specialists/raters identify insulated siding, including its specified R-value based on ASTM C1363 testing. Currently, labeling or identification marks are not specified for insulated siding, but have been developed and established since the publication of the last energy code. For more information, go to www.insulatedsiding.info.

Cost Impact: The code change proposal will have minimal cost impact as many insulated siding products are on the market and are certified and labeled in the way.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: The proposal was a companion proposal to CE67-13. CE67 established the proper testing method for the product. This proposal adds the labeling requirement for these products similar to labeling for other products.

Assembly Action: **None**

Final Hearing Results

CE63-13 Part I **AS**

Code Change No: CE63-13 Part II

Original Proposal

Section(s): C303.1.1, R303.1.1 (IRC N1101.12.1)

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R303.1.1 (N1101.12.1) Building thermal envelope insulation. An *R*-value identification mark shall be applied by the manufacturer to each piece of *building thermal envelope* insulation 12 inches (305 mm) or greater in width. Alternately, the insulation installers shall provide a certification listing the type, manufacturer and *R*-value of insulation installed in each element of the *building thermal envelope*. For blown or sprayed insulation (fiberglass and cellulose), the initial installed thickness, settled thickness, settled *R*-value, installed density, coverage area and number of bags installed shall be *listed* on the certification. For sprayed polyurethane foam (SPF) insulation, the installed thickness of the areas covered and *R*-value of installed thickness shall be *listed* on the certification. <u>For insulated siding the *R-value* shall be labeled on the product's package and shall be *listed* on the certification.</u> The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

Reason: This change will help building officials and energy specialists/raters identify insulated siding, including its specified R-value based on ASTM C1363 testing. Currently, labeling or identification marks are not specified for insulated siding, but have been developed and established since the publication of the last energy code. For more information, go to www.insulatedsiding.info.

Cost Impact: The code change proposal will have minimal cost impact as many insulated siding products are on the market and are certified and labeled in the way.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This adds needed information regarding labeling of insulated siding.

Assembly Action: **None**

Final Hearing Results

CE63-13 Part II AS

Code Change No: **CE65-13 Part I**

Original Proposal

Section(s): C303.1.3, Chapter 5, R303.1.3 (IRC N1101.12.3), Chapter 5

Proponent: Joseph R. Hetzel, P.E., Thomas Associates, Inc., representing the Door & Access Systems Manufacturers Association (DASMA) International (jhetzel@thomasamc.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C303.1.3 Fenestration product rating. U-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100 ~~by an accredited, independent laboratory, and labeled and certified by the manufacturer~~.

> **Exception:** Where required, garage door U-factors shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105.

U-factors shall be determined by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled U-factor shall be assigned a default U-factor from Table C303.1.3(1) or C303.1.3(2). The solar heat gain coefficient (SHGC) and *visible transmittance* (VT) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC or VT shall be assigned a default SHGC or VT from Table C303.1.3(3).

Add new standard to Chapter 5 as follows:

DASMA

ANSI/DASMA 105-2004 Test Method for Thermal Transmittance and Air Infiltration of Garage Doors

Reason: Although NFRC 100 has been updated to include procedures for garage doors, there are instances where companies do not and cannot manufacture the 7' by 7' door size required to validate the NFRC 100 simulation by testing to NFRC 102. Research has shown that garage doors tested to ANSI/DASMA 105 result in U-factor values comparable to NFRC 100/NFRC 102. "Where required" indicates that the Exception only applies where garage doors are affected by conditioned space since there may be detached, non-conditioned structures where U-factor is not needed. We have separated the laboratory and labeling/certifying information since it applies to all doors including garage doors.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

For staff analysis of the content of ANSI/DASMA 105-2004 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf"

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: The exception allows the use of an alternate test method for garage doors. The tests are considered to be equivalent in the results provided.

Assembly Action: **None**

Final Hearing Results

CE65-13 Part I **AS**

Code Change No: CE65-13 Part II

Original Proposal

Section(s): C303.1.3, Chapter 5, R303.1.3 (IRC N1101.12.3), Chapter 5

Proponent: Joseph R. Hetzel, P.E., Thomas Associates, Inc., representing the Door & Access Systems Manufacturers Association (DASMA) International (jhetzel@thomasamc.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R303.1.3 (N1101.12.3) Fenestration product rating. U-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100 ~~by an accredited, independent laboratory, and labeled and certified by the manufacturer~~.

> **Exception:** Where required, garage door U-factors shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105.

U-factors shall be determined by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled U-factor shall be assigned a default *U*-factor from Table R303.1.3(l) or R303.1.3(2). The solar heat gain coefficient (SHGC) and *visible transmittance* (VT) of glazed fenestration products (windows, glazed doors and skylights) shall be determined in accordance with NFRC 200 by an accredited, independent laboratory, and labeled and certified by the manufacturer. Products lacking such a labeled SHGC or VT shall be assigned a default SHGC or VT from Table R303.1.3(3).

Add new standard to Chapter 5 as follows:

DASMA

ANSI/DASMA 105-2004 Test Method for Thermal Transmittance and Air Infiltration of Garage Doors

Reason: Although NFRC 100 has been updated to include procedures for garage doors, there are instances where companies do not and cannot manufacture the 7' by 7' door size required to validate the NFRC 100 simulation by testing to NFRC 102. Research has shown that garage doors tested to ANSI/DASMA 105 result in U-factor values comparable to NFRC 100/NFRC 102. "Where required" indicates that the Exception only applies where garage doors are affected by conditioned space since there may be detached, non-conditioned structures where U-factor is not needed. We have separated the laboratory and labeling/certifying information since it applies to all doors including garage doors.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

For staff analysis of the content of ANSI/DASMA 105-2004 relative to CP#28, Section 3.6, please visit:

http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf"

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: The proposal installs an exception that is needed for garage doors.

Assembly Action: **None**

Final Hearing Results

CE65-13 Part II **AS**

Code Change No: CE66-13 Part I

Original Proposal

Section(s): C301.4 (NEW), R301.4 (NEW) (IRC N1101.10.3 (NEW)), R406 (NEW) (IRC N1106 (NEW))

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com), Agustin Mujica, Levitt Homes, Puerto Rico

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

<u>**C301.4 Tropical climate zone.** The tropical climate zone shall be defined as:</u>

<u>1. Hawaii, Puerto Rico, Guam, American Samoa, U.S. Virgin Islands, Commonwealth of Northern Mariana Islands, and</u>
<u>2. Islands in the area between the Tropic of Cancer and the Tropic of Capricorn</u>

Reason: This creates a Chapter 4 alternative for residences in the tropical climates as a new section. Tropical areas are quite different from the US mainland in climate, construction techniques, traditional construction, and energy prices. The IECC treats tropical climates as if they were simply a southern extension of the US mainland. Traditional residences, especially the less expensive residences, have evolved inexpensive ways to work with the tropical climates to provide comfortable interior spaces without the need for substantial space conditioning. Tropical electrical prices, usually over 20 cents per hWh, provide a substantial incentive for energy conservation. Solar water heating works particularly well in tropical climates.

This proposed change is meant to add a simple option for a newly defined climate zone, the “tropical zone”. The area between the Tropic of Cancer and the Tropic of Capricorn is the area between 23.5° northern and southern latitude of the equator. A zone that recognizes the unusually constant and unique climate of this region would help make the ICC Codes more of an “international code”.

Traditional construction, especially with solar water heating, is usually more energy efficient than the construction style assumed in the IECC, as is shown by an analysis done for Puerto Rico.[1] Using energy efficient versions of traditional construction saves more energy and is much more cost-effective than pushing those in tropical climates to adopt mainland construction practices. Traditional tropical construction focuses on greatly reducing or eliminating the need for space conditioning by making a living space that is comfortable without space conditioning.

The requirements proposed here are based on informal conversations with those who live in tropical regions. The proponent does not live in the proposed tropical zone and will continue to solicit the input of those who do. Some items were taken from energy codes proposed or in place in the tropical regions. This is not intended as a replacement for existing topical codes, such as the energy codes recently adopted in Hawaii and Puerto Rico. This is meant as a simple climate-appropriate alternative for tropical climates.

Reason by item:

#1 Air conditioning only a portion of the residence is common in some residences and saves energy compared to air conditioning the whole occupied space.
#2 Heating is seldom needed.
#3 Consistently warm temperatures and high power costs make solar water heating very attractive. Solar water heating is widely used. Water heating is often 35% or more of the residential energy use.[1,2] Substantial energy savings come from solar water heating.
#4 Limiting solar gains and providing ventilation is the energy focus for windows. Window U-factor has little impact. Window air tightness is of little value when the important feature of the windows is their ability to be operable and provide ventilation.
#5 High efficiency lighting makes sense with tropical energy prices.
#6 This references the “cool roof” provisions. This is similar to an option in Hawaii’s code and the Puerto Rico Energy Center’s analysis. Insulation is less valuable in mild climates where the outside temperature is often comfortable as an inside temperature.
#7 Even flat roofs need to drain.
#8 Ventilation provided by tropical winds makes occupied spaces more comfortable. 14% is an option for unconditioned

residences in Hawaii's new energy code.

#9 When bedroom walls facing two directions are available, ventilation on both walls will be more effective.

#10 Interior doors should not block bedroom ventilation. This is similar to Hawaii's new energy code and recommended by the Puerto Rico Energy Center.

#11 Ceiling fans increase comfort without conditioning the air. This is similar to Hawaii's new energy code and recommended by the Puerto Rico Energy Center.

1. "Energy Modeling of Low Income Residencies" by C. G. Morales & A. J. Malavé
http://library.witpress.com/pages/PaperInfo.asp?PaperID=22547
The paper above is not free. The proponents will send a Puerto Rico Energy Center presentation done for DOE that summarizes that work to anyone who requests this by email.
2. Typical Hawaiin energy use for hot water: http://www.hawaiienergy.com/16/water-heating

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: Without any specific provisions which would apply uniquely to a tropical climate zone, there is no need for it to be created. Applying such a tropical zone to all of the island of Hawai'i is in appropriate as the range of elevations on the island result in a range of climate zones.

Assembly Action: None

Public Comment

Public Comment:

Craig Conner, Building Quality, representing self; Howard C. Wiig, Energy Analyst, Department of Business, Economic Development, and Tourism, representing State of Hawaii, request Approval as Submitted.

Commenter's Reason: The climate in tropical islands is uniquely constant, with moderate temperatures year around. Parts I and II of CE66 create a tropical climate zone, which is a subset of IECC climate zone 1. Part II also creates a residential "deemed to comply" option for the tropical island climate based on their traditional residential construction.

Part II of this change was approved by the residential IECC committee with the reason that the "*options are appropriate to a unique climate zone*". Part II included the option for traditional construction that lowers energy use by taking advantage of the moderate tropical climate. The modifications to Part II in this public comment do not apply to Part I, so Part I is simply "as submitted".

These changes were made based on comments received, both at the hearing and afterwards.

1. The first modification deals with high elevations in Hawaii, where a 2400 feet above sea level limit was added. Commenters noted the difference between inland Hawaiian climates at higher elevations and the coastal Hawaiian climates. (By far the highest tropical island elevations occur in Hawaii.) Commenters noted that the traditional construction that might work well in coastal Hawaii and other islands, but would not work well at the higher Hawaiian elevations. Therefore, the "deemed to comply" option is limited to elevations below 2400 feet above sea level; because that elevation is already used in the Hawaiian energy code. In reality this has limited effect because less than 2% of the Hawaiian population lives above that level.

Two other comments resulted in changes.

2. The term "roof" was changed to "roof/ceiling" to cover both possible locations for insulation (item #6).
3. The "bedroom walls" became "exterior bedroom walls" which was implied, but not stated (item #9). Exterior walls are the best source of the tropical breezes that help keep the residences comfortable and lessen the need for energy. Other comments did not result in changes.

Overall, the largest criticism of the tropical climate zone was that it was arbitrary, unjustified and not related to the existing IECC climate zones. The existing climate zones were developed at the Pacific Northwest National Laboratory (PNNL, a US

Department of Energy lab) as part of the rewrite and simplification of the IECC that become the 2006 IECC. The development of the climate zones is documented in two publications[1,2].

PNNL staff went through an extended analysis to try to group climates for the IECC. Grouping climates turned out to be difficult. After an extensive analysis PNNL stated " … boundaries were found in the Köppen classification that served as good approximations for the divisions that emerged from the … analysis .."[3] The Köppen Climate Classification is the mostly widely used system for classifying the world's climates[4]. In particular PNNL took the primary criteria for IECC zone 1 from Köppen (Koppen's tropical climate)[5].

PNNL adapted the Köppen system for use as a building energy code (IECC). Adaptations included using the political boundaries of jurisdictions (counties, occasionally states) and classifying large counties based on the locations in the county where building occurs rather than the extreme climates where few people live.

As in the existing IECC climate zones, the proposed tropical climate zone is based on Köppen's classification of climates. Köppen divided the earth's climates into five major types of climates, one of the climate types being "tropical". According to Köppen, tropical climates are characterized by constant high temperature (at sea level and low elevations) — all twelve months of the year in the proposed zone in question have average temperatures of 18 °C (64.4 °F) or higher[6]. The existing IECC zone 1 boundary and the proposed tropical climate zone are based on the Köppen temperature criteria for Köppen's "tropical zone".

Traditional tropical construction works best where temperatures are relatively constant and relatively warm. Köppen's tropical climates define a region with a large solar radiation that is relatively constant from month to month, ensuring both high temperatures and almost an absence of seasons. Typically, the temperature difference between day and night is greater than that between the warmest and the coolest month, the opposite of other climate zones[7].

There were a few other comments that are being addressed here.

Some argued that the proposed "deemed to comply" option might not be as energy efficient as the current zone 1 code. An energy analysis for Puerto Rico was reference #1 in the original proposal. Many parts of the "deemed to comply" option are taken from or adapted from the current Hawaiian energy code and/or the Puerto Rican energy code. Specifying that half the occupied space is neither cooled nor heated is a significant reduction in energy use. Specifying 80% of the water heating is solar water heating (renewable energy) saves considerable energy in a region where water heating is a big end use for energy (see reference #2 in the original comment).

Some argued that the tropical zone SHGC should be the same as the Zone 1 SHGC in the IECC, which is an SHGC of 0.25. SHGCs of 0.25 usually mean double pane windows. Due to the warm and constant outdoor temperature, these windows are not remotely cost-effective in the tropical zone. The current Puerto Rico Energy Code has a requirement for 0.40 SHGC. The Tropical Energy Code, in use in Guam and elsewhere, has no requirement for residential SHGC. A jalousie window or louvered windows, common in the tropics and often constructed locally, often have no low SHGC coating, so this is an increased requirement for most of them.

Some argued that the climate zone map in the commercial IECC should not include features that are not used in the commercial energy code. However, for both residential and commercial use the same IECC climate map is used and it is important to keep that consistency. Because both chapters use copies of the same map, they both already include features not used in their respective portions of the IECC. The climate zones 2A, 2B, 3A, 3B, 4A, 4B, 5A, and 5B are not used in residential. Similarly the "warm-humid" counties are not used in commercial. Let's keep one climate zone map.

Some commented that the term "occupied space" was unclear. The term occupied space is defined by the IRC. The term is used because some of the "occupied space" is not "conditioned space".

A "deemed to comply" option for the tropical island climate based on their traditional residential construction would provide an economical option for improving energy efficiency in the tropical island climate.

References:

1. Climate classification for building energy codes and standards: Part 1—Development Process. ASHRAE Transactions 109(1). Briggs, R.S., R.G. Lucas, and Z.T. Taylor. 2003. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
2. Climate classification for building energy codes and standards: Part 2—Zone definitions, maps, and comparisons. ASHRAE Transactions 109(1). Briggs, R.S., R.G. Lucas, and Z.T. Taylor. 2003. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
3. From reference 1 above, page 116.
4. There are many academic papers on the "Köppen Climate Classification". A more understandable mildly humorous YouTube video is at http://www.youtube.com/watch?v=GBuQc1OL1xE
5. From reference 1 above, page 119."*The 5000 CDD10° C (9000 CDD50° F) dividing line for the lower limit of the hottest zone (also a 90.1 bin boundary) was selected because it corresponds in the United States with the dividing line between tropical and subtropical climates in the Köppen-Geiger system.*"
6. The is a short description of tropical climates in http://en.wikipedia.org/wiki/Tropical_climates
7. Weather Channel data demonstrates the constant temperatures in the tropical islands.

Google " weather channel average monthly temperature city_name state_name".
For example "weather channel average monthly temperature San Juan Puerto Rico"
Click first Google hit. Click boxes for "extreme high" and "extreme low". Compare tropical and non-tropical cities if you like.

Final Hearing Results

CE66-13 Part I **AS**

Code Change No: CE66-13, Part II

Original Proposal

Section(s): C301.4 (NEW), R301.4 (NEW) (IRC N1101.10.3 (NEW)), R406 (NEW) (IRC N1106 (NEW))

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com), Agustin Mujica, Levitt Homes, Puerto Rico

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R301.4 (N1101.10.3) Tropical climate zone. The tropical climate zone shall be defined as:

1. Hawaii, Puerto Rico, Guam, American Samoa, U.S. Virgin Islands, Commonwealth of Northern Mariana Islands, and
2. Islands in the area between the Tropic of Cancer and the Tropic of Capricorn.

R406. (N1106) Tropic zone option. *Residential buildings* in the tropical zone shall be deemed to comply with this Chapter where the following conditions are met:

1. Not more than one half of the *occupied space* is air conditioned.
2. The *occupied space* is not heated.
3. Solar, wind, or other renewable energy source supplies at least 80 percent of the energy for service water heating.
4. Glazing in *conditioned space* has a *solar heat gain coefficient* of less than or equal to 0.40, or has an overhang with a projection factor equal to or greater than 0.30.
5. Permanently installed lighting is in accordance with Section R404.
6. The exterior roof surface complies with one of the options in Table C402.2.1.1, or the roof has insulation with an *R-value* of R-15 or greater. If present, attics above the insulation are vented and attics below the insulation are unvented.
7. Roof surfaces have a minimum slope of one quarter inch per foot of run. The finished roof does not have water accumulation areas.
8. Operable fenestration provides ventilation area equal to a minimum of 14% of the floor area in each room. Alternatively, equivalent ventilation is provided by a ventilation fan.
9. Bedrooms with walls facing two different directions have operable fenestration facing two directions.
10. Interior doors to bedrooms are capable of being secured in the open position.
11. A ceiling fan or ceiling fan rough-in is provided for bedrooms and the largest non-bedroom space.

Reason: This creates a Chapter 4 alternative for residences in the tropical climates as a new section. Tropical areas are quite different from the US mainland in climate, construction techniques, traditional construction, and energy prices. The IECC treats tropical climates as if they were simply a southern extension of the US mainland. Traditional residences, especially the less expensive residences, have evolved inexpensive ways to work with the tropical climates to provide comfortable interior spaces without the need for substantial space conditioning. Tropical electrical prices, usually over 20 cents per hWh, provide a substantial incentive for energy conservation. Solar water heating works particularly well in tropical climates.

This proposed change is meant to add a simple option for a newly defined climate zone, the “tropical zone”. The area between the Tropic of Cancer and the Tropic of Capricorn is the area between 23.5° northern and southern latitude of the equator. A zone that recognizes the unusually constant and unique climate of this region would help make the ICC Codes more of an "international code".

Traditional construction, especially with solar water heating, is usually more energy efficient than the construction style assumed in the IECC, as is shown by an analysis done for Puerto Rico.[1] Using energy efficient versions of traditional construction saves more energy and is much more cost-effective than pushing those in tropical climates to adopt mainland construction practices. Traditional tropical construction focuses on greatly reducing or eliminating the need for space conditioning by making a living space that is comfortable without space conditioning.

The requirements proposed here are based on informal conversations with those who live in tropical regions. The proponent does not live in the proposed tropical zone and will continue to solicit the input of those who do. Some items were taken from energy codes proposed or in place in the tropical regions. This is not intended as a replacement for existing topical codes, such as the energy codes recently adopted in Hawaii and Puerto Rico. This is meant as a simple climate-appropriate alternative for tropical climates.

Reason by item:
#1 Air conditioning only a portion of the residence is common in some residences and saves energy compared to air conditioning the whole occupied space.
#2 Heating is seldom needed.
#3 Consistently warm temperatures and high power costs make solar water heating very attractive. Solar water heating is widely used. Water heating is often 35% or more of the residential energy use.[1,2] Substantial energy savings come from solar water heating.
#4 Limiting solar gains and providing ventilation is the energy focus for windows. Window U-factor has little impact. Window air tightness is of little value when the important feature of the windows is their ability to be operable and provide ventilation.
#5 High efficiency lighting makes sense with tropical energy prices.
#6 This references the "cool roof" provisions. This is similar to an option in Hawaii's code and the Puerto Rico Energy Center's analysis. Insulation is less valuable in mild climates where the outside temperature is often comfortable as an inside temperature.
#7 Even flat roofs need to drain.
#8 Ventilation provided by tropical winds makes occupied spaces more comfortable. 14% is an option for unconditioned residences in Hawaii's new energy code.
#9 When bedroom walls facing two directions are available, ventilation on both walls will be more effective.
#10 Interior doors should not block bedroom ventilation. This is similar to Hawaii's new energy code and recommended by the Puerto Rico Energy Center.
#11 Ceiling fans increase comfort without conditioning the air. This is similar to Hawaii's new energy code and recommended by the Puerto Rico Energy Center.

1. "Energy Modeling of Low Income Residencies" by C. G. Morales & A. J. Malavé
http://library.witpress.com/pages/PaperInfo.asp?PaperID=22547
The paper above is not free. The proponents will send a Puerto Rico Energy Center presentation done for DOE that summarizes that work to anyone who requests this by email.
2. Typical Hawaiin energy use for hot water: http://www.hawaiienergy.com/16/water-heating

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This installs energy saving options appropriate for a unique climate zone.

Assembly Action: **None**

Public Comments

Public Comment 1:

Craig Conner, Building Quality, representing self; Howard C. Wiig, Energy Analyst, Department of Business, Economic Development, and Tourism, representing State of Hawaii, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R406. (N1106) Tropic zone option. *Residential buildings* in the tropical zone at elevations below 2400 feet above sea level shall be deemed to comply with this Chapter where the following conditions are met:

1. Not more than one half of the *occupied space* is air conditioned.
2. The *occupied space* is not heated.
3. Solar, wind, or other renewable energy source supplies at least 80 percent of the energy for service water heating.
4. Glazing in *conditioned space* has a *solar heat gain coefficient* of less than or equal to 0.40, or has an overhang with a projection factor equal to or greater than 0.30.
5. Permanently installed lighting is in accordance with Section R404.
6. The exterior roof surface complies with one of the options in Table C402.2.1.1, or the roof/ceiling has insulation with an *R-value* of R-15 or greater. If present, attics above the insulation are vented and attics below the insulation are unvented.
7. Roof surfaces have a minimum slope of one quarter inch per foot of run. The finished roof does not have water accumulation areas.
8. Operable fenestration provides ventilation area equal to a minimum of 14% of the floor area in each room. Alternatively, equivalent ventilation is provided by a ventilation fan.
9. Bedrooms with exterior walls facing two different directions have operable fenestration on exterior walls facing two directions.
10. Interior doors to bedrooms are capable of being secured in the open position.
11. A ceiling fan or ceiling fan rough-in is provided for bedrooms and the largest non-bedroom space.

(Portions of proposal not show remain unchanged)

Commenter's Reason: The climate in tropical islands is uniquely constant, with moderate temperatures year around. Parts I and II of CE66 create a tropical climate zone, which is a subset of IECC climate zone 1. Part II also creates a residential "deemed to comply" option for the tropical island climate based on their traditional residential construction.

Part II of this change was approved by the residential IECC committee with the reason that the "*options are appropriate to a unique climate zone*". Part II included the option for traditional construction that lowers energy use by taking advantage of the moderate tropical climate. The modifications to Part II in this public comment do not apply to Part I, so Part I is simply "as submitted".

These changes were made based on comments received, both at the hearing and afterwards.

1. The first modification deals with high elevations in Hawaii, where a 2400 feet above sea level limit was added. Commenters noted the difference between inland Hawaiian climates at higher elevations and the coastal Hawaiian climates. (By far the highest tropical island elevations occur in Hawaii.) Commenters noted that the traditional construction that might work well in coastal Hawaii and other islands, but would not work well at the higher Hawaiian elevations. Therefore, the "deemed to comply" option is limited to elevations below 2400 feet above sea level; because that elevation is already used in the Hawaiian energy code. In reality this has limited effect because less than 2% of the Hawaiian population lives above that level.

Two other comments resulted in changes.

2. The term "roof" was changed to "roof/ceiling" to cover both possible locations for insulation (item #6).
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PNNL adapted the Köppen system for use as a building energy code (IECC). Adaptations included using the political boundaries of jurisdictions (counties, occasionally states) and classifying large counties based on the locations in the county where building occurs rather than the extreme climates where few people live.

As in the existing IECC climate zones, the proposed tropical climate zone is based on Köppen's classification of climates. Köppen divided the earth's climates into five major types of climates, one of the climate types being "tropical". According to Köppen, tropical climates are characterized by constant high temperature (at sea level and low elevations) — all twelve months of the year in the proposed zone in question have average temperatures of 18 °C (64.4 °F) or higher[6]. The existing IECC zone 1 boundary and the proposed tropical climate zone are based on the Köppen temperature criteria for Köppen's "tropical zone".

Traditional tropical construction works best where temperatures are relatively constant and relatively warm. Köppen's tropical climates define a region with a large solar radiation that is relatively constant from month to month, ensuring both high temperatures and almost an absence of seasons. Typically, the temperature difference between day and night is greater than that between the warmest and the coolest month, the opposite of other climate zones[7].

There were a few other comments that are being addressed here.

Some argued that the proposed "deemed to comply" option might not be as energy efficient as the current zone 1 code. An energy analysis for Puerto Rico was reference #1 in the original proposal. Many parts of the "deemed to comply" option are taken from or adapted from the current Hawaiian energy code and/or the Puerto Rican energy code. Specifying that half the occupied space is neither cooled nor heated is a significant reduction in energy use. Specifying 80% of the water heating is solar water heating (renewable energy) saves considerable energy in a region where water heating is a big end use for energy (see reference #2 in the original comment).

Some argued that the tropical zone SHGC should be the same as the Zone 1 SHGC in the IECC, which is an SHGC of 0.25. SHGCs of 0.25 usually mean double pane windows. Due to the warm and constant outdoor temperature, these windows are not remotely cost-effective in the tropical zone. The current Puerto Rico Energy Code has a requirement for 0.40 SHGC. The Tropical Energy Code, in use in Guam and elsewhere, has no requirement for residential SHGC. A jalousie window or louvered windows, common in the tropics and often constructed locally, often have no low SHGC coating, so this is an increased requirement for most of them.

Some argued that the climate zone map in the commercial IECC should not include features that are not used in the commercial energy code. However, for both residential and commercial use the same IECC climate map is used and it is important to keep that consistency. Because both chapters use copies of the same map, they both already include features not used in their respective portions of the IECC. The climate zones 2A, 2B, 3A, 3B, 4A, 4B, 5A, and 5B are not used in residential. Similarly the "warm-humid" counties are not used in commercial. Let's keep one climate zone map.

Some commented that the term "occupied space" was unclear. The term occupied space is defined by the IRC. The term is used because some of the "occupied space" is not "conditioned space".

A "deemed to comply" option for the tropical island climate based on their traditional residential construction would provide an economical option for improving energy efficiency in the tropical island climate.

References:

1. Climate classification for building energy codes and standards: Part 1—Development Process. ASHRAE Transactions 109(1). Briggs, R.S., R.G. Lucas, and Z.T. Taylor. 2003. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
2 . Climate classification for building energy codes and standards: Part 2—Zone definitions, maps, and comparisons. ASHRAE Transactions 109(1). Briggs, R.S., R.G. Lucas, and Z.T. Taylor. 2003. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.
3. From reference 1 above, page 116.
4. There are many academic papers on the "Köppen Climate Classification". A more understandable mildly humorous YouTube video is at http://www.youtube.com/watch?v=GBuQc1OL1xE
5. From reference 1 above, page 119."*The 5000 CDD10° C (9000 CDD50° F) dividing line for the lower limit of the hottest zone (also a 90.1 bin boundary) was selected because it corresponds in the United States with the dividing line between tropical and subtropical climates in the Köppen-Geiger system.*"
6. The is a short description of tropical climates in http://en.wikipedia.org/wiki/Tropical_climates
7. Weather Channel data demonstrates the constant temperatures in the tropical islands.

Google " weather channel average monthly temperature city_name state_name".
For example "weather channel average monthly temperature San Juan Puerto Rico"
Click first Google hit. Click boxes for "extreme high" and "extreme low". Compare tropical and non-tropical cities if you like.

Final Hearing Results

CE66-13, Part II AMPC1

Code Change No: CE67-13 Part I

Original Proposal

Section(s): C303.1.4.1 (NEW), Chapter 5, R303.1.4.1 (N1101.12.4) (NEW), Chapter 5

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C303.1.4 Insulation product rating. The thermal resistance (*R*-value) of insulation shall be determined in accordance with the U.S. Federal Trade Commission *R*-value rule (CFR Title 16, Part 460) in units of h ×ft2 × °F/Btu at a mean temperature of 75°F (24°C).

<u>**C303.1.4.1 Insulated siding.** The thermal resistance (*R-value*) of insulated siding shall be determined in accordance with ASTM C1363. Installation for testing shall be in accordance with the manufacturer's installation instructions.</u>

Add new standard to Chapter 5 as follows:

ASTM

<u>C1363 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus</u>

Reason: This additional requirement is necessary so that the testing protocol is spelled out clearly as the valid method for testing of R-value for insulated siding.

The Federal Trade Commission agrees that ASTM C1363 is the appropriate test method for insulated siding and further supported specific protocol as a part of ASTM C1363, established in ASTM D7793, is in the spirit of the home insulation rule.

Without adding this information to the energy code, manufacturers could try to enter the home insulation/insulated siding marketplace with product that has not been tested appropriately for R-value. This addition will ensure that proper, close to field condition testing, is required for any type of insulated siding to qualify as home insulation and in the energy code. This will ultimately result in a manufacturer compliance requirement and create easy enforcement for the building official and energy specialists. It will also further ensure that insulated siding's determined R-value will be legitimate in determining energy performance calculations and consumer confidence that it will provide specific energy performance.

This is a photo of a test chamber and insulated siding being tested to ASTM C1363.

Cost Impact: The code change proposal will have minimal cost impact as many insulated siding products are on the market and are certified and labeled in the way.

Public Hearing Results

For staff analysis of the content of ASTM C1363-11 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: The proposal establishes, in the code, the proper test method for these products. It is consistent for this class of materials.

Assembly Action: **None**

Final Hearing Results

CE67-13 Part I **AS**

Code Change No: CE67-13 Part II

Original Proposal

Section(s): C303.1.4.1 (NEW), Chapter 5, R303.1.4.1 (N1101.12.4) (NEW), Chapter 5

Proponent: Matt Dobson, Vinyl Siding Institute (mdobson@vinylsiding.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R303.1.4 (N1101.12.4) Insulation product rating. The thermal resistance (*R*-value) of insulation shall be determined in accordance with the U.S. Federal Trade Commission *R*-value rule (CFR Title 16, Part 460) in units of h ×ft2 × °F/Btu at a mean temperature of 75°F (24°C).

<u>**R303.1.4.1 (N1101.12.4.1) Insulated siding.** The thermal resistance (*R-value*) of insulated siding shall be determined in accordance with ASTM C1363. Installation for testing shall be in accordance with the manufacturer's installation instructions.</u>

Add new standard to Chapter 5 as follows:

ASTM

<u>C1363 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus</u>

Reason: This additional requirement is necessary so that the testing protocol is spelled out clearly as the valid method for testing of R-value for insulated siding.

The Federal Trade Commission agrees that ASTM C1363 is the appropriate test method for insulated siding and further supported specific protocol as a part of ASTM C1363, established in ASTM D7793, is in the spirit of the home insulation rule.

Without adding this information to the energy code, manufacturers could try to enter the home insulation/insulated siding marketplace with product that has not been tested appropriately for R-value. This addition will ensure that proper, close to field condition testing, is required for any type of insulated siding to qualify as home insulation and in the energy code. This will ultimately result in a manufacturer compliance requirement and create easy enforcement for the building official and energy specialists. It will also further ensure that insulated siding's determined R-value will be legitimate in determining energy performance calculations and consumer confidence that it will provide specific energy performance.

This is a photo of a test chamber and insulated siding being tested to ASTM C1363.

Cost Impact: The code change proposal will have minimal cost impact as many insulated siding products are on the market and are certified and labeled in the way.

Public Hearing Results

For staff analysis of the content of ASTM C1363-11 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This proposal adds requirements for a product that is currently referenced in the code.

Assembly Action: **None**

Final Hearing Results

CE67-13 Part II **AS**

Code Change No: CE69-13

Original Proposal

Section(s): C401.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C401.1 Scope. The provisions ~~requirements contained~~ in this chapter are applicable to commercial *buildings* and their *building sites* ~~or portions of commercial buildings~~.

Reason: This proposal includes building sites in the scope of the IECC (consistent with C101.2). The other ICC codes use the terminology "provisions in this chapter…." The code was revised during the last code development cycle to clarify that building sites associated with the building are included due to the scope of the provisions in the lighting chapter. There is no need to include "or portions of commercial buildings" because that higher level scope is covered in Chapter 1.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was concerned that adding 'building sites' was too broad and might be confusing. They did not want to see site elements regulated not currently covered by the code, but they recognized that the site may be the location of systems or portions of systems that service the building.

Assembly Action: **None**

Public Comment

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Submitted.

Commenter's Reason: At the code development hearing, the reason statement for the code change proposal was presented. There was one party in opposition to the change who indicated that this would be confusing as the provisions in Chapter 4 deal with buildings and not building sites. DOE replied that there are currently provisions in Chapter 4 that are not in or on the building but are on the building site and that these provisions have been there for some time. Further, during the code development cycle leading to the 2012 IECC, a definition of building site was added to the code and Section 101.2 of the code (scope) was clarified to specifically include building sites, as follows:

> **C101.2 Scope.** This code applies to *commercial buildings* and the **buildings sites** and associated systems and equipment. *[emphasis added]*

The reason for disapproval was a concern by the committee that building "sites" might be too broadly interpreted or confusing. This scope is in the current code (as noted above), and DOE is not aware of any resulting confusion.

As discussed during the prior code development cycle, there are provisions in Chapter 4 of the IECC that apply to items not in or on buildings (i.e., not associated with the building footprint). These include exterior lighting, snow melt systems, outdoor pools and spas, and, in some cases, any HVAC or SWH equipment and associated systems that are located on the site but remote from the building. In disapproving the code change, the committee recognized that such regulated items are located on the building site. This change is not focused on other items associated with the building site, such as solar access, trees, grading or other items associated with a building site. The change is strictly intended to recognize the validity of certain items already included in Chapter 4, and to make Chapter 4 consistent with Section 101.2 of the current code. There have been and are items covered by the code that are technically outside the scope of the code. Without this clarification of scope, a loophole exists: systems and equipment serving the building could be located outside the building and considered unregulated.

In recommending disapproval, the committee noted a concern about regulating site elements that are not currently covered by the code. This should not be a concern, because where there are actual criteria in the code for items on the site rather than in the building, the items covered by the criteria would be regulated, and if no requirements are provided in the code for these items, there is nothing to regulate.

The current code has in its scope buildings and building sites, both of those terms are defined and the provisions in the code are applicable to one or the other. There is no reason why the scope of Chapter 4, Commercial Energy Efficiency, should not be consistent with Section C101.2 of the IECC and officially recognize those current items in Chapter 4 that occur outside the building footprint but are already addressed in the code.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

CE69-13 **AS**

Code Change No: CE75-13

Original Proposal

Section(s): C401.2.2 (NEW)

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Add new text as follows:

<u>**C401.2.2 Application to replacement fenestration products**. Where some or all of an existing *fenestration* unit is replaced with a new *fenestration* product, including sash and glazing, the replacement *fenestration* unit shall meet the applicable requirements for *U-factor* and *SHGC* in Table C402.3.</u>

> <u>**Exception**: An area-weighted average of the *U-factor* of replacement fenestration products being installed in the building for each fenestration product category listed in Table C402.3 shall be permitted to satisfy the *U-factor* requirements for each fenestration product category listed in Table C402.3. Individual fenestration products from different product categories listed in Table C402.3 shall not be combined in calculating the area-weighted average *U-factor*.</u>

Reason: The purpose of this code change is to create a new code section to clarify that whenever an entire new fenestration product or assembly replaces some or all of an existing fenestration product (typically in the remodeling or modernizing of an existing building), the new fenestration product must meet the U-factor and SHGC requirements of the fenestration table. Section C401.2.1 of the 2012 IECC already requires that additions, alterations and repairs comply with C402 (thermal building envelope) – as a result this proposal does not add any additional requirements. However, this proposal will further clarify the application of the requirements, increase effective enforcement, and reduce the likelihood of confusion and differing interpretations:

- This proposed commercial fenestration requirement is identical to the residential requirement in Section R402.3.6. This specific requirement has been in the residential chapter of the IECC since at least the 2000 *IECC*. The exception adds additional flexibility by allowing the U-factor requirement to be satisfied on a weighted average basis by product category consistent with the current area-weighting approach to U-factor in section C402.3.4.
- Existing buildings represent one of the greatest untapped sources of energy efficiency, yet there are few ways to effectively require improvements to these buildings. This section does not mandate the replacement of windows; however, if windows are going to be replaced, the code should expressly require that the replacement windows achieve the same efficiency level as windows in newly constructed buildings.
- There is no valid reason why replacement windows cannot meet the same thermal efficiency requirements as windows installed in new buildings, so there is no reason to have separate requirements for them.
- Common repairs to damaged windows, such as the replacement of a broken pane of glass, would not be covered under C401.2.2.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal was approved so that the code provides direction on replacement fenestration. The committee did express concern that provision was overly restrictive where only one or a few windows were replaced, resulting in unmatched fenestration on a building's facade.

Assembly Action: **None**

Final Hearing Results

CE75-13 **AS**

Code Change No: CE77-13

Original Proposal

Section(s): C402.1, C402.1.1, C402.1.1

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.1 General (Prescriptive). ~~The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1.~~ Building thermal envelope assemblies for buildings that are intended to comply with the code on a prescriptive basis, in accordance with the compliance path described in Item 2 of Section C401.2, shall comply with the following:

1. The opaque portions of the building thermal envelope shall comply with the specific insulation requirements of Section C402.2 and the thermal requirements of either the *R*-value based method of Section C402.1.1 or the *U-, C-* and *F*-factor based method of Section C402.1.2;
2. Fenestration in building envelope assemblies shall comply with Section C402.3; and
3. Air leakage of building envelope assemblies shall comply with Section C402.4.

Alternatively, where buildings have a vertical fenestration area or skylight area that exceeds that allowed in Section C402.3, the building and the building thermal envelope shall comply with Section C401.2 Item 1 or Section C401.2 Item 3.

C402.1.1 ~~**Insulation and fenestration criteria.**~~ **Insulation component *R*-value-based method.** ~~The *building thermal envelope* shall meet the requirements of Tables C402.2 and C402.3~~ For opaque portions of the *building thermal envelope* intended to comply on an insulation component *R-value*-basis, the *R*-values for insulation in framing cavities, and for continuous insulation, shall be not less than that specified in Table C402.2, based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table C402.2. ~~Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table C402.3 shall comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1~~.

C402.1.2 ~~***U*-factor alternative.**~~ **Assembly *U*-factor, *C*-factor and *F*-factor-based method.** ~~An assembly with a *U-factor*, *C*-factor, or *F*-factor equal or less than that specified in Table C402.1.2 shall be permitted as an alternative to the *R*-values in Table C402.2.~~ *Building thermal envelope* opaque assemblies intended to comply on an assembly *U*-factor, *C*-factor or *F*-factor basis shall have a *U*-factor, *C*-factor, or *F*-factor that is not greater than that specified in Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-factor, *C*-factor, or *F*-factor from the "Group R" column of Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-factor, *C*-factor or *F*-factor from the "All other" column of Table C402.1.2.

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this proposal are as follows:

a) This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code.

b) These sections are proposed to be revised to *clarify* that fact that the code contains both *insulation component R-value* and *assembly U-/C-/F-factor* methods, either of which can be used to comply with the code's prescriptive building thermal envelope provisions, and that they both methods are equally valid and independently useable. These proposed revisions are also intended to *clarify* the application of both of these available methods.

c) The reference to Section C401.2, Item 2, in the first sentence of this proposal is intended to tie to the general scoping provisions of Chapter 4 and, in particular, the prescriptive IECC path.) Section C401.2 clearly indicates that Section C402 is applicable only in the compliance path outlined in Item 2 and is *not* applicable to the compliance paths outlined in Items 1 and 3.

d) The intent of the code is that the method described in Section C402.1.1 is applicable to insulation components, while the method described in Section C402.1.2 is intended to apply to entire assemblies. As currently written, however, there is unnecessary interaction between the two prescriptive building thermal envelope methods/sections and the tables that they reference. This clouds their application. It also makes the *U*-factor method in particular extremely difficult to decipher and apply.

For example, the verbiage as written in Section C402.1.1 gives the appearance that the insulation layers are mandatory. In reality, however, these "prescriptive" R-values are only one of many possible wall combinations. This creates confusion in building community: they feel that the R-values are required and there is not an option.

In many scenarios it becomes critical that the availability of these options is communicated effectively by the code. For example, most seismically active locations (Oregon, WA, ID, MT) utilize 6" stud construction for low rise commercial construction. The walls under Table C402.1.2, however, are for 4" stud construction, which is uncommon in all but high-rise construction in these regions. It becomes critical, therefore, that the requirements related to Table C402.2 be readily understood and useable.

e) This proposal takes the references to the U-factor method out of the R-value method provisions of Section C402.1.1 and moves them to a more appropriate location: to the general building envelope provisions of Section 402.1.

f) Although current text indicates that the U-factor method is an alternative in Section C402.1.1, the current text of Section C402.1.1 appears to presents another alternative: to comply with the prescriptive building envelope provisions of ASHRAE 90.1. This alternative is presented in the last sentence of the current text of Section C402.1.1. However, Section C401.2 clearly indicates that Section C402 is applicable only to the prescriptive compliance path outlined in Item 2 to Section C401.2. This proposal, therefore, moves the text referencing ASHRAE 90.1 from the last sentence of Section C402.1.1 to the general prescriptive provisions of Section C402.1 but, instead of directly referencing ASHRAE 90.1, the proposed language now references the ASHRAE 90.1 compliance path of Item 1 to Section C401.2 and the IECC performance path of Item 3 to Section C401.2. The SEHPCAC has been advised by the original proponents of Sections C401.2 and C402.1.1 that the intent is that these compliance paths outlined in Items 1, 2 and 3 to Section C401.2 be used separately and should not be mixed and matched. This change clarifies that by essentially sending the user to ASHRAE 90.1 or the IECC performance path whenever the IECC prescriptive building envelope provisions of Section C402 are not satisfied. Specifically, high glass buildings (buildings with over 30% vertical fenestration area) do not comply with Section C402.3 (or, more specifically, subsection C402.3.1) and, as such, are directed by the proposed language to Item 1 or 3 of Section C401.2.

In reality, the proposed language in the last sentence to Section C402.1 is unnecessary. Any reference to ASHRAE 90.1 for prescriptive building thermal envelope requirements should be deleted from Section C402.1 because Section C401.2 already puts forth the three available commercial energy compliance paths and adequately covers the ASHRAE 90.1 alternative issue. Thus, references to ASHRAE 90.1 or other alternative energy compliance paths in Sections C402.1 orC402.1.1 only serve to add confusion. However, in the spirit of this code change, which is to reorganize and clarify, not to raise questions regarding intent, the language addressing these issues was simply moved from Section C402.1.1 to Section C402.1 and modified. Thus the tie to ASHRAE 90.1 remains in Section C402 but is clarified. So as not to jeopardize the success of this proposal, the SEHPCAC has also created a separate proposal to delete the existing reference to ASHRAE 90.1 in Section C402.1.1.

g) The general provisions of Section C402.1 have been revised to clearly indicate the requirements in Section C402 that are specifically applicable to the R-value method of Section C402.1.1, the U-factor method of Section C402.1.2, and the ASHRAE 90.1 building envelope alternative method. Where a provision is applicable to all methods/alternatives, the information now appears in the general provisions of Section C402.1. Where a provision applies to only one method, the provision is referenced in the body of the provisions for that specific method.

h) This proposal revises the section titles, as well as the text of the indicated sections, to clarify that the R-value method applies to individual insulation components, while the U-factor method apples to entire assemblies. Furthermore, typical I-Code format conventions require that code text stand on their own without the aid of the title. These revisions achieve that. That said, the use of the code is simplified wherever section titles are accurate, and this gives further justification to the proposed title revisions.

i) As *R*-values are minimum values and *U*-factors are maximum values, these sections have been revised to clearly indicate this and eliminate unintended misapplication of the tables. Note that many users incorrectly assumed that both tables contained minimum values.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the application of the different methods of the code for building envelope. It clearly distinguishing in the text the difference in the R-value based method from the U-, C- and F-factor based methodology. Clearly links the code to the related tables.

Assembly Action: **None**

Final Hearing Results

CE77-13	**AS**

Code Change No: CE79-13

Original Proposal

Section(s): C402.1.1, Table C402.2

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.1.1 Insulation and fenestration criteria. The building thermal envelope shall meet the requirements of Tables ~~C402.2~~ C402.1.1 and C402.3 based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table ~~C402.2~~ C402.1.1. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table ~~C402.2~~ C402.1.2. Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table C402.3 shall comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1.

TABLE ~~C402.2~~ C402.1.1
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

(Portions of Table not shown remains unchanged.)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code. Detailed reasons are as follows:

a) The current numbering of Table C402.2 adds confusion to the application of the codes prescriptive building thermal envelope R-value method.
b) This proposal changes the numbering of Table C402.2 to Table C402.1.1 to coordinate with number of the primary and initial section that references it: Section C402.1.1 (which references the table three times).
c) Due to the existing numbering anomaly, Table C402.2 is currently located in the code AFTER the table for the U-factor method referenced in Section C402.1.2 (which, by the way, appropriately references a table of the same number: Table C402.1.2). Code officials tell us that many architects, engineers, and contractors are confused by the order and incorrectly conclude that the only way to comply is to have the continuous insulation, regardless of the U-value of the assembly.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

The following errata were not posted to the ICC website.

Modify proposal as follows:

C402.1.1 Insulation and fenestration criteria. The building thermal envelope shall meet the requirements of Tables C402.1.1 and C402.3 based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.1.1. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table ~~C402.1.2~~ C402.1.1 . Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table C402.3 shall comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1.

(*Portions of proposal* not shown remain unchanged)

Committee Reason: Corrects the numbering of the tables to be consistent with the section in which they are first mentioned.

Assembly Action: **None**

Final Hearing Results

CE79-13 **AS**

Code Change No: CE81-13

Original Proposal

Section(s): C402.1.1

Proponent: Brian Dean,, ICF, International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Revise as follows:

C402.1.1 Insulation and fenestration criteria. The *building thermal envelope* shall meet the requirements of Sections C402.2 and C402.3, including Tables C402.2 and C402.3 based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table C402.2. Buildings with a vertical fenestration area or skylight area that exceeds that allowed ~~in Table~~ by Section C402.3.1 shall use one of the other compliance methods specified in Section C401.2 ~~comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1~~.

Reason: The purpose of the proposed code change is to clarify that commercial buildings built to the prescriptive option under Section 402 must meet all the requirements of the insulation and fenestration sections, and not just the prescriptive tables. We are not aware of any widespread misapplication of these requirements, but it is important to refine code language wherever there is any potential ambiguity. The revision above will ensure that the opaque envelope components meet the requirements of the prescriptive R-value or U-factor table, as well as all of the specific requirements as to the proper installation of insulation components. Likewise, the revisions will ensure that fenestration meets all of the associated requirements outlined in Section C402.3, and not just the prescriptive U-factor and SHGC requirements in Table C402.3.

In addition, the proposal correctly points buildings with more than the maximum allowed prescriptive fenestration area to the two other compliance methods available under section C401.2 – the performance path under section C407 and *ASHRAE 90.1*. The current language incorrectly suggests that compliance can be achieved only through the provisions of *ASHRAE 90.1*.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The import of this change is to make sure that compliance is not only with the tables but with the related sections of the code. The committee was concerned that the text of this proposal and CE77-13 conflict and hopefully will be resolved in public comment.

Assembly Action: **None**

Final Hearing Results

CE81-13 **AS**

Code Change No: CE82-13

Original Proposal

Section(s): C402.1.1, C402.1.2, C402.2.4

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.1.1 Insulation and fenestration criteria. The building thermal envelope shall meet the requirements of Tables C402.2 and C402.3, based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table C402.2. Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table C402.3 shall comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1. The thermal resistance or R-value of the insulating material installed in, or continuously on, below grade exterior walls of the building envelope required in accordance with Table C402.2 shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less.

C402.1.2 *U*-factor alternative. An assembly with a *U-factor*, *C*-factor, or *F*-factor equal or less than that specified in Table C402.1.2 shall be permitted as an alternative to the *R*-values in Table C402.2. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-factor, *C*-factor, or *F*-factor from the "Group R" column of Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-factor, *C*-factor or *F*-factor from the "All other" column of Table C402.1.2. The C-factor for the below grade exterior walls of the building envelope, as required in accordance with Table C402.1.2, shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less.

~~**C402.2.4 Thermal resistance of below grade walls.** The minimum thermal resistance (*R*-value) of the insulating material installed in, or continuously on, the below-grade walls shall be as specified in Table C402.2, and shall extend to a depth of 10 feet (3048 mm) below the outside finished ground level, or to the level of the lowest floor, whichever is less.~~

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code. Detailed reasons are as follows:

This proposal moves and clarifies, but does not delete the provisions of Section C402.2.4 of the 2012 IECC.
As originally written, Section C402.2.4 requires that both the R-value and the U-factor methods of Sections C402.1.1 and C402.1.2 comply with the R-values for above grade wall insulation indicated in Table C402.2. However, only R-values are listed in Table R402.2. It does not make sense to require the U- factors method of Table R401.1.1, which contains values for below grade insulation, to also comply with the R-value method for below grade insulation. Section C402.2.4 is really intended to require that the thermal properties required for below-grade walls under either method extend at least 10 feet below grade or to the floor level, whichever is less. This proposal clarifies that by adding footnotes to the tables associated with both of these methods. It is only by the application of these tables that this information becomes relevant.

Where these requirements are currently located they become disconnected and their application to the tables becomes unclear and unlikely.

Note that the R-values in Table C402.2 are based on analysis of the insulation components only. Although a wall without any insulation would have an R-value of 0, it has a C-factor of 0.1140. This is because the U-values for walls in Table C402.1.2 are based on the impact of all components of the building envelope assembly, not just the insulation components. The values in Table C402.1.2 consider the impact of all materials that compose each building envelope assembly, including whether block, wood stud, metal stud, solid concrete or other materials are used, and the amount of and location of the insulation components. Because Tables C402.1.2 and C402.2 evaluate thermal properties in different ways, it is important that the thermal resistance of below grade walls are addressed in a manner that consistent with the manner that they are addressed in each table. This proposal accomplishes that goal and preserves the potential application of each table to below grade walls.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the code by making sure that both methodologies include text regarding the below grade walls.

Assembly Action: **None**

Final Hearing Results

CE82-13 **AS**

Code Change No: CE85-13

Original Proposal

Section(s): C402.1.2.1 (NEW), Table C402.2.3 (NEW)

Proponent: Mark Nowak, M. Nowak Consulting LLC, representing Steel Framing Alliance

Add new text as follows:

C402.1.2.1 Thermal resistance of cold-formed steel walls. U-factors of walls with cold-formed steel studs shall be permitted to be determined in accordance with Equation 4-X:

$U = 1/[R_s + (R_{ins} \times F_c)]$ **Equation 4-x**

Where:

R_s = The cumulative R-value of the wall components along the path of heat transfer, excluding the cavity insulation and steel studs.
R_{ins} = The R-value of the cavity insulation.
F_c = The correction factor from Table 402.2.3

TABLE C402.2.3
F_c VALUES FOR STEEL STUD WALL ASSEMBLIES

Nominal stud depth (inches)	Spacing of framing (inches)	Cavity R-Value	Correction factor (F_c)
3-1/2	16	13	0.46
		15	0.43
3-1/2	24	13	0.55
		15	0.52
6	16	19	0.37
		21	0.35
6	24	19	0.45
		21	0.43
8	16	25	0.31
8	24	25	0.38

Reason: This proposal addresses a gap in the code in regard to calculating U-factors for steel stud wall assemblies. The proposed equation and correction factors are the same as those in the 2003 IECC residential section. They were removed in favor of simplistic prescriptive solutions in the 2004 and later editions. The code has lacked direction in the commercial section for determining U factors of cold-formed steel assemblies. Although the 2003 edition only contained this equation in the residential section, the assumptions underlying the methodology are equally applicable to commercial buildings. The same calculation procedure is recognized in ASHRAE 90.2. It is also the same methodology used by the ASHRAE 90.1 envelope subcommittee in developing the U factor tables in Appendix Table A.3.3 (Assembly U-Factors for Steel-Framed Walls) for non-residential buildings. Inclusion of the equation and correction factors in this section of the IECC will provide users with a calculation method without the need to refer to additional references for U-factors of conventional C-shaped steel stud walls. It will enable calculations with varying levels of cavity and continuous insulation for compliance with the envelope requirements in Section C402.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Provides a methodology to calculate U-factors not currently in the code for steel frame construction.

Assembly Action: **None**

Public Comments

Public Comment:

Duane Jonlin, City of Seattle, Department of Planning and Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.1.2.1 Thermal resistance of cold-formed steel walls. U-factors of walls with cold-formed steel studs shall be permitted to be determined in accordance with Equation 4-X:

$U = 1/[R_s + (\underline{ER})\ \cancel{(R_{ins} \times F_c)}]$ **Equation 4-X**

Where:

R_s = The cumulative R-value of the wall components along the path of heat transfer, excluding the cavity insulation and steel studs.

ER = The effective R-value of the cavity insulation with steel studs

~~R_{ins} = The R-value of the cavity insulation.~~

~~F_c = The correction factor from Table 402.2.3~~

TABLE C402.2.3

~~F_c~~ EFFECTIVE R-VALUES FOR STEEL STUD WALL ASSEMBLIES

Nominal stud depth (inches)	Spacing of framing (inches)	Cavity R-Value (insulation)	Correction factor (F_c)	Effective R-Value (ER) (Cavity R-Value x F_c)
3-1/2	16	13	0.46	5.98
		15	0.43	6.45
3-1/2	24	13	0.55	7.15
		15	0.52	7.80
6	16	19	0.37	7.03
		21	0.35	7.35
6	24	19	0.45	8.55
		21	0.43	9.03
8	16	25	0.31	7.75
	24	25	0.38	9.50

Commenter's Reason: We support the concept of this code change. However, it will be clearer and more effective if a new "effective R-Value" column is added to the table, so that applicants and code officials are not required to do the arithmetic each time they use the table. They will be able to see the effective R-value of insulated metal stud walls at a glance. This will reduce calculation errors and save time for everyone.

Final Hearing Results

CE85-13 **AMPC**

Code Change No: CE88-13

Original Proposal

Section(s): C402.1, C402.1.3 (NEW)

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD) (lkranz@bellevuewa.gov)

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 <u>or Section C402.1.3</u> shall be permitted as an alternative to the R-values specified in Section C402.1.1.

<u>**C402.1.3 Component performance alternative.** Building envelope values and fenestration areas determined in accordance with Equation 4-3 shall be permitted in lieu of compliance with the U-factors, F-factors and C-factors in Tables C402.1.2 and C402.3 and the maximum allowable fenestration areas in Section C402.3.1.</u>

<u>(UA Sum) + (FL Sum) + (CA Sum) + (XVG) + (XSky) ≤ Zero.</u> <u>**(Equation 4-3)**</u>

<u>Where:</u>

<u>UA Sum = Sum of the (UA Dif) values for each assembly that comprises a portion of the building thermal envelope.</u>
<u>UA Dif = (UA Proposed) – (UA Table).</u>
<u>UA Table = (Maximum allowable U-factor specified in Table C402.1.2 or Table C402.3) x (Area).</u>
<u>UA Proposed = (Proposed U-value) x (Area).</u>

<u>FL Sum = Sum of the (FL Dif) values for each slab on grade assembly that comprises a portion of the building thermal envelope.</u>
<u>FL Dif = (FL Proposed) – (FL Table).</u>
<u>FL Table = (Maximum allowable F-factor specified in Table C402.1.2) x (Perimeter length).</u>
<u>FL Proposed = (Proposed F-value) x (Perimeter length) .</u>

<u>CA Sum = Sum of the (CA Dif) values for each below-grade wall assembly that comprises a portion of the building thermal envelope.</u>
<u>CA Dif = (CA Proposed) – (CA Table).</u>
<u>CA Table = (Maximum allowable C-factor specified in Table C402.1.2) x (area).</u>
<u>CA Proposed = (Proposed C-value) x (area).</u>

<u>XVG (Excess Vertical Glazing Value) = (XVGArea x UVG) – (XVGArea x UWall), but not less than zero.</u>
<u>XVGArea (Excess Vertical Glazing Area) = (Proposed Vertical Glazing Area) – (Allowable Vertical Glazing Area deterimined in accordance with Section C402.3.1).</u>
<u>UA Wall = Sum of the (UA Proposed) values for each opaque assembly comprising a portion of the exterior wall.</u>
<u>UWall = UA Wall / total opaque exterior wall area.</u>
<u>UA VG = Sum of the (UA Proposed) values for each vertical glazing assembly.</u>
<u>UVG = UA VG / total vertical glazing area.</u>

<u>XSky (Excess Skylight Value) = (XSArea X USky) – (XSArea x U Roof), but not less than zero.</u>

XSArea (Excess Skylight Area) = (Proposed Skylight Area) – (Allowable Skylight Area determined in accordance with Section C402.3.1).
UA Roof = Sum of the (UA Proposed) values for each opaque assembly comprising a portion of a roof.
URoof = UA Roof / total opaque roof area.
UA Sky = Sum of the (UA Proposed) values for each skylight assembly.
USky = UA Sky / total skylight area.

Reason: This proposal provides an Alternative component performance path for commercial buildings parallel to the "Total UA Alternative" for residential buildings in Section R402.1.4, but accounting for slab edge F-factors, basement wall C-Factors, and fenestration areas in excess of the code limits.

This optional path provides significant additional flexibility for design teams, allowing them to trade off the U values of various building envelope components, without having to do a full Total Building Performance computation. The calculation can be done by an architect or engineer using a simple calculator. It is variation of a widely-used method in the Washington State code, and results in lower overall costs and more design freedom without any sacrifice of energy conservation.

The formula allows various envelope components to be traded off against each other, provided that the overall calculated building heat loss of the proposed design is no greater than a code-compliant design. Thus, greater window area might be acceptable with lower window U-values, or wall insulation might be reduced in certain areas while roof insulation is increased.

The five principal factors in the equation are:

- (UA Sum) The sum of the U-value for each envelope assembly times its area.
- (FL Sum) The sum of the F-value for each slab edge assembly times its length.
- (CA Sum) The sum of the C-value for each basement wall assembly times its area.
- (XSky) Additional amount for skylight area in excess of code maximum – Substitutes the average roof U-value for the average skylight U-value in the base case for the excess skylight area.
- (XVG) Additional amount for vertical glazing area in excess of maximum – Substitutes the average wall U-value for the average vertical glazing U-value in the base case for the excess vertical glazing area

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Three proposals (CE86 through CE88-13) proposed different ways to allow a UA tradeoff approach. The committee felt that the formula may be too complicated for those without engineering background to be able to enforce. There was concern that not all elements of the design are properly captured.

Assembly Action: **None**

Public Comments

Public Comment:

Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 or Section C402.1.3 shall be permitted as an alternative to the R-values specified in Section C402.1.1.

C402.1.3 Component performance alternative. Building envelope values and fenestration areas determined in accordance with Equation 4-3 shall be permitted in lieu of compliance with the U-factors, F-factors and C-factors in Tables C402.1.2 and C402.3 and the maximum allowable fenestration areas in Section C402.3.1.

A + B + C + D + E ≤ Zero **(Equation 4-3)**

Where:

A = Sum of the (UA Dif) values for each distinct assembly type of the building thermal envelope, other than slabs on grade and below-grade walls
UA Dif = UA Proposed – UA Table
UA Proposed = Proposed U-value x Area

UA Table = (U-factor from Table C402.1.2 or Table C402.3) x Area

B = Sum of the (FL Dif) values for each distinct slab on grade perimeter condition of the building thermal envelope
FL Dif = FL Proposed – FL Table
FL Proposed = Proposed F-value x Perimeter length
FL Table = (F-factor specified in Table C402.1.2) x Perimeter length

C = Sum of the (CA Dif) values for each distinct below-grade wall assembly type of the building thermal envelope
CA Dif = CA Proposed – CA Table
CA Proposed = Proposed C-value x Area
CA Table = (Maximum allowable C-factor specified in Table C402.1.2) x Area

Where the proposed vertical glazing area is less than or equal to the maximum vertical glazing area allowed by Section C402.3.1, the value of D (Excess Vertical Glazing Value) shall be zero. Otherwise:
D = (DA x UVG) – (DA x UWall), but not less than zero.
DA = (Proposed Vertical Glazing Area) – (Vertical Glazing Area allowed by Section C402.3.1)
UA Wall = Sum of the (UA Proposed) values for each opaque assembly of the exterior wall
UWall = Area-weighted average U-value of all above-grade wall assemblies
UAV = Sum of the (UA Proposed) values for each vertical glazing assembly
UV = UAV / total vertical glazing area

Where the proposed skylight area is less than or equal to the skylight area allowed by Section C402.3.1, the value of E (Excess Skylight Value) shall be zero. Otherwise:
E = (EA X US) – (EA x URoof), but not less than zero.
EA = (Proposed Skylight Area) – (Allowable Skylight Area from Section C402.3.1)
URoof = Area-weighted average U-value of all roof assemblies
UAS = Sum of the (UA Proposed) values for each skylight assembly
US = UAS / total skylight area

Commenter's Reason: Please see the example calculation at the end of this comment. This formula was revised and simplified in response to Committee and membership concerns that it appeared too complex.
The component performance path is clearly valuable for commercial buildings. The evidence is straightforward: in Washington State, where a similar UxA calculation has been available for decades, almost every commercial project in the state makes use of it. It allows envelope heat loss to be calculated using a simple spreadsheet (see attached for example) instead of using either COMcheck or a full-blown Total Building Performance analysis. It provides design flexibility and cost savings while maintaining the same limits on heat loss. It provides a compliance path that does not depend on continued DOE funding for COMcheck.

This proposal provides a component performance path for commercial buildings similar to the "Total UA Alternative" for residential buildings in Section R402.1.4, but accounting for slab edge F-factors, basement wall C-Factors, and fenestration areas in excess of the code limits.

Component Performance								
	Example building: 2-story building with 10,000 SF each floor, 10,000 SF exterior wall area, 5,000 SF floor over parking, no basement walls, and 40% vertical glazing (instead of code max 30%). In this case, the extra glazing area is accommodated in the design by use of a triple-glazed curtain wall.							
	Formula: (A + B + C + D + E ≤ Zero)							
		Area	Proposed U-value	Proposed UA (U xArea)	Table U-factor	Table UA (U x Area)	UA Dif (Proposed UA - Table UA)	**Totals**
	roof - insul above deck	10000	0.03	300	0.034	340	-40	
	wall 1 - mass wall	6000	0.09	540	0.078	468	72	
	wall 2 - steel stud	4000	0.055	220	0.055	220	0	
	floor - framed	5000	0.029	145	0.029	145	0	
	skylight	100	0.5	50	0.5	50	0	
	VG 1 - alum curtain wall	3000	0.22	660	0.38	1140	-480	
	VG 2 - wood framed	1000	0.3	300	0.3	300	0	
A	**Sum of the (UA Dif) values for envelope assemblies**						-448	**-448**

		Length of slab edge	Proposed F-value	Proposed FxLength	Table F-factor	Table FxLength	FL Dif	
	slab edge - perimeter	200	0.54	108	0.528	105.6	2.4	
	slab edge - at garage	100	0.62	62	0.528	52.8	9.2	
B	**Sum of the (FL Dif) values for both slab-on-grade perimeter conditions**						11.6	**11.6**
C	**(no basement walls in this design)**							**0**
	Uwall	0.076	= Area-weighted avg U-value of above-grade wall assemblies					
	UAV	960	= Sum of the (UA Proposed) values for each vertical glazing assembly					
	UV	0.24	= UAV / total vertical glazing area					
	DA	1000	= (Proposed VG Area) – (VG Area allowed by Section C402.3.1)					
	VGA	4000	= Proposed Vertical Glazing Area					
	Allow VG Area	3000	= 30% max from Section C402.3.1					
	Wall Area	10000	= Gross wall area					
	UA Wall	760	= Uwall x Wall Area)					
D	**Excess vert glazing area**	**164**	(DA x UVG) – (DA x UWall) - Zero if ≤ zero					**164**
E	**Excess skylight area**	(Proposed skylight area is less than allowable area, so value is zero)						**0**
Component Performance: (A + B + C + D + E) - OK since less than zero.								**-272**

Final Hearing Results

CE88-13 **AMPC**

Code Change No: CE91-13

Original Proposal

Section(s): Table C402.1.2, Table C402.2

Proponent: Michael D. Fischer, Kellen Company, representing Polyisocyanurate Insulation Manufacturers Association (mfischer@kellencompany.com)

Revise as follows:

Table C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS

Climate Zone	1		2		3		4		5		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
								Roofs								
Insulation entirely above deck	U-0.048	~~U-0.048~~ U-0.039	~~U-0.048~~ U-0.039	~~U-0.048~~ U-0.039	~~U-0.048~~ U-0.039	~~U-0.048~~ U-0.039	~~U-0.039~~ U-0.032	~~U-0.039~~ U-0.032	~~U-0.039~~ U-0.032	~~U-0.039~~ U-0.032	U-0.032	U-0.032	U-0.028	U-0.028	U-0.028	U-0.028

(Portions of Table not shown remain unchanged)

Table C402.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS

Climate Zone	1		2		3		4		5		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
								Roofs								
Insulation entirely above deck	R-20ci	R-~~20~~ 25ci	R-~~20~~ 25ci	R-~~20~~ 25ci	R-~~20~~ 25ci	R-~~20~~ 25ci	R-~~25~~ 30ci	R-~~25~~ 30ci	R-~~25~~ 30ci	R-~~25~~ 30ci	R-30ci	R-30ci	R-~~30~~ 35ci	R-35ci	R-35ci	R-35ci

(Portions of Table not shown remain unchanged)

Reason: This proposal modifies the thermal envelope requirements for above-deck roof insulation to be consistent with the recently revised ASHRAE 90.1 Addendum bb. The change is necessary to ensure that the IECC is at least as efficient as 90.1

Cost Impact: The code change proposal will increase the cost of construction. This proposal will increase the initial cost of construction, but will result in reduced energy costs that will result in a short payback.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee concluded that the current minimums in the code are adequate and there is no need to increase stringency at this time.

Assembly Action: **None**

Public Comment

Public Comment:

Michael D. Fischer, Kellen Company, representing Polyisocyanurate Insulation Manufacturers Association, requests Approval as Submitted.

Commenter's Reason: Each year about 2.5 billion square feet of roof coverings are installed on existing buildings, representing about 75% of the overall roofing market. Unlike other opaque envelope components, roofing is unique with so much of the market in existing buildings. Because most roof replacement projects do not involve alterations to other portions of the building envelope, the code should provide consistent R-Value requirements. With IECC and ASHRAE 90.1 values diverging in some climate zones, permit applicants can look for the lesser insulation requirement and pick an R-Value from either set of requirements.

It seems illogical that permit applicants can complete their design in this manner. And, since the overall envelope requirements for the IECC and ASHRAE 90.1 are evaluated based on whole building design using new construction as the baseline assumption, it makes no sense to allow roofing applicants to shop the code for the lowest R-Value when replacing the roof. With the selection of roof insulation resulting in a decision that will determine building energy usage for decades, we have to get it right.

Final Hearing Results

CE91-13 **AS**

Code Change No: CE94-13

Original Proposal

Section(s): Table C402.1.2

Proponent: Martha G. VanGeem, representing Masonry Alliance for Codes and Standards

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Walls, Above Grade																
Mass	~~U-0.142~~ U-0.151	~~U-0.142~~ U-0.151	~~U-0.142~~ U-0.151	U-0.123	~~U-0.110~~ U-0.123	U-0.104	U-0.104	U-0.090	U-0.078	U-0.078	~~U-0.078~~ U-0.080	U-0.071	~~U-0.061~~ U-0.071	U-0.061	U-0.061	U-0.061

(Portions of Table not shown remain unchanged)

Reason: According to Section 402.1 of the IECC, the criteria are the R-values specified in Section 402.1.1. The U-factors in Section 402.1.2 are an alternate compliance path. IECC Section 402.1.1 states that the R-values are in Tables C402.2 and C402.3. Therefore, the values in Table 402.2 are the main requirements and Table C402.1.2 lists alternates that should correspond to values in Table C402.2. Most of the mass wall criteria in both of these tables, C402.2 and C402.1.2, are based on the criteria in *ASHRAE/IES Standard 90.1-2010*.

In the last edition of the IECC, errors were introduced into Table C402.1.2 for Climate Zones 1, 2, 3, 6, and 7 for "Mass Walls, Above Grade." (Corrections to values in Climate Zone 5 are submitted in a separate proposal.)

- For Climate Zone 6, in the governing criteria table C402.2, the requirement is R-13.3ci for the row for "Mass Walls, Above Grade" and the column "Climate Zone 6, All Other." According to *ASHRAE/IES Standard 90.1-2010*, Table 5.5-6, the U-factor that corresponds to an R-value of R-13.3ci is 0.080, not 0.078.
- For Climate Zone 7, the corresponding U-factor for R-15.2ci is 0.071 not 0.061. This is shown in Table 5.5-7 of *ASHRAE 90.1-2010*. This is also demonstrated by the U-factor for Climate Zone 6 "Group R", which also has a requirement for R-15.2ci in Table 402.2 and a U-factor of 0.071 in Table 402.1.2 as shown above.
- For Climate Zone 3 "All other", the corresponding U-factor for R-7.6ci is 0.123, not 0.110. This is shown in Table 5.5-3 for Climate Zone 3 of *ASHRAE 90.1-2010.* This is also demonstrated by the U-factor for Climate Zone 2 "Group R", which also has a requirement for R-7.6ci in Table 402.2 and a U-factor of 0.123 in Table 402.1.2 as shown above.
- For Climate Zones 1 "All other" and "Group R" as well as Climate Zone 2 "All other," the corresponding U-factor for R-5.7ci is 0.151, not 0.142. This is shown in Tables 5.5-1 and 5.5-2 of *ASHRAE 90.1-2010.*

Correcting these U-factors will make the IECC less confusing and thereby simplify it and increase its use.

Therefore, the U-factors should be changed as shown in Table 402.1.2 for the row for "Mass Walls, Above Grade" for the Climate Zones 1, 2, 3, 6, and 7 to correct these errors.

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal corrects values in the table.

Assembly Action: **None**

Final Hearing Results

CE94-13	**AS**

Code Change No: CE95-13

Original Proposal

Section(s): Table C402.1.2

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Walls, Above Grade																
Mass	U-0.142	U-0.142	U-0.142	U-0.123	U-0.110	U-0.104	U-0.104	U-0.090	~~U-0.078~~ U-0.090	~~U-0.078~~ U-0.080	U-0.078	U-0.071	U-0.061	U-0.061	U-0.061	U-0.061

(Portions of Table not shown remain unchanged)

Reason: According to Section 402.1 of the IECC, the criteria are the R-values specified in Section 402.1.1. The U-factors in Section 402.1.2 are an alternate compliance path. IECC Section 402.1.1 states that the R-values are in Tables C402.2 and C402.3. Therefore, the values in Table 402.2 are the main requirements and Table C402.1.2 lists alternates that should correspond to values in Table C402.2.

In the last edition of the IECC, errors were introduced into Table C402.1.2 for Climate Zones 5 and Marine 4 for "Mass Walls, Above Grade." In the governing criteria table C402.2, the requirement is R-11.4ci for the row for "Mass Walls, Above Grade" and the column "Climate Zones 5 and Marine 4, All Other." This is the same criteria as for one cell to the left, "Mass Walls, Above Grade" and the column "Climate Zones 4 except Marine, Group R." The U-factor that corresponds to an R-value of R-11.4ci is 0.090, not 0.078, as indicated by the value in "Climate Zones 4 except Marine, Group R."

Most of the mass wall criteria in both of these tables, C402.2 and C402.1.2, are based on the criteria in *ASHRAE/IES Standard 90.1-2010*. For "All other," the corresponding R-value in *90.1-2010* for nonresidential in Table 5.5-5 for Climate Zone 5 on page 30 is R-11.4ci and the corresponding U-factor is 0.90. Therefore the U-factor in C402.1.2 for "All other" should be 0.090 for mass walls in "Climate Zones 5 and Marine 4". In addition, for "Group R," the corresponding R-value in *90.1-2010* in Table 5.5-5 for Climate Zone 5 on page 30 is R-13.3ci and the corresponding U-factor is 0.80. Therefore the U-factor in C402.1.2 for "Group R" should be 0.080. These values will remain the same in *90.1-2013*. Correcting these U-factors will make the IECC less confusing and thereby simplify it and increase its use.

Therefore, in Table 402.1.2 for the row for "Mass Walls, Above Grade" and the column "Climate Zones 5 and Marine 4," the U-factor should be changed to 0.090 for "All other" and the U-factor should be changed to 0.080 for "Group R" to correct these errors.

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal corrects values in the table. Action consistent with approval of CE95-13.

Assembly Action: **None**

Final Hearing Results

CE95-13	**AS**

Code Change No: CE96-13

Original Proposal

Section(s): Table C402.1.2, Table C402.2, C402.2.5

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Floors																
Mass[c]	U-0.322	U-0.322	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051

(Portions of Table not shown remain unchanged)

a. Opaque assembly U-factors, C-factors, and F-factors from ASHRAE 90.1 Appendix A shall be permitted provided the construction complies with the applicable construction details from ASHRAE 90.1 Appendix A.
b. Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.
c. “Mass floors” shall include floors weighing not less than:
   1. 35 psf (170 kg/m^2) of floor surface area; or
   2. 25 psf (120 kg/m^2) of floor surface area where the material weight is not more than 12 pounds per cubic foot (pcf) (1900 kg/m^3).

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Floors																
Mass[h]	NR	NR	R-6.3ci	R-8.3ci	R-10ci	R-10ci	R-10ci	R-10.4ci	R-10ci	R-12.5ci	R- 12.5ci	R-12.5ci	R-15ci	R-16.7ci	R-15ci	R-16.7ci

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm ci = Continuous insulation. NR = No requirement.
LS = Liner System- A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

a. Assembly descriptions can be found in ASHRAE 90.1 Appendix A.
b. Where using *R*-value compliance method, a thermal spacer block is required, otherwise use the *U*-factor compliance method in Table C402.1.2.
c. R-5.7 ci is allowed to be substituted with concrete block walls complying with ASTM C 90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in./h-f^2 F.
d. Where heated slabs are below grade, below-grade walls shall comply with the exterior insulation requirements for heated slabs.
e. Steel floor joist systems shall ~~to~~ be insulated to R-38.
a. "Mass floors" shall include floors weighing not less than:
   1. 35 psf (170 kg/m^2) of floor surface area; or
   2. 25 psf (120 kg/m^2) of floor surface area where the material weight is not more than 12 pounds per cubic foot (pcf) (1900 kg/m^3).

C402.2.5 Floors over outdoor air or unconditioned space. The thermal properties (component *R*-values or assembly *U*-, *C*- or *F*-factors) ~~resistance (*R*-value) of the insulating material installed either between the floor framing or continuously on the floor assembly~~ of floor assemblies over outdoor air or unconditioned space shall be as specified in Table C402.1.2 or C402.2, based on the construction materials used in the floor assembly.

~~"Mass floors" shall include floors weighing not less than:~~

1. ~~35 psf (170 kg/m^2) of floor surface area; or~~
2. ~~25 psf (120 kg/m^2) of floor surface area if the material weight is not more than 12 pcf (1,900 kg/m^3).~~

Reason: This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 2 open meetings and over 15 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code. Detailed reasons for this proposal are as follows:

a) This proposal moves and clarifies, but does not delete the requirements of Section C402.2.5 of the 2012 IECC.
b) In the I-Codes, text should not rely on section titles for application. Therefore, the information in the title was added to the code text.
c) The first sentence in Section C402.2.5 is revised to clarify that the provisions for floors over outdoor air or unconditioned space are also applicable to the assembly U-, C- and F-factors of Table C402.1.2.
d) The original language of Section C402.2.4 did not clearly indicate what the "mass floor" requirements were relevant or related to. These requirements are more appropriately and clearly applied as footnotes to Tables C402.1.2 and C402.2. By moving the information to the appropriate tables, unintentional non compliance will decrease (compliance will increase).

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

Public Hearing Results

The following errata were not posted to the ICC website. The first printing of the 2012 IECC has an incorrect value in the second 'definition' of mass floors. It shows 12 pcf where 120 is the correct value. The changes below reflect the correct value.

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

c. "Mass floors" shall include floors weighing not less than:

1. 35 psf (170 kg/m^2) of floor surface area; or
2. 25 psf (120 kg/m^2) of floor surface area where the material weight is not more than ~~12~~ 120 pounds per cubic foot (pcf) (1900 kg/m^3).

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

f. "Mass floors" shall include floors weighing not less than:

1. 35 psf (170 kg/m^2) of floor surface area; or
2. 25 psf (120 kg/m^2) of floor surface area where the material weight is not more than ~~12~~ 120 pounds per cubic foot (pcf) (1900 kg/m^3).

C402.2.5 Floors over outdoor air or unconditioned space. The thermal properties (component *R*-values or assembly *U*-, *C*- or *F*-factors) ~~resistance (*R*-value) of the insulating material installed either between the floor framing or continuously on the floor assembly~~ of floor assemblies over outdoor air or unconditioned space shall be as specified in Table C402.1.2 or C402.2, based on the construction materials used in the floor assembly.
~~"Mass floors" shall include floors weighing not less than:~~

1. ~~35 psf (170 kg/m^2) of floor surface area; or~~
2. ~~25 psf (120 kg/m^2) of floor surface area if the material weight is not more than 120 pcf (1,900 kg/m^3).~~

(Portions of proposal not shown remain unchanged)

Committee Action: Approved as Submitted

Committee Reason: The proposal clarifies the application of the values in both tables, by providing a description of what are mass walls as a footnote to the tables. It replaces text which is somewhat disconnected in a section of the code.

Assembly Action: None

Final Hearing Results

CE96-13 AS

Code Change No: CE101-13

Original Proposal

Section(s): Table C402.1.2

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Walls, Below Grade																
Below-grade wall [b]	C-1.140[d]	C-1.140[d]	C-1.140[d]	C-1.140[d]	C-1.140[d]	C-1.140[d]	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.119	C-0.092	C-0.092	C-0.092	C-0.092
Floors																
Mass	U-0.322[d]	U-0.322[d]	U-0.107	U-0.087	U-0.076	U-0.076	U-0.076	U-0.074	U-0.074	U-0.064	U-0.064	U-0.057	U-0.055	U-0.051	U-0.055	U-0.051
Joist/Framing	U-0.066[d]	U-0.066[d]	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033	U-0.033 [e]	U-0.033	U-0.033 [e]	U-0.033[e]	U-0.033[e]
Slab-on-Grade Floors																
Unheated slabs	F-0.73[d]	F-0.73[d]	F-0.73[d]	F-0.73[d]	F-0.73[d]	F-0.73[d]	F-0.54	F-0.54	F-0.54	F-0.54	F-0.54	F-0.52	F-0.40	F-0.40	F-0.40	F-0.40
Heated slabs	F-0.70[c]	F-0.70[c]	F-0.70[c]	F-0.70[c]	F-0.70[c]	F-0.70[c]	F-0.65[c]	F-0.65[c]	F-0.58[c]	F-0.58[c]	F-0.58[c]	F-0.58[c]	F-0.55[c]	F-0.55[c]	F-0.55[c]	F-0.55[c]

a. Use of opaque assembly *U*-factors, *C*-factors, and *F*-factors from ASHRAE 90.1 Appendix A shall be permitted provided the construction complies with the applicable construction details from ASHRAE 90.1 Appendix A.

b. Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.

c. Evidence of compliance with the *F-factors* indicated in the table for heated slabs shall be demonstrated by the application of the unheated slab *F*-factors and R-*values* derived from ASHRAE 90.1 Appendix A.

d. These *C*-, *F*- and *U-factors* are based on assemblies that are not required to contain insulation.

(Portions of Table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal does not contain technical changes. Its purpose is to clarify the intent and application of the code provisions. Detailed reasons for this proposal are as follows:

a. Reason for footnote c: Footnote c is necessary because the heated slab F-factor values in Table C402.1.2 do not match those in ASHRAE 90.1. ASHRAE 90.1 Appendix A values in Table A6.3, Assembly F-Factors for Slab on Grade Floors, reflect much higher F-factors for heated slabs with a specific R-value, as opposed to unheated slabs with the same R-value. Heated slabs lose more energy due to the input of heat directly into the slab. Therefore, more insulation is needed in a heated slab to provide the same resistance to heat loss (and therefore the same heat loss rate). IECC 2012 Table C402.1.2 heated slab F-factor values are closer to the unheated slab values in ASHRAE Appendix A. This proposal corrects Table C402.1.2 heated-slab f-factors to align with 90.1 Appendix A. If using the 2012 Table 402.1.2, correlating the IECC F-factor to an equivalent R-value via ASHRAE Appendix A, would require significantly more insulation than the IECC prescriptive R-value. Example: Heated slab in Climate Zone 3, per C402.1.2 requires an F-factor of F-0.70, or a prescriptive R-10 for 24” below. In the 90.1-2010 Appendix A tables, an equivalent to F-0.70 for heated slabs would require R-20 for 48” below, doubling the prescriptive IECC R-value and depth. The existing C402.12 F-factors for Climate Zones 5 and higher correlate to ASHRAE Appendix A insulation levels that prohibit the use of slab edge insulation; only a fully insulated slab can meet the F-0.58 or lower (derived from Table C402.1.2 and correlated to 90.1). Whereas the most restrictive slab edge R-value via IECC prescriptive tables is R-20 for 48” below. ASHRAE’s best slab edge F-factor is for R-30 for 48” below (only F-0.659).
b. Footnote “d” has been added to clarify that all specific C-, F- and U-factors that are followed by the “d” superscript are factors for assemblies that do not contain insulation. Note that Table C402.2 indicates “NR” (Not Required) for all equivalent applications. This will save time for users by not requiring them to go to ASHRAE 90.1 Appendix A to verify for themselves that the end result is that no insulation is required in these scenarios.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code’s prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides clarification of the table without introducing any technical changes. The result should be easier enforcement.

Assembly Action: **None**

Final Hearing Results

CE101-13 **AS**

Code Change No: CE103-13

Original Proposal

Section(s): C402.1.1, C402.1.2, C402.2.7, Table C402.1.2, Table C402.2

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.1.1 Insulation and fenestration criteria. ~~The~~ *Building thermal envelope* opaque assemblies shall meet the requirements of Tables C402.2 and C402.3 based on the climate zone specified in Chapter 3. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *R*-values from the "Group R" column of Table C402.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *R*-values from the "All other" column of Table C402.2. Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table C402.3 shall comply with the building envelope provisions of ANSI/ASHRAE/IESNA 90.1. Doors having less than 50 percent glass area shall be considered opaque doors. Opaque swinging doors shall comply with Table C402.1.2 and opaque roll-up or sliding doors shall comply with Table C402.1.1.

C402.1.2 *U*-factor alternative. An opaque assembly with a *U-factor*, *C*-factor, or *F*-factor equal or less than that specified in Table C402.1.2 shall be permitted as an alternative to the *R*-values in Table C402.2. Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the *U*-factor, *C*-factor, or *F*-factor from the "Group R" column of Table C402.1.2. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the *U*-factor, *C*-factor or *F*-factor from the "All other" column of Table C402.1.2. Doors having less than 50 percent glass area shall be considered opaque doors. Opaque swinging doors shall comply with Table C402.1.2 and opaque roll-up or sliding doors shall comply with Table C402.1.1.

~~**C402.2.7 Opaque doors.** Opaque doors (doors having less than 50 percent glass area) shall meet the applicable requirements for doors as specified in Table C402.2 and be considered as part of the gross area of above-grade walls that are part of the building envelope.~~

TABLE C402.1.2
OPAQUE THERMAL ENVELOPE ASSEMBLY MAXIMUM REQUIREMENTS, U-FACTOR METHOD[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R	All other	Group R
Heated slabs	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.70	F-0.65	F-0.65	F-0.58	F-0.58	F-0.58	F-0.58	F-0.55	F-0.55	F-0.55	F-0.55
Opaque Doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37

(Portions of Table not shown remain unchanged)

TABLE C402.2
OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, R-VALUE METHOD[a]

Climate Zone	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Opaque Doors																
~~Swinging~~	~~U-0.61~~	~~U-0.61~~	~~U-0.61~~	~~U-0.61~~	~~U-0.61~~	~~U-0.61~~	~~U-0.61~~	~~U-0.61~~	~~U-0.37~~	~~U-0.37~~	~~U-0.37~~	~~U-0.37~~	~~U-0.37~~	~~U-0.37~~	~~U-0.37~~	~~U-0.37~~
Roll-up or Sliding	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

(Portions of Table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this proposal are as follows:

a) This proposal is intended to clarify the use and application of the codes prescriptive building thermal envelope provisions and does not contain changes to the technical requirements of the code.

b) The information related to opaque doors in the code is confusing. Doors are only found in Table C402.2 which is supposed to be the table addressing R values. But R-values are only provided for roll-up and sliding doors, but not for swinging doors. For swinging doors it provides a U-factor. U-factors are commonly listed in Table C402.1.2, but this latter table has no provisions for doors.

c) This proposal moves the U-factor information for swinging doors to the U-factor table, but leaves the R-values for Roll-up or sliding doors in the R-value table (C402.2). It also and adds language to the text of Sections C402.1.1 and C402.1.2 that directs users from one table to the other for the information related to opaque doors that is not contained in each respective table. (i.e., Section C402.1.1 is revised to direct users to Table C402.1.2 for opaque swinging door thermal information and Section C402.1.2 has been revised to direct users to Table C402.2 for opaque roll-up or sliding door thermal requirements.

d) The opaque door requirements of existing Section C402.2.7of the 2012 IECC are directly related to the application of Sections C402.1.1 and C402.1.2 and their associated tables. The current scenario, however, is disjointed as there is no direct connection in Sections C402.1.1 or C402.1.2 to Section C402.2.7. Therefore, users are often unaware of the connection. As a result of the current disjointed arrangement of the opaque door provisions, Section C402.7 tends to be overlooked. This proposal clarifies the relationship by moving (not deleting) the information related to opaque doors from Section C402.2.7 directly into the sections they are related to: Sections C402.1.1 and C402.1.2.

e) With the R-value and U-factor information relegated to the proper tables by this proposal, it clears the way for the titles to be revised to clearly indicate their proper application. The existing text titles do not indicate a) which method they are associated with or b) whether the values in the tables are intended to be applied as maximum or

f) minimum values. Furthermore, while Table 402.1.2 appropriately indicates that it applies to assemblies, Table C402.2 does not indicate whether it is applicable to entire assemblies or to insulation components. Therefore, this proposal:

a. Revises the title of Table C402.1.2 to indicate that it contains ***maximum*** requirements, while the title of Table C402.2 is revised to indicate that it contains ***minimum*** requirements. This information differs for each table, is not intuitive to all users (many users incorrectly assume both tables contain maximum values) and is critical to the proper application of these tables.
b. Adds "R-VALUE METHOD" to the title of Table C402.2 and "U-FACTOR METHOD" to the title of Table C402.1.2. This reinforces the proper application of the tables with their respective methods. Note that existing Footnote "b" to Table C402.2 describes these methods in exactly this way.
c. Adds the words "insulation component" to the title of Table C402.2 in order to further clarify its application. Once again, unlike Table 401.1.2, Table C402.2 is not applicable to entire assemblies.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides clarification to the table without resulting in any technical changes.

Assembly Action: **None**

Final Hearing Results

CE103-13 **AS**

Code Change No: CE104-13

Original Proposal

Section(s): Table C402.1.2, Chapter 5

Proponent: Mark Nowak, M. Nowak Consulting LLC, representing Steel Framing Alliance

Revise as follows:

TABLE C402.1.2
OPAGUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS[a, b]

a. Use of Opaque assembly U-factors, C-factors, and F-factors from ANSI/ASHRAE/IESNA 90.1 Appendix A shall be permitted, provided the construction, excluding the cladding system on walls, complies with the appropriate construction details from ANSI/ASHRAE/ISNEA 90.1 Appendix A.

b. Opaque assembly U-factors based on designs tested in accordance with ASTM C1363 shall be permitted. Modifications to the test results shall be permitted based on the addition or subtraction of building components on the exterior of the framing of the original tested design.

~~b~~c. Where heated slabs are below grade, below-grade walls shall comply with the F-factor requirements for heated slabs.

(Portions of table not shown remain unchanged)

Add new standard to Chapter 5 as follows:

ASTM

ASTM C 1363-11 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

Reason: This proposal accomplishes three objectives. First it clarifies that one can use the ASHRAE 90.1 Appendix A U-Factors for compliance even if the siding system differs from the stucco siding system assumed in 90.1. The R-value of stucco is insignificant (approximately R 0.08) and choice of other siding should not disallow use of the 90.1 Appendix tables. For many assemblies, 90.1 is the only source of U-factors. This proposal will broaden their use without any significant impact on energy use.

Second, this proposal recognizes results of hot box laboratory tests conducted in accordance with ASTM C1363 for compliance with the code. Tested assemblies represent the best available data for assemblies and they should be recognized as acceptable for compliance.

Third, the proposal recognizes that hot box tests are costly and time consuming and it is not feasible or necessary to test every possible configuration but only the base assembly. A base assembly consists of the wall framing and cavity insulation with or without interior gypsum board or exterior sheathing. The U-factor of assemblies that differ from the base assembly in terms of different claddings, exterior continuous insulation, and sheathings can be calculated by adding or subtracting component R-values as long as changes are not made to the framing factor or the R-value of the cavity insulation.

The proposed test standard can be viewed by the committee through the ASTM website set up specifically to facilitate review of proposals to the ICC codes.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, ASTM C 1363-2011 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Public Hearing Results

For staff analysis of the content of ASTM C1363-11 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf.

Committee Action: Approved as Modified

Modify the proposal as follows:

b. Opaque assembly U factors based on designs tested in accordance with ASTM C1363 shall be permitted. ~~Modifications to the test results~~ The R-value of continuous insulation shall be permitted to be added to or subtracted from ~~based on the addition or subtraction of building components on the exterior of the framing of~~ the original tested design.

(Portions of proposal not shown remain unchanged)

Committee Reason: The change brings into the code the proper test procedure for hot box laboratory tests of opaque assemblies.

Assembly Action: None

Final Hearing Results

CE104-13	**AM**

Code Change No: CE105-13

Original Proposal

Section(s): C402.2, C402.2.1 (NEW)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.2 Specific building thermal envelope insulation requirements (Prescriptive). ~~Opaque assemblies shall comply with Table C402.2.~~ Insulation in building thermal envelope opaque assemblies shall comply with Sections C402.2.1 through C402.2.8 and Table C402.2.

C402.2.1. Multiple layers of continuous insulation board. Where two or more layers of continuous insulation board are used in a construction assembly, the continuous insulation boards shall be installed in accordance with Section C303.2. If the continuous insulation board manufacturer's installation instructions do not address installation of two or more layers, the edge joints between each layer of continuous insulation boards shall be staggered.

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this proposal are as follows:

a) This proposal clarifies the application of these sections and makes no technical changes.
b) The intent of the code is that the provisions of Section C402.2 and its subsections are to apply to both of the code's prescriptive building thermal envelope methods (the R-value and U-factor methods), not just the R-value method indicated in the existing text by its reference solely to Table C402.2.
c) In addition, this proposal breaks out the specific requirement for continuous insulation into a separate subsection, which agrees conceptually with the format of the other current subsections of Section C402.2.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Provides clarification of the envelope provisions of the code without any technical changes.

Assembly Action: **None**

Final Hearing Results

CE105-13	**AS**

Code Change No: CE109-13

Original Proposal

Section(s): Table C402.2

Proponent: Robert A. Zabcik, NCI Building Systems, representing self

Revise as follows:

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE	
	All Other	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**	**All Other**	**Group R**
ROOFS								
Insulation entirely above deck	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-20ci	R-25ci	R-25ci
Metal Buildings ~~(with R-5 thermal blocks)~~[a,b]	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS	R-19 + R-11 LS
Attic and other	R-38	R-38	R-38	R-38	R-38	R-38	R-38	R-38

(Portions of Table not shown remain unchanged)

For SI: 1 inch = 25.4 mm. ci = Continuous insulation. NR = No requirement.
LS = Liner System—A continuous membrane installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the membrane between the purlins.

a. Assembly descriptions can be found in ANSI/ASHRAE/IESNA Appendix A.
b. Where using *R*-value compliance method, a thermal spacer block shall be provided, otherwise use the *U*-factor compliance method in Table C402.1.2.

Reason: The purpose of this proposal is to correct an error. The requirement of R-5 thermal blocks for the referenced assemblies is not correct. According to Appendix A of ASHRAE 90.1-2010 (as referenced in footnote a and as qualified in Chapter 5 of the Commercial Provisions of IECC) the reference liner system has a minimum R-3.5 thermal block. Rather than change the table to reflect R-3.5, it is proposed to eliminate the statement completely since the thermal block requirement is very clearly stated in the 90.1 Appendix already. To repeat the requirement in this table further introduces a maintenance issue, especially considering the fact that many state codes incorporate this table verbatim. This has caused a problem in the North Carolina energy code, for instance. For convenience, the pertinent ASHRAE 90.1 Appendix A passage is repeated below and the R factor requirement bolded:

> **A2.3.2.4 *Liner System* (Ls).** A continuous vapor barrier liner is installed below the purlins and uninterrupted by framing members. Uncompressed, unfaced insulation rests on top of the liner between the purlins. For multilayer installations, the first *rated R-Value of insulation* is for unfaced insulation draped over purlins and then compressed when the metal *roof* panels are attached. A minimum **R-3.5**. thermal spacer block between the purlins and the metal *roof* panels is required when specified in Table A2.3.

Cost Impact: The code change proposal will not increase the cost of construction. This to correct an error.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal corrects an error in the table. Thermal blocks should not be required for metal building construction.

Assembly Action: **None**

Final Hearing Results

CE109-13	**AS**

Code Change No: CE111-13

Original Proposal

Section(s): Table C402.2

Proponent: Joseph R. Hetzel, P.E., Thomas Associates, Inc., representing the Door & Access Systems Manufacturers Association (DASMA) International (jhetzel@thomasamc.com)

Revise as follows:

TABLE C402.2
OPAQUE THERMAL ENVELOPE REQUIREMENTS[a]

CLIMATE ZONE	1		2		3		4 except Marine		5 & Marine 4		6		7		8	
	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Opaque Doors																
Swinging	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.61	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37	U-0.37
~~Roll-up or sliding~~ Non-swinging	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75	R-4.75

(Portions of Table not shown remain unchanged)

Reason: "Non-swinging" is a better term to use since it not only would distinguish these types of doors from "swinging doors", but the term encompasses sectional garage doors as well as rolling ("roll-up") doors and sliding doors. "Non-swinging" is also used in ASHRAE 90.1.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal replaces an out-of-date term with one now consistently used in the industry.

Assembly Action: **None**

Final Hearing Results

CE111-13 **AS**

Code Change No: CE114-13

Original Proposal

Section(s): C402.2.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.2.1 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.2, based on construction materials used in the roof assembly. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

Exceptions:

1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly with the *R*-value specified in Table C402.2.
2. Unit skylight curbs included as a component of ~~an NFRC 100 rated assembly~~ <u>a skylight listed and labeled in accordance with NFRC 100</u> shall not be required to be insulated.

Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

Reason: The term "rated" is generally understood but the correct presentation of the criterion is that the assembly be listed and labeled in accordance with NFRC 100. This proposal clarifies when a skylight curb can be exempted from meeting the requirements for insulating the curb.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides a technical correction to the wording for the referenced standard and the required listing of assemblies.

Assembly Action: **None**

Final Hearing Results

CE114-13 **AS**

Code Change No: CE115-13

Original Proposal

Section(s): C402.2.1

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

C402.2.1 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table C402.2, based on construction materials used in the roof assembly. Skylight curbs shall be insulated to the level of roofs with insulation entirely above deck or R-5, whichever is less.

Exceptions:

1. Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25 mm) or less and where the area-weighted *U*-factor is equivalent to the same assembly with the *R*-value specified in Table C402.2.
2. Where tapered insulation is used with insulation entirely above deck, the *R*-value where the insulation thickness varies 1 inch (25 mm) or less from the minimum thickness of tapered insulation shall comply with the *R*-value specified in Table C402.2

~~2~~ 3. Unit skylight curbs included as a component of an NFRC 100 rated assembly shall not be required to be insulated.

Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

Reason: This code change proposal is intended to clarify the Code's intent how R-value is determined when using slope-to-drain tapered insulation systems in roof assemblies using the insulation entire above deck configuration.

The *2012 IECC Code and Commentary* indicates Exception 1 is intended to address tapered insulation systems in insulation entire above deck configurations. The Commentary's text on this specific topic is as follows:

> "The exception to this section permits a roof that is "continuously insulated" to have areas that do not meet the required *R*-values, provided that the area weighted values are equivalent to the specified insulation values. This type of insulation referred to as a tapered installation is where the roof insulation thickness varies to provide slope for drainage. Therefore, while one section may have less insulation due to this slope, other portions of the roof would be above the values required. Therefore, in this situation the weighted average of the insulation would meet the required values even though some portions may be less than that specified in Table C402.2. When applying the exception, it is important to notice that the variation in insulation thickness is limited to 1 inch (25 mm). This limitation on the thickness variation will help ensure more consistent insulation coverage and also reduce the number of roofs that qualify to use this exception.
>
> This 1-inch (25 mm) limitation does not prevent the provisions from being applied to roofs that have a greater variation; it simply does not allow additional thickness to be factored into the average insulation values. Where the variation exceeds 1 inch (25 mm), it would be permissible to go to the thinnest spot and measure the *R*-value at that point (for the example call this Point "a"). Then go to a point that is 1 inch (25 mm) thicker than Point "a" and measure the *R*-value there (for the example, call this Point "b"). The remaining portions of the roof that are thicker than that additional 1-inch (25 mm) portion (Point "b") would simply be assumed to have the same *R*-value that Point "b" had. All portions of the roof that meet or exceed the Point "b" *R*-value would simply use the Point "b" *R*-value when determining the area weighted *U*-factor for the roof."

Simply put, this is confusing.

The proposed new Exception 2 is an attempt to provide clearer, more concise wording addressing tapered insulation systems in roof assemblies using the insulation entire above deck configuration.

This proposal keeps the existing Exception 1 intact as it may apply to situations other than tapered insulation systems in roof assemblies using the insulation entire above deck configuration.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies how compliance should be determined when insulation is tapered.

Assembly Action: **None**

Final Hearing Results

CE115-13	**AS**

Code Change No: CE117-13

Original Proposal

Section(s): C402.1, C402.1.1, Table C402.2.1.1

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Sections C402.1.1 and C402.3. Section C402.1.2 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1.

~~C402.2.1.1~~ C402.3 Roof solar reflectance and thermal emittance. Low-sloped roofs, with a slope less than 2 units vertical in 12 horizontal, directly above cooled *conditioned spaces* in Climate Zones 1, 2, and 3 shall comply with one or more of the options in Table ~~C402.2.1.1~~ C402.3.

Exceptions: The following roofs and portions of roofs are exempt from the requirements in Table C402.2.1.1:

1. Portions of roofs that include or are covered by:

   1.1. Photovoltaic systems or components.
   1.2. Solar air or water heating systems or components.
   1.3. Roof gardens or landscaped roofs.
   1.4. Above-roof decks or walkways.
   1.5. Skylights.
   1.6. HVAC systems, components, and other opaque objects mounted above the roof.
2. Portions of roofs shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings.
3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot (psf) (74kg/m^2) or 23 psf (117 kg/m^2) pavers.
4. Roofs where a minimum of 75 percent of the roof area meets a minimum

TABLE ~~C402.2.1.1~~ C402.3
MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS[a]

(Portions of Table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this proposal are as follows:

This section is currently located incorrectly under parent section C402.2, which addresses insulation. This section has nothing to do with insulation. Therefore, this proposal renumbers the section, relocating it in a manner that separates it from the insulation requirements. The table referenced in this section is also proposed to be renumbered to coordinate with the revised section number.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal relocates the requirements for solar reflectance so that it isn't confused with envelope provisions. The roofing solar reflectance is a distinct requirement.

Assembly Action: **None**

Final Hearing Results

CE117-13	**AS**

Code Change No: CE118-13

Original Proposal

Section(s): C202 (NEW), C402.2.1.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.2.1.1 Roof solar reflectance and thermal emittance. Low sloped roofs~~, with a slope less than 2 units vertical in 12 units horizontal,~~ directly above cooled conditioned spaces in Climate Zones 1, 2, and 3 shall comply with one or more of the options in Table C402.2.1.1.

> **Exceptions:** The following roofs and portions of roofs are exempt from the requirements in Table C402.2.1.1:
>
> 1. Portions of roofs that include or are covered by:
>   - 1.1. Photovoltaic systems or components.
>   - 1.2. Solar air or water heating systems or components.
>   - 1.3. Roof gardens or landscaped roofs.
>   - 1.4. Above-roof decks or walkways.
>   - 1.5. Skylights.
>   - 1.6. HVAC systems, components, and other opaque objects mounted above the roof.
> 2. Portions of roofs shaded during the peak sun angle on the summer solstice by permanent features of the building, or by permanent features of adjacent buildings.
> 3. Portions of roofs that are ballasted with a minimum stone ballast of 17 pounds per square foot (psf) (74 kg/m^2) or 23 psf (117 kg/m^2) pavers.
> 4. Roofs where a minimum of 75 percent of the roof area meets a minimum of one of the exceptions above.

Add new definition as follows:

LOW SLOPED ROOF. A roof having a slope less than 2 units vertical in 12 units horizontal.

Reason: This proposal simplifies criteria for low sloped roofs by adding a definition for the term "low slope roof." The current code text includes within it a definition that might be better placed in the definitions section of the code. Alternatively, if this is the only place the term is used, the need for a definition is moot if the text is then revised as "Roofs with a slope less than 2 units vertical in 12 units horizontal directly above…."

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal adds a welcome definition and should eliminate confusion between the IECC and the *International Residential Code* regarding low sloped roofs.

Assembly Action: **None**

Final Hearing Results

CE118-13 **AS**

Code Change No: CE119-13

Original Proposal

Section(s): Table C402.2.1.1, Chapter 5

Proponent: Sherry Hao, Energy Solutions, representing Cool Roof Rating Council (sherry@coolroofs.org)

Revise as follows:

TABLE C402.2.1.1
MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS[a]

b. Solar reflectance tested in accordance with ASTM C1549, ASTM E903, ~~or~~ ASTM E1918, or the CRRC-1 Standard.
c. Thermal emittance tested in accordance with ASTM C1371, ~~or~~ ASTM E408, or the CRRC-1 Standard.

(Portions of Table not shown remain unchanged)

Add new standard to Chapter 5 as follows:

CRRC Cool Roof Rating Council
1610 Harrison Street
Oakland, CA 94612

CRRC-1-12 CRRC-1 Standard

Reason: The Cool Roof Rating Council is recommending that another choice be integrated into the IECC. In this case the CRRC-1 Standard.

The Cool Roof Rating Council was created in 1998 to develop accurate and credible methods for evaluating and labeling the solar reflectance and thermal emittance (radiative properties) of roofing products and to disseminate the information to all interested parties. The CRRC is incorporated as a non-profit educational organization for the following purposes:

- To implement and communicate fair, accurate, and credible radiative energy performance rating systems for roof surfaces.
- To support research into energy related radiative properties of roofing surfaces, including durability of those properties.
- To provide education and objective support to parties interested in understanding and comparing various roofing options.

The CRRC-1 Standard is a testing standard that has many features which are attractive to roof product manufacturers which are beyond the ASTM standards already cited in this these provisions. This document:

- Defines and covers both initial and aged testing requirements
- Covers variegated, granular coated, and custom colored roof products
- Specifies roof product specimen preparation
- Addresses how to handle specimens which may be uncharacteristically damaged during testing
- Specifies the minimum contents of a testing report

This is not a proprietary document, as it is material neutral. This document is not specifically tied to the Cool Roof Rating Council “Product Rating Program”, but is designed to be independent of that program or any others.

This code change proposal does not attempt to remove the existing ASTM standards as industry in past code hearings has indicated that it wishes to retain those options currently available to them.

The standard is available at no charge at http://www.coolroofs.org for viewing or downloading.

Cost Impact: The code change proposal will not increase the cost of construction. None know.

Analysis: A review of the standard proposed for inclusion in the code, CRRC-1-2012 – CRRC-1 Standard, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Public Hearing Results

For staff analysis of the content of ANSI/CRRC-1-2012 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this proposal to confirm the action taken in CE121 to add the CRRC-1 Standard as well as retain the existing standards.

Assembly Action: **None**

Final Hearing Results

CE119-13 **AS**

Code Change No: CE121-13

Original Proposal

Section(s): Table C402.2.1.1, C402.1.1.1 (NEW), Chapter 5

Proponent: Robert A. Zabcik, P.E., NCI Building Systems, Inc., representing Cool Metal Roofing Coaliton

Revise as follows:

TABLE C402.2.1.1
MINIMUM ROOF REFLECTANCE AND EMITTANCE OPTIONS[a]

Three-year aged solar reflectance[b] of 0.55 and three-year aged thermal emittance[c] of 0.75
~~Initial solar reflectance[b] of 0.70 and initial thermal emittance[c] of 0.75~~
Three-year-aged solar reflectance index[d] of 64
~~Initial solar reflectance index[d] of 82~~

a. The use of area-weighted averages to meet these requirements shall be permitted. ~~Materials lacking initial tested values for either solar reflectance or thermal emittance, shall be assigned both an initial solar reflectance of 0.10 and an initial thermal emittance of 0.90.~~ Materials lacking three-year aged tested values for either solar reflectance or thermal emittance shall be assigned ~~both~~ a three-year aged solar reflectance in accordance with Section C402.2.1.1.1 ~~of 0.10~~ and a three-year aged thermal emittance of 0.90.

b. Aged s~~S~~olar reflectance tested in accordance with CRRC-1~~ASTM C 1549, ASTM E 903or ASTM E 1918~~.

c. Aged t~~T~~hermal emittance tested in accordance with CRRC-1~~ASTM C 1371 or ASTM E408~~.

d. Solar reflectance index (SRI) shall be determined in accordance with ASTM E 1980 using a convection coefficient of 2.1 Btu/h × ft2 ×°F (12W/m^2 × K). Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance. ~~Calculation of initial SRI shall be based on initial tested values of solar reflectance and thermal emittance.~~

C402.2.1.1.1 Aged roof solar reflectance. Where an aged solar reflectance required by Section C402.2.1.1 is not available, it shall be determined in accordance with Equation 4-X.

$R_{aged} = [0.2+0.7(R_{initial}-0.2)]$ (Equation 4-X)

where:

R_{aged} = The aged solar reflectance

$R_{initial}$ = The initial solar reflectance determined in accordance with CRRC-1

Add new standard to Chapter 5 as follows:

CRRC Cool Roof Rating Council
1610 Harrison St
Oakland, CA 94612

CRRC-1 2012 Cool Roof Rating Council, CRRC-1 Standard

Reason: The use of initial values for compliance with solar reflectance (SR) and thermal emittance (TE) requirements as opposed to three-year aged values is not representative of real-word conditions. Weathering of most roofing materials greatly changes the SR and to a lesser degree, the TE, as documented by Lawrence Berkeley and Oak Ridge National Laboratories. The California Energy Commission (CEC) Title 24 Building Energy Efficiency Standards has addressed this issue very effectively since 2005. By requiring 3-year aged SR and TE values, a more realistic SRI is obtained; one that represents the performance of the roofing material during the life of the material rather than at the time of installation. The Cool Roof Rating Council (CRRC) has simultaneously developed the CRRC-1 standard to rigorously qualify the test procedures used to measure SR and TE, as well as the aging process. Thus, referencing the CRRC-1 standard is much more thorough than simply referencing the ASTM test methods used to measure SR and TE directly. The CRRC has recently been ANSI accredited to develop standards, further adding credibility.

The CRRC-1 standard uses the same test methods as the 2012 IECC, with the exception of ASTM E 408, which measures direct normal TE using a handheld device. (ASTM C 1371 measures the TE averaged over a hemisphere and the two methods can yield greatly different results.) Energy Star has recently dropped ASTM E408 as well. Furthermore, the test procedures are further qualified to ensure consistency across all tested roofing products, including variegated products such as granule coated shingles. The aging process has absolutely no qualification as currently specified in the IECC. The CRRC-1 Standard very effectively addresses this gap as well by specifying multiple test farms sites and accrediting labs to age and test specimens for SR and TE. It also outlines a color family program that allows manufacturers of colored products to group and test their products in representative lots. The downside is that the aging process takes three years. However, the CEC has included the aging formula presented in proposed new Section C402.2.1.1.1 since 2005 to predict aged values, which is also introduced in this proposal to provide values to use before testing is completed. This formula is based on a curve fit of the CRRC dataset and provides aged values of SR with conservatism and accuracy.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, CRRC-1-2012 – CRRC-1 Standard, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Public Hearing Results

For staff analysis of the content of ANSI/CRRC-1-2012 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Modified**

Modify the proposal as follows:

b. Aged solar reflectance tested in accordance with <u>ASTM C 1549, ASTM E 903, ASTM E 1918 or</u> CRRC-1.
c. Aged thermal emittance tested in accordance with <u>ASTM C 1371, ASTM E 408 or</u> CRRC-1.

(Portions of proposal not shown remain unchanged)

Committee Reason: The modification retains the existing testing standards so that products which had been tested under them don't need to be retested under CRRC-1. The proposal was accepted by the committee as providing a method by which aged solar reflectance can be determined where testing hasn't been completed. The proposal is a compatible addition to the revision to the section approved in CE122-13.

Assembly Action: **None**

Final Hearing Results

CE121-13 **AM**

Code Change No: CE124-13

Original Proposal

Section(s): C202 (New), C402.2.2, C402.2.2.1, C402.2.2.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Delete without substitution as follows:

~~**C402.2.2 Classification of walls.** Walls associated with the building envelope shall be classified in accordance with Section C402.2.2.1 or C402.2.2.2.~~

~~**C402.2.2.1 Above-grade walls.** Above-grade walls are those walls covered by Section C402.2.3 on the exterior~~
~~of the building and completely above grade or walls that are more than 15 percent above grade.~~

~~**C402.2.2.2 Below-grade walls.** Below-grade walls covered by Section C402.2.4 are basement or first-story walls associated with the exterior of the building that are at least 85 percent below grade.~~

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

WALL, ABOVE-GRADE. A wall associated with the *building thermal envelope* that is more than 15 percent above grade and is on the exterior of the building or any wall that is associated with the *building thermal envelope* that is not on the exterior of the building.

WALL, BELOW-GRADE. A wall associated with the basement or first story of the building that is part of the *building thermal envelope* , is at least 85 percent below grade and is on the exterior of the building.

Reason: In order to clarify and simplify the code, this proposal replaces the current text indicating how to determine a wall classification with a formal definition of each wall type

Section C402.2.2 contains only definitions that are more appropriately located in Section C202. Application of the current Sections C402.2.3 (above grade walls) and C402.2.4 (below grade walls) are clear as to requirements and can be readily and more easily applied by locating the definitions of those terms in the definitions section as opposed to another section of the code.

The current code provisions are technically incorrect. They refer to the building envelope (not the defined term building thermal envelope) and the exterior of the building. This omits any wall that is an interior wall that is part of the building thermal envelope, which is where the heat transfer occurs that the code is intending to address. Examples of this are a stairway wall separating an unconditioned basement from a conditioned first floor or a wall separating a conditioned basement from a vented crawl space. A strict application of the current code would eliminate such walls from having to be insulated because they are neither on the building exterior nor associated with the building envelope. The proposed definitions, therefore, cover all possible walls that could be part of the building thermal envelope (those bounded completely or partially by earth, those exposed to the outdoor elements and not bounded by earth, and those separating conditioned from unconditioned or exempt spaces regardless of location in relation to grade) in a clearer manner.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: As with CE123-13, the committee is concerned that the existing definitions of above grade wall and basement wall and introduction of these two new definitions will result in confusion in application of the code. While the committee did approve a modification to remove the definition of Above Grade Wall, in the end there remained unresolved issues.

Assembly Action: **Approved as Modified**

Modify the proposal as follows:

~~**ABOVE-GRADE WALL.** A wall more than 50 percent above grade and enclosing conditioned space. This includes between-floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.~~

(Portions of proposal not shown remain unchanged)

Public Comments

Public Comment 1:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

SECTION C202
GENERAL DEFINITIONS

~~**ABOVE-GRADE WALL.** A wall more than 50 percent above grade and enclosing conditioned space. This includes between-floor spandrels, peripheral edges of floors, roof and basement knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and skylight shafts.~~

~~**BASEMENT WALL.** A wall 50 percent or more below grade and enclosing conditioned space.~~

WALL, ABOVE-GRADE. A wall associated with the *building thermal envelope* that is more than 15% above grade and is on the exterior of the building or any wall that is associated with the *building thermal envelope* that is not on the exterior of the building.

WALL, BELOW-GRADE. A wall associated with the basement or first story of the building that is part of the *building thermal envelope*, is at least 85% below grade and is on the exterior of the building.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: At the code development hearing, it was noted that the current code has a conflict wherein the definitions of above grade wall and basement wall, and the provisions in Sections C402.2.2.1 and C402.2.2.2 treat walls differently. The former being a 50/50 threshold, and the latter two being a 15/85 threshold. In addition, and more importantly, the former do not clearly indicate how a wall below grade and not on the building exterior but which is part of the building thermal envelope (e.g. interior wall in a basement separating a conditioned basement from a vented crawl space) is to be classified. It was noted that the intent was to also delete the current definitions of above-grade wall and basement wall, and a floor modification to do that was approved for consideration and voted for by the committee 6-3.

During testimony on the change, there were questions about the 15/85 threshold and disagreement that a wall that might be over 15% above grade but less than 50% above grade would or should be considered an above grade wall. While this might be, it remains that the code currently delineates above and below grade walls based on more than 15% above grade in Sections C402.2.2.1 and C402.2.2.2. So whether the issue of above and below grade walls is covered in the code text or a definition as proposed in CE124-13, any concern associated with a 50/50 versus 15/85 threshold is not related to this code change proposal but would require a change in the current code. This change simply proposes to put what are definitions in the definitions section, as opposed to having them located within the technical requirements of the code. It is important to note that the term 'basement wall' appears outside Chapter 2 of the IECC Commercial provisions (definitions) only once – in Section C303.2.1 where referring to protecting insulation on the exterior of basement walls – a likely unintended carryover from the separation of residential and commercial building provisions in the 2012 edition, where basement walls is used and applied to residential buildings. The thermal criteria in Chapter 4 of the IECC Commercial Provisions consistently refer to walls above-grade and walls-below grade and never use the term basement wall.

This change is simply about correcting a significant conflict within the code that is causing confusion. The existence of two conflicting ways to designate above and below grade walls and basement walls can be traced back to the prior editions of the IECC, where the commercial section (Chapter 5) had the 15/85 threshold covered in the text of the code, and the definitions of above-grade wall and basement wall were in the definitions section; intending to apply to the residential provisions of the IECC in Chapter 4. When the residential and commercial provisions were fully separated in the 2012 IECC the definitions of above-grade wall and basement wall and the 50/50 threshold associated with them was carried forward in error. In short – whether this code change proposal is approved as modified or not, the code will still have a 15/85 and 50/50 issue. The code change proposal, as modified and approved with a floor vote of 30-16 at least makes the following improvements, which are not covered in the current code:

- clarifies this conflicting percentage of wall issue for commercial buildings,
- confirms that the threshold is 15/85,
- confirms that the proper place to address that is as a definition, and

- provides specific direction for interior walls that separate conditioned and unconditioned space and are below grade but not on the building exterior,

In disapproving the change, the committee expressed concern about resulting confusion in the application of the code. The code change **as modified** removes any confusion, because it (1) removes terms that are not needed and not used in a relevant manner in the IECC Commercial Provisions, and (2) defines terms that are used identical to how they are "defined" in the body of the code. If anything, the current code is confusing as noted above by having the definition of above grade wall and basement, and then not using those terms in a relevant manner. It is further confusing by including conflicting criteria defining above and below grade walls in the body of the code. In recommending disapproval, the committee noted there were unresolved issues in the proposal. The only remaining unresolved issue is the removal of the term basement wall in the definitions section, which is addressed by this public comment.

Also of relevance, there were three other code change proposals submitted that relate to these definitions; all of which were recommended for disapproval. CE45-13 would retain the current definitions of above-grade wall and basement wall but change the 50/50 threshold to 15/85. This would ensure the consistency of the definitions to the criteria in C402.2.2.1 and C402.2.2.2 but could still result in confusion given the terms are then essentially defined in both Section C202 and those sections. CE123-13, if approved, as submitted would have the same result as the approval of CE124-13 as modified by this public comment. CE125-13 would not address this issue, as the definitions in Section C202 for above-grade wall and basement wall would be retained and the conflict would remain.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

CE124-13 **AMPC1**

Code Change No: CE126-13

Original Proposal

Section(s): C402.2.3

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.2.3 Thermal resistance of above-grade walls. The minimum thermal resistance (R-value) of the insulating materials installed in the wall cavity between the framing members, where required, and continuously on the walls, where required, shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The R-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table 402.2.

"Mass walls" shall include walls weighing not less than:

1. 35 psf (170 kg/m2) of wall surface area; or
2. 25 psf (120 kg/m2) of wall surface area if the material weight is not more than 120 pounds per cubic foot (pcf) (1900 kg/m3).

Reason: This proposal clarifies the provisions in the code related to above-grade walls. The current code indicates that the insulation is to be applied between framing members and continuously on the wall. This is never the case for mass walls where only continuous insulation is to be applied and for wood framed walls in some climate zones continuous insulation may not be required to be applied, depending on the insulation option chosen in Table C402.2. Adding the words "where required" allows for cases where either but not both are required or where both are required.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee found the changes to improve the readability of the code provisions.

Assembly Action: **None**

Final Hearing Results

CE126-13 **AS**

Code Change No: CE127-13, Part I

Original Proposal

Section(s): C402.2.3, R402.2.5 (IRC N1102.2.5)

Proponent: James D. Katsaros, PhD, DuPont Building Innovations (james.d.katsaros@dupont.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C402.2.3 Thermal resistance of above-grade walls. The minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table C402.2.

"Mass Walls" shall include walls weighing not less than:

1. 35 psf (170 kg/m^2) of wall surface areas; ~~or~~
2. 25 psf (120 kg/m^2) of wall surface area if the material weight is not more than 120 pound per cubic foot (pcf) (1900 kg/m^3), or
3. Having a heat capacity greater than or equal to 6 BTU/ft^2 x ^oF [123 kJ/m^2 x K].

Reason: This proposal adds a heat capacity provision to mass wall definition to be consistent with IRC definition

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The lead in language is that mass walls are those that weigh a certain amount, but the proposed text is not a measurement of weight. There was concern that the proposal contained the correct factor for the heat capacity. The proposal needs to be reformatted.

Assembly Action: None

Public Comments

Public Comment:

Martha VanGeem, representing Masonry Alliance of Codes and Standards; Theresa A. Weston, PhD., DuPont Building Innovations, request Approval as Modified by this Public Comment

Modify the proposal as follows:

C402.2.3 Thermal resistance of above-grade walls. The minimum thermal resistance (*R*-value) of the insulating materials installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table C402.2, based on framing type and construction materials used in the wall assembly. The *R*-value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table C402.2.

"Mass Walls" shall include walls ~~weighing not less than~~:

1. weighing not less than 35 psf (170 kg/m^2) of wall surface areas; or
2. weighing not less than 25 psf (120 kg/m^2) of wall surface area if the material weight is not more than 120 pound per cubic foot (pcf) (1900 kg/m^3), or
3. having a heat capacity exceeding 7 Btu/ft^2·°F ~~greater than or equal to 6 BTU/ft^2 x °F~~ [144 ~~123~~ kJ/m^2 x K], or
4. having a heat capacity exceeding 5 Btu/ft^2·°F [103 kJ/m^2 x K], where the material weight is not more than 120 pound per cubic foot (pcf) (1900 kg/m^3).

Commenter's Reason:
Van Geem: The energy-saving benefits of thermal mass are not based on the weight of the wall or the heat capacity, but on the thermal diffusivity. It is thermal diffusivity or its combined components of thermal conductivity, specific heat, and density that are entered into simulation software to model thermal mass. A simplification of this to ease code compliance is allowing mass walls to be defined differently for different wall weights (as already in the IECC in items (1) and (2) above) or different heat capacities (as in the code change proposal and this comment). Items (1) and (3) are technically equivalent for mass walls, as are items (2) and (4). This proposal is consistent with the definitions for mass walls used in ASHRAE 90.1.

A paper providing more information has been published on this subject and is available upon request:
VanGeem, M.G., "Optimal Thermal Mass and R-Value in Concrete," First International Conference on Concrete Sustainability, Tokyo, May 2013.

Weston: The original proposal sought to add to the code a better understanding of thermal "mass walls". During the earlier hearings, as was noted in the committee's reason statement, there was a discussion on the correct usage of heat capacity in the determination of a mass wall. The modification corrects the usage of heat capacity and was arrived at after discussion with industry experts. The modification also corrects the formatting issue stated in the committee's comments.

Final Hearing Results

CE127-13, Part I AMPC

Code Change No: CE128-13

Original Proposal

Section(s): C402.2.4

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.2.4 Thermal resistance of below-grade walls. The minimum thermal resistance (R-value) of the insulating materials installed ~~in, or~~ continuously within or on the below-grade walls shall be as specified in Table C402.2 and shall extend to a depth of not less than 10 feet (3048 mm) below the outside finish ground level, or to the level of the floor of the conditioned space enclosed by the below-grade wall, whichever is less.

Reason: This proposal clarifies where and how insulation is to be installed on below-grade walls. The term "installed in or continuously on" is potentially confusing in that it infers that the insulation could be inside the wall but not necessarily continuous. The proposal also clarifies where the 'depth of burial' measurements are to be made.

Where insulation is required, the current code requires it to be continuous insulation. The term "installed in, or" is potentially confusing in that it infers that the insulation could be inside the wall but not necessarily continuous. The proposed change ensures that regardless of the location of the insulation, the insulation that is applied must be continuous as provided in Table C402.2. As a minimum code, it is more appropriate to state measurements such as depth of burial as minimums that can be exceeded rather than a single "one length only" criterion. The term "floor" can be clarified further to indicate what floor is being considered. For instance, a wall separating an unconditioned crawl space from a conditioned basement or below-grade room could be a below-grade wall bounded by two floors (one in the conditioned space and the grade in the crawl space). The proposed text ensures there is no confusion as to what floor the insulation depth is to be measured.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the text and therefore the application of the code.

Assembly Action: **None**

Final Hearing Results

CE128-13	**AS**

Code Change No: CE129-13

Original Proposal

Section(s): C402.2.5

Proponent: Joseph Lstiburek, Building Science Corporation, representing self

Delete and substitute as follows:

~~**C402.2.5 Floors over outdoor air or unconditioned space.** The minimum thermal resistance (*R*-value) of the insulating material installed either between the floor framing or continuously on the floor assembly shall be as specified in Table C402.2, based on construction materials used in the floor assembly.~~

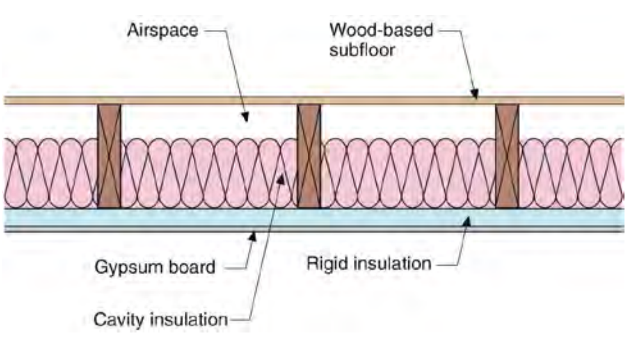
~~"Mass floors" shall include floors weighing not less than:~~

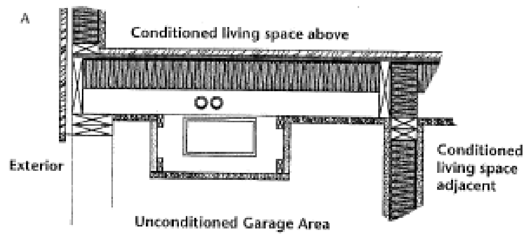
1. ~~35 psf (170 kg/m^2) of floor surface area; or~~
2. ~~25 psf (120 kg/m^2) of floor surface area if the material weight is not more than 12 pcf (1,900 kg/m^3).~~

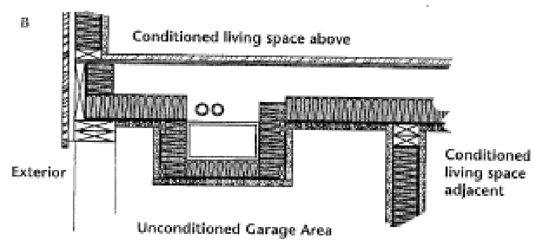
C402.2.5 Floors. Floor framing cavity insulation or structural slab insulation shall be installed to maintain permanent contact with the underside of the subfloor decking or structural slabs.

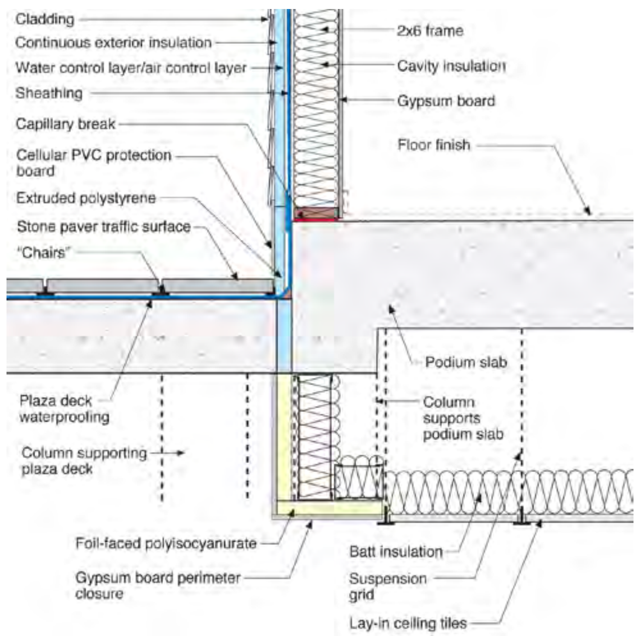
> **Exception:** The floor framing cavity insulation or structural slab insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing when combined with insulation that meets or exceeds the minimum Metal framed or Wood framed and other Walls, Above Grade, R-value in Table C402.1.2 and extends from the bottom to the top of all perimeter floor framing or floor assembly members.

Reason: Requiring insulation in floors to be in direct contact with the underside of subfloor decking or structural slabs is one insulating option. Another option is to have an airspace between the floor sheathing and structural slabs and the top of the cavity insulation where this cavity insulation is in direct contact with the topside of sheathing or continuous insulation installed on the underside of the floor framing and is combined with perimeter insulation that meets or exceeds the R-value requirements for walls. This second option leads to fewer cold spots yet does not change the heat loss as long as the cavity insulation is in direct contact with a sheathing below it or continuous insulation below it. It also facilitates services to be enclosed within the thermal envelope. Examples of these configurations are illustrated below:









Cost Impact: This code change proposal will not increase the cost of construction. This proposal will not raise the cost of construction.

Public Hearing Results

Committee Action: Approved as Modified

Modify the proposal as follows:

C402.2.5 Floors. Floor framing cavity insulation or structural slab insulation shall be installed to maintain permanent contact with the underside of the subfloor decking or structural slabs. The minimum thermal resistance (R-value) of the insulating material installed either between the floor framing or continuously on the floor assembly shall be as specified in Table C402.2, based on construction materials used in the floor assembly.

> **Exception:** The floor framing cavity insulation or structural slab insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor assemblies ~~framing~~ where combined with insulation that meets or exceeds the minimum Metal framed or Wood framed or other Walls, Above Grade, R-value specified in Table C402.1.2 and that extends from the bottom to the top of all perimeter floor framing or floor assembly members.

"Mass floors" shall include floors weighing not less than:

1. 35 psf (170 kg/m^2) of floor surface area; or
2. 25 psf (120 kg/m^2) of floor surface area if the material weight is not more than 120 pcf (1,900 kg/m^3).

Committee Reason: The modification restores existing text that the proponent did not intend to delete. The new provisions provide a practical solution to floor construction.

Assembly Action: **None**

Final Hearing Results

CE129-13	**AM**

Code Change No: CE130-13

Original Proposal

Section(s): C402.2.5

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.2.5 Floors ~~over outdoor air or unconditioned space~~. The minimum thermal resistance (R-value) of the insulating materials installed either between the floor framing or continuously on the floor assembly shall be as specified in Table C402.2, based on construction materials used in the floor assembly. Insulation applied on the underside of the floor assembly facing outdoor air or unconditioned space shall be installed to maintain permanent contact with the underside of the floor assembly.

> **Exception**: Insulation applied to the underside of concrete floor slabs shall be permitted an air space of not more than 1 inch where it turns up and is in contact with the underside of the floor under walls associated with the *building thermal envelope.*

Reason: There is no need to indicate in the title anything other than floors because the overall focus of Section 402 is the building thermal envelope, which as defined eliminates the need to further specify any particular conditions associated with the floor. In addition Table C402.2 to which this section refers for insulation provisions refers simply to "floors". The provisions in R402.2.5 are equally applicable to floor assemblies in commercial buildings where insulation batts for instance may be installed in a floor framing assembly. The need to eliminate a space between the insulation and the underside of the floor is equally applicable in commercial buildings, many of which use the same construction practices as residential buildings. The situation where concrete floor decks may need an air space to address moisture control is covered through an exception that is intended to permit such space but also ensure the insulation is in contact with the floor deck under walls associated with the building thermal envelope so as to cut off any "short circuit" around the floor insulation at the perimeter of the floor deck. This proposal ensures that insulation applied in floors over outside air or unconditioned spaces is in contact with the underside of the floor deck above.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

C402.2.5 Floors over outdoor air or unconditioned space. The minimum thermal resistance (R-value) of the insulating materials installed either between the floor framing or continuously on the floor assembly shall be as specified in Table C402.2, based on construction materials used in the floor assembly~~. Insulation applied on the underside of the floor assembly facing outdoor air or unconditioned space shall be installed to maintain permanent contact with the underside of the floor assembly.~~

> **Exception**: Insulation applied to the underside of concrete floor slabs shall be permitted an air space of not more than 1 inch where it turns up and is in contact with the underside of the floor under walls associated with the *building thermal envelope.*

Committee Reason: The proponent requested that the changes to the main paragraph be eliminated from this proposal because the changes provided in CE129-13 are preferred. Therefore this proposal is simply to add the exception for concrete slab insulation and to provide a second exception after that was approved in CE129. The committee agreed that the exception was needed to address concrete slab construction.

Assembly Action: **None**

Final Hearing Results

CE130-13 **AM**

Code Change No: CE131-13

Original Proposal

Section(s): C402.2.6

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.2.6 Slab~~s~~-on-grade perimeter insulation. Where the slab-on-grade is in contact with the ground**,** the minimum thermal resistance (*R*-value) of the insulation around the perimeter of unheated or heated slab-on-grade floors designed in accordance with the *R*-value method of Section C402.1.2 shall be as specified in Table C402.2. The insulation shall be placed on the outside of the foundation or on the inside of the foundation wall. The insulation shall extend downward from the top of the slab for a minimum distance as shown in the table or to the top of the footing, whichever is less, or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table. Insulation extending away from the building shall be protected by pavement or by a minimum of 10 inches (254 mm) of soil.

> **Exception:** Where the slab-on-grade floor is greater than 24 inches (61 mm) below the finished exterior grade, perimeter insulation is not required.

Reason: This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 2 open meetings and over 15 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The title of this section is proposed to be revised to clarify that:

a) Section C402.2.6 applies only to the perimeter insulation associated with slab-on-grade construction. This section does not apply to the insulation installed within or immediately above or below and in contact with the slab-on-grade construction.

b) Section C402.2.6 applies only to the R-value method in Section C402.1.1. It does not apply to the U-, C- and F-factor method in Section C402.1.2. (Note the ASHRAE 90.1 prescriptive tables referenced by Table C402.1.2 contain their own perimeter insulation requirements and are not reliant on Table C402.2.)

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal was found to be confusing, especially the proposed section title. F-factor is not addressed.

Assembly Action: **None**

Final Hearing Results

CE131-13 **AS**

Code Change No: CE133-13

Original Proposal

Section(s): C202 (NEW), C402.2.7

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

~~C402.2.7~~ C402.3.5 ~~Opaque d~~Doors. *Opaque doors* ~~(having less than 50% glass area)~~ shall meet the applicable requirements for doors as specified in Table C402.2 and be considered part of the gross area of above-grade walls that are part of the building *thermal* envelope. All other doors shall meet the provisions of Section C402.3.3 for vertical fenestration.

Add a definition as follows:

OPAQUE DOORS. Doors that are at least 50 percent opaque in surface area.

Reason: As currently defined, doors are considered fenestration regardless of the percentage of glazing they contain. As such, users of the code would logically begin to look for and address the requirements for doors in the fenestration section of the code. Instead the provisions for opaque doors (those with less than 50% glass area) are located in Section C402.2.7 covering opaque assemblies. One could conclude from a review of this provision in the opaque section of the code that any door with at least 50-percent glass area must be fenestration. This proposal **clarifies** when doors are considered part of the opaque wall and subject to thermal requirements for the wall, and when doors are fenestration and subject to those requirements.

Relocation of the door provisions to the fenestration section of the code is appropriate, and from there doors that are opaque can be correctly referred back to the sections of the code addressing opaque assemblies and components. Note also the term glass area technically precludes consideration of other non-opaque materials. The proposed code change addresses this by using opaque area as the metric.

Cost Impact: The code change proposal does not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides clarity to the code. The definition of this feature is essential.

Assembly Action: **None**

Final Hearing Results

CE133-13 **AS**

Code Change No: CE134-13

Original Proposal

Section(s): C202 (NEW), C402.2.8

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.2.8 Insulation of radiant heating systems. *Radiant* heating system panels~~,~~ and their associated components ~~U-bends and headers, designed for sensible heating of an indoor space through heat transfer from the thermally effective panel surfaces to the occupants or indoor space or thermal radiation and natural convection and the bottom surfaces of floor structures incorporating radiant heating~~ that are installed in interior or exterior assemblies shall be insulated with a minimum of R-3.5 (0.62 m2/K × W) on all surfaces not facing the space being heated. *Radiant heating system* panels that are installed in the *building thermal envelope* shall be separated from the exterior of the building or unconditioned or exempt spaces by not less than the R-value of insulation installed in the opaque assembly in which they are installed or the assembly shall comply with Section C402.1.2.

Exception: Heated slabs on grade insulated in accordance with Section C402.2.6.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

RADIANT HEATING SYSTEM. A heating system that transfers heat to objects and surfaces within a conditioned space primarily by infrared radiation.

Reason: This proposal clarifies that panels installed in building thermal envelope assemblies must be insulated in accordance with the requirements of the assembly in which they are installed. It also requires insulation of R-3.5 on the non-radiant surface when installed in interior assemblies and refer to the other applicable sections of the code for heated slab insulation. The objective of this proposal is to clarify language as radiant systems can be embedded in floor slabs or can be separate panels applied within wall or roof/ceiling assemblies.

In training sessions on the IECC conducted by the DOE Building Energy Codes Program it regularly comes up that the current provision in Section C402.2.8 conflicts with an R-5 requirement in the International Mechanical Code and the insulation requirements in the IECC for heated slabs. As heated slabs are different than radiant heating system panels and are already addressed in Section C402.2.8 the new exception is intended to address any confusion. Beyond heated slabs on grade, what remains are such systems and panels located within the building thermal envelope or within assemblies that are associated with the building interior but not the building thermal envelope. The proposed change clarifies that Section C402.2.7 applies to those conditions. It also clears up an interpretation issue. On the one hand, the current language can be interpreted to allow only R-3.5 on the back of a radiant panel installed within an exterior wall. On the other hand, the section could be interpreted to mean the radiant panel requires a minimum of R-3.5 no matter where installed, but does not relieve the requirement to provide the required insulation in an opaque wall assembly pursuant to the applicable provisions in Section C402.2. The proposed language makes it clear that the full insulation is required in the opaque wall where associated with the building thermal envelope. The intent of the building thermal envelope provisions is to minimize the heating loads on the building. It is not appropriate to reduce the required amount of insulation in an envelope assembly at the very location of such a heating system where a higher temperature difference occurs. In interior assemblies, the effectiveness of the radiant heating system is improved if heat loss to interior plenums or wall cavities is reduced. If the radiant system/panels cannot be located on an interior assembly and the satisfaction of the insulation level in an assembly associated with the building thermal envelope is challenging, then the option remains to use Section C402.1.2. The lengthy definitions of radiant heat embedded in the section are removed and a definition consistent with that in ANSI/ASHRAE/IES Standard 90.1-2010 for radiant heating systems is added to the IECC definitions.

If the current section is interpreted to require minimum insulation on radiant panels but not reduce any requirement for exterior wall insulation there will be no cost impact. Based on the interpretation that only R-3.5 is required for a radiant panel in an exterior wall, there may be a cost impact if the designer chooses to install such systems in building thermal envelope assemblies as opposed to other available interior assemblies. Additional cost could be incurred if providing the required insulation in a wall assembly where above the level of the currently required R-3.5. Where heaters are installed in exterior ceilings under an attic, there is very minimal additional cost to maintain the full attic insulation depth over the radiant panel. In actual practice, exterior wall installation is rare, as radiant heaters on the perimeter are typically installed inside the interior wall finish material. When installed in building thermal envelope assemblies, there is no reason why insulation equal to the same level as the remainder of the envelope assembly should not be required as the required level of insulation has been previously shown to be cost effective. Insulation adjacent to radiant panels will have a shorter payback due to the high temperature of the radiant panel compared to the space temperature that in turn increases the heat loss through the insulation.

Cost Impact: The code change proposal will increase the cost of construction in some buildings.

Note: The term 'radiant heating system' is not defined in other International Codes. However the term 'radiant heater' is defined in the IMC as follows:

RADIANT HEATER. A Heater designed to transfer heat primarily by direct radiation.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the placement of insulation and improves the enforceability of the code.

Assembly Action: **None**

Final Hearing Results

CE134-13 **AS**

Code Change No: CE137-13

Original Proposal

Section(s): C202 (NEW), C402.3, C402.3.1.1, C402.3.1.2, C402.3.2.1, C402.3.3.3, C402.3.3.4, Table C406.3, C408.3.1

Proponent: Jack Bailey, One Lux Studio, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. ~~Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.~~ *Daylight responsive controls* shall comply this section and Section C405.2.2.3.2.

C402.3.1.1 Increased vertical fenestration area with ~~daylighting controls~~ daylight responsive controls. In Climate Zones I through 6, a maximum of 40 percent of the gross above-grade wall area shall be permitted to be vertical fenestration, provided:

1. No less than 50 percent of the conditioned floor area is within a daylight zone;
2. ~~Automatic daylighting controls~~ *Daylight responsive controls* are installed in daylight zones; and
3. Visible transmittance (VT) of vertical fenestration is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).

   Exception: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 3.

C402.3.1.2 Increased skylight area with ~~daylighting controls~~ daylight responsive controls. The skylight area shall be permitted to be a maximum of 5 percent of the roof area provided ~~automatic daylighting controls~~ *daylight responsive controls* are installed in daylight zones under skylights.

C402.3.2.1 Lighting controls in daylight zones under skylights. ~~All lighting in the daylight zone shall be controlled by multilevel lighting controls that comply with Section C405.2.2.3.3.~~ *Daylight responsive controls* shall be provided to control the electric lights within *daylight zones* under skylights.

~~**Exception:** Skylights above daylight zones of enclosed spaces are not required in:~~

1. ~~Buildings in Climate Zones 6 through 8.~~
2. ~~Spaces where the designed *general lighting* power densities are less than 0.5 W/ft^2 (5.4 W/m^2).~~
3. ~~Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 am and 4 pm.~~
4. ~~Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.~~

C402.3.3.3 Increased skylight SHGC. In Climate Zones 1 through 6, skylights shall be permitted a maximum SHGC of 0.60 where located above daylight zones provided with ~~automated daylighting controls~~ *daylight responsive controls*.

C402.3.3.4 Increased skylight *U*-factor. Where skylights are installed above daylight zones provided with ~~automated daylighting controls~~ *daylight responsive controls*, a maximum *U*-factor of 0.9 shall be permitted in Climate Zones 1 through 3; and a maximum *U*-factor of 0.75 shall be permitted in Climate Zones 4 through 8.

TABLE C406.3
REDUCED INTERIOR LIGHTING POWER

(*Portions of Table not shown remain unchanged)*

a. In cases where both a general building area type and a more specific building area type are listed, the more specific building area type shall apply.
b. First LPD value applies if no less than 30 percent of conditioned floor area is in daylight zones. ~~Automatic daylighting controls~~ *Daylight responsive controls* shall be installed in daylight zones and shall meet the requirements of Section C405.2.2.3. In all other cases, second LPD value applies.
c. No less than 70 percent of the floor area shall be in the daylight zone. Automatic daylighting controls shall be installed in daylight zones and shall meet the requirements of Section 405.2.2.3.

C408.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. The construction documents shall state the party who will conduct the required functional testing. Where required by the code official, an approved party independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405.

Where occupant sensors, time switches, programmable schedule controls, photosensors or ~~daylighting controls~~ *daylight responsive controls* are installed, the following procedures shall be performed:

1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
3. Confirm that the placement and sensitivity adjustments of ~~photosensor~~ *daylight responsive controls* reduce electric light based on the amount of usable daylight in the space as specified.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides automatic control of electric light levels based on the amount of daylight in a space.

Reason: The terms "daylighting controls", "automatic daylighting controls", "automated daylighting controls" and "photosensor controls" are used interchangeably throughout the code but not defined. These terms are misleading because the controls they are describing do not control daylight, but rather they control electric lights in response to daylight. "Daylight responsive controls" is proposed to replace all of these terms.

The exceptions to C402.3.2.1 do not make any sense, as they are exceptions to the skylight requirement in the code, but Section C402.3.2.1 refers to daylighting controls, not skylights. The exact same list of exceptions appears under C402.3.2. We believe that including these exceptions under C402.3.2.1 was an unintentional oversight.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The terminology in the proposal is not the same as used by NEMA.

Assembly Action: **None**

Final Hearing Results

CE137-13	**AS**

Code Change No: CE139-13

Original Proposal

Section(s): C402.3, C402.3.1.1, C402.3.1.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. ~~Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.~~

C402.3.1.1 Increased vertical fenestration area with daylighting controls. In Climate Zones 1 through 6, a maximum of 40 percent of the gross above-grade wall area shall be permitted to be vertical fenestration, provided:

1. No less than 50 percent of the conditioned floor area is within a daylight zone;
2. Automatic daylighting controls complying with Section C405.2.2.3.2 are installed in daylight zones; and
3. Visible transmittance (VT) of vertical fenestration is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).

   Exception: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 3.

C402.3.1.2 Increased skylight area with daylighting controls. The skylight area shall be permitted to be a maximum of 5 percent of the roof area provided automatic daylighting controls complying with Section C405.2.2.3.2 are installed in daylight zones under the skylights.

Reason: This proposal clarifies daylighting control provisions associated with fenestration and increased skylight area and locate in a more appropriate subsection. The objective of this proposal is to clarify the code to foster implementation and compliance verification.

The primary purpose of the parent Section C402.3 is to introduce the provisions of the code related to fenestration. It is later on in the section that the issue of skylights and an increased skylight area allowance are addressed and the controls provisions then become relevant. The proposal simply locates the relevant daylighting control provisions in the code where they are specifically relevant.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the code by putting the references in the appropriate sections. The placement in the general provision of the section is misleading.

Assembly Action: **None**

Final Hearing Results

CE139-13 **AS**

Code Change No: CE140-13

Original Proposal

Section(s): C402.3, Table C402.3

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Sections C402.3 through C402.3.4 and Table C402.3. Automatic daylighting controls specified by this section shall comply with Section C405.2.2.3.2.

TABLE C402.3
BUILDING ENVELOPE FENESTRATION MAXIMUM U-FACTOR AND SHGC REQUIREMENTS~~:~~ ~~FENESTRATION~~

(Portions of Table not shown remain unchanged)

Reason: This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The following revisions are proposed to clarify the application of Table C402.3:

a) The word "maximum" is proposed to be added to the title of Table C402.3. Previously, many users incorrectly assumed that these were minimum values.
b) References to "Sections C402.3 through C402.3.4" were added to the text of Section C402.3 to clarify that these sections must be complied with in addition to the currently referenced Table C402.3 in order to satisfy the codes prescriptive fenestration requirements.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: This proposal is a clarification and, as such, will not increase the cost of construction. This code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides a better, more comprehensive, title to the table.

Assembly Action: **None**

Final Hearing Results

CE140-13 **AS**

Code Change No: CE142-13

Original Proposal

Section(s): Table C402.3, C402.3.3, C402.3.3.1, Table C402.3.3.1

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov); Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee and Aluminum Extruders Council (culp@birchpointconsulting.com)

Revise as follows:

TABLE C402.3
BUILDING ENVELOPE REQUIREMENTS: FENESTRATION

CLIMATE ZONE	1		2		3		4 EXCEPT MARINE		5 AND MARINE 4		6		7		8	
Vertical fenestration																
***U*-factor**																
Fixed fenestration	0.50		0.50		0.46		0.38		0.38		0.36		0.29		0.29	
Operable fenestration	0.65		0.65		0.60		0.45		0.45		0.43		0.37		0.37	
Entrance doors	1.10		0.83		0.77		0.77		0.77		0.77		0.77		0.77	
SHGC																
Orientation[a]	SEW	N	SEW	N	SEW	N	SEW	N	SEW	N	SEW	N	SEW	N	SEW	N
~~SHGC~~ PF < 0.2	0.25	0.33	0.25	0.33	0.25	0.33	0.40	0.53	0.40	0.53	0.40	0.53	0.45	NR	0.45	NR
0.2 ≤ PF < 0.5	0.30	0.37	0.30	0.37	0.30	0.37	0.48	0.58	0.48	0.58	0.48	0.58	NR	NR	NR	NR
PF ≥ 0.5	0.40	0.40	0.40	0.40	0.40	0.40	0.64	0.64	0.64	0.64	0.64	0.64	NR	NR	NR	NR
Skylights																
U-factor	0.75		0.65		0.55		0.50		0.50		0.50		0.50		0.50	
SHGC	0.35		0.35		0.35		0.40		0.40		0.40		NR		NR	

NR = No requirement.

a. "N" indicates vertical fenestration oriented within 45 degrees of true north. "SEW" indicates orientations other than "N." For buildings in the southern hemisphere, reverse south and north. Buildings located at less than 23.5 degrees latitude shall use SEW for all orientations.

C402.3.3 Maximum *U*-factor and SHGC. For vertical fenestration, the maximum *U*-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3, based on the window projection factor and orientation. For skylights, the maximum *U*-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3.

The window projection factor shall be determined in accordance with Equation 4-2.

$$PF = A/B \qquad \textbf{(Equation 4-2)}$$

where:

PF = Projection factor (decimal).

A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.

B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

Where different windows or glass doors have different *PF* values, they shall each be evaluated separately.

~~**C402.3.3.1 SHGC adjustment.** Where the fenestration projection factor for a specific vertical fenestration product is greater than or equal to 0.2, the required maximum SHGC from Table C402.3 shall be adjusted by multiplying the required maximum SHGC by the multiplier specified in Table C402.3.3.1 corresponding with the orientation of the fenestration product and the projection factor.~~

~~**TABLE C402.3.3.1**~~
~~**SHGC ADJUSTMENT MULTIPLIERS**~~

~~**PROJECTION FACTOR**~~	~~**ORIENTED WITHIN 45 DEGREES OF TRUE NORTH**~~	~~**ALL OTHER ORIENTATION**~~
~~0.2 ≤ PF < 0.5~~	~~1.1~~	~~1.2~~
~~PF~~ ≤ 0.5	~~1.2~~	~~1.6~~

Reason:

(Thompson): This proposal is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

This proposal moves and clarifies, but does not delete requirements that are currently contained in Section C402.3.3.1 and Table C402.3.3.1 of the 2012 IECC.

The purpose of this proposal is twofold: correct a technical error in the SHGC shading adjustment, and increase the enforceability and usability of the vertical fenestration requirements.

Technical Correction

During review of the 2012 IECC, a technical error was identified in the way the multipliers of the new Table C402.3.3.1 are applied to adjust the SHGC based on shading projections and orientation. When used, Table C402.3.3.1 illogically allows a higher SHGC on the west side of a building than on the north side. For example, with a 3 ft overhang above 6 ft tall glazing on a building in zone 3, this would require a max SHGC of 0.30 on the north where solar loads are low, yet would allow 0.40 SHGC on the west where solar impact on energy efficiency is more critical. The source of the problem is as follows. The multipliers are indirectly based on a similar SHGC adjustment in ASHRAE 90.1, which in turn was based on a technical paper using DOE2 simulations in 12 cities across various climate zones and latitudes (E.P. Kolderup and C.N. Eley Jr, "Evaluating the Impact of Overhangs and

Sidefins", ACEEE Summer Study on Energy Efficiency in Buildings, 1992). ASHRAE 90.1 determined that the multipliers could be grouped into two sets of multipliers: one for the south, east, and west (SEW) orientations, and one for the north (N) orientation. At the same time, this was meant to be used together with two sets of SHGC base criteria: one number for the overall building, and a separate number for the north side. This recognized the difference in the solar performance of the north side, and also avoided the technical problem now identified in the 2012 IECC with how the shading adjustments are used.

This was the case in ASHRAE 90.1-2004, but unfortunately, this technical rationale may have been forgotten and both ASHRAE 90.1 and IECC have deviated from this since then. The 2009 IECC avoided the multiplication problem by simply listing the required SHGC for different shading levels (projection factor PF), but did not address the difference between north and the other sides. On the other hand, ASHRAE 90.1-2007 and 2010 kept the different shading factors for SEW and N, but dropped the different baseline SHGC for the north in an effort to simplify – and as a result, they now contain the same technical error as 2012 IECC. This proposal aims to correct the error for the IECC, and the issue will also be raised at ASHRAE 90.1.

This proposal restores the basic format of the 2009 IECC where the required SHGC is directly listed for the appropriate climate zone and projection factor, but also reinstates the different SHGC criteria for the north side. While adding some rows, this table format improves usability and enforcement by allowing the required SHGC to be simply read from the main fenestration table instead of involving a separate table and calculation. There is no change in the 2012 baseline SHGC criteria, but the SEW multipliers are applied to directly show the adjusted SHGC for different shading levels ($0.2 \le PF < 0.5$ and $PF \ge 0.5$) for the SEW orientations. Then, matching the adjusted SHGC requirement for N and SEW orientations for this high PF well shaded window, the SHGC requirements for the north side are then calculated at $0.2 \le PF < 0.5$ and $PF < 0.2$ using the same multipliers. This ensures consistency, corrects the technical error of requiring higher SHGC on the west than on the north, and also accounts for the different solar performance of northern orientations.

Additionally, the footnote is added to clarify what to do if located in the southern hemisphere or near the equator. The northern multipliers do not apply well between the Tropics of Cancer and Capricorn (23.5 degrees latitude), and the SEW multipliers are more appropriate for all orientations. (Think of it this way: there is no difference between north and south in terms of the sun when standing at the equator.

Improved Usability and Enforcement

In addition to correcting the technical error, a very important aspect of this proposal is to improve usability and enforcement of the code. Concerns have been expressed about the increased complexity for enforcement with the format of the 2012 IECC, as compared to the 2009 and 2006 IECC. Rather than simply looking up the maximum SHGC for a given projection factor on the main prescriptive table, the 2012IECC forces extra unnecessary steps on the user, referring to a separate table and requiring additional calculations. This increases both the workload and potential for error in code compliance checks. This proposal simplifies the process by allowing the code official to simply look up the required SHGC on the main fenestration table, similar to the 2006 and 2009 IECC. This simplifies enforcement and compliance, makes it easy to determine the baseline value in performance path calculations, and improves overall usability of the code. Also, while SHGC requirements for the northern orientation have been added to make this section technically correct, this does not necessarily add complexity – users can still simply comply with one glass type and SHGC by meeting the main SHGC requirement for the SEW orientation (which is lower or equal to the N requirement in all cases).

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

(Culp): The purpose of this proposal is twofold: correct a technical error in the SHGC shading adjustment, and increase the enforceability and usability of the vertical fenestration requirements.

Technical Correction

During review of the 2012 IECC, a technical error was identified in the way the multipliers of the new Table C402.3.3.1 are applied to adjust the SHGC based on shading projections and orientation. When used, Table C402.3.3.1 illogically allows a higher SHGC on the west side of a building than on the north side. For example, with a 3 ft overhang above 6 ft tall glazing on a building in zone 3, this would require a max SHGC of 0.30 on the north where solar loads are low, yet would allow 0.40 SHGC on the west where solar impact on energy efficiency is more critical. The source of the problem is as follows. The multipliers are indirectly based on a similar SHGC adjustment in ASHRAE 90.1, which in turn was based on a technical paper using DOE2 simulations in 12 cities across various climate zones and latitudes (E.P. Kolderup and C.N. Eley Jr, "Evaluating the Impact of Overhangs and Sidefins", ACEEE Summer Study on Energy Efficiency in Buildings, 1992). ASHRAE 90.1 determined that the multipliers could be grouped into two sets of multipliers: one for the south, east, and west (SEW) orientations, and one for the north (N) orientation. At the same time, this was meant to be used together with two sets of SHGC base criteria: one number for the overall building, and a separate number for the north side. This recognized the difference in the solar performance of the north side, and also avoided the technical problem now identified in the 2012 IECC with how the shading adjustments are used.

This was the case in ASHRAE 90.1-2004, but unfortunately, this technical rationale may have been forgotten and both ASHRAE 90.1 and IECC have deviated from this since then. The 2009 IECC avoided the multiplication problem by simply listing the required SHGC for different shading levels (projection factor PF), but did not address the difference between north and the other sides. On the other hand, ASHRAE 90.1-2007 and 2010 kept the different shading factors for SEW and N, but dropped the different baseline SHGC for the north in an effort to simplify – and as a result, they now contain the same technical error as 2012 IECC. This proposal aims to correct the error for the IECC, and the issue will also be raised at ASHRAE 90.1.

This proposal restores the basic format of the 2009 IECC where the required SHGC is directly listed for the appropriate climate zone and projection factor, but also reinstates the different SHGC criteria for the north side. While adding some rows, this table format improves usability and enforcement by allowing the required SHGC to be simply read from the main fenestration table instead of involving a separate table and calculation. There is no change in the 2012 baseline SHGC criteria, but the SEW multipliers are applied to directly show the adjusted SHGC for different shading levels ($0.2 \le PF < 0.5$ and $PF \ge 0.5$) for the SEW orientations. Then, matching the adjusted SHGC requirement for N and SEW orientations for this high PF well shaded window, the SHGC requirements for the north side are then calculated at $0.2 \le PF < 0.5$ and $PF < 0.2$ using the same multipliers. This ensures consistency, corrects the technical error of requiring higher SHGC on the west than on the north, and also accounts for the different solar performance of north orientations.

Additionally, the footnote is added to clarify what to do if located in the southern hemisphere or near the equator. The northern multipliers do not apply well between the Tropics of Cancer and Capricorn (23.5 degrees latitude), and the SEW multipliers are more appropriate for all orientations. (Think of it this way: there is no difference between north and south in terms of the sun when standing at the equator.)

Improved Usability and Enforcement

In addition to correcting the technical error, a very important aspect of this proposal is to improve usability and enforcement of the code. Concerns have been expressed about the increased complexity for enforcement with the format of the 2012 IECC, as compared to the 2009 and 2006 IECC. Rather than simply looking up the maximum SHGC for a given projection factor on the main prescriptive table, the 2012 IECC forces extra unnecessary steps on the user, referring to a separate table and requiring additional calculations. This increases both the workload and potential for error in code compliance checks. This proposal simplifies the process by allowing the code official to simply look up the required SHGC on the main fenestration table, similar to the 2006 and 2009 IECC. This simplifies enforcement and compliance, makes it easy to determine the baseline value in performance path calculations, and improves overall usability of the code. Also, while SHGC requirements for the north orientation have been added to make this section technically correct, this does not necessarily add complexity – users can still simply comply with one glass type and SHGC by meeting the main SHGC requirement for the SEW orientation (which is lower or equal to the N requirement in all cases).

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is cost neutral as it is an optional trade-off only.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason:. The proposal reorganizes the code requirements into a format which should be easier to use. It improves how the code addresses north facing fenestration.

Assembly Action: **None**

Final Hearing Results

CE142-13 **AS**

Code Change No: CE148-13

Original Proposal

Section(s): C402.3.2

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

C402.3.2 Minimum skylight fenestration area. In an enclosed space greater than ~~10,000~~ 2,500 square feet (~~929~~ 232 m^2), directly under a roof with ceiling heights greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage, gymnasium/exercise center, convention center, automotive service, manufacturing, nonrefrigerated warehouse, retail store, distribution/sorting area, transportation, or workshop, the total daylight zone under skylights shall be not less than half the floor area and shall provide a minimum skylight area to daylight zone under skylights of either:

1. Not less than 3 percent with a skylight VT of at least 0.40; or
2. Provide a minimum skylight effective aperture of at least 1 percent determined in accordance with Equation 4-1.

$$\text{Skylight Effective Aperature} = \frac{0.85 \times \text{Skylight Area} \times \text{Skylight VT} \times \text{WF}}{\text{Daylight zone under skylight}}$$

(Equation 4-1)

where:

Skylight area	=	Total fenestration area of skylights.
Skylight VT	=	Area weighted average visible transmittance of skylights.
WF	=	Area weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater.
Light well depth	=	Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.

Exception: Skylights above daylight zones of enclosed spaces are not required in:

1. Buildings in climate zones 6 through 8.
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft^2 (5.4 W/m^2).
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 am and 4 pm.
4. Spaces where the daylight zone under the rooftop monitors is greater than 50 percent of the enclosed space floor area.
5. Spaces where the total area minus the area of *daylight zones adjacent to vertical fenestration* is less than 2,500 square feet (929 232 m^2), and where the lighting is controlled according to Section C405.2.2.3.2.

Reason: Separate analyses for ASHRAE 90.1 and California Title 24 have shown toplighting of larger open spaces to provide very cost effective energy savings, and that the size threshold may be significantly reduced from the current 10,000 ft2. 2008 Title 24 uses an 8,000 ft2 threshold, and will use 5,000 ft2 in the 2013 standard. ASHRAE 90.1-2010 has already been at 5,000 ft2, and following a new cost effectiveness analysis by Pacific Northwest National Laboratory, is now lowering it further to 2,500 ft2. At the time this proposal was submitted in Dec 2012, addendum "bv" received no negative comments on the threshold, and was moving forward to the ASHRAE and IES boards for final publication. Some had expressed concern about smaller retail spaces that might be triggered by the 2,500 ft2 threshold, but it was noted that these types of retail spaces rarely have ceiling heights over 15 ft, and would therefore be exempt. (Also, toplighting is ideal for the retail spaces that do have taller ceiling heights over 15 ft, such as grocery stores and larger retail.) As such, this proposal lowers the threshold and also adds an exception to be consistent with ASHRAE 90.1 addendum “bv”.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal was preferred over proposals CE146 and CE147-13. It provides a reasonable balance between the lower threshold and the new exception to expand the daylighting requirement.

Assembly Action: **None**

Final Hearing Results

CE148-13	**AS**

Code Change No: CE149-13

Original Proposal

Section(s): C402.3.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.3.2 Minimum skylight ~~fenestration~~ area. In an enclosed space greater than 10,000 square feet (929 m^2) in floor area directly under a roof with ~~a~~ not less than 75 percent of ceiling area with heights greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage space, gymnasium/exercise center, convention center, automotive service area, space where manufacturing occurs, non-refrigerated warehouse, retail store, distribution/sorting area, transportation depot, or workshop, the total daylight zone under skylights shall be not less than half the floor area and shall provide ~~a minimum skylight area to daylight zone under skylights of~~ either

1. A minimum skylight area to daylight zone under skylights of not less than 3 percent ~~with a skylight~~ where all skylights have a VT of at least 0.40 when tested in accordance with NFRC 202, or
2. A ~~provide~~ minimum skylight effective aperture of at least 1 percent as determined in accordance with Equation 4-1.

$$\text{Skylight Effective Aperature} = \frac{0.85 \times \text{Skylight Area} \times \text{Skylight VT} \times \text{WF}}{\text{Daylight zone under skylight}} \quad \textbf{(Equation 4-1)}$$

where:

Skylight area = Total fenestration area of skylights.

Skylight VT = Area weighted average visible transmittance of skylights.

WF = Area weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater.

Light well depth = Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.

Exception: Skylights above daylight zones of enclosed spaces are not required in:

1. Buildings in climate zones 6 through 8.
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft^2 (5.4 W/m^2).
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on at least half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 am and 4 pm.
4. Spaces where the daylight zone under rooftop monitors is greater than 50 percent of the enclosed space floor area.

Reason: This proposal clarifies the language pertaining to requiring skylights in roofs covering areas greater than 10,000 ft^2. The objective of this proposal is to clarify the code to foster implementation and compliance verification.

By definition skylights are fenestration such that the use of the term fenestration with skylights is redundant. The intent is to address ceilings with variable heights and the proposed revision does that by indicating the requirement applies when more than 75% of ceiling area is above 15 feet. Some of the subject spaces referenced are not technically spaces or areas so the language has been enhanced to convey the intent. Simplification is achieved by making items 1 and 2 parallel construction with reference to the charging section. While VT is defined, there is no referenced test method. NFRC 202 provides a uniform test method by which

VT can be objectively determined and should be referenced to enhance uniformity of application and implementation of and compliance verification with the code.

Cost Impact: The code change proposal will not increase the cost of construction. There is no cost impact associated with this proposed change because the current code requires daylighting control.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proponent was not sure that NFRC 202 was the appropriate standard to be referenced. The testimony indicated that this standard referenced did not address domed skylights that are commonly used in commercial applications.

Assembly Action: **None**

Public Comments

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.3.2 Minimum skylight area. In an enclosed space greater than 10,000 square feet (929 m^2) in floor area directly under a roof with ~~a~~ not less than 75 percent of the ceiling area with a ceiling height ~~heights~~ greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage space, gymnasium/exercise center, convention center, automotive service area, space where manufacturing occurs, non-refrigerated warehouse, retail store, distribution/sorting area, transportation depot, or workshop, the total daylight zone under skylights shall be not less than half the floor area and shall provide either

1. A minimum skylight area to daylight zone under skylights of not less than 3 percent where all skylights have a VT of at least 0.40 ~~when tested in accordance with NFRC 202~~ as determined in accordance with Section C303.1.3,, or
2. A minimum skylight effective aperture of at least 1 percent as determined in accordance with Equation 4-1.

Commenter's Reason: At the code development hearing, only one issue was raised in opposition to the code change proposal. Specifically the reference to NFRC 202 that is appropriate for flat panel skylights only. This could result in confusion as to what to do for plastic domed skylights when determining the VT of such products, since there is no reference standard for those skylights. There was no intent to omit any skylight type, and it is recognized that all skylights need to have a means for determining VT.

A further review of that comment and the code suggests that the issue of testing standards for fenestration products such as skylights is covered in Section C 303.1.3 (fenestration product rating). So, the basis for measuring and expressing VT is already covered in the code and need not be addressed in this section of the code. The code change proposal is further modified in this public comment by simply referring to Section C303.1.3 where the basis for VT is covered either through testing or use of a default table. There was no opposition to the other portions of the change, all of which were focused on clarification and simplification of the code provisions and are not proposed for further modification in this public comment.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

CE149-13 **AMPC**

Code Change No: CE152-13

Original Proposal

Section(s): C402.3.3 (NEW)

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Add new text as follows:

C402.3.3 Daylight zones. In *buildings* not greater than two stories above grade plane, not less than 10 percent of the net floor area shall be located within a *daylight zone*. In *buildings* three or more stories above grade plane, not less than 5 percent of the net floor area shall be located within a *daylight zone.*

Exception: Daylighting in accordance with this section is not required in the following spaces:

1. Auditoriums, places of religious worship, theaters, museums, mercantile occupancies with less than 10,000 square feet of net floor area, and refrigerated warehouses.
2. Existing buildings undergoing *alteration*, *repair*, relocation, or a change of occupancy.
3. *Buildings* where the total daylight potential (TDP) calculated in accordance with Section 808.3 of the *International Green Construction Code* is less than 0.5.

Reason: This proposal would require a minimum daylight area similar in concept to the 2012 International Green Construction Code, but at much less aggressive level (only 1/5 of the IgCC) and with a simplified approach. For comparison, the IgCC requires 50% of the net floor area to be in daylight zones for 1-2 story buildings, and 25% for 3+ story buildings. On the other hand, this proposal is meant to only be a simple base level requirement to ensure that building designers address daylighting and glazing layout, while being easy enough to provide flexibility for different space and building types, and not require any gross changes in building geometry. Exceptions are included for spaces where daylighting would interfere with the function of the space, provide little benefit, or not be feasible.

Cost Impact: This proposal will not increase the cost of construction for most buildings and will help improve layout and use of glazing that would have been installed anyway, but this will increase the cost of construction in some buildings where there would have been insufficient fenestration and daylighting.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt that the exceptions were not adequate and that there were unintended consequences from this proposal. For example one would not want to daylight a movie studio. Requiring daylighting in residential buildings would be problematic.

Assembly Action: **None**

Public Comments

Public Comment:

Dr. Thomas C. Culp, Birch Point Consulting LLC, representing Glazing Industry Code Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.3.1.1 Increased vertical fenestration area with daylighting controls. In Climate Zones 1 through 6, a maximum of 40 percent of the gross above-grade wall area shall be permitted to be vertical fenestration, provided:

1. In buildings not greater than two stories above grade, not ~~No~~ less than 50 percent of the ~~conditioned~~ net floor area is within a *daylight zone*; In buildings three or more stories above grade, not less than 25 percent of the net floor area is within a *daylight zone*;
2. Automatic daylighting controls are installed in daylight zones; and
3. Visible transmittance (VT) of vertical fenestration is greater than or equal to 1.1 times solar heat gain coefficient (SHGC).

Exception: Fenestration that is outside the scope of NFRC 200 is not required to comply with Item 3.

~~**C402.3.3 Daylight zones.** In *buildings* not greater than two stories above grade plane, not less than 10 percent of the net floor area shall be located within a *daylight zone*. In *buildings* three or more stories above grade plane, not less than 5 percent of the net floor area shall be located within a *daylight zone.*~~

~~**Exception:** Daylighting in accordance with this section is not required in the following spaces:~~

1. ~~Auditoriums, places of religious worship, theaters, museums, mercantile occupancies with less than 10,000 square feet of net floor area, and refrigerated warehouses.~~
2. ~~Existing buildings undergoing *alteration*, *repair*, relocation, or a change of occupancy.~~
3. ~~*Buildings* where the total daylight potential (TDP) calculated in accordance with Section 808.3 of the *International Green Construction Code* is less than 0.5.~~

Section C202
Definitions:

FLOOR AREA, NET. The actual occupied area not including unoccupied accessory areas such as corridors, stairways, toilet rooms, mechanical rooms and closets.

Commenter's Reason: The original purpose of CE152 was to require a minimum amount of daylight zones similar to the *2012 International Green Construction Code*, but at a much lower level (only 1/5th of the IgCC requirement) in recognition of the IECC being a base energy code. Nonetheless, while many expressed support for the concept, the committee felt that *requiring* a minimum amount of daylight zones was too aggressive for the IECC at this time, and even with the exceptions, it would be difficult to apply to every building type covered by the code.

Therefore, this public comment modifies the proposal based on the committee feedback to increase the incentive for daylight zones without making it a requirement, while at the same time correcting section C402.3.1.1 to be more consistent with the IgCC. It moves the requirement that a minimum percentage of the floor area be within a daylight zone to the optional path of section C402.3.1.1, which provides an incentive allowing increased window area as long as the minimum daylight zones are provided, along with automatic daylighting controls and certain glazing properties.

When first written as a requirement, the original proposal set the minimum daylight zones at 1/5 of that required by the IgCC. Since this is now written as an optional incentive, it is appropriate to set the level higher, and we have chosen to use the same levels required by the IgCC: 50% of the net floor area for 1-2 story buildings, and 25% of the net floor area in higher buildings. Note that this also corrects the current language of section C402.3.1.1 to be consistent with the IgCC, including adding the definition of net floor area consistent with the IgCC and IBC. In the time after approval of the 2012 IECC and during development of the 2012 IgCC, it was noted that it is much more difficult to achieve the 50% daylit area in the more constrained floor plates of taller buildings, so 25% was used for buildings 3 stories and up. It doesn't make sense for this part of the IECC to be more restrictive than the IgCC, so this proposed modification serves both purposes of turning the original proposal from a requirement into an incentive for designers to increase daylight zones, while also making this subsection more consistent with the IgCC.

We ask that you vote "NO" on the initial motion for disapproval, and then vote "YES" to approve CE152 as modified by this comment.

Final Hearing Results

CE152-13 AMPC

Code Change No: CE153-13

Original Proposal

Section(s): C402.3.2.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.3.2.2 Haze factor. Skylights in office, storage, automotive, service, manufacturing, non-refrigerated warehouse, retail store and distribution/sorting area spaces shall have a glazing materials or diffuser with a ~~measured~~ haze factor greater than 90 percent when tested in accordance with Procedure A of ASTM D 1003.

> **Exception:** Skylights ~~designed~~ installed to exclude direct sunlight entering the occupied space by use of fixed or automated baffles, or the geometry of skylight and light well ~~need not comply with Section C402.3.2.2~~.

Reason: This proposal clarifies the testing requirements for fenestration haze factor to reference Procedure A of ASTM D 1003 or other ASTM standards as applicable.

The requirement for testing in the code eliminates the need to use the term "measured," and could provide additional confusion should a user of the code interpret that as allowing post-installation measurement of haze factor in accordance with the standard. ASTM D 1003 has multiple procedures. Procedure A (hazemeter) test values are normally slightly higher and less variable than Procedure B (spectrophotometer) test values. Where the code indicates a singular criterion (90%) a singular test procedure should be specifically referenced. If there are two test procedures that yield different results for the same metric then the code should provide a separate criterion for each procedure (e.g. 90% when tested per procedure A and a TBD equivalent percentage when tested per procedure B). Also replacing "designed" with "installed " provides clarification as a skylight can be "designed" in the factory where the installation conditions in the exception may not be known. Those conditions are related to the installation of the skylight within the building and are more appropriately referenced in the code.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was concerned that the proposal limited the testing to one procedure. Testimony had identified the potential applicability of more than one procedure.

Assembly Action: **None**

Public Comments

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.3.2.2 Haze factor. Skylights in office, storage, automotive service, manufacturing, non-refrigerated warehouse, retail store and distribution/sorting area spaces shall have ~~a~~ glazing materials or diffuser with a haze factor greater than 90 percent when tested in accordance with ~~Procedure A of~~ ASTM D 1003.

> **Exception:** Skylights designed and installed in such a manner as to exclude direct sunlight entering the occupied space by use of fixed or automated baffles, or the geometry of the skylight and light well.

Commenter's Reason: At the code development hearing, there were two issues raised in opposition to the code change proposal. One proposed a floor modification to retain the word 'designed' in the exception, and that floor modification was approved for consideration. The other concern raised was with limiting the determination of haze factor to only Procedure A of ASTM D1003. Testimony mentioned the difference between Procedure A and Procedure B, and that those skylights that had been tested to Procedure B would have to be re-tested.

Procedure A and B differ with respect to how the light is transmitted through the sample. Procedure A directly transmits the light beam through the sample into a reflecting integrating sphere and measures light transmission. Procedure B is reversed, where the light is reflected into an integrating sphere and then transmitted through the sample. Procedure A provides results that are less variable than those obtained through Procedure B. The difference between procedure A and B is also due to the different equipment and manufacturers of the equipment used with each.

In the original proposal, DOE expressed the view that if there is a singular criterion that must be satisfied (in this case haze factor), the allowance for two separate procedures to determine haze factor that would not yield the exact same results. DOE felt that this created two paths to compliance, with an increased likelihood that the path of least resistance would be taken. However, DOE understands the challenges associated with re-testing of products. This public comment addresses that issue by not calling out either procedure in ASTM D 1003, but retains the remainder of the code change proposal as editorially enhanced, and includes the floor amendment that was accepted at the code development hearing.

Note that CE154-13 was recommended for approval as submitted and the modifications contained in this public comment do not conflict with CE154-13 and would be readily additive with that change.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

CE153-13 **AMPC**

Code Change No: CE154-13

Original Proposal

Section(s): C402.3.2.2

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C402.3.2.2 Haze factor. Skylights in office, storage, automotive service, manufacturing, nonrefrigerated warehouse, retail store, and distribution/sorting area spaces shall have a glazing material or diffuser with a measured haze factor greater than 90 percent when tested in accordance with <u>the procedures contained in</u> ASTM D 1003.

> **Exception:** Skylights designed to exclude direct sunlight entering the occupied space by the use of fixed or automated baffles, or the geometry of skylight and light well need not comply with Section C402.3.2.2.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

ASTM D 1003 has the title of “Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.” However the standard actually contains test methods and procedures for all transparent materials and isn’t limited in application to plastics. As it is up to ASTM to name their standard and it can’t be changed in the ICC process, this proposal is intended to try to clarify that the standard is used for the procedures, and not limited to the material contained in the title.

Cost Impact: This code change proposal will not increase the cost of construction. The proposal is editorial in nature and will not affect the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal provides a better solution. It doesn't have the procedure limitation found in CE153-13.

Assembly Action: **None**

Final Hearing Results

CE154-13 **AS**

Code Change No: CE155-13

Original Proposal

Section(s): C402.3.3

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.3.3 Maximum U-factor and SHGC. ~~For vertical fenestration, the~~ The maximum U-factor and solar heat gain coefficient (SHGC) for fenestration shall be as specified in Table C402.3~~, based on the window projection factor. For skylights, the maximum U-factor and solar heat gain coefficient (SHGC) shall be as specified in Table C402.3~~.

The window projection factor shall be determined in accordance with Equation 4-2.

$PF = A/B$ **(Equation 4-2)**

where:

PF = Projection factor (decimal).
A = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing.
B = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

Where different windows or glass doors have different *PF* values, they shall each be evaluated separately.

Reason: This proposal clarifies the provisions in the code related to maximum U-factor and SHGC, to increase simplicity of the code.

The opening section (parent) need only state the scope and criteria and then when consulting Table C402.3 as required the application of the provisions as to which type of fenestration (vertical or skylight) become obvious. The relevance of text beyond the first paragraph of Section C402.3.3 does not become apparent until after Table C402.3.3.1 and should be relocated after that table where is relates to the PF term used in that table.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal simplifies the code by reducing text which is redundant to the referenced table.

Assembly Action: **None**

Final Hearing Results

CE155-13 **AS**

Code Change No: CE158-13

Original Proposal

Section(s): C402.3.3.2

Proponent: Brian Dean, ICF International, representing Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; Bill Prindle, Energy Efficient Codes Coalition; and Don Vigneau, Northeast Energy Efficiency Partnerships.

Delete without substitution as follows:

~~**C402.3.3.2 Increased vertical fenestration SHGC.** In Climate Zones 1, 2 and 3, vertical fenestration entirely located not less than 6 feet (1729 mm) above the finished floor shall be permitted a maximum SHGC of 0.40.~~

Reason: The purpose of the proposed code change is to eliminate an exception to the fenestration SHGC requirement because it does not produce equivalent energy savings. In climate zones 1-3, low-SHGC fenestration is crucial for lowering energy use and peak electric demand. If there are to be any exceptions from this requirement, the exceptions should result in energy savings that will meet or exceed the savings that would have resulted from using 0.25 SHGC windows.

The current language does not meet this hurdle. It carves out an exception for fenestration located more than 6 feet above the finished floor. However, the exception does not require higher-VT fenestration, or clarify whether the windows must be part of a daylight area, or require the installation of automatic daylighting controls that possibly could offset at least some of the resulting increase in energy use. The language simply increases the maximum SHGC allowed by 60% with no requirement for any offset. Solar heat gain and the associated peak electricity use of commercial buildings are too important to carve out unnecessary exemptions like C402.3.3.2.

Presumably this exception was created to help with daylighting on the theory that a higher SHGC was necessary for more daylighting. We too are in favor of improving daylighting. However, we do not believe it is necessary to sacrifice solar heat gain reduction to obtain adequate visible light. Substantial VT can be achieved while still meeting the SHGC requirements. We have submitted a companion proposal for a minimum VT, which will do just that.

Moreover, eliminating this exception will also improve the clarity and usability of the code because it is an extremely specific exception that only adds unnecessary complexity to the code.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The existing text provides a limitation to the application of the SHGC factor that no longer seems appropriate.

Assembly Action: **None**

Final Hearing Results

CE158-13	**AS**

Code Change No: CE161-13, Part I

Original Proposal

Section(s): C402.3.3.5, R402.3.2 (IRC N1102.3.2)

Proponent: Dr. Helen Sanders, SAGE Electrochromics Inc. (helen.sanders@sageglass.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C402.3.3.5 Dynamic glazing. ~~For compliance with Section C402.3.3, the SHGC for *dynamic glazing* shall be determined using the manufacturer's lowest-rated SHGC, and the VT/SHGC ratio shall be determined using the maximum VT and maximum SHGC.~~ <u>*Dynamic glazing* shall be permitted to satisfy the SHGC and VT requirements of Table C402.3 and Section C402.3.1.1 provided the ratio of the higher to lower labeled SHGC is greater than or equal to 3, and the *dynamic glazing* is automatically controlled to modulate the amount of solar gain into the space in multiple steps.</u> *Dynamic glazing* shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not *dynamic glazing* shall not be permitted.

Reason: (Part I) Last cycle, the commercial IECC clarified how to deal with code compliance for dynamic glazing, and dynamic glazing is also now addressed in the IgCC, ASHRAE 90.1, ASHRAE 189.1, and the new 2013 California Title 24 standards. This was important in that dynamic glazing offers the unique ability to reversibly change properties such as SHGC and VT to optimize energy performance, daylighting, and glare based on changing situations during the day, and over different seasons. As such, dynamic glazing represents a key technology on the route to zero energy buildings, and has been strongly supported by the U.S. Department of Energy, Lawrence Berkeley National Laboratory, and the National Renewable Energy Laboratory.

However, to provide additional assurances that the dynamic glazing delivers the maximum energy savings, this proposal strengthens the requirement by only allowing compliance if the dynamic glazing has a certain dynamic range (ratio of the high to low SHGC greater than 3) and is automatically controlled in multiple steps. The minimum dynamic range prevents a loophole for products claiming dynamic properties that do not really have a significant energy impact. Also, with a minimum SHGC dynamic ratio of 3, the current language about using the lowest rated SHGC for compliance is no longer needed … the highest SHGC in any double glazing is perhaps 0.60, so the lowest SHGC would have to be < 0.20, which is already lower than the lowest 0.25 SHGC requirement. Furthermore, although the dynamic range is specified as a SHGC ratio, this also ensures a good dynamic range for VT, which will be higher than the SHGC ratio. (Typical products commonly have SHGC range from <0.10 to >0.40, and VT range from <0.04 to >0.50.)

Finally, the dynamic glazing must be properly controlled in order to optimize energy performance. Dynamic glazing is almost always already sold as a system integrated with automatic controls, but this proposal clarifies that the dynamic glazing must be automatically controlled in multiple steps, and not rely on manual adjustment by occupants.

References:

1. "Window Systems for High-Performance Buildings" by Carmody, Selkowitz, Lee, Arasteh, Willmert, 2004, pages 94-100.
2. Lawrence Berkeley National Laboratory – Paper 50502
   "High Performance Commercial Building Facades" by Lee, Selkowitz, Bazjanac, Inkarojrit, and Kohler, 2002. See especially p. 28. http://windows.lbl.gov/comm_perf/Electrochromic/refs/LBNL-50502.pdf
3. Lawrence Berkeley National Laboratory – Paper 54924
   "Daylighting control performance of a thin-film ceramic electrochromic window: field study results" by Lee, DiBartolomeo, Selkowitz, 2005. http://windows.lbl.gov/comm_perf/Electrochromic/refs/LBNL-54924.pdf

Cost Impact: The code change proposal will not increase the cost of construction. The large majority of dynamic glazing is already sold with automatic control systems.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the intent of dynamic glazing. Approval is consistent with action by Residential Energy Code Development Committee to approve Part II of this item.

Assembly Action: **None**

Public Comments

Public Comment:

Dr. Helen Sanders, SAGE ELectrochromics Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.3.3.5 Dynamic glazing. *Dynamic glazing* shall be permitted to satisfy the SHGC and VT requirements of Section ~~Table~~ C402.3 ~~and Section C402.3.1.1~~ provided the ratio of the higher to lower labeled SHGC is greater than or equal to ~~3~~ 2.4, and the *dynamic glazing* is automatically controlled to modulate the amount of solar gain into the space in multiple steps. *Dynamic glazing* shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not *dynamic glazing* shall not be permitted.

> **Exception:** *Dynamic glazing* is not required to comply with this section when both the lower and higher labeled SHGC already comply with the requirements of Table C402.3.

Commenter's Reason: CE161 parts 1 and 2 were both unanimously recommended for approval by the commercial and residential energy code committees, respectively. This public comment simply builds upon that by making a few corrections / clarifications that were noticed during the public comment period:

1. Section numbers were corrected. In part 1, it is more correct to reference Section C402.3 instead of just Table C402.3, so that it also covers when VT is needed in subsections C402.3.1.1 and C402.3.2. In part 2, this is simply an editorial correction to the correct table number.
2. The ratio of higher to lower labeled SHGC was adjusted to 2.4 to account for the full range of window product categories and frame-to-glass ratios at NFRC standard sizes, and to ensure other dynamic glazing products are not inadvertently excluded.
3. The exception was added to clarify that a product whose full range already complies with Table R402.1.1 does not need to comply with the extra requirements of this section such as automatic control, since it is already in compliance just like a normal window.

Dynamic glazing is an important energy savings technology that has been available for 10 years and will be in even wider use during the time period when this code is adopted and enforced, so it is important to address it properly in the energy code. We ask you to please vote to approve CE161 parts 1 and 2 as modified by this comment.

Final Hearing Results

CE161-13, Part I **AMPC**

Code Change No: CE161-13, Part II

Original Proposal

Section(s): C402.3.3.5, R402.3.2 (IRC N1102.3.2)

Proponent: Dr. Helen Sanders, SAGE Electrochromics Inc. (helen.sanders@sageglass.com)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R402.3.2 (N1102.3.2) Glazed fenestration SHGC. An area-weighted average of fenestration products more than 50-percent glazed shall be permitted to satisfy the SHGC requirements.

Dynamic glazing shall be permitted to satisfy the SHGC requirements of Table R402.3.3 provided the ratio of the higher to lower labeled SHGC is greater than or equal to 3, and the *dynamic glazing* is automatically controlled to modulate the amount of solar gain into the space in multiple steps. *Dynamic glazing* shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not dynamic glazing shall not be permitted.

Reason: (Part II) Dynamic glazing is currently defined and addressed in the commercial IECC, as well as the IgCC, ASHRAE 90.1, ASHRAE 189.1, and the new 2013 California Title 24 standards. However, the residential IECC does not currently address how to deal with compliance of dynamic glazing. Dynamic glazing is unique in that it has the ability to reversibly change properties such as SHGC and VT. This allows the glazing to be controlled optimize energy performance, daylighting, and glare based on changing situations during the day, and over different seasons. For example, unlike traditional glazing with fixed properties, dynamic glazing can be operated in a lower SHGC state during summer to reduce cooling loads, and a higher SHGC state during winter to reduce heating loads.

As such, dynamic glazing represents a key technology on the route to zero energy buildings, and has been strongly supported by the U.S. Department of Energy, Lawrence Berkeley National Laboratory, and the National Renewable Energy Laboratory. Dynamic glazing has been available on the market for 10 years now, and manufacturing expansions have come on line in 2012 to provide larger pane sizes at higher volumes and lower prices to allow broader application. Not only should its use be encouraged, but barriers to its use must be removed. Specifically, the NFRC label for dynamic glazing which has been in place for a number of years, lists two values for SHGC, representing the range over which the SHGC varies. It is not clear how this label should be used to determine compliance with maximum or minimum SHGC requirements, and direction must be given to aid enforcement by the building code official.

Because of the ability of dynamic glazing to optimize solar gain and energy efficiency, the commercial IECC already allows compliance with SHGC requirements by simply saying to use the lower labeled SHGC value, and to treat dynamic glazing separately from other fenestration in the building (no mixing in area-weighted averages). To provide additional assurances of proper performance, this proposal provides a stronger requirement by only allowing compliance if the dynamic glazing has a certain dynamic range (ratio of the high to low SHGC greater than 3) and is automatically controlled in multiple steps. First, the minimum dynamic range prevents a loophole for products claiming dynamic properties that do not really have a significant energy impact. The minimum SHGC dynamic ratio of 3 will also more than ensure compliance with the lowest rated SHGC … the highest SHGC in any double glazing is perhaps 0.60, so the lowest SHGC would have to be < 0.20, which is already lower than the lowest 0.25 SHGC requirement. (In practice, typical products commonly have SHGC range from <0.10 to 0.40.) Second, the dynamic glazing must be properly controlled in order to optimize energy performance. Automatic controls are especially important in a residential home or apartment, where the occupant may not be home to manually adjust the glazing. A separate proposal is also being submitted to the commercial IECC to strengthen those requirements in a similar manner.

References:

1. “Window Systems for High-Performance Buildings” by Carmody, Selkowitz, Lee, Arasteh, Willmert, 2004, pages 94-100.
2. Lawrence Berkeley National Laboratory – Paper 50502
   “High Performance Commercial Building Facades” by Lee, Selkowitz, Bazjanac, Inkarojrit, and Kohler, 2002. See especially p. 28. http://windows.lbl.gov/comm_perf/Electrochromic/refs/LBNL-50502.pdf
3. Lawrence Berkeley National Laboratory – Paper 54924
   “Daylighting control performance of a thin-film ceramic electrochromic window: field study results” by Lee, DiBartolomeo, Selkowitz, 2005. http://windows.lbl.gov/comm_perf/Electrochromic/refs/LBNL-54924.pdf

Cost Impact: The code change proposal will not increase the cost of construction. The large majority of dynamic glazing is already sold with automatic control systems.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This is a proven technology that provides flexibility for achieving energy savings in the code.

Assembly Action: **None**

Public Comments

Public Comment:

Dr. Helen Sanders, SAGE Electrochromics, Inc., requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.3.2 (N1102.3.2) Glazed fenestration SHGC. An area-weighted average of fenestration products more than 50-percent glazed shall be permitted to satisfy the SHGC requirements.

Dynamic glazing shall be permitted to satisfy the SHGC requirements of Table ~~R402.3.3~~ R402.1.1 provided the ratio of the higher to lower labeled SHGC is greater than or equal to ~~3~~ 2.4, and the *dynamic glazing* is automatically controlled to modulate the amount of solar gain into the space in multiple steps. *Dynamic glazing* shall be considered separately from other fenestration, and area-weighted averaging with other fenestration that is not dynamic glazing shall not be permitted.

> **Exception:** *Dynamic glazing* is not required to comply with this section when both the lower and higher labeled SHGC already comply with the requirements of Table R402.1.1.

Commenter's Reason: CE161 parts 1 and 2 were both unanimously recommended for approval by the commercial and residential energy code committees, respectively. This public comment simply builds upon that by making a few corrections / clarifications that were noticed during the public comment period:

1. Section numbers were corrected. In part 1, it is more correct to reference Section C402.3 instead of just Table C402.3, so that it also covers when VT is needed in subsections C402.3.1.1 and C402.3.2. In part 2, this is simply an editorial correction to the correct table number.
2. The ratio of higher to lower labeled SHGC was adjusted to 2.4 to account for the full range of window product categories and frame-to-glass ratios at NFRC standard sizes, and to ensure other dynamic glazing products are not inadvertently excluded.
3. The exception was added to clarify that a product whose full range already complies with Table R402.1.1 does not need to comply with the extra requirements of this section such as automatic control, since it is already in compliance just like a normal window.

Dynamic glazing is an important energy savings technology that has been available for 10 years and will be in even wider use during the time period when this code is adopted and enforced, so it is important to address it properly in the energy code. We ask you to please vote to approve CE161 parts 1 and 2 as modified by this comment.

Final Hearing Results

CE161-13, Part II **AMPC**

Code Change No: CE164-13

Original Proposal

Section(s): C402.4, C402.4.1.2, C402.4.1.2.3

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.4 Air leakage (Mandatory). The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8. Alternatively the building thermal envelope shall be permitted to be tested in accordance with ASTM E779 at a pressure differential of 0.3 inches water gauge, or an equivalent method approved by the code official, and deemed to comply with the provisions of this section when the tested air leakage rate of the building thermal envelope does not exceed 0.40 cfm/ft^2. Where compliance is based on such testing the building shall also comply with Sections C402.4.5, 402.4.6 and 402.4.7.

C402.4.1.2 Air barrier compliance options. A continuous air barrier for the opaque portions of the building thermal envelope shall comply with Section C402.4.1.2.1, or C402.4.1.2.2. ~~or C402.4.1.2.3~~.

~~**C402.4.1.2.3 Building test.** The completed building shall be tested and the air leakage rate of the *building envelope* shall not exceed 0.40 cfm/ft^2 at a pressure differential of 0.3 inches water gauge (2.0 L/s · m^2 at 75 Pa) in accordance with ASTM E 779 or an equivalent method approved by the code official.~~

Reason: This proposal clarifies the language pertaining to the sealing of penetrations in the building thermal envelope associated with continuous air barriers so that all three compliance options associated with air barriers are equivalent.
The current code lists three options for meeting the provisions of the opaque building envelope. The first two that deal with the opaque components are valid and allow compliance based on either the materials used or the assemblies of the envelope. The test is also a valid way of addressing air leakage on a performance basis. Unfortunately, a whole building test includes fenestration such that the test cannot address only opaque sections of the envelope as is the case with the other two options. All three options should be comparable and have the same scope. For this reason the text has been more appropriately rearranged. One approach prescriptively addresses the particular components of the building thermal envelope and their construction and installation as well as individual air leakage properties. The other provides a performance oriented approach that is based on the testing currently allowed, since all possible means of air leakage through the envelope are measured

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal relocates the alternative compliance option in the code so that it occurs before the prescriptive standards which would have to be used if the alternative isn't chosen.

Assembly Action: **None**

Public Comments

Public Comment 1:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.4 Air leakage (Mandatory). The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8. Alternatively the building thermal envelope shall be permitted to be tested in accordance with ASTM E779 at a pressure differential of 0.3 inches water gauge, or an equivalent method approved by the code official, and deemed to comply with the provisions of this section when the tested air leakage rate of the building thermal envelope does not exceed 0.40 cfm/ft^2. Where compliance is based on such testing the building shall also comply with Sections C402.4.5, 402.4.6 and 402.4.7.

C402.4.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. Air barrier penetrations shall be sealed in accordance with Section C402.4.2. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. Recessed lighting fixtures shall comply with Section C404.2.8. Where similar objects are installed which penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

    ~~**Exception:** Buildings that comply with Section C402.4.1.2.3 are not required to comply with Items 1 and 3.~~

(Portions of code change proposal not shown remain unchanged)

Commenter's Reason: This change is needed to address some housekeeping items associated with this change and CE167-13, which was also recommended for approval. Note that there was no opposing testimony, adverse comment or committee concern raised about either CE164-13 or CE167-13 at the first public hearing. With the approval of CE164-13 Section C402.4.1.2.3 is moved to Section C402.4. This places the compliance path that is based on building testing up front so that those choosing this option are not required to specifically address criteria no longer relevant (e.g., if you are testing the building then it is not necessary to specifically follow criteria covering air barrier penetrations and then inspect them.) With this change, you either meet the performance test criterion or not, and if not, then the building must sealed better. This approach is very similar to what is currently done for testing duct systems for leakage. The exception to Section C402.4.1.1 refers to Section C402.4.1.2.3, which per CE164-13 does not exist. This is a simple housekeeping change to remove the exception, because there is no more Section C402.4.1.2.3 and as noted above is covered in Section C402.4 as stated above because any building so tested does not need to specifically comply with Section C402.4.1.1.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

CE164-13	**AMPC1**

Code Change No: CE165-13

Original Proposal

Section(s): C402.4

Proponent: Mark S. Graham, National Roofing Contractors Association (mgraham@nrca.net)

Revise as follows:

C402.4 Air leakage (Mandatory). The thermal envelope of buildings shall comply with Sections C402.4.1 through C402.4.8.

> <u>**Exception:** The provisions of this section shall not be required for roof repairs, roof recovering and roof replacement where the alterations, renovations or repairs to the building do not also include alterations, renovations or repairs to the remainder of the building envelope.</u>

Reason: This code change proposal is intended to clarify the Code's intent regarding when air barriers are and are not required as components of buildings' thermal envelopes.

In existing buildings that do not currently include an air barrier in the building's thermal envelope, it can be interpreted the addition of an air retarder is required in roof repair, roof recover or roof replacement projects where the project's scope does not otherwise require alterations, renovations or repairs to the remainder of the building's thermal envelope. In these situations, the addition of an air retarder to the roof assembly only will do little to and be ineffective in improving the building envelope's overall air leakage performance.

This Exception provides clarity by specifically indicating an air retarder is not required for roof repairs, roof recovering or roof replacement where the scope of the project does not also include alterations, renovations or repairs to the remainder of the building envelope.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee found the exception too broad. It would waive any opportunity to improve the efficiency of the roof assembly where only the roof assembly was being upgraded. Finally, the proposal is located in the wrong portion of the code. It should be located with other existing building provisions.

Assembly Action: **None**

Public Comments

Public Comment:

Jason Wilen, AIA, CDT, RRO, National Roofing Contractors Association, requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

C101.4.3 Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

> **Exception:** The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.
6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,
7. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.
8. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.
9. <u>Air barriers shall not be required for roof repair, roof recover, and roof replacement where the alterations, renovations or repairs to the building do not also include alterations, renovations or repairs to the remainder of the building envelope.</u>

Commenter's Reason: Following the committee's recommendations, this proposal is being modified by relocating the new text from section C402.4 as originally proposed to section C101.4.3. The text is changed slightly from the original proposal to match the format of section C101.4.3.

Also, because proposal CE56-13 was approved as modified by the committee, the terms "Roof Recover", "Roof Repair" and "Roof Replacement" are now defined in the IECC.

Final Hearing Results

CE165-13 AMPC

Code Change No: CE166-13

Original Proposal

Section(s): C402.4.1

Proponent: Theresa A. Weston, PhD., DuPont Building Innovations (theresa.a.weston@usa.dupont.com)

Revise as follows:

C402.4.1 Air barriers. A continuous air barrier shall be provided throughout the building thermal envelope. The air barriers shall be permitted to be located on the inside or outside of the building envelope, located within the assemblies composing the envelope, or any combination thereof. The air barrier shall comply with Sections C402.4.1.1 and C402.4.1.2.

> ~~**Exception:** Air barriers are not required in buildings located in Climate Zones 1, 2 and 3.~~

Reason: This proposal deletes the exception for air barriers in Climates Zones 1, 2 and 3. Air barrier use is important to the energy efficiency, moisture performance and comfort in all climate zones and therefore should be included for all climate zones. This change would also make the provisions within the IECC more consistent with both ASHRAE 90.1 and the IgCC.

Cost Impact: The code change proposal will increase the cost of construction in zones 1, 2 and 3.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal is too broad. The committee felt that air barriers should be waived in the dry climate zones of 2B and 3B.

Assembly Action: **Approved as Submitted**

Public Comments

Public Comment 1:

Theresa W. Weston, DuPont Building Innovations, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.4.1 Air barriers. A continuous air barrier shall be provided throughout the building thermal envelope. The air barriers shall be permitted to be located on the inside or outside of the building envelope, located within the assemblies composing the envelope, or any combination thereof. The air barrier shall comply with Sections C402.4.1.1 and C402.4.1.2.

> <u>**Exception**: Air barriers are not required in buildings located in Climate Zone 2B</u>

Commenter's Reason: The original proposal removed the exception for air barriers in Climate Zones 1, 2 and 3, thus requiring air barriers in all climate zones. Air barrier use is important to the energy efficiency, moisture performance and comfort in all climate zones. A NIST Report investigated direct energy savings from reduced air leakage, and found energy savings from infiltration in all climate zones, including cooling dominated climates.

Simulated Location	Climate Zone	Building Type	Annual Energy Savings
Phoenix, AZ	2B	Office Building	$745
Phoenix, AZ	2B	Retail Building	$1169
Phoenix, AZ	2B	Multi-unit Residential Building	$133
Miami, FL	1A	Office Building	$769
Miami, FL	1A	Retail Building	$1231
Miami, FL	1A	Multi-unit Residential Building	$411

This report found air barriers to be cost effective with the exception of office building with masonry backup in climate zones 1 and 2.

In addition to the direct energy efficiency benefits of air barriers, there are indirect energy efficiency benefits from preventing moisture "piggy-backing" on air intruding and accumulating within building assemblies. When insulation gets wet its R-value can be reduced 60 to 70%. This is a critical in hot humid climates.

Analyzing the data in light of the committee's opinion that the proposal was too broad, this modification leaves the exception in place for zone 2B. The modified proposal would increase consistency with both ASHRAE 90.1 (which has an exception for masonry construction in Climate Zone 2B) and the IgCC (which has no exceptions).

NISTIR 7238, "Investigation of the impact of Commercial Building Envelope Airtightness on HVAC Energy Use", *S. J. Emmerich, Tim McDowell, W. Anis*

Controlling the Transfer of Heat, Air & Moisture through the Building Envelope M.C. Swinton, W.C. Brown, G.A. Chown

Final Hearing Results

CE166-13 **AMPC1**

Code Change No: CE167-13

Original Proposal

Section(s): **C402.4.1.1, C402.4.2**

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.4.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. Air barrier penetrations shall be sealed in accordance with Section C402.4.2. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. <u>Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seats associated with penetrations shall be sealed in the same manner or taped or covered with moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed and shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.</u>

~~3.~~ <u>4.</u> Recessed lighting fixtures shall comply with Section C404.2.8. Where similar objects are installed which penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

Exception: Buildings that comply with Section C402.4.1.2.3 are not required to comply with Items 1 and <u>4</u>~~3~~.

~~**C402.4.2 Air barrier penetrations.** Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals shall be sealed in the same manner or taped or covered with moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.~~

Reason: This proposal clarifies the language pertaining to the sealing of penetrations in the building envelope. The objective of the proposal is to increase the simplicity of the code.

The provisions of C402.4.2 are currently out of place. They have the same standing in the order of the code as C402.4.1 yet are actually a component of the air barrier provisions. They are more appropriately located as a part of the code text addressing air barrier construction. In addition, the present item 2 is duplicated by C402.4.2 to a large degree so the text has been revised to focus on penetrations.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal relocates one of the criteria for air barrier construction from a separate section to be listed with the other criteria. There is no change to the technical requirements.

Assembly Action: **None**

Public Comments

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.4.1.1 Air barrier construction. The *continuous air barrier* shall be constructed to comply with the following:

1. The air barrier shall be continuous for all assemblies that are the thermal envelope of the building and across the joints and assemblies.
2. Air barrier joints and seams shall be sealed, including sealing transitions in places and changes in materials. ~~Air barrier penetrations shall be sealed in accordance with Section C402.4.2.~~ The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
3. Penetrations of the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seats associated with penetrations shall be sealed in the same manner or taped or covered with moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed and shall be securely installed around the penetration so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.
4. Recessed lighting fixtures shall comply with Section C404.2.8. Where similar objects are installed which penetrate the air barrier, provisions shall be made to maintain the integrity of the air barrier.

   Exception: Buildings that comply with Section C402.4.1.2.3 are not required to comply with Items 1 and 3.

Commenter's Reason: This change is needed to address a single housekeeping item. The deletion of the reference to Section C402.4.2 of the code regarding the sealing of air barrier penetrations is needed, because pursuant to this change the provisions that were in C402.4.2 are now located in the new numbered item 3 to Section C402.4.1.1 above, and are therefore not available at C402.4.2 for reference. Note that there was no opposing testimony, adverse comment or committee concern raised about CE167-13 at the first public hearing.

Final Hearing Results

CE167-13 **AMPC**

Code Change No: CE173-13

Original Proposal

Section(s): C402.4.1.2.1

Proponent: Charles Clark, Brick Industry Association, representing Masonry Alliance for Codes and Standards (cclark@bia.org)

Revise as follows:

402.4.1.2.1 Materials. Materials with an air permeability no greater than 0.004 cfm/ft^2 (0.02 L/s·m^2) under a pressure differential of 0.3 in. water (w.g.)(75 Pa) when tested in accordance with ASTM E2178 shall comply with this section. Materials in items 1 through ~~15~~ 16 shall be deemed to comply with this section provided joints are sealed and materials are installed as air barriers in accordance with the manufacturer's instructions.

16. Solid or fully grouted masonry constructed of clay or shale masonry units.

(Portions of text not shown remain unchanged)

Reason: Testing will show that fully grouted masonry constructed of clay or shale masonry units can meet the IECC requirements to be a material deemed-to-comply as an air barrier. This research is being conducted at the National Brick Research Center and will be available in time for consideration at the ICC Committee Hearings.

Cost Impact: This code change will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

16. Solid or hollow ~~fully-grouted~~ masonry constructed of clay or shale masonry units.

Committee Reason: The modification reflects the testing on these materials which has been completed since the original submittal. The product's testing shows that the product qualifies to be on this list of materials.

Assembly Action: **None**

Final Hearing Results

CE173-13 **AM**

Code Change No: CE175-13

Original Proposal

Section(s): C402.4.1.2.2

Proponent: Charles Clark, Brick Industry Association, representing Masonry Alliance for Codes and Standards (cclark@bia.org)

Revise as follows:

402.4.1.2.2 Assemblies. Assemblies of materials and components with an average air leakage not to exceed 0.04 cfm/ft^2 (0.2 L/s·m^2) under a pressure differential of 0.3 inches of water gauge (w.g.)(75 Pa) when tested in accordance with ASTM E 2357, ASTM E 1677 or ASTM E 283 shall comply with this section. Assemblies listed in items 1 ~~and 2~~ through 3 shall be deemed to comply provided joints are sealed and requirements of Section 402.4.1.1 are met.

1. Concrete masonry walls coated with either one application ~~either~~ of block filler or ~~and~~ two applications of a paint or sealer coating;
2. Masonry walls constructed of clay or shale masonry units with a nominal width of 4-inches or more;
3. ~~2~~ A Portland cement/sand parge, stucco or plaster minimum ½ inch (12 mm) in thickness.

Reason: This code change proposal modifies or adds text to the air barrier assembly section in two ways. It corrects the current requirement for a concrete masonry wall assembly to comply as an air barrier. And it adds an assembly option for masonry walls constructed of clay or shale masonry units.

The current text for concrete masonry walls is incorrectly worded. As was substantiated by testing submitted with code change proposal EC 146-09/10, a concrete masonry wall assembly is able to comply as an air barrier when EITHER (not both) of the following are applied:

1) One application of block filler, or
2) Two applications of a paint or sealer coating.

Testing to support both of these methods of compliance was previously submitted with EC146-09/10 and can be downloaded at the following URL: www.ncma.org/resources/design/Research%20Reports/MR36.pdf.

This code change proposal also adds an option for masonry construction made from clay or shale masonry units to qualify as an air barrier. Testing will show that masonry constructed of clay or shale masonry units can meet the IECC requirements to be an assembly deemed-to-comply as an air barrier. This research is being conducted at the National Brick Research Center and will be available in time for consideration at the ICC Committee Hearings.

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proponent has demonstrated that the new assembly will comply with the code. The revisions to Item 1 correct an error in the code.

Assembly Action: **None**

Final Hearing Results

CE175-13	**AS**

Code Change No: CE177-13, Part I

Original Proposal

Section(s): C402.4.1.2 (NEW), R402.1.2 (NEW), (IRC N1102.4.1.2 (NEW))

Proponent: Brent Ursenbach, Salt Lake County representing Utah Chapter ICC and Utah Association of Plumbing and Mechanical Officials Chapter ICC (bursenbach@slco.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C 402.4.1.2 Combustion air openings. In climate zones 3 through 8, where open combustion air ducts provide combustion air to open combustion space conditioning fuel burning appliances, the appliances and combustion air opening shall be located outside the *building thermal envelope* or enclosed in a room, isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table C402.1.2 or C402.2, where the walls shall meet a minimum of the below-grade wall R-value requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section C403. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R-8.

Exceptions:

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with Sections 901, 902, 903, 904, and 905 of the *International Mechanical Code*, and Section 2111.13 of the *International Building Code.*

Reason: (Part I) The entire section C402.4 Air leakage- is of little value when a combustion air duct is installed, open to the conditioned space, virtually placing a large hole through the thermal envelope. The building testing option for leakage in C402.4.1.2.3 cannot be accomplished with a combustion air opening inside the thermal envelope. Testers regularly block these opening as this is the only way they can pressurize the building; only to be opened after the test is completed. Ideally, direct vent, sealed combustion appliances solve the problem. Where less efficient, open combustion fuel burning appliances are used, it is reasonable and proper to isolate the appliances and the required combustion air from inside the thermal envelope.

Cost Impact: The code change proposal will increase the cost of construction, while it will reduce the energy consumption and cost throughout the life of the home.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The text proposal is unclear. Application is not clear. Would it inadvertently control other equipment such as gas dryers. The proposal seems to be describing a 'thermal isolation' without using the defined term.

Assembly Action: Approved as Modified

Modify the proposal as follows:

C402.4.1.2 Combustion air openings. In climate zones 3 through 8, where open combustion air ducts provide combustion air to open combustion space conditioning fuel burning appliances, the appliances and combustion air openings shall be located outside of the building thermal envelope or enclosed in a room isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table C402.1.2 or Table C402.2, where the walls<u>, floors and ceilings</u> shall meet the minimum of the below-grade wall R-value requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section C403. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R-8.

(Portions of proposal not shown remain unchanged)

Final Hearing Results

CE177-13, Part I AMF

Code Change No: CE177-13, Part II

Original Proposal

Section(s): C402.4.1.2 (NEW), R402.1.2 (NEW), (IRC N1102.4.1.2 (NEW))

Proponent: Brent Ursenbach, Salt Lake County representing Utah Chapter ICC and Utah Association of Plumbing and Mechanical Officials Chapter ICC (bursenbach@slco.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R402.4.1.2 (N1102.4.1.2) Combustion air openings. In climate zones 3 through 8, where open combustion air ducts provide combustion air to open combustion fuel burning appliances, the appliances and combustion air opening shall be located outside the *building thermal envelope* or enclosed in a room, isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table R402.1.1, where the walls shall meet a minimum of the basement wall R-value requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section R403. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R-8.

Exceptions:

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with Section 402.4.2 and Section R1006 of the *International Residential Code*.

Reason: (Part I) The entire section C402.4 Air leakage- is of little value when a combustion air duct is installed, open to the conditioned space, virtually placing a large hole through the thermal envelope. The building testing option for leakage in C402.4.1.2.3 cannot be accomplished with a combustion air opening inside the thermal envelope. Testers regularly block these opening as this is the only way they can pressurize the building; only to be opened after the test is completed. Ideally, direct vent, sealed combustion appliances solve the problem. Where less efficient, open combustion fuel burning appliances are used, it is reasonable and proper to isolate the appliances and the required combustion air from inside the thermal envelope.
(Part II) The entire section N1102.4 Air leakage- is of little value when a combustion air duct is installed, open to the conditioned space, virtually placing a large hole through the thermal envelope. Blower door testing as now required by the code cannot be accomplished with a combustion air opening inside the thermal envelope. Testers regularly block these opening as this is the only way they can pressurize the home; only to be opened after the test is completed. Ideally, direct vent, sealed combustion appliances solve the problem. Where less efficient, open combustion fuel burning appliances are used, it is reasonable and proper to isolate the appliances and the required combustion air from inside the thermal envelope.

Cost Impact: The code change proposal will increase the cost of construction, while it will reduce the energy consumption and cost throughout the life of the home.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Disapproved**

Committee Reason: The committee disapproved this consistent with action taken on RE62-13.

Assembly Action: **None**

Public Comments

Public Comment:

Brent Ursenbach, Salt Lake County Representing Utah Chapter ICC; Hope Medina, Cherry Hills Village, representing Colorado Chapter ICC, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

R402.4.1.2 Combustion air openings. In climate zones 3 through 8, where open combustion air ducts provide combustion air to open combustion, space conditioning fuel burning appliances, the appliances and combustion air openings shall be located outside of the building thermal envelope, or enclosed in a room isolated from inside the thermal envelope. Such rooms shall be sealed and insulated in accordance with the envelope requirements of Table R402.1.1, where the walls, floors and ceilings shall meet the minimum of the below- grade wall R-value requirement. The door into the room shall be fully gasketed and any water lines and ducts in the room insulated in accordance with Section R403. The combustion air duct shall be insulated where it passes through conditioned space to a minimum of R-8.

Exceptions:

1. Direct vent appliances with both intake and exhaust pipes installed continuous to the outside.
2. Fireplaces and stoves complying with Section 402.4.2 and Section R1006 of the *International Residential Code*.

Commenter's Reason: This proposal, after failing on the residential side was modified as shown above, resulting in approval by assembly action on the commercial side.

The entire section R402.4 Air leakage- is of little value when a combustion air duct is installed, open to a conditioned space, virtually placing a large hole through the thermal envelope. The building testing requirement for leakage in R402.4. 1.2 is extremely difficult to accomplish, with a combustion air opening inside the thermal envelope. Ideally, direct vent, sealed combustion appliances solve the problem. Where less efficient, open combustion fuel burning appliances are used, which require outside combustion, it is reasonable and proper to isolate the appliances and the required combustion air from inside the thermal envelope.

Addressing opponents concerns:

Opposition was expressed to the original proposal as the higher R-values for floors and ceilings were correctly considered excessive, hence this modification where the R-values for all surfaces separating the equipment room from conditioned space met the R-value of U-Factor for basement walls from Tables R402.1.1. With this modification, this was approved on the commercial side through assembly action. The temperature inside these rooms will not reach the outside extremes; therefore the insulation R-value has been decreased.

The committee listed to reason for disapproval as being consistent with RE62. RE62 addressed insulation only to the full level of the thermal envelope and did not address sealing, which is a mandatory requirement in the IECC.

An opponent expressed opposition based on a 12 year old AGA study which discourages insulating these equipment rooms, based on the large quantities of heat leaking and radiating off appliances is beneficial to the conditioned space. That was the case prior to the much tighter duct sealing, increased duct insulation requirements, and increased IECC enforcement. This study is out dated.

A committee member expressed reservations that somehow this proposal would require combustion air for gas dryers. Please note the proposal states in the first sentence- '**where** open combustion air ducts'- this proposal only applies where combustion air ducts are required. There is not an outside combustion requirement for gas dryers in the IFGC.

Several expressed opposition, seeking the addition of definitions and testing procedures of the Combustion Appliance Zone (CAZ). This proposal is not in opposition of CAZ, as CAZ addresses situations, typically in existing buildings, where combustion air is drawn from within the conditioned space, not through an open duct to outside. CAZ methods undoubtedly should be applied to those situations.

Final Hearing Results

CE177-13, Part II **AMPC**

Code Change No: CE179-13, Part I

Original Proposal

Section(s): C402.4.2, Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Jeffrey M. Hugo, CBO, National Fire Sprinkler Association (hugo@nfsa.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C402.4.2 Air barrier penetrations. Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals shall be sealed in the same manner or taped or covered with a moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation.

<u>**Exception:**</u>

1. <u>Penetrations of the air barrier for a*utomatic* sprinkler systems installed according to the *International Building Code* or the *International Fire Code*,</u>

Reason: (Part I) This proposal seeks to exempt fire sprinkler systems, specifically pendent sprinklers (and other similar sprinklers), that penetrate the typical building envelope at the ceilings by adding an exception.

Section C402.4.2 of the 2012 IECC states that the penetrations in the air barrier shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Caulking the sprinkler, escutcheon, or cover plate could delay, cease or interrupt the flow of the fire sprinkler. In cases when a concealed pendent fire sprinkler is used, the caulk may adhere to the cover plate to the ceiling material and severely delay the fast response of the sprinkler.

Caulked Concealed

The same IECC section above, also states that the "sealing materials shall be appropriate to the construction materials being sealed". Caulk and other sealants are never compatible with the sprinklers, escutcheons and cover plates. In fact, some caulks and sealants are chemically incompatible with certain piping and the pipe manufacturers shall be consulted prior to applying any material.

The fire sprinkler, escutcheon and cover plate are designed to fit together without any adhesive. Escutcheons and cover plates can have gaps or spaces that are required to meet certain specification tolerances for activation of the sprinkler, but in most cases the escutcheons and cover plates should fit tightly to the wall or ceiling.

Furthermore, the intent of the IECC (Section C101.3) is not "intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances." When fire sprinklers are installed or required by other codes such as the IBC, they are installed according to those referenced standards. Fire sprinklers are installed by NFPA 13 (Standard for the Installation of Sprinkler Systems), NFPA 13R (Standard for the Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height) and NFPA 13D (Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes) along with IRC Section P2904.

These codes and standards require that all fire sprinklers, escutcheons and cover plates be listed and installed according to that listing. The testing and listing process (of fire sprinklers, escutcheons, and cover plates) does not take into account any additional field applied materials on the sprinkler, escutcheon and cover plate, such as: paint, caulk, drywall compound, and other construction materials. This prohibition is not only reiterated, but is enforced by NFPA 13 and NFPA 25 (Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems) as both of these standards require full replacement of the affected components when found. When a fire sprinkler is properly installed, the escutcheon and/or cover plate should adequately seal the penetration.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The proposal implies there is no method by which sprinkler systems can be installed and at the same time maintaining adequate air barrier sealing. Appropriate sealants are available.

Assembly Action: None

Public Comments

Public Comment:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.4.2 Air barrier penetrations. Penetrations of the air barrier and paths of air leakage shall be caulked, gasketed or otherwise sealed in a manner compatible with the construction materials and location. Joints and seals shall be sealed in the same manner or taped or covered with a moisture vapor-permeable wrapping material. Sealing materials shall be appropriate to the construction materials being sealed. The joints and seals shall be securely installed in or on the joint for its entire length so as not to dislodge, loosen or otherwise impair its ability to resist positive and negative pressure from wind, stack effect and mechanical ventilation. <u>Sealing of concealed fire sprinklers, when required, shall be in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.</u>

~~**Exception:**~~

~~1. Penetrations of the air barrier for a*utomatic* sprinkler systems installed according to the *International Building Code* or the *International Fire Code*.~~

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work

Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This public comment is no longer asking for a blanket exception for all components of an automatic sprinkler system that penetrate an air barrier. It is putting the previous criteria into the body of the charging paragraph and is narrowed down to the concealed sprinkler. There are two types of concealed sprinkler; pendent and sidewall. The most common air barrier penetration is the pendent concealed sprinkler, however, there may be times when a sidewall concealed sprinkler is used. This public comment seeks to address both, since it is critical to life safety and property protection that when a concealed sprinkler is sealed that it be sealed accordingly and maintain its listings and approvals.

The primary purpose of this change stays the same, which is to prohibit field caulking or sealing of concealed sprinklers. Concealed sprinklers are popular for designers and architects as they are virtually hidden on the surface and cover plates can be colored to match decor. They are the most preferred sprinkler in many occupancies. Because of their makeup and function, when they are caulked or sealed in the field by using sealants, caulk or other methods, it impairs the operation of the sprinkler. Concealed sprinklers with foreign materials attached such as caulk, paint, sealants, foam, tape, etc are no longer considered compliant with their listing and approvals.

Sprinkler manufacturers do have products available to appropriately seal these sprinklers to meet the commercial energy code.

This public comment is to insert language to assist the code official and user of the energy code. Installing sprinklers contrary to their listing is prohibited by the IECC, IFC, IBC, NFPA 13 and NFPA 25 already.

Final Hearing Results

CE179-13, Part I AMPC

Code Change No: CE179-13, Part II

Original Proposal

Section(s): C402.4.2, Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Jeffrey M. Hugo, CBO, National Fire Sprinkler Association (hugo@nfsa.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II – IECC-RESIDENTIAL PROVISIONS

Revise as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA[a]
<u>Automatic sprinkler systems</u>	<u>Penetrations of the building envelope for *automatic* sprinkler systems installed according to the *International Residential Code*, *International Building Code* and *International Fire Code* are exempt from being sealed.</u>
Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed. Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.
Walls	Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Knee walls shall be sealed.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.
Rim joists	Rim joists shall be insulated and include the air barrier.
Floors (including above-garage and cantilevered floors)	Insulation shall be installed to maintain permanent contact with underside of subfloor decking. The air barrier shall be installed at any exposed edge of insulation.

COMPONENT	CRITERIA[a]
Crawl space walls	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.
Narrow cavities	Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated, and sealed to the drywall.
Plumbing and wiring	Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower/tub on exterior wall	Exterior walls adjacent to showers and tubs shall be insulated and the air barrier installed separating them from the showers and tubs.
Electrical/phone box on exterior walls	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.
Fireplace	An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors.

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

Reason: (Part II) This proposal seeks to exempt fire sprinkler systems, specifically pendent sprinklers (and other similar sprinklers), which penetrate the typical building envelope at the ceilings by adding a new automatic sprinkler systems row in the component and criteria columns of Table R402.4.1.1.

NFSA fire sprinkler contractors are reporting that local authorities and building owners are caulking fire sprinklers in order to pass the air leakage testing. Caulking the sprinkler, escutcheon, or cover plate could delay, cease or interrupt the flow of the fire sprinkler. In cases when a concealed pendent fire sprinkler is used, the caulk may adhere to the cover plate to the ceiling material and severely delay the fast response of the sprinkler.

Caulk and other sealants are never compatible with the sprinklers, escutcheons and cover plates. In fact, some caulks and sealants are chemically incompatible with certain piping and the pipe manufacturers shall be consulted prior to applying any material.

The fire sprinkler, escutcheon and cover plate are designed to fit together without any adhesive. Escutcheons and cover plates can have gaps or spaces that are required to meet certain specification tolerances for activation of the sprinkler, but in most cases the escutcheons and cover plates should fit tightly to the wall or ceiling.

The intent of the IECC (Section R101.3) is not “intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances.” When fire sprinklers are installed or required by other codes such as the IBC, they are installed according to those referenced standards. Fire sprinklers are installed by NFPA 13 (Standard for the Installation of Sprinkler Systems), NFPA 13R (Standard for the Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height) and NFPA 13D (Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes) along with IRC Section P2904.

These codes and standards require that all fire sprinklers, escutcheons and cover plates be listed and installed according to that listing. The testing and listing process (of fire sprinklers, escutcheons, and cover plates) does not take into account any additional field applied materials on the sprinkler, escutcheon and cover plate, such as: paint, caulk, drywall compound, and other construction materials. This prohibition is not only reiterated, but is enforced by NFPA 13 and NFPA 25 (Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems) as both of these standards require full replacement of the affected components when found. When a fire sprinkler is properly installed, the escutcheon and/or cover plate should adequately seal the penetration.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: Disapproved

Committee Reason: Sprinkler systems provide a hole in the building thermal envelope that needs to be addressed somehow. If malfunction of the sprinkler system is possible the manufacturer of the system needs to specify an appropriate method.

Assembly Action: None

Public Comments

Public Comment 2:

Adolf Zubia. Chairman IAFC Fire and Life Safety Section, representing ICC Fire Code Action Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA
Concealed sprinklers	~~Where required, penetrations of the building envelope from concealed sprinklers shall be sealed according to the manufacturers installation instructions.~~ When required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.

COMPONENT	CRITERIA
~~Automatic sprinkler systems~~	~~Penetrations of the building envelope from *Automatic sprinkler systems* installed according to the *International Residential Code*, *International Building Code and International Fire Code* are exempt from being sealed.~~

Commenter's Reason: This proposal is submitted by the ICC Fire Code Action Committee (FCAC). This ICC committee was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portions thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the Fire-CAC has held 6 open meetings and numerous Regional Work Group and Task Group meetings and conference calls which included members of the committees as well as any interested party to discuss and debate the proposed changes. Related documentation and reports are posted on the FAC website at: http://www.iccsafe.org/cs/CAC/Pages/default.aspx.

This public comment is no longer asking for a blanket exception for all components of an automatic sprinkler system that penetrate the building envelope. The primary concern is the concealed sprinkler in the ceiling that penetrates the building envelope. There are two types of concealed sprinkler; pendent and sidewall. This public comment seeks to address both, since it is critical to life safety and property protection that when a concealed sprinkler is sealed that it be sealed according to the manufacturer's instructions and maintain its listings and approvals.

The primary purpose of this change stays the same, which is to prohibit field caulking or sealing of concealed sprinklers. Concealed sprinklers are popular for designers and architects as they are virtually hidden on the surface and cover plates can be colored to match decor. They are the most preferred sprinkler in many occupancies. Because of their makeup and function, when they are caulked or sealed in the field by using sealants, caulk or other methods, it impairs the operation of the sprinkler possibly causing delays in the operation of the sprinker, distorting the spray, or preventing the sprinkler from operating at all. Concealed sprinklers with foreign materials attached such as caulk, paint, sealants, foam, tape, etc. are no longer considered compliant with their listing and approvals.

This public comment addresses the concealed sprinkler as "where required". It may not be necessary in testing the home to seal the concealed sprinklers due to their tight tolerance and minimal leakage. A concealed sprinkler may only contribute up to 10 cfm, the same as a swinging door.

Finally, this addition to the residential energy code is in place to assist those in the enforcing or constructing to the energy code that fire sprinklers are a critical life safety component in the IRC. In no way does the energy code permit fire sprinklers to impaired or installed contrary to the listing. Unlike commercial occupancies, where the NFPA 25 and fire code inspections are being performed on a frequent basis, residential occupancies covered by this code may never have a re-inspection to catch an impaired system.

Final Hearing Results

CE179-13, Part II **AMPC2**

Code Change No: CE182-13

Original Proposal

Section(s): Table C402.4.3

Proponent: Joseph R. Hetzel, P.E., Thomas Associates, Inc., representing the Door & Access Systems Manufacturers Association (DASMA) International (jhetzel@thomasamc.com)

Revise as follows:

TABLE C402.4.3
MAXIMUM AIR INFILTRATION RATE
FOR FENESTRATION ASSEMBLIES

FENESTRATION ASSEMBLY	MAXIMUM RATE (CFM/FT^2)	TEST PROCEDURE
Windows	0.20[a]	AAMA/WDMA/ CSA101/I.S.2/A440 or NFRC 400
Sliding doors	0.20[a]	
Swinging doors	0.20[a]	
Skylights - with condensation weepage openings	0.30	
Skylights - all other	0.20[a]	
Curtain walls	0.06	NFRC 400 or ASTM E 283 at 1.57 psf (75 Pa)
Storefront glazing	0.06	
Commercial glazed swinging entrance doors	0.06	
Revolving doors	1.00	
Garage doors	0.40	ANSI/DASMA 105, NFRC 400, or ASTM E 283 at 1.57 psf (75 Pa)
Rolling doors	1.00	
High speed doors[b]	1.30	

For SI: 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093 m^2

a. The maximum rate for windows, sliding and swinging doors, and skylights is permitted to be 0.3 cfm per square foot of fenestration or door area when tested in accordance with AAMA/WDMA/CSA101/I.S.2/A440 at 6.24 psf (300 Pa).

b. A non-swinging door intended for vehicular access and material transportation, with a minimum opening rate of 32 inches per second

Reason: "High speed doors" are typically automatically controlled, non-swinging doors, and are commonly used in conjunction with vehicular traffic or transportation of materials and are not generally intended for pedestrian traffic. Sizes typically range from 8x8 to 12x12. When high speed doors are used in a building exterior envelope, the primary purposes are for environmental control and/or building security.

High speed door panels or curtains are usually made of a thin layer of vinyl, fabric, rubber or composite material. Materials can be opaque, translucent or a combination thereof.

The assemblies are constructed of flexible materials at the perimeter to provide sealing against air leakage but yet to allow variations in contact between door panels/curtains and jamb construction to maximize the effectiveness of continual high speed operation. Thus, high speed doors cannot comply with prescriptive air leakage requirements for any current fenestration assembly type in Table C402.4.3. The high speed nature of these doors provides for minimizing of "air exchange", a valuable and predominant characteristic of minimizing overall energy losses through a door opening.

An air leakage value of 1.30 cfm/sf is recommended for a high speed door based on a tested value of 1.26 obtained via a March 2012 DASMA-sponsored test on a representative 8'x8' high speed door product.

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

The following errata were not posted to the ICC website. The existing value in Table C402.4.3 for commercial glazed swinging entrance doors was incorrectly shown as 0.06.

TABLE C402.4.3
MAXIMUM AIR ~~INFILTRATION~~ LEAKAGE RATE
FOR FENESTRATION ASSEMBLIES

FENESTRATION ASSEMBLY	MAXIMUM RATE (CFM/FT^2)	TEST PROCEDURE
Curtain walls	0.06	NFRC 400 or ASTM E 283 at 1.57 psf (75 Pa)
Storefront glazing	0.06	
Commercial glazed swinging entrance doors	~~0.06~~ 1.00	
Revolving doors	1.00	

Committee Action: Disapproved

Committee Reason: The committee understood that the concept needs to be addressed, but more specificity is needed including a definition.

Assembly Action: None

Public Comments

Public Comment:

Joseph R. Hetzel, P.E., Thomas Associates, Inc., representing Door & Access Systems Manufacturers Association (DASMA), requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C402.4.3
MAXIMUM AIR ~~INFILTRATION~~ LEAKAGE RATE
FOR FENESTRATION ASSEMBLIES

FENESTRATION ASSEMBLY	MAXIMUM RATE (CFM/FT^2)	TEST PROCEDURE
Windows	0.20[a]	AAMA/WDMA/ CSA101/I.S.2/A440 or NFRC 400
Sliding doors	0.20[a]	
Swinging doors	0.20[a]	
Skylights - with condensation weepage openings	0.30	
Skylights - all other	0.20[a]	
Curtain walls	0.06	NFRC 400 or ASTM E 283 at 1.57 psf (75 Pa)
Storefront glazing	0.06	
Commercial glazed swinging entrance doors	1.00	
Revolving doors	1.00	
Garage doors	0.40	ANSI/DASMA 105, NFRC 400, or ASTM E 283 at 1.57 psf (75 Pa)
Rolling doors	1.00	
High speed doors~~[b]~~	1.30	

For SI: 1 cubic foot per minute = 0.47 L/s, 1 square foot = 0.093 m^2

a. The maximum rate for windows, sliding and swinging doors, and skylights is permitted to be 0.3 cfm per square foot of fenestration or door area when tested in accordance with AAMA/WDMA/CSA101/I.S.2/A440 at 6.24 psf (300 Pa).

~~b. A non-swinging door intended for vehicular access and material transportation, with a minimum opening rate of 32 inches per second~~

CHAPTER 2
GENERAL DEFINITIONS

Add a new definition as follows:

HIGH SPEED DOOR: A non-swinging door used primarily to facilitate vehicular access or material transportation, with a minimum opening rate of 32 inches per second, a minimum closing rate of 24 inches per second, and an automatic closing device.

Commenter's Reason: High speed doors are often used in energy related applications where an internal building environment must be controlled. In these applications, "air exchange" (air flowing through the door opening when the door is in other than the fully closed position) is the predominant energy concern. Because of their design, high speed doors cannot meet any of prescriptive values given in the current Table. Since air leakage values cannot be traded off like U-factor values, a specific maximum value for high speed doors is needed. The value proposed is based on research described in the reasoning given in our original proposal.

With respect to our original proposal, we have moved the description of a "high speed door" (proposed footnote b) into the Definitions section of the code. In the description, we have included additional parameters as well as descriptive language found elsewhere in the code.

The Table heading has been revised for consistency within the IECC.

Final Hearing Results

CE182-13	**AMPC**

Code Change No: CE183-13

Original Proposal

Section(s): C402.4.4

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.4.4 Doors and access openings to shafts, chutes, stairways, and elevator lobbies. Doors and access openings from conditioned space to shafts, chutes, stairways and elevator lobbies not within the scope of the fenestration assemblies covered in Section C402.4.3 shall ~~either meet the requirements of Section C402.4.3 or shall~~ be gasketed, weatherstripped or sealed.

> **Exception:** Door openings required to comply with Section 716 ~~or 716.4~~ of the *International Building Code*; or doors and door openings required to comply with UL 1784 by the International Building Code ~~to comply with UL 1784 shall not be required to comply with Section C402.4.4~~.

Reason: This proposal clarifies the components covered in the section on doors and access openings to shafts, chutes, stairways, and elevator lobbies are subject to air leakage provisions as components of the building thermal envelope, and provides a distinction between these doors and other doors that are already covered within the scope of fenestration assemblies. The objective of this proposal is to clarify the code to foster implementation and compliance verification.

Some doors are covered by Section C402.4.3 and the intent of the code should be that doors within the scope of fenestration that can be tested and listed *should* be tested and listed in accordance with and meet the provisions of Section C402.4.3. This leaves those doors that cannot be so tested and listed subject to the caulking and sealing criterion. This clarification is needed because the current code allows some doors that could (and should) be assessed as meeting the provisions of Section C402.4.3 through testing and listing only required to be "caulked or sealed." The exception is revised to provide clarification and to eliminate the ending statement—an exception by definition means something is not required to comply.

Cost Impact: The code change proposal does not increase the cost of construction.

Anaysis: Section C402.4.4 of the IECC contains errata with respect to the sections of the IBC referenced in the exception. The proper references: 716 and 716.4 are shown in this code change proposal.

Public Hearing Results

Errata for this proposal is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

Committee Action: **Disapproved**

Committee Reason: Deleting reference to Section 716.4 is inappropriate.

Assembly Action: **None**

Public Comments

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.4.4 Doors and access openings to shafts, chutes, stairways, and elevator lobbies. Doors and access openings from conditioned space to shafts, chutes, stairways and elevator lobbies not within the scope of the fenestration assemblies covered in Section C402.4.3 shall be gasketed, weatherstripped or sealed.

> **Exception:** Door openings required to comply with Section 716 or 716.4 of the International Building Code; or doors and door openings required to comply with UL 1784 by the International Building Code.

Commenter's Reason: At the code development hearing, there was a singular point of opposition from the floor. A concern was raised about omitting the reference to Section 716.4 of the IBC, because it has a particular application to a certain type of door and access opening cover. The proponent asked for retention of Section 716.4 in the code change proposal as a floor modification, but the chair ruled that out of order. In the original change, DOE argued that by default, since Section 716.4 is a subsection of Section 716, it would automatically be referenced. The proposal, as originally submitted, was denied by a committee vote of 5 to 4.
This public comment simply retains the current reference in the code to Section 716.4. No other modifications to the code change proposal are proposed, because there was no opposing testimony on those parts of the code change proposal, and, as outlined in the original reason statement, they are relevant and appropriate in ensuring increased clarity of the code.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

CE183-13 AMPC

Code Change No: CE184-13

Original Proposal

Section(s): C402.4.4, C402.4.5, C402.4.5.1, C402.4.5.2, C403.2.4.4 (NEW)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

~~**C402.4.4 Doors and access openings to shafts, chutes, stairways, and elevator lobbies.** Doors and access openings from conditioned space to shafts, chutes stairways and elevator lobbies shall either meet the requirements of Section C402.4.3 or shall be gasketed, weatherstripped or sealed.~~

> ~~**Exception:** Door openings required to comply with Section 715 or 715.4 of the *International Building Code*; or doors and door openings required by the *International Building Code* to comply with UL 1784 shall not be required to comply with Section C402.4.4.~~

C402.4.5 Air intakes, exhaust openings, stairways and shafts. Stairway enclosures and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be provided with dampers in accordance with Section~~s C402.4.5.1 and C402.4.5.2~~ C403.2.4.4.

~~**C402.4.5.1 Stairway and shaft vents.** Stairway and shaft vents shall be provided with Class I motorized dampers with a maximum leakage rate of 4 cfm/ft^2 (20.3 L/s · m^2) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.~~

~~Stairway and shaft vent dampers shall be installed with controls so that they are capable of automatically opening upon:~~

1. ~~The activation of any fire alarm initiating device of the building's fire alarm system; or~~
2. ~~The interruption of power to the damper.~~

~~**C402.4.5.2 Outdoor air intakes and exhausts.** *Outdoor air* supply and exhaust openings shall be provided with Class IA motorized dampers with a maximum leakage rate of 4 cfm/ft^2 (20.3 L/s · m^2) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.~~

~~**Exceptions:**~~

1. ~~Gravity (nonmotorized) dampers having a maximum leakage rate of 20 cfm/ft^2 (101.6 L/s · m^2) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D are permitted to be used as follows:~~
   - ~~1.1 In buildings for exhaust and relief dampers.~~
   - ~~1.2 In buildings less than three stories in height above grade.~~
   - ~~1.3. For ventilation air intakes and exhaust and relief dampers in buildings of any height located in Climate Zones 1, 2 and 3.~~
   - ~~1.4. Where the design *outdoor air* intake or exhaust capacity does not exceed 300 cfm (141 L/s).~~

   ~~Gravity (nonmotorized) dampers for ventilation air intakes shall be protected from direct exposure to wind.~~
2. ~~Dampers smaller than 24 inches (610 mm) in either dimension shall be permitted to have a leakage of 40 cfm/ft^2 (203.2 L/s · m^2) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.~~

C403.2.4.4 Shutoff dampers. Outdoor air intake and exhaust openings and stairway and shaft vents shall be provided with Class 1 motorized dampers having a maximum air leakage rate of 4 cfm/ft^2 of damper surface area at 1.0 inch water gauge when tested in accordance with AMCA 500D.

Outdoor air intake and exhaust dampers shall be installed with automatic controls configured to close when the systems or spaces served are not in use or during unoccupied period warm-up and setback operation unless the systems served require outdoor or exhaust air in accordance with the *International Mechanical Code* or the dampers are opened to provide intentional economizer cooling.

Stairway and shaft vent dampers shall be installed with automatic controls configured to open upon the activation of any fire alarm initiating device of the building's fire alarm system or the interruption of power to the damper.

Exceptions: Gravity (non-motorized) dampers shall be permitted to be used as follows:

1. In buildings less than three stories in height above grade plane.

2. In buildings of any height in climate zones 1, 2 or 3.

3. Where the design exhaust capacity is not greater than 300 cfm.

All gravity (non-motorized) dampers shall have a maximum air leakage rate of 20 cfm/ft^2 where not less than 24 inches in either dimension and 40 cfm/ft^2 where less than 24 inches in either dimension. The rate of air leakage shall be determined at 1.0 inch water gauge when tested in accordance with AMCA 500D.

Reason: This proposal consolidates all provisions associated with leakage rates, sealing, dampers, etc. of mechanical system openings, vents, grills, etc. for air intakes, exhaust openings, stairways and shafts in one place in the code. The objective of this proposal is to clarify the code to foster implementation and compliance verification.

Currently shutoff dampers are covered in two places (envelope and mechanical) and based on experiences with energy code trainings is causing confusion. There is also a conflict in the current code where exhaust and relief dampers are allowed to be gravity dampers no matter the building height in Section C402.4.5.2 and per Section C403.2.4.4 only up to three stories in height in the mechanical section in Climate Zones 4-8. Because all exhaust and relief dampers are associated with mechanical systems, the more stringent requirement in the mechanical section is retained. Locating all the provisions in one place will eliminate this confusion and current and potential future conflicts. It is important to note that the code change does not change the technical content of the current code (other than addressing the above mentioned conflict) and simply places all the requirements in one better organized location in the code, noting Section 402.4.5 is retained in the envelope section of the code and refers the user to Section 403.2.4.4 where all damper provisions would be located.

A summary of the current code provisions in C402.4.5 and C403.2.4.4 finds the following:

- Stairway enclosures and elevator shaft vents need to have motorized dampers with 4.0 or less leakage and have controls allowing the dampers to automatically open with a fire alarm or power interruption.
- Outdoor air and exhaust openings integral to the building envelope need to have the same motorized damper leakage rate but in some cases these openings can be provided with gravity (non-motorized) dampers meeting certain leakage limits.
- Outdoor air supply and exhaust ducts need to have motorized dampers but no leakage limit is provided and gravity dampers are allowed in some cases.

The proposed code change contains all those provisions so the outcome from following the current code and the code change proposal above is the same, except where the current code provisions conflict, in which case the more specific or stringent has been applied in the code change proposal.

Cost Impact: The code change proposal does not increase the cost of construction.

Public Hearing Results

The following errata were not posted to the ICC website. The printed monograph shows Section C402.4.4 being deleted by this proposal. Such is incorrect. The proposal deletes Section C403.2.4.4 among other actions.

C402.4.4 Doors and access openings to shafts, chutes, stairways, and elevator lobbies.

~~**C403.2.4.4 Shutoff damper controls.** Both outdoor air supply and exhaust ducts shall be equipped with motorized dampers that will automatically shut when the systems or spaces served are not in use.~~

~~**Exceptions:**~~

1. ~~Gravity dampers shall be permitted in buildings less than three stories in height.~~
2. ~~Gravity dampers shall be permitted for buildings of any height located in Climate Zones 1, 2 and 3.~~
3. ~~Gravity dampers shall be permitted for outside air intake or exhaust airflows of 300 cfm (0.14 m^3/s) or less.~~

(Portions of proposal not shown remain unchanged)

Committee Action: **Approved as Submitted**

Committee Reason: The proposal relocates the damper provisions to a more appropriate location associated with other related provisions.

Assembly Action: **None**

Final Hearing Results

CE184-13	**AS**

Code Change No: CE186-13

Original Proposal

Section(s): C402.4.5.1

Proponent: Amanda Hickman, Intercode Incorporated, representing AMCA International (Amanda@intercodeinc.com)

Revise as follows:

C402.4.5.1 Stairway and shaft vents. Stairway and shaft vents shall be provided with Class I motorized dampers. Dampers shall have ~~with~~ a maximum leakage rate of 4 cfm/ft2 (20.3 L/s · m2) at 1.0 inch water gauge (w.g.) (249 Pa) and shall be labeled by an *approved agency* when tested in accordance with AMCA 500D for such purpose.

Stairway and shaft vent dampers shall be installed with controls so that they are capable of automatically opening upon:

1. The activation of any fire alarm initiating device of the building's fire alarm system; or
2. The interruption of power to the damper.

Reason: This change will make enforcement faster and easier. Applying sealed (low-leakage) dampers in the building envelope will save energy and will be more easily enforced because of the presence of a certification label.

The requirement for labeling dampers is already required in the International Building Code for fire and smoke dampers. However, there is no such labeling requirement for sealed low leakage dampers that indicates the certified air leakage rating verified by an approved third party agency. This is an important tool for designers and inspectors to ensure that the appropriate equipment is specified and installed.

There is no significant cost increase since the majority of damper manufacturers already have their products certified, and are already providing labels for other types of dampers. There may be some small increase in the cost of dampers for a manufacturer who are not already voluntarily participating in a certified ratings program.

Cost Impact: The code change proposal will increase the cost of construction. This proposal could minimally increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee found that the changes would bring the IECC into agreement with the *International Building Code* and it would improve enforceability of the code.

Assembly Action: **None**

Final Hearing Results

CE186-13 **AS**

Code Change No: CE187-13

Original Proposal

Section(s): C402.4.5.2

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA International

Revise as follows:

C402.4.5.2 Outdoor air intakes and exhausts. *Outdoor air* supply and exhaust openings shall be provided with Class ~~IA~~ I motorized dampers with a maximum leakage rate of 4 cfm/ft2 (20.3 L/s · m2) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.

Exceptions:

1. Gravity (nonmotorized) dampers having a maximum leakage rate of 20 cfm/ft^2 (101.6 L/s · m^2) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D are permitted to be used as follows:
   1.1. In buildings for exhaust and relief dampers.
   1.2. In buildings less than three stories in height above grade.
   1.3. For ventilation air intakes and exhaust and relief dampers in buildings of any height located in Climate Zones 1, 2 and 3.
   1.4. Where the design *outdoor air* intake or exhaust capacity does not exceed 300 cfm (141 L/s).

   Gravity (nonmotorized) dampers for ventilation air intakes shall be protected from direct exposure to wind.
2. Dampers smaller than 24 inches (610 mm) in either dimension shall be permitted to have a leakage of 40 cfm/ft^2 (203.2 L/s · m^2) at 1.0 inch water gauge (w.g.) (249 Pa) when tested in accordance with AMCA 500D.

Reason: This change is an editorial correction. The leakage specification of 4 cfm/ft2 pertains to Class I, not Class IA, so the "A" needs to be dropped. Class 1A has a maximum leakage rate of 3 cfm/ft2.

Cost Impact: This proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal corrects the class of the equipment from IA to correct I.

Assembly Action: **None**

Final Hearing Results

CE187-13	**AS**

Code Change No: CE187-13

Original Proposal

Section(s): C402.4.5.2

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA International (amanda@intercodeinc.com)

Revise as follows:

C402.4.5.2 Outdoor air intakes and exhausts. *Outdoor air* supply and exhaust openings shall be provided with Class IA motorized dampers. The dampers shall have ~~with~~ a maximum leakage rate of 4 cfm/ft2 (20.3 L/s · m2) at 1.0 inch water gauge (w.g.) (249 Pa) and shall be labeled by an *approved agency* when tested in accordance with AMCA 500D for such purpose.

Reason: This change will make enforcement faster and easier. Applying sealed (low-leakage) dampers in the building envelope saves energy and is more easily enforced because of the presence of a certification label.

Cost Impact: The code change proposal could slightly increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal is consistent with the action taken on CE186-13. The committee found that the changes would bring the IECC into agreement with the *International Building Code* and it would improve enforceability of the code.

Assembly Action: **None**

Final Hearing Results

CE188-13 **AS**

Code Change No: CE192-13

Original Proposal

Section(s): C202 (NEW), C402.4.7, Chapter 5

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA International (amanda@intercodeinc.com)

Revise as follows:

C402.4.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Exceptions: <u>Vestibules are not required for the following:</u>

1. Buildings in Climate Zones 1 and 2.
2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors that open directly from a space less than 3,000 square feet (298 m2) in area.
5. Revolving doors.
6. <u>Doors that have an installed air curtain that has been tested in accordance with ANSI/AMCA 220. Air curtains shall be controlled with the opening and closing of the door.</u>

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

<u>**AIR CURTAIN.** A device that generates and discharges a laminar air stream installed at the building entrance intended to prevent the infiltration of external, unconditioned air into the conditioned spaces, or the loss of interior, conditioned air to the outside.</u>

Add new standard to Chapter 5 as follows:

AMCA

<u>220-05 Laboratory Methods of Testing Air Curtain Units for Aerodynamic Performance Rating.</u>

Reason: This code change will allow an air curtain to be used as a low cost, low maintenance alternative to a vestibule, thereby saving valuable floor space and creating an invisible, energy saving barrier when the door is open. An air curtain's base function requires nothing more than ambient air. Air curtains can save from 1-10% of the building energy use, depending on climate zone, building size, wind exposure and traffic volume. On average, an air curtain saves 60 - 80% of the energy lost through an open unprotected doorway, while consuming as little as 7.5% of that energy to operate. They require minimal annual maintenance (such as cleaning or vacuuming) and have a life expectancy of 15 to 25 years.

Air curtains installed on the interior of a building provides a coherent sheet of air created by an air stream and the surrounding entrained air. This sheet of air is able to bend and resist thermal exchange over an opening by way of support from the building's interior pressure and the stability created as the air stream meets a return grill or splits when it meets a surface, such as a floor, or another air stream.

An additional benefit of using an air curtain is a cleaner environment. They prevent the infiltration of dirt, fumes and debris and repel flying insects. They are approved for use in the food service industry as a means of insect control for customer entry doors, kitchen service, and delivery doors. They also have less of a propensity to be unintentional defeated like a vestibule, by common situations such as high traffic or being held open for egress.

Numerous studies have been published that evaluate the effectiveness of air curtains. When compared to that of a vestibule, air curtains consistently outperform vestibules in energy savings. Recent studies take advantage of current technology to evaluate the air curtains efficiencies and effectiveness.

Cost Impact: The code change proposal will not increase the cost of construction. It will decrease the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, AMCA 220-05 Laboratory Methods of Testing Air Curtain Units for Aerodynamic Performance Rating, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Note: The term 'air curtain' is currently defined in the IgCC. The definition is the same as proposed here.

Public Hearing Results

For staff analysis of the content of AAMCA 220-05 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: Approved as Modified

Further modify the proposal as follows:

6. Doors that have an ~~installed~~ air curtain <u>with a minimum velocity of 2 m/s at the floor</u>, that has been tested in accordance with ANSI/AMCA 220 <u>and installed in accordance with manufacturer's instructions</u>. Air curtains shall be controlled with the opening and closing of the door.

(Portions of proposal not shown remain unchanged)

Committee Reason: Modification provides the technical minimum needed for the air curtain to function as intended as well as specifying manufacturer's installation instructions. The proposal adds an effective alternative to a constructed vestibule.

Assembly Action: None

Public Comments

Public Comment:

Shaunna Mozingo, City of Cherry Hills Village, CO, representing Colorado Chapter of ICC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C402.4.7 Vestibules. All building entrances shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time. The installation of one or more revolving doors in the building entrance shall not eliminate the requirement that a vestibule be provided on any doors adjacent to revolving doors.

Exceptions: Vestibules are not required for the following*:*

1. Buildings in Climate Zones 1 and 2.
2. Doors not intended to be used by the public, such as doors to mechanical or electrical equipment rooms, or intended solely for employee use.
3. Doors opening directly from a *sleeping unit* or dwelling unit.
4. Doors that open directly from a space less than 3,000 square feet (298 m2) in area.
5. Revolving doors.
6. Doors that have an air curtain with a minimum velocity of 2 m/s at the floor, ~~that has~~ <u>have</u> been tested in accordance with ANSI/AMCA 220 and installed in accordance with manufacturer's instructions. ~~Air curtains shall be controlled~~ <u>Manual or automatic controls shall be provided that will operate the air curtain</u> with the opening and closing of the door. <u>Air curtains and their controls shall comply with Section C408.2.3.</u>

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This modification is to provide clarification to the modified approved language that came out of the committee hearings in Dallas. There were some words that seemed unnecessary and made the section hard to read. Also added to this proposal were control requirements to make the air curtains consistent with other systems regulated by this code. All systems, whether lighting or mechanical have control requirements that include functional performance testing.

Final Hearing Results

CE192-13	**AMPC**

Code Change No: CE193-13

Original Proposal

Section(s): C402.4.8

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C402.4.8 Recessed lighting. Recessed luminaires installed in the building thermal envelope shall be: ~~sealed to limit air leakage between conditioned and unconditioned spaces. All recessed luminaires shall be~~

1. IC-rated, ~~and~~
2. L~~l~~abeled as having an air leakage rate of not more than 2.0 cfm when tested in accordance with ASTM D E 283 at a 1.57 psf pressure differential, and~~. All recessed luminaires shall be s~~
3. Sealed with gasket or caulk between the housing and interior wall or ceiling covering.

Reason: The location in the building thermal envelope defines by default the reason for the requirement (i.e. to limit air leakage). This proposal clarifies the language for sealing recessed lighting that is located in the building thermal envelope. The current language could be interpreted to require gasketing or caulking recessed fixtures even when not installed in the thermal envelope, even though there is no reason for this requirement. The objective of this proposal is to clarify the code to foster implementation and compliance verification.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the intent of the provision as well as providing a clearer format.

Assembly Action: **None**

Final Hearing Results

CE193-13 **AS**

Code Change No: CE194-13

Original Proposal

Section(s): C202 (NEW), C402.1, C402.5 (NEW), C403.1, C403.5 (NEW), C403.6, C405.1, C405.10 (NEW)

Proponent: Tim Nogler, Washington Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C402.1 General (Prescriptive). The building thermal envelope shall comply with Section C402.1.1. Section C402.1.2 shall be permitted as an alternative to the *R*-values specified in Section C402.1.1. Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C402.5.

C402.5 Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers. *Walk-in coolers*, *walk-in freezers*, *refrigerated warehouse coolers* and *refrigerated warehouse freezers* shall comply with all of the following:

1. Be equipped with automatic door closers that firmly close walk-in doors that have been closed to within 1 inch of full closure.

   Exception: Automatic closers are not required for doors wider than 3 feet 9 inches or taller than 7 feet.

2. Doorways shall have strip doors, curtains, spring-hinged doors, or other method of minimizing infiltration when doors are open.

3. *Walk-in coolers* and *refrigerated warehouse coolers* shall contain wall, ceiling, and door insulation of not less than R–25 and *walk-in freezers* and *refrigerated warehouse freezers* shall contain wall, ceiling, and door insulation of not less than R–32.

   Exception: Glazed portions of doors or structural members need not be insulated.

4. *Walk-in freezers* shall contain floor insulation of not less than R–28.

5. Transparent reach-in doors for *walk-in freezers* and windows in *walk-in freezer* doors shall be of triple-pane glass, either filled with inert gas or with heat-reflective treated glass.

6. Windows and transparent reach-in doors for *walk-in coolers* doors shall be of double-pane or triple-pane, inert gas-filled, heat-reflective treated glass.

C403.1 General. Mechanical systems and equipment serving the building heating, cooling, or ventilating needs shall comply with Section C403.2 (referred to as the mandatory provisions) and either:

1. Section C403.3 (Simple systems); or
2. Section C403.4 (Complex systems).

Walk-in coolers, *walk-in freezers*, *refrigerated warehouse coolers* and *refrigerated warehouse freezers* shall comply with Section C403.5.

C403.5 Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers. *Walk-in coolers*, *walk-in freezers*, *refrigerated warehouse coolers* and *refrigerated warehouse freezers* shall comply with all of the following:

1. Evaporator fan motors that are less than 1 horsepower and less than 460 volts shall use electronically commutated motors, brushless direct current motors, or 3-phase motors.
2. Condenser fan motors that are less than 1 horsepower shall use electronically commutated motors, permanent split capacitor-type motors or 3-phase motors.
3. Where anti-sweat heaters without anti-sweat heater controls are provided, they shall have a total door rail, glass, and frame heater power draw of not more than 7.1 Watts per square foot of door opening for *walk-in freezers*, and 3.0 Watts per square foot of door opening for *walk-in coolers*.
4. Where anti-sweat heater controls are provided, they shall reduce the energy use of the anti-sweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.

C405.1 General (Mandatory). This section covers lighting system controls, the connection of ballasts, the maximum lighting power for interior applications, electrical energy consumption, and minimum acceptable lighting equipment for exterior applications.

Exception: Dwelling units within commercial buildings shall not be required to comply with Sections C405.2 through C405.5 provided that not less than 75 percent of the permanently installed light fixtures, other than low voltage lighting, shall be fitted for, and contain only, high efficacy lamps~~.~~. Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall comply with Section C405.10.

C405.10 Walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers. Lights in walk-in coolers, walk-in freezers, refrigerated warehouse coolers and refrigerated warehouse freezers shall either use light sources with an efficacy of not less than 40 lumens per Watt, including ballast losses , or shall use light sources with an efficacy of not less than 40 lumens per Watt, including ballast losses , in conjunction with a device that turns off the lights within 15 minutes when the space is not occupied.

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

REFRIGERATED WAREHOUSE COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F that can be walked into and has a total chilled storage area of not less than 3,000 square feet.

REFRIGERATED WAREHOUSE FREEZER: An enclosed storage space capable of being refrigerated to temperatures at or below 32°F that can be walked into and has a total chilled storage area of not less than 3,000 square feet.

WALK-IN COOLER. An enclosed storage space capable of being refrigerated to temperatures above 32°F that can be walked into and has a total chilled storage area of less than 3,000 square feet.

WALK-IN FREEZER: An enclosed storage space capable of being refrigerated to temperatures at or below 32°F that can be walked into and has a total chilled storage area of less than 3,000 square feet..

Reason: Refrigeration is one of the largest unregulated electrical loads in buildings. This proposal provides basic minimum performance levels for walk-in coolers and freezers, and for refrigerated warehouse coolers and refrigerated warehouse freezers. The national model code should set a minimum performance for these significant energy using systems. This proposal is based on industry standard practice.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was concern about the option allowing clear glass in the doors of this equipment.

Assembly Action: **None**

Public Comment

Public Comment:

Tim Nogler, Washington State Building Code Council, requests Approval as Submitted.

Commenter's Reason: The committee expressed concern about the glazing in cooler and freezer enclosures fogging up. However, this proposal, based on industry practice, defines the required thermal quality of this glazing, which not only limits heat transfer but also limits interior condensation. Federal law contains criteria for walk-in coolers and walk-in freezers. Incorporation of these criteria will keep the IECC in compliance with Federal law. Also, without including these criteria, the baseline for tradeoffs or taking credit for insulation is not readily apparent. Designers, contractors, and building department staff would need to locate the information in the Federal register. Incorporating the criteria in the IECC eliminates the need to track down this information. This proposal provides a baseline for tradeoffs or for taking credit for additional insulation.

Final Hearing Results

CE194-13 **AS**

Code Change No: CE196-13

Original Proposal

Section(s): C403.2.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.1 Calculation of heating and cooling loads. Design loads associated with heating, ventilating and air conditioning of the building shall be determined in accordance with ~~the procedures described in~~ ANSI/AHRAE/ACCA Standard 183 or by an *approved* equivalent computational procedure using the design parameters specified in Chapter 3~~. The design loads shall account for the building envelope, lighting, ventilation and occupancy loads based on the project design.~~ Heating and cooling loads shall be adjusted to account for load reductions that are achieved where energy recovery systems are utilized in the HVAC system in accordance with the ASHRAE HVAC Systems and Equipment Handbook~~.~~ ~~Alternatively, design loads shall be determined by an approved equivalent computational procedure using the design parameters specified in Chapter 3~~.

Reason: ASHRAE 183 provides the relevant details on how to calculate the loads. The "loads" are specified as associated with HVAC. This proposal simplifies the language requiring heating and cooling load calculations to simply reference ASHRAE 183. The objective of this proposal is to simplify the code to foster implementation and compliance verification.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

C403.2.1 Calculation of heating and cooling loads. Design loads associated with heating, ventilating and air conditioning of the building shall be determined in accordance with ANSI/ASHRAE/ACCA Standard 183 or by an approved equivalent computational procedure using the design parameters specified in Chapter 3. Heating and cooling loads shall be adjusted to account for load reductions that are achieved where energy recovery systems are utilized in the HAVAC system in accordance with the ASHRAE HVAC Systems and Equipment Handbook by an approved equivalent computational procedure.

Committee Reason: The modification is needed to provide specific direction to the code user when the ASHRAE HVAC Handbook is used. The proposal clarifies the intent of the code.

Assembly Action: **None**

Final Hearing Results

CE196-13	**AM**

Code Change No: CE198-13

Original Proposal

Section(s): C403.2.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.2 Equipment ~~and system~~ sizing. The output capacity of heating and cooling equipment ~~and systems~~ shall not exceed the loads calculated in accordance with Section C403.2.1. A single piece of equipment providing both heating and cooling shall satisfy this provision for one function with the capacity for the other function as small as possible, within available equipment options.

Exceptions:

1. Required standby equipment and systems provided with controls and devices that allow such systems or equipment to operate automatically only when the primary equipment is not operating.
2. Multiple units of the same equipment type with combined capacities exceeding the design load and provided with controls that have the capability to sequence the operation of each unit based on load.

Reason: This proposal clarifies intent that the provisions are written to apply to the output capacity of the equipment that provides heating or cooling functions.

While not defined, there is a distinct difference between systems and equipment. The equipment refers to the piece of equipment (or the appliance) that converts delivered energy into heating or cooling capability. The system is much broader in scope and includes not only the equipment but the distribution system, controls, etc. The design loads in Section C403.2.1 will cover the distribution system loads such that the loads in question and the point of comparison with size occurs at the output to the equipment.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal simplifies the code by putting the focus, where it should be, on equipment.

Assembly Action: **None**

Final Hearing Results

CE198-13 **AS**

Code Change No: CE200-13

Original Proposal

Section(s): Table C403.2.3(1), Table C403.2.3(2), Table C403.2.3(3), Table C403.2.3(8), Chapter 5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

TABLE C403.2.3(1)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY			TEST PROCEDURE[a]
				~~Before 6/1/2011~~	~~As of 6/1/2011~~ <u>Before 1/1/2016</u>	<u>As of 1/1/2016</u>	
Air conditioners, air cooled	< 65,000 Btu/h[b]	All	Split System	~~13.0 SEER~~	13.0 SEER	<u>13.0 SEER</u>	AHRI 210/240
			Single Package	~~13.0 SEER~~	~~13.0~~ <u>14.0</u> SEER	<u>14.0 SEER</u>	
Through-the-wall (air cooled)	≤ 30,000 Btu/h[b]	All	Split system	~~12.0 SEER~~	12.0 SEER	<u>12.0 SEER</u>	
			Single Package	~~12.0 SEER~~	12.0 SEER	<u>12.0 SEER</u>	
Small-duct high-velocity (air cooled)	< 65,000 Btu/h[b]	All	Split System	~~10.0 SEER~~	~~10.0~~ <u>11.0</u> SEER	<u>11.0 SEER</u>	
Air conditioners, air cooled	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.2 EER~~ ~~11.4 IEER~~	11.2 EER 11.4 IEER	<u>11.2 EER</u> <u>12.8 IEER</u>	AHRI 340/360
		All other	Split System and Single Package	~~11.0 EER~~ ~~11.2 IEER~~	11.0 EER 11.2 IEER	<u>11.0 EER</u> <u>12.6 IEER</u>	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.0 EER~~ ~~11.2 IEER~~	11.0 EER 11.2 IEER	<u>11.0 EER</u> <u>12.4 IEER</u>	
		All other	Split System and Single Package	~~10.8 EER~~ ~~11.0 IEER~~	10.8 EER 11.0 IEER	<u>10.8 EER</u> <u>12.2 IEER</u>	
	≥ 240,000 Btu/h and < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~10.0 EER~~ ~~10.1 IEER~~	10.0 EER 10.1 IEER	<u>10.0 EER</u> <u>11.6 IEER</u>	
		All other	Split System and Single Package	~~9.8 EER~~ ~~9.9 IEER~~	9.8 EER 9.9 IEER	<u>9.8 EER</u> <u>11.4 IEER</u>	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY ~~Before 6/1/2011~~	 ~~As of 6/1/2011~~ Before 1/1/2016	 As of 1/1/2016	TEST PROCEDURE[a]
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~9.7 EER~~ ~~9.8 IEER~~	9.7 EER 9.8 IEER	9.7 EER 11.2 IEER	
		All other	Split System and Single Package	~~9.5 EER~~ ~~9.6 IEER~~	9.5 EER 9.6 IEER	9.5 EER 11.0 IEER	
Air conditioners, water cooled	< 65,000 Btu/h[b]	All	Split System and Single Package	~~12.1 EER~~ ~~12.3 IEER~~	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	AHRI 210/240
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.5 EER~~ ~~11.7 IEER~~	12.1 EER 12.3 IEER	12.1 EER 13.9 IEER	AHRI 340/360
		All other	Split System and Single Package	~~11.3 EER~~ ~~11.5 IEER~~	11.9 EER 12.1 IEER	11.9 EER 13.7 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.0 EER~~ ~~11.2 IEER~~	12.5 EER 12.5 IEER	12.5 EER 13.9 IEER	
		All other	Split System and Single Package	~~10.8 EER~~ ~~11.0 IEER~~	12.3 EER 12.5 IEER	12.3 EER 13.7 IEER	
	≥ 240,000 Btu/h And < 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.0 EER~~ ~~11.1 IEER~~	12.4 EER 12.6 IEER	12.4 EER 13.6 IEER	
		All other	Split System and Single Package	~~10.8 EER~~ ~~10.9 IEER~~	12.2 EER 12.4 IEER	12.2 EER 13.4 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.0 EER~~ ~~11.1 IEER~~	12.2 EER 12.4 IEER	12.2 EER 13.5 IEER	
		All other	Split System and Single Package	~~10.8 EER~~ ~~10.9 IEER~~	12.0 EER 12.2 IEER	12.0 EER 13.3 IEER	
Air conditioners, evaporatively cooled	< 65,000 Btu/h[b]	All	Split System and Single Package	~~12.1 EER~~ ~~12.3 IEER~~	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	AHRI 210/240
	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.5 EER~~ ~~11.7 IEER~~	12.1 EER 12.3 IEER	12.1 EER 12.3 IEER	AHRI 340/360
		All other	Split System and Single Package	~~11.3 EER~~ ~~11.5 IEER~~	11.9 EER 12.1 IEER	11.9 EER 12.1 IEER	
	< 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.0 EER~~ ~~11.2 IEER~~	12.0 EER 12.2 IEER	12.0 EER 12.2 IEER	
		All other	Split System and Single Package	~~10.8 EER~~ ~~11.0 IEER~~	11.8 EER 12.0 IEER	11.8 EER 12.0 IEER	
	< 240,000 Btu/h and	Electric Resistance (or None)	Split System and Single Package	~~11.0 ERR~~ ~~11.1 ERR~~	11.9 ERR 12.1 IERR	11.9 ERR 12.1 IEER	

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY			TEST PROCEDURE[a]
				~~Before 6/1/2011~~	~~As of 6/1/2011~~ Before 1/1/2016	As of 1/1/2016	
	< 760,000 Btu/h	All other	Split System and Single Package	~~10.8 EER~~ ~~10.9 EER~~	~~12.2~~ 11.7 ERR 11.9 IEER	11.7 ERR 11.9 IEER	
	≥ 760,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	~~11.0 ERR~~ ~~11.1 EER~~	11.7 ERR 11.9 ERR	11.7 ERR 11.9 ERRT	
	≥ 760,000 Btu/h	All other	Split System and Single Package	~~10.8 ERR~~ ~~10.9 ERR~~	11.5 ERR 11.7 ERR	11.5 ERR 11.7 ERR	
Condensing units, air cooled	≥ 135,000 Btu/h			~~10.1 EER~~ ~~11.4 IEER~~	10.5 EER ~~14.0~~ 11.8 IEER	10.5 EER 11.8 IEER	AHRI 365
Condensing units, water cooled	≥ 135,000 Btu/h			~~13.1 EER~~ ~~13.6 IEER~~	13.5 EER 14.0 IEER	13.5 EER 14.0 IEER	AHRI 365
Condensing units, evaporatively cooled	≥ 135,000 Btu/h			~~13.1 EER~~ ~~13.6 IEER~~	13.5 EER 14.0 IEER	13.5 EER 14.0 IEER	AHRI 365

For SI: 1 British thermal unit per hour = 0.2931 W.

a. Chapter 5 of the referenced standard contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

b. Single-phase, air-cooled air conditioners less than 65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE C403.2.3(2)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AND APPLIED HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
				Before 1/1/2016	As of 1/1/2016	
Air cooled (cooling mode)	< 65,000 Btu/h[b]	All	Split System	~~13.0~~ 14.0 SEER	14.0 SEER	AHRI 210/240
			Single Packaged	~~13.0~~ 14.0 SEER	14.0 SEER	
Through-the-wall, air cooled	≤ 30,000 Btu/h[b]	All	Split System	~~13.0~~ 12.0 SEER	12.0 SEER	
			Single Packaged	~~13.0~~ 12.0 SEER	12.0 SEER	
Single-duct high-velocity air cooled	< 65,000 Btu/h[b]	All	Split System	~~10.0~~ 11.0 SEER	11 SEER	
Air cooled (cooling mode)	≥ 65,000 Btu/h and < 135,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	11.0 EER 11.2 IEER	11.0 EER 12.0 IEER	AHRI 340/360

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
				Before 1/1/2016	**As of 1/1/2016**	
		All other	Split System and Single Package	10.8 EER 11.0 IEER	10.8 EER 11.8 IEER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	10.6 EER 10.7 IEER	10.6 EER 11.6 IEER	
		All other	Split System and Single Package	10.4 EER 10.5 IEER	10.4 EER 11.4 IEER	
	≥ 240,000 Btu/h	Electric Resistance (or None)	Split System and Single Package	9.5 EER 9.6 IEER	9.5 EER 10.6 IEER	
		All other	Split System and Single Package	9.3 EER 9.4 IEER	9.3 EER 10.4 IEER	
~~Water source (cooling mode)~~	~~< 17,000 Btu/h~~	~~All~~	~~86°F entering water~~	~~11.2 EER~~		~~ISO 13256-1~~
	~~≥ 17,000 Btu/h and < 65,000 Btu/h~~	~~All~~	~~86°F entering water~~	~~12.0 EER~~		
	~~≥ 65,000 Btu/h and < 135,000 Btu/h~~	~~All~~	~~86°F entering water~~	~~12.0 EER~~		
~~Ground water source (cooling mode)~~	~~< 135,000 Btu/h~~	~~All~~	~~59°F entering water~~	~~16.2 EER~~		
		~~All~~	~~77°F entering water~~	~~13.4 EER~~		
~~Water-source water to water (cooling mode)~~	~~< 135,000 Btu/h~~	~~All~~	~~86°F entering water~~	~~10.6 EER~~		~~ISO 13256-2~~
			~~59°F entering water~~	~~16.3 EER~~		
~~Ground water source Brine to water (cooling mode)~~	~~< 135,000 Btu/h~~	~~All~~	~~77°F entering fluid~~	~~12.1 EER~~		
~~Air cooled (heating mode)~~	~~< 65,000 Btu/h[b]~~	—	~~Split System~~	~~7.7 HSPF~~		~~AHRI 210/240~~

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
				Before 1/1/2016	As of 1/1/2016	
		—	~~Single Package~~	~~7.7 HSPF~~		
~~Through-the-wall, (air cooled, heating mode)~~	~~≤ 30,000 Btu/h[b] (cooling capacity)~~	—	~~Split System~~	~~7.4 HSPF~~		
		—	~~Single Package~~	~~7.4 HSPF~~		
~~Small-duct high velocity (air cooled, heating mode)~~	~~< 65,000 Btu/h[b]~~	—	~~Split System~~	~~6.8 HSPF~~		
~~Air cooled (heating mode)~~	~~≥ 65,000 Btu/h and < 135,000 Btu/h (cooling capacity)~~	—	~~47ºF db/43ºF wb Outdoor Air~~	~~3.3 COP~~		~~AHRI 340/360~~
			~~17ºF db/15ºF wb Outdoor Air~~	~~2.25 COP~~		
	~~≥ 135,000 Btu/h (cooling capacity)~~	—	~~47ºF db/43ºF wb Outdoor Air~~	~~3.2 COP~~		
			~~17ºF db/15ºF wb Outdoor Air~~	~~2.05 COP~~		
~~Water source (heating mode)~~	~~< 135,000 Btu/h (cooling capacity)~~	—	~~68°F entering water~~	~~4.2 COP~~		~~ISO 13256-1~~
~~Ground water source (heating mode)~~	~~< 135,000 Btu/h (cooling capacity)~~	—	~~50°F entering water~~	~~3.6 COP~~		
~~Ground source (heating mode)~~	~~< 135,000 Btu/h (cooling capacity)~~	—	~~32°F entering fluid~~	~~3.1 COP~~		
~~Water-source water to water (heating mode)~~	~~< 135,000 Btu/h (cooling capacity)~~	—	~~68°F entering water~~	~~3.7 COP~~		~~ISO 13256-2~~
		—	~~50°F entering water~~	~~3.1 COP~~		
~~Ground source brine to water (heating mode)~~	~~< 135,000 Btu/h (cooling capacity)~~	—	~~32°F entering fluid~~	~~2.5 COP~~		

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
				Before 1/1/2016	As of 1/1/2016	
Water to Air: Water Loop (cooling mode)	<17,000 Btu/h	All	86 °F entering water	12.2 EER	12.2 EER	ISO 13256-1
	≥17,000 Btu/h and <65,000 Btu/h	All	86 °F entering water	13 EER	13 EER	
	≥65,000 Btu/h and <135,000 Btu/h	All	86 °F entering water	13 EER	13 EER	
Water to Air: Ground Water (cooling mode)	<135,000 Btu/h	All	59 °F entering water	18.0 EER	18.0 EER	ISO 13256-1
Brine to Air: Ground Loop (cooling mode)	<135,000 Btu/h	All	77 F entering water	14.1 EER	14.1 EER	ISO 13256-1
Water to Water: Water Loop (cooling mode)	<135,000 Btu/h	All	86 °F entering water	10.6 EER	10.6 EER	ISO-13256-2
Water to Water: Ground Water (Cooling Mode)	<135,000 Btu/h	All	59 °F entering water	16.3 EER	16.3 EER	
Brine to Water: Ground Loop (cooling mode)	<135,000 Btu/h	All	77 °F entering water	12.1 EER	12.1 EER	
Air cooled (heating mode)	<65,000 Btu/h[b]	—	Split System	8.2 HSPF	8.2 HSPF	AHRI 210/240
		—	Single Package	8.0 HSPF	8.0 HSPF	
Through-the-wall, (air cooled, heating mode)	≤30,000 Btu/h[b] (cooling capacity)	—	Split System	7.4 HSPF	7.4 HSPF	
		—	Single Package	7.4 HSPF	7.4 HSPF	
Small-Duct high velocity (air cooled, heating mode)	<65,000 Btu/h[b]	—	Split System	6.8 HSPF	6.8 HSPF	
Air Cooled (Heating Mode)	≥65,000 Btu/h and	—	47ºF db/43ºF wb Outdoor Air	3.3 COP	3.3 COP	AHRI 340/360

EQUIPMENT TYPE	SIZE CATEGORY	HEATING SECTION TYPE	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
				Before 1/1/2016	**As of 1/1/2016**	
	<135,000 Btu/h (Cooling Capacity)		17ºF db/15ºF wb Outdoor Air	2.25 COP	2.25 COP	
	≥135,000 Btu/h (Cooling Capacity)	—	47ºF db/43ºF wb Outdoor Air	3.2 COP	3.2 COP	
			17ºF db/15ºF wb Outdoor Air	2.05 COP	2.05 COP	
Water to Air: Water Loop (heating mode)	<135,000 Btu/h (cooling capacity)	—	68 °F entering water	4.3 COP	4.3 COP	ISO 13256-1
Water to Air Ground Water (heating mode)	<135,000 Btu/h (cooling capacity)	—	50 °F entering water	3.7 COP	3.7 COP	
Brine to Air: Ground Loop (heating mode)	<135,000 Btu/h (cooling capacity)	—	32 °F entering fluid	3.2 COP	3.2 COP	
Water to Water: Water Loop (heating mode)	<135,000 Btu/h (cooling capacity)	—	68 °F entering water	3.7 COP	3.7 COP	ISO 13256-2
Water to Water: Ground Water (heating mode)	<135,000 Btu/h (cooling capacity)	—	50 °F entering water	3.1 COP	3.1 COP	
Brine to Water: Ground Loop (heating mode)	<135,000 Btu/h (cooling capacity)	—	32 °F entering fluid	2.5 COP	2.5 COP	

For SI: 1 British thermal unit per hour = 0.2931 W. $^{o}C = [(^{o}F) – 32]/1.8$

a. Chapter 5 of the referenced standard contains a complete specification of the referenced test procedure, including the reference year version of the test procedure.

b. Single-phase, air-cooled air conditioners less than 65,000 Btu/h are regulated by NAECA. SEER values are those set by NAECA.

TABLE C403.2.3(3)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS,
PACKAGED TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS,
SINGLE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR-CONDITIONER HEAT PUMPS

EQUIPMENT TYPE	SIZE CATEGORY (INPUT)	SUBCATEGORY OR RATING CONDITION	MINIMUM EFFICIENCY		TEST PROCEDURE[a]
			~~Before 10/08/2012~~	~~As of 10/08/2012~~	
PTAC (cooling mode) new construction	All Capacities	95°F db outdoor air	~~12.5 - (0.213 × Cap/1000) EER~~	~~13.8 - (0.300 × Cap/1000) EER~~ 14.0 – (0.300 × Cap/1000)[c] EER	AHRI 310/380
PTAC (cooling mode) replacements[b]	All Capacities	95°F db outdoor air	~~10.9 - (0.213 × Cap/1000) EER~~	10.9 - (0.213 × Cap/1000) EER	
PTHP (cooling mode) new construction	All Capacities	95°F db outdoor air	~~12.3 - (0.213 × Cap/1000) EER~~	14.0 - (0.300 × Cap/1000) EER	
PTHP (cooling mode) replacements[b]	All Capacities	95°F db outdoor air	~~10.8 - (0.213 × Cap/1000) EER~~	10.8 - (0.213 × Cap/1000) EER	
PTHP (heating mode) new construction	All Capacities	—	~~3.2 - (0.026 × Cap/1000) COP~~	3.2 - (0.026 × Cap/1000) COP	
PTHP (heating mode) replacements[b]	All Capacities	—	~~2.9 - (0.026 × Cap/1000) COP~~	2.9 - (0.026 × Cap/1000) COP	
SPVAC (cooling mode)	< 65,000 Btu/h	95°F db/ 75°F wb outdoor air	~~9.0 EER~~	9.0 EER	AHRI 390
	≥ 65,000 Btu/h and < 135,000 Btu/h	95°F db/ 75°F wb outdoor air	~~8.9 EER~~	8.9 EER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	95°F db/ 75°F wb outdoor air	~~8.6 EER~~	8.6 EER	
SPVHP (cooling mode)	< 65,000 Btu/h	95°F db/ 75°F wb outdoor air	~~9.0 EER~~	9.0 EER	
	≥ 65,000 Btu/h and < 135,000 Btu/h	95°F db/ 75°F wb outdoor air	~~8.9 EER~~	8.9 EER	
	≥ 135,000 Btu/h and < 240,000 Btu/h	95°F db/ 75°F wb outdoor air	~~8.6 EER~~	8.6 EER	
SPVHP (heating mode)	<65,000 Btu/h	47°F db/ 43°F wb outdoor air	~~3.0 COP~~	3.0 COP	AHRI 390
	≥ 65,000 Btu/h and < 135,000 Btu/h	47°F db/ 43°F wb outdoor air	~~3.0 COP~~	3.0 COP	

	≥ 135,000 Btu/h and < 240,000 Btu/h	47°F db/ 75°F wb outdoor air	~~2.9 COP~~	2.9 COP	
Room air conditioners, with louvered slides	< 6,000 Btu/h	—	~~9.7 SEER~~	9.7 SEER	ANSI/AHAM RAC-1
	≥ 6,000 Btu/h and < 8,000 Btu/h	—	~~9.7 EER~~	9.7 EER	
	≥ 8,000 Btu/h and < 14,000 Btu/h	—	~~9.8 EER~~	9.8 EER	
	≥ 14,000 Btu/h and < 20,000 Btu/h	—	~~9.7 SEER~~	9.7 SEER	
	≥ 20,000 Btu/h	—	~~8.5 EER~~	8.5 EER	
Room air conditioners, with louvered slides	< 8,000 Btu/h	—	~~9.0 EER~~	9.0 EER	
	≥ 8,000 Btu/h and < 20,000 Btu/h	—	~~8.5 EER~~	8.5 EER	
	≥ 20,000 Btu/h	—	~~8.5 EER~~	8.5 EER	
Room air-conditioner heat pumps with louvered sides	< 20,000 Btu/h	—	~~9.0 EER~~	9.0 EER	
	≥ 20,000 Btu/h	—	~~8.5 EER~~	8.5 EER	
Room air-conditioner heat pumps without louvered sides	< 14,000 Btu/h	—	~~8.5 EER~~	8.5 EER	
	≥ 14,000 Btu/h	—	~~8.0 EER~~	8.0 EER	
Room air conditioner casement only	All capacities	—	~~8.7 EER~~	8.7 EER	
Room air conditioner casement-slider	All capacities	—	~~9.5 EER~~	9.5 EER	

For SI: 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8.

"Cap" = The rated cooling capacity of the project in Btu/h. If the unit's capacity is less than 7000 Btu/h, use 7000 Btu/h in the calculation. If the unit's capacity is greater than 15,000 Btu/h, use 15,000 Btu/h in the calculations

a. Chapter 5 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.

b. Replacement unit shall be factory labeled as follows: "MANUFACTURED FOR REPLACEMENT APPLICATIONS ONLY: NOT TO BE INSTALLED IN NEW CONSTRUCTION PROJECTS." Replacement efficiencies apply only to units with existing sleeves less than 16 inches (406 mm) in height and less than 42 inches (1067 mm) in width.

TABLE C403.2.3(8)
MINIMUM EFFICIENCY REQUIREMENTS:
HEAT REJECTION EQUIPMENT

EQUIPMENT TYPE[a]	TOTAL SYSTEM HEAT REJECTION CAPACITY AT RATED CONDITIONS	SUBCATEGORY OR RATING CONDITION[i]	PERFORMANCE REQUIRED[b, c, d, g, h]	TEST PROCEDURE[e, f]
Propeller or axial fan open circuit cooling towers	All	95°F Entering Water 85°F Leaving Water 75°F Entering wb	~~≥38.2~~ ≥ 40.2 gpm/hp	CTI ATC-105 and CTI STD-201
Centrifugal fan open circuit cooling towers	All	95°F Entering Water 85°F Leaving Water 75°F Entering wb	≥ 20.0 gpm/hp	CTI ATC-105 and CTI STD-201
Propeller or axial fan closed circuit cooling towers	All	102°F Entering Water 90°F Leaving Water 75°F Entering wb	≥ 14.0 gpm/hp	CTI ATC-105S and CTI STD-201
Centrifugal closed circuit cooling towers	All	102°F Entering Water 90°F Leaving Water 75°F Entering wb	≥ 7.0 gpm/hp	CTI ATC-105S and CTI STD-201
Propeller or axial fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F *entering wb*	≥ 134,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	Ammonia Test Fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F *entering wb*	≥ 110,000 Btu/h·hp	CTI ATC-106
Propeller or axial fan evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F *entering wb*	≥ 157,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers	All	R-507A Test Fluid 165°F entering gas temperature 105°F condensing temperature 75°F *entering wb*	≥ 135,000 Btu/h·hp	CTI ATC-106
Air-cooled condensers	All	125°F Condensing Temperature ~~R-22 Test Fluid~~ 190°F Entering Gas Temperature 15°F Subcooling 95°F Entering db	≥ 176,000 Btu/h·hp	ARI 460

For SI: °C = [(°F)-32]/1.8, L/s · kW = (gpm/hp)/(11.83), COP = (Btu/h · hp)/(2550.7)
db = dry bulb temperature, °F, wb = wet bulb temperature, °F.

a. The efficiencies and test procedures for both open and closed circuit cooling towers are not applicable to hybrid cooling towers that contain a combination of wet and dry heat exchange sections.

b. For purposes of this table, open circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the fan nameplate rated motor power.

c. For purposes of this table, closed circuit cooling tower performance is defined as the water flow rating of the tower at the thermal rating condition listed in Table 403.2.3(8) divided by the sum of the fan nameplate rated motor power and the spray pump nameplate rated motor power.

d. For purposes of this table, air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan nameplate rated motor power.

e. Chapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure. The certification requirements do not apply to field erected cooling towers.

f. If a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, then the product shall be listed in the certification program, or, if a certification program exists for a covered product, and it includes provisions for verification and challenge of equipment efficiency ratings, but the product is not listed in the existing certification program, the ratings shall be verified by an independent laboratory test report.

g. All cooling towers shall comply with the minimum efficiency listed in the table for that specific type of tower with the capacity effect of any project specific accessories and / or options included in the capacity of the cooling tower

h. For purposes of this table, evaporative condenser performance is defined as the heat rejected at the specified rating condition in the table divided by the sum of the fan motor nameplate power and the integral spray pump nameplate power

I. Requirements for evaporative condensers are listed with ammonia (R-717) and R-507A as test fluids in the table. Evaporative condensers intended for use with halocarbon refrigerants other than R-507A shall meet the minimum efficiency requirements listed above with R-507A as the test fluid.

Add new standards as follows:

CTI

ATC 105S-11 Acceptance Test Code for Closed Circuit Cooling Towers
ATC 106-11 Acceptance Test Code for Mechanical Draft Evaporative Vapor Condensers

Reason: For consistency with Standard 90.1. This proposal contains all of the increased equipment efficiency requirements found in standard 90.1. As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with 90.1.

Cost Impact: The code change proposal will increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, CTI -ATC 105S-2011 Acceptance Test Code for Closed Circuit Cooling Towers, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

A review of the standard proposed for inclusion in the code, CTI-ATC 106-2011 Acceptance Test Code for Mechanical Draft Evaporative Vapor Condensers, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Public Hearing Results

For staff analysis of the content of ATC 105S-11 and ATC 106-11 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: The proposal updates the equipment efficiencies to federal minimum provisions and those contained in ASHRAE 90.1.

Assembly Action: **None**

Public Comments

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C403.2.3(1)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AIR CONDITIONERS AND CONDENSING UNITS

Air conditioners air cooled	<65,000 Btu/h[b]	All	Split System	13 SEER	13 SEER	AHRI 210/240
			Single Package	13 ~~14~~ SEER[c]	14 SEER[c]	

c. Minimum efficiency as of 1/1/2015”.

(Portions of code change proposal not remain unchanged)

TABLE C403.2.3(2)

MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED UNITARY AND APPLIED HEAT PUMPS

Air cooled (cooling mode)	<65,000 Btu/h[b]	All	Split System	13 ~~14~~ SEER[c]	~~13~~14.0 SEER[c]	AHRI 210/240
			Single Package	13 ~~14~~ SEER[c]	14,0 SEER[c]	

Air cooled (heating mode)	<65,000 Btu/h[b]	-	Split System	~~8.2~~7.7 HSPF[c]	8.2 HSPF[c]	AHRI 210/240
			Single Package	~~8.0~~7.7 HSPF[c]	8.0 HSPF[c]	

c. Minimum efficiency as of 1/1/2015"..

(Portions of code change proposal not remain unchanged)

TABLE C403.2.3(3)
MINIMUM EFFICIENCY REQUIREMENTS:
ELECTRICALLY OPERATED PACKAGED TERMINAL AIR CONDITIONERS,
PACKAGED TERMINAL HEAT PUMPS, SINGLE-PACKAGE VERTICAL AIR CONDITIONERS,
SINGLE VERTICAL HEAT PUMPS, ROOM AIR CONDITIONERS AND ROOM AIR-CONDITIONER HEAT PUMPS

PTAC (cooling mode) New Construction	All Capacities	95 F db outdoor air	Split System Single Package		14.0 – (0.300 × Cap/1000) EER [c]	AHRI 310/380

c. Before 1/1/2015 the minimum efficiency shall be13.8 – (0.300 × Cap/1000) EER

Commenter's Reason: *On June 27, 2011, the Department of Energy (DOE) issued a final rule amending the federal minimum energy efficiency standards for the single-phase residential central air conditioners and heat pumps. This proposal harmonizes the minimum energy efficiencies of three-phase air-cooled commercial air conditioners and heat pumps less than 65,000 Btu/h with the efficiencies adopted by DOE for residential central air conditioners. The new SEERs and HSPFs will become effective on January 1, 2015.*

The current format of the table has a date of January 1, 2016 as the switchover date for all equipment efficiencies (where applicable),due to the formatting, it's difficult to add a new column for the few efficiencies that go into effect on January 1, 2015.This proposes to add a footnote indicating those efficiencies go into effect a year earlier.

Final Hearing Results

CE200-13 **AMPC**

Code Change No: CE201-13

Original Proposal

Section(s): C202 (NEW), Table 403.2.3(9) (NEW), Chapter 5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new Table as follows:

TABLE C403.2.3 (9)
MINIMUM EFFICIENCY AIR CONDITIONERS AND CONDENSING UNITS SERVING COMPUTER ROOMS

Equipment Type	Net Sensible Cooling Capacity[a]	MinimumSCOP-127[b] Efficiency Downflow units / Upflow units	Test Procedure
Air conditioners, air cooled	65,000 Btu/h	2.20 / 2.09	ANSI/ASHRAE 127
	≥65,000 Btu/h and < 240,000 Btu/h	2.10 / 1.99	
	≥240,000 Btu/h	1.90 / 1.79	
Air conditioners, water cooled	65,000 Btu/h	2.60 / 2.49	
	≥65,000 Btu/h and < 240,000 Btu/h	2.50 / 2.39	
	≥240,000 Btu/h	2.40 /2.29	
Air conditioners, water cooled with fluid economizer	65,000 Btu/h	2.55 /2.44	
	≥65,000 Btu/h and < 240,000 Btu/h	2.45 / 2.34	
	≥240,000 Btu/h	2.35 / 2.24	
Air conditioners, glycol cooled (rated at 40% propylene glycol)	65,000 Btu/h	2.50 / 2.39	
	≥65,000 Btu/h and < 240,000 Btu/h	2.15 / 2.04	
	≥240,000 Btu/h	2.10 / 1.99	
Air conditioners, glycol cooled (rated at 40% propylene glycol) with fluid economizer	65,000 Btu/h	2.45 / 2.34	
	≥65,000 Btu/h and < 240,000 Btu/h	2.10 / 1.99	
	≥240,000 Btu/h	2.05 / 1.94	

a. Net sensible cooling capacity: The total gross cooling capacity less the latent cooling less the energy to the air movement system. (Total Gross – latent – Fan Power)

b. Sensible coefficient of performance (SCOP-127): a ratio calculated by dividing the net sensible cooling capacity in watts by the total power input in watts (excluding re-heaters and humidifiers) at conditions defined in ASHRAE Standard 127. The net sensible cooling capacity is the gross sensible capacity minus the energy dissipated into the cooled space by the fan system.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

COMPUTER ROOM. A room whose primary function is to house equipment for the processing and storage of electronic data and that has a design electronic data equipment power density exceeding 20 watts/ft^2 of *conditioned floor area*.

Add new standard to Chapter 5 as follows:

ASHRAE

<u>127-07 Method of Testing for Raining Computer and Data Processing Room Unitary Air Conditioners</u>

Reason: Computer rooms, due to the unique nature of the space, have a significant level of internal heat generation that must be addressed to ensure the equipment therein functions properly. This generally "trumps" any consideration of the sensible or latent loads associated with the people in the space. The cooling equipment that addresses the loads associated with these spaces operates differently and responds to different loads and schedules. This necessitates the efficiency of such equipment be addressed differently than more traditional cooling equipment. ANSI/ASHRAE Standard 127 has been developed for use in measuring and expressing the performance of this equipment for this particular and unique application. This equipment is currently addressed by ASHRAE/IES 90.1-2010, which is adopted as an alternative means of compliance with the IECC. This proposed change addresses the need to cover this unique energy efficiency opportunity in a manner consistent with 90.1-2010. Without this change the IECC Commercial Provisions could not be deemed equivalent to 90.1-2010 or subsequent editions of 90.1 that retain these provisions. More importantly if this change is not approved then the equipment efficiency provisions currently in the IECC would continue to be applied to equipment serving such spaces inappropriately

Cost Impact: The code change proposal will increase the cost of construction as there were previously no requirements for this equipment.

Analysis: A review of the standard proposed for inclusion in the code, ASHRAE 127-2007 Method of Testing for Raining Computer and Data Processing Room Unitary Air Conditioners, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Public Hearing Results

For staff analysis of the content of ASHRAE 127-07 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: Computer rooms develop substantial heat and need specific air-conditioning equipment. The proposal would establish minimum efficiencies for these systems. A public comment is needed to provide a reference to this table within the requirements of the chapter.

Assembly Action: **None**

Public Comments

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.2.3 HVAC equipment performance requirements. Equipment shall meet the minimum efficiency requirements of Tables C403.2.3(1), C403.2.3(2), C403.2.3(3), C403.2.3(4), C403.2.3(5), C403.2.3(6), C403.2.3(7)<u>,</u> ~~and~~ C403.2.3(8) <u>and C403.2.3(9)</u> when tested and rated in accordance with the applicable test procedure. Plate-type liquid-to-liquid heat exchangers shall meet the minimum requirements of Table ~~C403.2.3(9)~~ <u>C403.2.3(10)</u>. The efficiency shall be verified through certification under an *approved* certification program or, if no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the manufacturer. Where multiple rating conditions or performance requirements are provided, the equipment shall satisfy all stated requirements. Where components, such as indoor or outdoor coils, from different manufacturers are used, calculations and supporting data shall be furnished by the designer that demonstrates that the combined efficiency of the specified components meets the requirements herein.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The original proposal adds important criteria for the limitation of energy usage in computer rooms. It adds another equipment table in the pantheon of C403.2.3 tables. What it fails to do is provide a reference to such table in the text. The proposed modification simply cleans up the proposal by adding reference to it in Section C403.2.3.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

Final Hearing Results

CE201-13 AMPC

Code Change No: CE202-13

Original Proposal

Section(s): C403.2.3.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.3.1 Water-cooled centrifugal chilling packages. Equipment not designed for operation at AHRI Standard 550/590 test conditions of 44°F (7°C) leaving chilled-water temperature and 85°F (29°C) entering condenser water temperature with 3 gpm/ton (0.054 I/s · kW) condenser water flow shall have maximum full-load kW/ton and *NPLV* ratings adjusted using Equations 4-3 and 4-4.

Adjusted minimum full-load COP ratings = (Full-load COP from Table 6.8.1C of AHRI 550/590) × K_{adj} **(Equation 4-3)**

Adjusted minimum NPLV rating = (IPLV from Table 6.8.1C of AHRI 550/590) × K_{adj} **(Equation 4-4)**

where:

K_{adj}	=	A × B
A	=	$0.0000015318 \times (\text{LIFT})^4 - 0.000202076 \times (\text{LIFT})^3 + 0.0101800 \times (\text{LIFT})^2 - 0.264958 \times \text{LIFT} + 3.930196$
B	=	$0.0027 \times L_{vg}^{\text{Evap}}$ (°C) + 0.982
LIFT	=	$L_{vg}^{\text{Cond}} - L_{vg}^{\text{Evap}}$
L_{vg}^{Cond}	=	Full-load condenser leaving water temperature (°C)
L_{vg}^{Evap}	=	Full-load leaving evaporator temperature (°C)

SI units shall be used in the K_{adj} equation.

The adjusted full-load and *NPLV* values shall only be applicable for centrifugal chillers meeting all of the following full-load design ranges:

1. The leaving evaporator fluid temperature is not less than 36°F (2.2°C).
2. The leaving condenser fluid temperature is not greater than 115°F (46.1°C).
3. LIFT is not less than 20°F (11.1 °C) and not greater than 80°F (44.4°C).

Exception: Centrifugal chillers designed to operate outside of ~~these~~ the temperature and flow ranges specified in this section need not meet the minimum efficiency requirements in Table C403.2.3(7) ~~need not comply with this code~~.

Reason: This proposal clarifies the code with respect to the type of systems that need not comply with the requirements. The ranges in question (temperature and flow) should be stated to eliminate any confusion as to what "these" refers. The result of the exception is more explicitly stated to refer to the minimum efficiency requirements in Table C403.2.3(7), as there are other requirements of "this code" related to the chiller that still apply, such as part load controls.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the application of the exception.

Assembly Action: **None**

Final Hearing Results

CE202-13	**AS**

Code Change No: CE203-13

Original Proposal

Section(s): C403.2.3.1, C403.2.3.2, Table C403.2.3(7)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.2.3.1 Water-cooled centrifugal chilling packages. Equipment not designed for operation at AHRI Standard 550/590 test conditions of 44°F (7°C) leaving chilled-water temperatureand 2.4 gpm/ton evaporator fluid flow and 85°F (29°C) entering condenser water temperature with 3 gpm/ton (0.054 I/s · kW) condenser water flow shall have maximum full-load kW/ton (FL) and ~~*NPLV*~~ part load rating~~s~~ requirements adjusted using Equations 4-3 and 4-4.

~~Adjusted minimum full-load COP ratings = (Full-load COP from Table 6.8.1C of AHRI Standard 550/590) ×~~ ~~K_{adj}~~

$FL_{adj} = FL / K_{adj}$

~~Adjusted minimum NPLV rating = (IPLV from Table 6.8.1C of AHRI Standard 550/590) ×~~ ~~K_{adj}~~

$PLV_{adj} = IPLV / K_{adj}$ **Equation 4-4)**

where:

K_{adj} = A × B

~~A = $0.0000015318 \times (LIFT)^4 - 0.000202076 \times (LIFT)^3 + 0.0101800 \times (LIFT)^2 - 0.264958 \times LIFT + 3.930196$~~

~~B = $0.0027 \times L_{vg}^{Evap}$ (°C) + 0.982~~

~~LIFT = $L_{vg}^{Cond} - L_{vg}^{Evap}$~~

~~L_{vg}^{Cond} = Full-load condenser leaving water temp-erature (°C)~~

~~L_{vg}^{Evap} = Full-load leaving evaporator temperature (°C)~~

~~SI units shall be used in the K_{adj} equation.~~

~~The adjusted full-load and *NPLV* values shall only be applicable for centrifugal chillers meeting all of the following full-load design ranges:~~

~~1. The leaving evaporator fluid temperature is not less than 36°F (2.2°C).~~

~~2. The leaving condenser fluid temperature is not greater than 115°F (46.1°C).~~

~~3. LIFT is not less than 20°F (11.1 °C) and not greater than 80°F (44.4°C).~~

> ~~**Exception:** Centrifugal chillers designed to operate outside of these ranges need not comply with this code.~~

FL = full-load kW/Ton value from Table C403.2.3(7)

FL_{adj} = maximum full-load kW/Ton rating, adjusted for non-standard conditions

IPLV = IPLV value from Table C403.2.3(7)

PLV_{adj} = maximum *NPLV* rating, adjusted for non-standard conditions

A= 0.00000014592 x $(LIFT)^4$ – 0.0000346496 x $(LIFT)^3$ + 0.00314196 x $(LIFT)^2$ – 0.147199 x (LIFT) + 3.9302

B= 0.0015 x LvgEvap + 0.934

LIFT= LvgCond – LvgEvap

LvgCond = Full-load condenser leaving fluid temperature (°F)

LvgEvap = Full-load evaporator leaving temperature (°F)

The FL_{adj} and PLV_{adj} values are only applicable for centrifugal chillers meeting all of the following full-load design ranges:

- Minimum Evaporator Leaving Temperature:36°F
- Maximum Condenser Leaving Temperature:115°F
- 20°F ≤ LIFT ≤ 80°F

C403.2.3.2 Positive displacement (air- and water-cooled) chilling packages. Equipment with a leaving fluid temperature higher than 32°F (0°C) and water-cooled positive displacement chilling packages with a condenser leaving fluid temperature below 115°F~~,~~ shall meet the requirements of Table C403.2.3(7) when tested or certified with water at standard rating conditions, in accordance with the referenced test procedure.

~~TABLE C403.2.3(7)~~
~~MINIMUM EFFICIENCY REQUIREMENTS:~~
~~WATER CHILLING PACKAGES~~[a]

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY~~	~~UNITS~~	~~BEFORE 1/1/2010~~		~~AS OF 1/1/2010~~[b]				~~TEST PROCEDURE~~[c]
					~~PATH A~~		~~PATH B~~		
			~~FULL LOAD~~	~~IPLV~~	~~FULL LOAD~~	~~IPLV~~	~~FULL LOAD~~	~~IPLV~~	
~~Air-cooled chillers~~	~~< 150 tons~~	~~EER~~	~~≥ 9.562~~	~~≥ 10.416~~	~~≥ 9.562~~	~~≥ 12.500~~	~~NA~~	~~NA~~	~~AHRI 550/590~~
	~~≥ 150 tons~~	~~EER~~			~~≥ 9.562~~	~~≥ 12.750~~	~~NA~~	~~NA~~	
~~Air cooled without condenser, electrical operated~~	~~All capacities~~	~~EER~~	~~≥ 10.586~~	~~≥ 11.782~~	~~Air-cooled chillers without condensers shall be rated with matching condensers and comply with the air-cooled chiller efficiency requirements~~				
~~Water cooled, electrically operated, reciprocating~~	~~All capacities~~	~~kW/ton~~	~~≤ 0.837~~	~~≤ 0.696~~	~~Reciprocating units shall comply with water cooled positive displacement efficiency requirements~~				
~~Water cooled, electrically operated, positive displacement~~	~~< 75 tons~~	~~kW/ton~~	~~≤ 0.790~~	~~≤ 0.676~~	~~≤ 0.780~~	~~≤ 0.630~~	~~≤ 0.800~~	~~≤ 0.600~~	
	~~≥ 75 tons and < 150 tons~~	~~kW/ton~~			~~≤ 0.775~~	~~≤ 0.615~~	~~≤ 0.790~~	~~≤ 0.586~~	
	~~≥ 150 tons and < 300 tons~~	~~kW/ton~~	~~≤ 0.717~~	~~≤ 0.627~~	~~≤ 0.680~~	~~≤ 0.580~~	~~≤ 0.718~~	~~≤ 0.540~~	
	~~≥ 300 tons~~	~~kW/ton~~	~~≤ 0.639~~	~~≤ 0.571~~	~~≤ 0.620~~	~~≤ 0.540~~	~~≤ 0.639~~	~~≤ 0.490~~	
~~Water cooled, electrically operated, centrifugal~~	~~< 150 tons~~	~~kW/ton~~	~~≤ 0.703~~	~~≤ 0.669~~	~~≤ 0.634~~	~~≤ 0.596~~	~~≤ 0.639~~	~~≤ 0.450~~	
	~~≥ 150 tons and < 300 tons~~	~~kW/ton~~	~~≤ 0.634~~	~~≤ 0.596~~					

	~~≥ 300 tons and < 600 tons~~	~~kW/ton~~	~~≤ 0.576~~	~~≤ 0.549~~	~~≤ 0.576~~	~~≤ 0.549~~	~~≤ 0.600~~	~~≤ 0.400~~	
	~~≥ 600 tons~~	~~kW/ton~~	~~≤ 0.576~~	~~≤ 0.549~~	~~≤ 0.570~~	~~≤ 0.539~~	~~≤ 0.590~~	~~≤ 0.400~~	
~~Air cooled, absorption single effect~~	~~All capacities~~	~~COP~~	~~≥ 0.600~~	~~NR~~	~~≥ 0.600~~	~~NR~~	~~NA~~	~~NA~~	~~AHRI 560~~
~~Water cooled, absorption single effect~~	~~All capacities~~	~~COP~~	~~≥ 0.700~~	~~NR~~	~~≥ 0.700~~	~~NR~~	~~NA~~	~~NA~~	
~~Absorption double effect, indirect fired~~	~~All capacities~~	~~COP~~	~~≥ 1.000~~	~~≥ 1.050~~	~~≥ 1.000~~	~~≥ 1.050~~	~~NA~~	~~NA~~	
~~Absorption double effect, direct fired~~	~~All capacities~~	~~COP~~	~~≥ 1.000~~	~~≥ 1.000~~	~~≥ 1.000~~	~~≥ 1.000~~	~~NA~~	~~NA~~	

~~For SI: 1 ton = 3517 W, 1 British thermal unit per hour = 0.2931 W, °C = [(°F) - 32]/1.8.~~

~~NA = Not applicable, not to be used for compliance; NR = No requirement.~~

~~a. The centrifugal chiller equipment requirements, after adjustment in accordance with Section C403.2.3.1 or Section C403.2.3.2, do not apply to chillers used in low-temperature applications where the design leaving fluid temperature is less than 36ºF. The requirements do not apply to positive displacement chillers with leaving fluid temperatures less than or equal to 32ºF. The requirements do not apply to absorption chillers with design leaving fluid temperatures less than 40ºF.~~

~~b. Compliance with this standard can be obtained by meeting the minimum requirements of Path A or B. However, both the full load and IPLV shall be met to fulfill the requirements of Path A or B.~~

~~c. Chapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.~~

TABLE C403.2.3(7). Water Chilling Packages – Efficiency Requirements[a, b, e]

Equipment Type	Size Category	Units	Effective 1/1/2010 Path A	Effective 1/1/2010 Path B	Effective 1/1/2015 Path A	Effective 1/1/2015 Path B	Test Procedure[c]
Air-Cooled Chillers	< 150 Tons	EER (Btu/W)	≥9.562 FL	NA[d]	≥10.100 FL	≥9.700 FL	AHRI 550/590
			≥12.500 IPLV		≥13.700 IPLV	≥15.800 IPLV	
	≥150 Tons		≥9.562 FL	NA[d]	≥10.100 FL	≥9.700 FL	
			≥12.750 IPLV		≥14.000 IPLV	≥16.100 IPLV	
Air-Cooled without Condenser, Electrically Operated	All Capacities	EER(Btu/W)	Air-cooled chillers without condenser must be rated with matching condensers and comply with air-cooled chiller efficiency requirements				
Water-Cooled, Electrically Operated Positive Displacement	< 75 Tons	kW/ton	≤0.780 FL	≤0.800 FL	≤0.750 FL	≤0.780 FL	
			≤0.630 IPLV	≤0.600 IPLV	≤0.600 IPLV	≤0.500 IPLV	
	≥ 75 tons and <150 tons		≤0.775 FL	≤0.790 FL	≤0.720 FL	≤0.750 FL	
			≤0.615 IPLV	≤0.586 IPLV	≤0.560 IPLV	≤0.490 IPLV	
	≥ 150 tons and < 300 tons		≤0.680 FL	≤0.718 FL	≤0.660 FL	≤0.680 FL	
			≤0.580 IPLV	≤0.540 IPLV	≤0.540 IPLV	≤0.440 IPLV	
	≥ 300 tons and < 600 tons		≤0.620 FL	≤0.639 FL	≤0.610 FL	≤0.625 FL	
			≤0.540 IPLV	≤0.490 IPLV	≤0.520 IPLV	≤0.410 IPLV	
	≥ 600 tons		≤0.620 FL	≤0.639 FL	≤0.560 FL	≤0.585 FL	
			≤0.540 IPLV	≤0.490 IPLV	≤0.500 IPLV	≤0.380 IPLV	
Water Cooled, Electrically Operated Centrifugal	< 150 Tons	kW/ton	≤0.634 FL	≤0.639 FL	≤0.610 FL	≤0.695 FL	
			≤0.596 IPLV	≤0.450 IPLV	≤0.550 IPLV	≤0.440 IPLV	
	≥ 150 tons and <300 tons		≤0.634 FL	≤0.639 FL	≤0.610 FL	≤0.635 FL	
			≤0.596 IPLV	≤0.450 IPLV	≤0.550 IPLV	≤0.400 IPLV	
	≥ 300 tons and <400 tons		≤0.576 FL	≤0.600 FL	≤0.560 FL	≤0.595 FL	
			≤0.549 IPLV	≤0.400 IPLV	≤0.520 IPLV	≤0.390 IPLV	
	≥ 400 tons and <600		≤0.576 FL	≤0.600 FL	≤0.560 FL	≤0.585 FL	

	tons		≤0.549 IPLV	≤0.400 IPLV	≤0.500 IPLV	≤0.380 IPLV	
	≥ 600 tons		≤0.570-FL ≤0.539 IPLV	≤0.590 FL ≤0.400 IPLV	≤0.560 FL ≤0.500 IPLV	≤0.585 FL ≤0.380 IPLV	
Air-Cooled Absorption,Single Effect	All Capacities	COP	≥0.600 FL	NA[d]	≥0.600 FL	NA[d]	
Water-Cooled Absorption, Single Effect	All Capacities	COP	≥0.700 FL	NA[d]	≥0.700 FL	NA[d]	AHRI 560
Absorption Double-Effect, Indirect-Fired	All Capacities	COP	≥1.000 FL ≥1.050 IPLV	NA[d]	≥1.000 FL ≥1.050 IPLV	NA[d]	
Absorption Double-Effect, Direct-Fired	All Capacities	COP	≥1.000 FL ≥1.000 IPLV	NA[d]	≥1.000 FL ≥1.000 IPLV	NA[d]	

a. The requirements for centrifugal chiller shall be adjusted for non-standard rating conditions per C403.2.3.1and are only applicable for the range of conditions listed in C403.2.3.1. The requirements for air-cooled, water-cooled positive displacement and absorption chillers are at standard rating conditions defined in the reference test procedure.
b. Both the full load and IPLV requirements must be met or exceeded to comply with this standard. When there is a Path B, compliance can be with either Path A or Path B for any application.
c. NA means the requirements are not applicable for Path B and only Path A can be used for compliance.
e FL is the full load performance requirements and IPLV is for the part load performance requirements

Reason: For consistency with Standard 90.1. This propsoal makes changes to the requirements for air and water cooled chillers as defined in section C403.2.3.1 and the efficiency requirements listed in table C403.2.3(7). This change is a continuation of the efficiency improvements that were implemented in 2010 by further improving the efficiency requirements. In 90.1-2010 a Path B was added for part load intensive water cooled chillers. This change also expands the Path B by adding requirements to include air cooled chillers. Also as part of this change, efforts were made to bring the efficiency requirements for water cooled positive displacement and centrifugal chillers together while considering the available technology, and that chillers can be applied at other application conditions where one technology may better suited than the other. The new efficiency requirements will go into effect on 1/1/2015.

The proposal was develop thru a working team of the AHRI chiller section and a unanimous vote was obtained on the proposal.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal improves the efficiency of chiller equipment and is a consensus standard of the industry.

Assembly Action: **None**

Final Hearing Results

CE203-13 **AS**

Code Change No: CE204-13

Original Proposal

Section(s): C403.2.4.1.2, C403.2.4.1.3 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.2.4.1.2 **~~C403.2.4.2~~** **~~Set point overlap restriction~~** **Deadband.** Where used to control both heating and cooling, *zone* thermostatic controls shall be capable of providing ~~provide~~ a temperature range or deadband of at least 5°F (2.8°C) within which the supply of heating and cooling energy to the *zone* is ~~capable of being~~ shut off or reduced to a minimum.

Exceptions:

1. Thermostats requiring manual changeover between heating and cooling modes.
2. Occupancies or applications requiring precision in indoor temperature control as *approved* by the *code official.*

C403.2.4.1.3 Setpoint overlap restriction. Where a *zone* has a separate heating and a separate cooling thermostatic control located within the *zone*, a limit switch, mechanical stop, or direct digital control system with software programming shall be provided with the capability to prevent the heating setpoint from exceeding the cooling setpoint and to maintain a deadband in accordance with Section C403.2.4.1.2.

Reason: The text in current Section C403.2.4.2 entitled set point overlap restriction is really focused on deadband and is virtually identical to Section 6.3.4.1.2 of ASHRAE/IES Standard 90.1-2010. For consistency this provision is being renamed deadband and included in a new subsection to C403.2.4.1 on thermostatic controls. In addition ASHRAE/IES Standard 90.1-2010 has a provision to address a different situation wherein a zone has a separate heating and a separate cooling system and a separate thermostat for each one. This situation is not addressed in the IECC and needs to be to prevent a situation where both systems could be operational at the same time. These changes will help make the IECC consistent with ASHRAE/IES 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the distinction between deadband controls from those addressing setpoint overlap.

Assembly Action: **None**

Final Hearing Results

CE204-13 **AS**

Code Change No: CE205-13

Original Proposal

Section(s): C403.2.4.5 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.4.5 Zone isolation. HVAC systems serving *zones* that are over 25,000 square feet in floor area or that span more than one floor and designed to operate or be occupied non-simultaneously shall be divided into isolation areas. Each isolation area shall be equipped with isolation devices and controls configured to automatically shut off the supply of conditioned air and outdoor air to and exhaust air from the isolation area. Each isolation area shall be controlled independently by a device meeting the requirements of Section C403.2.4.3.2. Central systems and plants shall be provided with controls and devices that will allow system and equipment operation for any length of time while serving only the smallest isolation area served by the system or plant.

Exceptions:

1. Exhaust air and outdoor air connections to isolation areas when the fan system to which they connect does not exceed 5000 cfm.
2. Exhaust airflow from a single isolation area of less than 10 percent of the design airflow of the exhaust system to which it connects.
3. Isolation areas intended to operate continuously or intended to be inoperative only when all other isolation areas in a *zone* are inoperative.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the commercial provisions of the IECC, has a provision to provide the ability to create isolation areas within zones under certain circumstances in order to allow for additional reductions in energy use and operating costs. This situation is not addressed in the IECC and should be to ensure technical compatibility between both documents.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The change provides for the zonation of spaces over 25,000 square feet which allows for controls reflecting actual use of the space. It gains opportunity to save energy.

Assembly Action: **None**

Final Hearing Results

CE205-13	**AS**

Code Change No: CE206-13

Original Proposal

Section(s): C403.2.4.5

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.4.5 Snow melt system controls. Snow – and ice-melting systems~~, supplied through energy service to the building,~~ shall include automatic controls capable of shutting off the system when the pavement temperature is above 50^{0}F and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40^{0}F ~~so that the potential for snow or ice accumulation is negligible~~.

Reason: Because the energy for snow and ice-melting systems could come from an energy service other than the energy service for the building, the revision is needed to ensure all energy use for snow melting is covered. This proposal ensures that all snow melting systems are covered by the code. The language at the end of the last sentence being removed is not needed as it is not necessary to explain the intent of the provisions in the code.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The change results in these systems being regulated regardless of the source of the energy. The existing text provides a loophole.

Assembly Action: **None**

Final Hearing Results

CE206-13	**AS**

Code Change No: CE208-13

Original Proposal

Section(s): C403.2.4.5, C403.2.4.6 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.2.4.5 Snow and ice melt system controls. Snow- and ice-melting systems~~, supplied through energy service to the building,~~ shall include automatic controls capable of shutting off the system when the pavement temperature is above 50^0F and no precipitation is falling and an automatic or manual control that will allow shutoff when the outdoor temperature is above 40^0F ~~so that the potential for snow or ice accumulation is negligible~~.

C403.2.4.6 Freeze protection system controls. Freeze protection systems, such as heat tracing of outdoor piping and heat exchangers, including self-regulating heat tracing, shall include automatic controls configured to shut off the systems when outdoor air temperatures are above 40°F or when the conditions of the protected fluid will prevent freezing.

Reason: For consistency with ASHRAE/IES 90.1-2010. Section 6.4.3.8 of that document contains provisions for freeze protection systems. As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with 90.1 the issue of energy use for freeze protection systems must also be addressed in the IECC. The provisions associated with snow and ice melting systems are in the IECC but are not the same as those in 90.1. Since the energy for snow and ice melting systems could come from service other than to the building the revision is needed to ensure all energy use for snow melting is covered. The language at the end of the last sentence, while in 90.1, is suggested for deletion because it not necessary to explain the intent of the provisions in the code.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal adds important controls on freeze protection systems which are not currently addressed by Section C403.2.4.5. The changes to Section C403.2.4.5 are redundant with the action to approve CE206-13, but also correct the section title.

Assembly Action: **None**

Final Hearing Results

CE208-13 **AS**

Code Change No: CE209-13

Original Proposal

Section(s): C403.2.4.6 (NEW)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com), Jim Edelson, New Buildings Institute

Add new text as follows:

C403.2.4.6 Economizer fault detection and diagnostics (FDD). Air-cooled unitary direct-expansion units listed in Tables C403.2.3(1) through (3) and variable refrigerant flow (VRF) units that are equipped with an economizer in accordance with Section C403.3 or Section C403.4 shall include a fault detection and diagnostics (FDD) system complying with all of the following:

1. The following temperature sensors shall be permanently installed to monitor system operation:
   1.1. Outside air,
   1.2. Supply air,
   1.3. Return air;
2. Temperature sensors shall have an accuracy of ±2°F over the range of 40°F to 80°F;
3. Refrigerant pressure sensor, where used, shall have an accuracy of ±3 percent of full scale;
4. The unit controller shall be capable of providing system status by indicating the following:
   4.1. Free cooling available.
   4.2. Economizer enabled.
   4.3. Compressor enabled.
   4.4. Heating enabled.
   4.5. Mixed air low limit cycle active.
   4.6. The current value of each sensor.
5. The unit controller shall be capable of manually initiating each operating mode so that the operation of compressors, economizers, fans, and heating system can be independently tested and verified;
6. The unit shall be capable of reporting faults to a fault management application accessible by day-to-day operating or service personnel, or annunciated locally on zone thermostats; and
7. The FDD system shall be capable of detecting the following faults:
   7.1. Air temperature sensor failure/fault.
   7.2 Not economizing when the unit should be economizing.
   7.3. Economizing when the unit should not be economizing.
   7.4. Damper not modulating.
   7.5. Excess outdoor air.

Reason: Commercial HVAC systems have been shown to have problems with economizer function, control, and performance in field studies and utility-sponsored maintenance programs. This results in reduced energy efficiency and potential energy savings from the economizer with fan-only operation. The proposed FDD specifications have been standardized in California Title 24-2013.

Major HVAC original equipment manufacturer representatives played a major role in the Title 24 process that developed this measure. They supported the decision to propose the RTU FDD as a Mandatory Measure, rather than a Prescription Option in Title 24. The manufacturer's participants recognized the importance of this technical issue and stated that the industry would be ready by January 2014, the 2013 Title 24 implementation date, to meet the mandatory FDD requirements. A key factor for industry support was that the proposed FDD functions could be implemented on approximately 70% of RTUs sold that are electromechanically controlled, along with higher tier equipment that is microprocessor controlled.

The link to the cost-effectiveness analysis of the Title 24 FDD Mandatory Measure is noted here. The specific FDD reference material is found in three separate places in the document: Pgs. 13-18, 31-45, Appendix B pg. 118-131. http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/2011-04-27_workshop/review/2013_CASE_NR7_HVAC_Controls_and_Economizing_2011_04_20.pdf

Cost and benefit documentation is found in the Li and Braun (2007. Economic Evaluation of Benefits Associated with Automated Fault Detection and Diagnosis in Rooftop Air Conditioners. *ASHRAE Transactions* 113(2).) report, which states "Automated FDD reduces service costs due to reduced preventive maintenance inspections, fault prevention, lower-cost FDD, better scheduling of multiple service activities, and shifting service to low season."

Cost Impact: The code change proposal will increase the cost of construction but the increased level of efficiency over the life of the equipment will exceed the initial first cost.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Provides a system by which there can be specific detection of faults in economizers. This will greatly assist in the long term maintenance and effectiveness of the HVAC systems. As this isn't in the ASHRAE 90.1 standard, this opportunity would be lost if the regulation of complex systems wasn't included in the IECC.

Assembly Action: **None**

Final Hearing Results

CE209-13 **AS**

Code Change No: CE211-13

Original Proposal

Section(s): C403.2.5.2 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.5.2 Enclosed parking garage ventilation controls. Enclosed parking garages used for storing or handling automobiles operating under their own power shall employ contamination sensing devices and automatic controls configured to stage fans or modulate fan average airflow rates to 50 percent or less of design capacity or intermittently operate fans less than 20 percent of the occupied time or as required to maintain acceptable contaminant levels in accordance with IMC provisions. Failure of contamination sensing devices shall cause the exhaust fans to operate continuously at design airflow.

Exceptions:

1. Garages with total exhaust capacity less than 22,500 cfm (10,600 L/s) with ventilation systems that do not utilize heating or mechanical cooling.
2. Garages that have a garage area to ventilation system motor nameplate power ratio that exceeds 1125 cfm/hp (710 L/s/kW) and do not utilize heating or mechanical cooling.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has requirements for ventilation optimization control on parking ventilation systems that are not included in the IECC. These provisions provide significant energy savings. The change ensures continued consistency between the IECC and standard 90.1-2010 and provides significant energy savings in IECC.

Cost Impact: This code change proposal will increase the cost of construction when controls are now required.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal adds reasonable requirements for control systems to parking garage ventilation systems.

Assembly Action: **None**

Final Hearing Results

CE211-13	**AS**

Code Change No: CE212-13

Original Proposal

Section(s): C403.2.6

Proponent: Tim Manz, City of Blaine, MN, representing the Association of Minnesota Building Officials (tmanz@ci.blaine.mn.us)

Revise as follows:

C403.2.6 Energy recovery ventilation systems. Where the supply airflow rate of a fan system exceeds the values specified in Table C403.2.6, the system shall include an energy recovery system. The energy recovery system shall have the capability to provide a change in the enthalpy of the outdoor air supply of not less than 50 percent of the difference between the outdoor air and return air enthalpies, at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass or controls which permit operation of the economizer as required by Section C403.4

Exception: An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code*.
2. Laboratory fume hood systems that include at least one of the following features:
   - 2.1. Variable-air-volume hood exhaust and room supply systems capable of reducing exhaust and makeup air volume to 50 percent or less of design values <u>except when higher volumes are required to maintain safe operating conditions</u>.
   - 2.2. Direct makeup (auxiliary) air supply equal to at least 75 percent of the exhaust rate, heated no warmer than 2°F (1.1°C) above room setpoint, cooled to no cooler than 3°F (1.7°C) below room setpoint, no humidification added, and no simultaneous heating and cooling used for dehumidification control.
3. Systems serving spaces that are heated to less than 60°F (15.5°C) and are not cooled.
4. Where more than 60 percent of the outdoor heating energy is provided from site-recovered or site solar energy.
5. Heating energy recovery in Climate Zones 1 and 2.
6. Cooling energy recovery in Climate Zones 3C, 4C, 5B, 5C, 6B, 7 and 8.
7. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
8. Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design *outdoor air* flow rate.
9. Systems expected to operate less than 20 hours per week at the *outdoor air* percentage covered by Table C403.2.6
10. <u>Systems exhausting toxic, flammable, paint, or corrosive fumes or dust.</u>
11. <u>Commercial kitchen hoods used for collecting and removing grease vapors and smoke</u>.

Reason: Public health, safety and welfare takes precedence over reducing energy consumption, and the revision to Item 2.1 recognizes that with laboratory fume hoods. Additional exceptions 10 and 11 identify systems where energy recovery should not be used because what is being exhausted could be detrimental or destructive to any energy recovery equipment. All of these provisions are contained in the current Minnesota Commercial Energy Code.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal adds systems to the list of exceptions for which energy recovery systems would be inappropriate because the things being vented are dangerous or toxic. The committee identified that the change to Item 2.1 needs to be revised. It provides an exception within an exception and is unclear.

Assembly Action: **None**

Public Comments

Public Comment:

Eric Makela, Britt/Makela Group, representing Northwest Energy Codes Group, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.2.6 Energy recovery ventilation systems. Where the supply airflow rate of a fan system exceeds the values specified in Table C403.2.6, the system shall include an energy recovery system. The energy recovery system shall have the capability to provide a change in the enthalpy of the outdoor air supply of not less than 50 percent of the difference between the outdoor air and return air enthalpies, at design conditions. Where an air economizer is required, the energy recovery system shall include a bypass or controls which permit operation of the economizer as required by Section C403.4

Exceptions: An energy recovery ventilation system shall not be required in any of the following conditions:

1. Where energy recovery systems are prohibited by the *International Mechanical Code.*
2. Laboratory fume hood systems that include at least one of the following features:
   - 2.1 Variable-air-volume hood exhaust and room supply systems capable of reducing exhaust and makeup air volume to 50 percent of less of design values. ~~except when higher volumes are required to maintain safe operating conditions.~~
   - 2.2 Direct makeup (auxiliary) air supply equal to at least 75 percent of the exhaust rate, heated no warmer than 2°F (1.1°C) above room setpoint, cooled to no cooler than 3°F (1.7°C) below room setpoint, no humidification added, and no simultaneous heating and cooling used for dehumidification control.
3. Systems serving spaces that are heated to less than 60°F (15.5°C) and are not cooled.
4. Where more than 60 percent of the outdoor eating energy is provided from site-recovered or site solar energy.
5. Heating energy recovery in Climate Zones 1 and 2.
6. Cooling energy recovery in Climate Zones 3C, 4C, 5B, 5C, 6B, 7 and 8.
7. Systems requiring dehumidification that employ energy recovery in series with the cooling coil.
8. Where the largest source of air exhausted at a single location at the building exterior is less than 75 percent of the design *outdoor air* flow rate.
9. Systems expected to operate less than 20 hours per week at the *outdoor air* percentage covered by Table C403.2.6
10. Systems exhausting toxic, flammable, paint, or corrosive fumes or dust.
11. Commercial kitchen hoods used for collecting and removing grease vapors and smoke.

Commenter's Reason: The term "safe operating conditions" is not defined and would be open to interpretation. The addition to Exception 2.1, which is currently included in the 2012 IECC, would weaken the provision as designers could claim the need for additional air volumes which would increase energy use. Without a threshold built into the code provision it would be difficult to make determination as to what was safe or not safe relating to operating conditions.

Final Hearing Results

CE212-13	**AMPC**

Code Change No: CE214-13

Original Proposal

Section(s): Table C403.2.6

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

TABLE C403.2.6
ENERGY RECOVERY REQUIREMENT

CLIMATE ZONE	PERCENT (%) OUTDOOR AIR AT FULL DESIGN AIRFLOW RATE							
	≥10% and <20%	≥20% and <30%	≥ 30% and < 40%	≥ 40% and < 50%	≥ 50% and < 60%	≥ 60% and < 70%	≥ 70% and < 80%	≥ 80%
	DESIGN SUPPLY FAN AIRFLOW RATE (cfm)							
3B, 3C, 4B, 4C, 5B	NR	NR	NR	NR	NR	NR	~~≥5000~~ NR	~~≥5000~~ NR
1B, 2B, 5C	NR	NR	NR	NR	≥26000	≥12000	≥5000	≥4000
6B	≥28000	≥26500	≥11000	≥5500	≥4500	≥3500	≥2500	≥1500
1A, 2A, 3A, 4A, 5A, 6A	≥26000	≥16000	≥5500	≥4500	≥3500	≥2000	≥1000	> 0
7, 8	≥4500	≥4000	≥2500	≥1000	> 0	> 0	> 0	> 0

NR = not required

Reason: This proposal revises the requirements for the use of exhaust air energy recovery as defined in table C403.2.6

The current table requires energy recovery as a function of the percent outdoor air and design supply fan airflow. The current table defines requirements for energy recover for outdoor air ventilation rates above 30%. Many buildings operate with ventilation rates below 30%. Typical buildings in this category include offices, motels, hotels, grocery, and warehouses which represent a significant part of the market. Therefore by extending the table down we can save additional energy on these buildings where economically justified. SSPC 90.1 ran full 8760 hr simulation runs for building office, school and retail applications down to 10% outdoor air and then selected least restrictive cfm values for the table based on the 2010 scalar ratio metholody using a design life of 15 years. This results in additional requirements for energy recovery on larger systems in zones 1A, 2A, 3A, 4A, 5A, 6A, 7 and 8. These zones represent 30.8% of the market.

In addition to the changes to extend the table down low percent outdoor air ventilation rates, this also proposes to modify the requirements for zone 3B, 3C, 4B, 4C and 5B as they are not economical justified and have scalar values of 20.3 yrs up to infinity. We have received feedback that other studies have also confirmed that these values are not cost effective and it is felt these values need to be corrected.

The change ensures continued consistency between the IECC and Standard 90.1.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: These categories allow for cost effective application of energy recovery and should be included in the requirement.

Assembly Action: **None**

Public Comments

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C403.2.6 (1)

ENERGY RECOVERY REQUIREMENT (ventilation systems operating <8000 hr/yr)

(Portions of code change proposal not shown remain unchanged)

TABLE C403.2.6 (2) Energy Recovery Requirement (ventilation systems operating ≥8000 hrs/yr)

Zone	% *Outdoor Air* at Full Design Airflow Rate							
	≥10% and <20%	≥20% and <30%	≥30% and <40%	≥40% and <50%	≥50% and <60%	≥60% and <70%	≥70% and <80%	≥80%
	Design Supply Fan Airflow Rate (cfm)							
3C	NR	NR	NR	NR	NR	NR	NR	NR
1B, 2B, 3B, 4C, 5C	NR	≥19500	≥9000	≥5000	≥4000	≥3000	≥1500	>0
1A, 2A, 3A, 4B, 5B	≥2500	≥2000	≥1000	≥500	>0	>0	>0	>0
4A, 5A, 6A, 6B, 7, 8	>0	>0	>0	>0	>0	>0	>0	>0

NR – Not required

Commenter's Reason: In 2012 addendum BT to 90.1 2010 standard was developed to expand the range for the use of exhaust air energy recovery down to 10% rates ventilation rate, which was matched in the original CE214. At that time the requirements were adjusted based on the latest performance and economics analysis and energy recovery was removed for climate zones 3B, 3C, 4B, 4C, and 5B for >70% outside air.

This modification will modification will make the IECC consistent with the latest addenda to ASHRAE 90.1 that will be published in the 2013 version of the standard.

Additional studies have been completed for buildings with continuous ventilation operation (assumed to be ≥8,000 hrs) and a second table has been developed to cover buildings with the higher ventilation operation which expands the requirements for the use of energy recovery.

Final Hearing Results

CE214-13 AMPC

Code Change No: CE217-13

Original Proposal

Section(s): C403.2.7

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.7 Duct and plenum insulation and sealing. All supply and return air ducts and plenums shall be insulated with a minimum of R-6 insulation where located in unconditioned spaces and ~~a minimum of R-8 insulation~~ where located outside the building with a minimum of R-8 insulation in climate zones 1 through 4 and a minimum of R-12 insulation in climate zones 5 through 8. Where located within a building envelope assembly, the duct or plenum shall be separated from the building exterior or unconditioned or exempt spaces by a minimum of R-8 insulation in climate zones 1 through 4 and a minimum of R-12 insulation in climate zones 5 through 8.

Exceptions:

1. Where located within equipment.
2. Where the design temperature difference between the interior and exterior of the duct or plenum does not exceed 15°F (8°C).

All ducts, air handlers and filter boxes shall be sealed. Joints and seams shall comply with Section 603.9 of the *International Mechanical Code*.

Reason: This proposal reduces the energy loss associated with duct systems, such as those in cold climates, by increasing the level of insulation required on ducts and plenums where it is cost effective.

Exterior ducts and plenums (i.e. those not totally inside the building conditioned space) in colder climate zones are subject to a higher heat loss and consequent higher use of energy due to a greater temperature difference across the duct or plenum surface. As the cost of energy increases and the need to reduce building energy use becomes more acute, enhancements to the energy code are necessary. Such ducts and plenums will benefit from improved insulation because the added insulation will reduce heat loss and allow more of the heat provided by the HVAC equipment to be delivered to the space. In some cases the added insulation will also allow reduced heating equipment size.

There is a cost impact associated with this proposed change since more insulation will be required on some ductwork in climate zones 5-8. A cost effectiveness analysis was completed. In this analysis it was found that for the additional duct insulation the simple payback was 11.2 years or less. Based on insulation life of 24 years, a discounted cost effective payback threshold is 14.2 years. The simple paybacks for all of the additional insulation required under this proposal are well below this cost effective threshold.

References:

R. Hart. 2012. Supporting Analyses for proposed changes to the commercial provisions of the 2012 IECC: Increase Duct and Plenum Insulation. http://www.energycodes.gov/development/commercial/2015IECC

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal is a good change to provide savings of energy at a minimal cost. The temperature differences between ducts and the surrounding space can be very high. This is a reasonable improvement to the code.

Assembly Action: **None**

Final Hearing Results

CE217-13	**AS**

Code Change No: CE220-13

Original Proposal

Section(s): C403.2.7 (NEW), Table C403.2.7 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.7 Kitchen exhaust systems. Replacement air introduced directly into the exhaust hood cavity shall not exceed 10 percent of the hood exhaust airflow rate. Conditioned supply air delivered to any space containing a kitchen hood shall not exceed the greater of the ventilation rate required to meet the space heating or cooling load or the hood exhaust flow minus the available transfer air from adjacent space where available transfer air is considered that portion of outdoor ventilation air not required to satisfy other exhaust needs, such as restrooms, and not required to maintain pressurization of adjacent spaces.
When total kitchen hood exhaust airflow rate is greater than 5,000 cfm each hood shall have a maximum exhaust rate in accordance with Table C403.2.7 and shall meet one of the following:

1. At least 50 percent of all replacement air is transfer air that would otherwise be exhausted.
2. Demand ventilation systems on at least 75 percent of the exhaust air that are capable of at least 50 percent reduction in exhaust and replacement air system airflow rates, including controls necessary to modulate airflow in response to appliance operation and to maintain full capture and containment of smoke, effluent and combustion products during cooking and idle.
3. Listed energy recovery devices with a sensible heat recovery effectiveness of at least 40 percent on at least 50 percent of the total exhaust airflow.

When a single hood, or hood section, is installed over appliances with different duty ratings, then the maximum allowable flow rate for the hood or hood section shall be based on the requirements for the highest appliance duty rating under the hood or hood section.

Exception: When at least 75 percent of all the replacement air is transfer air that would otherwise be exhausted

TABLE C403.2.7
MAXIMUM NET EXHAUST FLOW RATE, CFM PER LINEAR FOOT OF HOOD LENGTH

Type of Hood	Light Duty Equipment	Medium Duty Equipment	Heavy Duty Equipment	Extra Heavy Duty Equipment
Wall-mounted canopy	140	210	280	385
Single island	280	350	420	490
Double island (per side)	175	210	280	385
Eyebrow	175	175	Not allowed	Not allowed
Backshelf/Pass-over	210	210	280	Not allowed

Reason: For consistency with Standard 90.1-2010. Considering that the IECC Commercial Provisions are intended to be technically compatible with that standard to facilitate adoption and implementation, ASHRAE is interested in keeping 2012 IECC Commercial Provisions aligned with ANSI/ASHRAE/IESNA Standard 90.1-2010.

The proposal basically outlaws "short-circuit" hoods.

Research and California Energy Commission has shown that direct supply of makeup air, in excess of 10% of hood exhaust airflow, into the hood cavity significantly deteriorates the Capture and Containment (C&C) performance of hoods. This research has also

demonstrated that short-circuit hoods waste energy and degrade kitchen environment and hygiene. If we assume a generic baseline C&C rate for a cooking process, studies show the exhaust rates for short-circuit hoods generally exceed those for exhaust-only hoods by at least the amount of air short-circuited, thus decreasing performance and increasing energy consumption.
Engineers are often in the habit of simply providing makeup air units in kitchens to provide makeup air equal to the exhaust flow rate even when "free" transfer air is available from adjacent spaces. Adding makeup air when transfer air is available is a wasteful design practice and should be prohibited. Using available transfer air saves energy and reduces the first cost of the makeup unit and exhaust system in the adjacent spaces. It simply requires some engineering and coordination to provide a path for the transfer air.
The proposed change is also intended to get rid of a wasteful common practice: specifying excessive exhaust airflow by selecting hoods that are not listed or have not been subjected to a recognized performance test. The exhaust airflow flow rates in Table C403.2.7 are 30% below the minimum airflow rates in ASHRAE Standard 154-2003.

ASHRAE Research Project 1202 shows that hoods listed per UL Standard 710 and/or are engineered and tested per ASTM/ANSI 1704 have exhaust rates that are at least 30% less than the exhaust airflow requirements for unlisted or untested hoods. The intent is to conserve energy through the use of engineered hoods or performance based hoods that have been validated based on consensus standard test methods it should be noted that ASHRAE research has not demonstrated that exhaust rate reductions substantially beyond the 30% can or should be recommended at this time. This requirement should not increase first cost and in many cases will reduce first cost through downsizing of exhaust, supply and cooling equipment.

The 5,000 CFM threshold recognizes small restaurants. In addition makeup air can be fully conditioned. As a result there are now cost effective opportunities to reduce energy with demand ventilation systems or energy recovery devices.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee recognized that there is significant potential for energy savings, but expressed concern that these systems are already difficult to balance properly without this added challenge. The proposal needs better coordination with the *International Mechanical Code*.

Assembly Action: **None**

Public Comments

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.2.7 Kitchen Exhaust Systems. Replacement air introduced directly into the exhaust hood cavity shall not exceed 10 percent of the hood exhaust airflow rate. Conditioned supply air delivered to any space containing a kitchen hood shall not exceed the greater of the ventilation rate required to meet the space heating or cooling load or the hood exhaust flow minus the available transfer air from adjacent space where available transfer air is considered that portion of outdoor ventilation air not required to satisfy other exhaust needs, such as restrooms, and not required to maintain pressurization of adjacent spaces.

When total kitchen hood exhaust airflow rate is greater than 5,000 cfm, each hood shall <u>be a factory-built commercial exhaust hood listed by a nationally recognized testing laboratory to comply with the requirements of UL710. Each hood shall</u> have a maximum exhaust rate in accordance with Table C403.2.7 and shall meet one of the following:

(Portions of proposal not shown remain unchanged)

Commenter's Reason: This will make the IECC consistent with 90.1-2010 and 90.1-2013. Considering that the IECC Commercial Provisions are intended to be technically compatible with that standard to facilitate adoption and implementation, ASHRAE is interested in keeping 2012 IECC Commercial Provisions aligned with ANSI/ASHRAE/IESNA Standard 90.1-2010.
The proposal basically outlaws "short-circuit" hoods.
Research and California Energy Commission has shown that direct supply of makeup air, in excess of 10% of hood exhaust airflow, into the hood cavity significantly deteriorates the Capture and Containment (C&C) performance of hoods. This research has also demonstrated that short-circuit hoods waste energy and degrade kitchen environment and hygiene. If we assume a generic baseline C&C rate for a cooking process, studies show the exhaust rates for short-circuit hoods generally exceed those for exhaust-only hoods by at least the amount of air short-circuited, thus decreasing performance and increasing energy consumption.

Engineers are often in the habit of simply providing makeup air units in kitchens to provide makeup air equal to the exhaust flow rate even when "free" transfer air is available from adjacent spaces. Adding makeup air when transfer air is available is a wasteful design practice and should be prohibited. Using available transfer air saves energy and reduces the first cost of the makeup unit and exhaust system in the adjacent spaces. It simply requires some engineering and coordination to provide a path for the transfer air.
The proposed change is also intended to get rid of a wasteful common practice: specifying excessive exhaust airflow by selecting hoods that are not listed or have not been subjected to a recognized performance test. The exhaust airflow flow rates in Table C403.2.7 are 30% below the minimum airflow rates in ASHRAE Standard 154-2003.

ASHRAE Research Project 1202 shows that hoods listed per UL Standard 710 and/or are engineered and tested per ASTM/ANSI 1704 have exhaust rates that are at least 30% less than the exhaust airflow requirements for unlisted or untested hoods. The intent is to conserve energy through the use of engineered hoods or performance based hoods that have been validated based on consensus standard test methods it should be noted that ASHRAE research has not demonstrated that exhaust rate reductions substantially beyond the 30% can or should be recommended at this time. This requirement should not increase first cost and in many cases will reduce first cost through downsizing of exhaust, supply and cooling equipment.

The 5,000 CFM threshold recognizes small restaurants. In addition makeup air can be fully conditioned. As a result there are now cost effective opportunities to reduce energy with demand ventilation systems or energy recovery devices.

This comment adds a requirement that hoods must be listed (which is required by the IMC to utilize exhaust rates lower than the IMC has for unlisted hood values).

Equipment manufacturers reviewed and agreed to the values proposed in the new table.

To address the Code Development Committee's concerns, this proposal has been modified to be such that hoods must be listed (which is required by the IMC to utilize exhaust rates lower than the IMC has for unlisted hood values).

Staff Note: The UL 710 standard is already a referenced standard in the *International Mechanical Code.*

Final Hearing Results

CE220-13 AMPC

Code Change No: CE222-13

Original Proposal

Section(s): C403.2.7.1.1

Proponent: Vickie Lovell InterCode Inc. representing DuctMate Industries (vickie@intercodeinc.com)

Revise as follows:

C403.2.7.1.1 Low-pressure duct systems. All longitudinal and transverse joints, seams and connections of supply and return ducts operating at a static pressure less than or equal to 2 inches water gauge (w.g.) (500 Pa) shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus embedded- fabric systems or tapes installed in accordance with the manufacturer's installation instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

> **Exception:** ~~Continuously welded and locking type longitudinal joints and seams on ducts operating at static pressures less than 2 inches water gauge (w.g.) (500 Pa) pressure classification.~~ For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams and locking-type joints and seams of other than the snap-lock and button-lock types.

Reason: This proposed text is derived from a revision to the International Mechanical Code that was proposed by the PMG Code Action Committee in M151-12 and was approved by the voting membership in Portland for the 2015 IMC.

Unless sealant or a gasket is used, snap-lock and button-lock type seams will leak significantly. The current exception attempted to prevent unnecessary sealing for joints and seams that leak very little or not at all, but it went too far by including all locking type joints and seams. Some locking joints are leak proof such as mechanically folded seams used for spiral seam duct, but this is not true for all locking joints.

The purpose of this code change is to create consistency between the IMC and the IECC.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the exception and the application of the code to these categories of ducts.

Assembly Action: **None**

Final Hearing Results

CE222-13 **AS**

Code Change No: CE223-13

Original Proposal

Section(s): C403.2.7.1.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.7.1.1 Low-pressure duct systems. All longitudinal and transverse joints, seams and connections of supply and return ducts operating at a static pressure less than or equal to 2 inches water gauge shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), mastic-plus-embedded-fabric systems or tapes installed in accordance with the manufacturer's installation instructions. Pressure classifications specific to the duct system shall be clearly indicated on the construction documents in accordance with the *International Mechanical Code*.

> **Exception:** ~~Continuously welded and l~~Locking-type longitudinal joints and seams need not be sealed as specified in this section ~~on ducts operating at static pressures less than 2 inches water gauge (w.g.) (500 Pa) pressure classification~~.

Reason: This proposal clarifies that locked joint construction methods for duct systems meet the code for longitudinal seams. The requirement clearly allows welded longitudinal seems to be acceptable, so that is not needed in the exception. As currently stated in the exception, it might be interpreted that the longitudinal seam must be both welded and locking. That is clearly not the intent, as welding and locking together are not typical duct sealing approaches.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal, similar to CE222-13, clarifies the exception.

Assembly Action: **None**

Final Hearing Results

CE223-13 **AS**

Code Change No: CE225-13

Original Proposal

Section(s): C403.2.7.1.3

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.7.1.3 High-pressure duct systems. Ducts and plenums designed to operate at static pressures ~~in excess of~~ greater than 3 inches water gauge shall be insulated and sealed in accordance with Section C403.2.7. In addition, ducts and plenums shall be leak tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual ~~with~~ ~~the~~ and shown to have a rate of air leakage (CL) less than or equal to 6.0 as determined in accordance with Equation 4-5.

$CL = F/P^{0.65}$ **(Equation 4-5)**

where:

F = The measured leakage rate in cfm per 100 square feet of duct surface.
P = The static pressure of the test.

Documentation shall be furnished by the designer demonstrating that representative sections totaling at least 25 percent of the duct area have been tested and that all tested sections meet the requirements of this section.

Reason: This proposal ensures consistency with the provisions in Section C403.2.7.1.2.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the code text and its application.

Assembly Action: **None**

Final Hearing Results

CE225-13 **AS**

Code Change No: CE226-13

Original Proposal

Section(s): 403.2.7.1.3

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferugson@ashrae.org)

Revise as follows:

C403.2.7.1.3 High-pressure duct systems. All ducts and plenums designed to operate at static pressures in excess of 3 inches water gauge (750 Pa) shall be insulated and sealed in accordance with Section C403.2.7. In addition, ducts and plenums shall be leak tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual with the rate of air leakage (CL) less than or equal to ~~6.0~~ 4.0 as determined in accordance with Equation 4-5.

$$CL = F/P^{0.65} \quad \textbf{(Equation 4-5)}$$

where:

F = The measured leakage rate in cfm per 100 square feet of duct surface.

P = The static pressure of the test.

Documentation shall be furnished by the designer demonstrating that representative sections totaling at least 25 percent of the duct system area have been tested and that all tested sections meet the requirements of this section.

Reason: Consistency with the provisions in Section C403.2.7.1.2. In addition ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to limit the air leakage rate to 4.0. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

C403.2.7.1.3 High-pressure duct systems. ~~All~~ Ducts and plenums designed to operate at static pressures in excess of 3 inches water gauge (750 Pa) shall be insulated and sealed in accordance with Section C403.2.7. In addition, ducts and plenums shall be leak tested in accordance with the SMACNA HVAC Air Duct Leakage Test Manual with the rate of air leakage (CL) less than or equal to 4.0 as determined in accordance with Equation 4-5.

$$CL = F/P^{0.65} \quad \textbf{(Equation 4-5)}$$

where:

F = The measured leakage rate in cfm per 100 square feet of duct surface.

P = The static pressure of the test.

Documentation shall be furnished by the designer demonstrating that representative sections totaling at least 25 percent of the duct ~~system~~ area have been tested and that all tested sections meet the requirements of this section.

Committee Reason: The modification deletes the word 'all' at the beginning because portions of the provision do not apply to all ducts and plenums. The word 'system' is struck from the last paragraph because the testing is of ducts and not other equipment which may be connected to the ducts.   The 4.0 leakage rate is consistent with ASHRAE and SMACNA standards. The balance of the proposal clarifies the text.

Assembly Action: **None**

Final Hearing Results

CE226-13	**AM**

Code Change No: CE229-13

Original Proposal

Section(s): Table C403.2.8

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

TABLE C403.2.8
MINIMUM PIPE INSULATION THICKNESS (thickness in inches)[a]

FLUID OPERATING TEMPERATURE RANGE AND USAGE (°F)	INSULATION CONDUCTIVITY		NOMINAL PIPE OR TUBE SIZE (inches)				
	Conductivity Btu · in./(h · ft^2 · °F)[b]	Mean Rating Temperature, °F	<1	1 to < 1$^1/_2$	1$^1/_2$ to < 4	4 to < 8	≤ 8
> 350	0.32 – 0.34	250	4.5	5.0	5.0	5.0	5.0
251 – 350	0.29 – 0.32	200	3.0	4.0	4.5	4.5	4.5
201 – 250	0.27 – 0.30	150	2.5	2.5	2.5	3.0	3.0
141 – 200	0.25 – 0.29	125	1.5	1.5	2.0	2.0	2.0
105 – 140	0.21 – 0.28	100	1.0	1.0	1.5	1.5	1.5
40 – 60	0.21 – 0.27	75	0.5	0.5	1.0	1.0	1.0
< 40	0.20 – 0.26	~~75~~ <u>50</u>	0.5	1.0	1.0	1.0	1.5

(Portions of Table not shown remain unchanged)

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has a different mean rating temperature for evaluating the thermal properties of insulation on piping serving fluids below 40°F. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The change appropriately corrects this value in the table.

Assembly Action: **None**

Final Hearing Results

CE229-13 **AS**

Code Change No: CE234-13

Original Proposal

Section(s): C202 (NEW), C403.2.10, C403.2.10.3 (NEW), Chapter 5

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA International (amanda@intercodeinc.com)

Revise as follows:

C403.2.10 Air system design and control. Each HVAC system having a total fan system motor nameplate horsepower (hp) exceeding 5 horsepower (hp) (3.7 kW) shall meet the provisions of Sections C403.2.10.1 through ~~C403.2.10.2~~ C403.2.10.3.

C403.2.10.3 Fan efficiency. Fans shall have a fan efficiency grade (FEG) of at least 67 when determined in accordance with AMCA 205 by an *approved*, independent testing laboratory and labeled by the manufacturer. The total efficiency of the fan at the design point of operation shall be within 15 percentage points of the maximum total efficiency of the fan.

Exceptions: The following fans are not required to have a fan efficiency grade:

1. Fans of 5 hp or less as follows:
   1.1 Single fan with a motor nameplate horsepower of 5 hp or less, unless Exception 1.2 applies.
   1.2 Multiple fans in series or parallel that have a combined motor nameplate horsepower of 5 hp or less and are operated as the functional equivalent of a single fan.
2. Fans that are part of equipment covered under Section C403.2.3.
3. Fans included in an equipment package certified by an *approved agency* for air or energy performance.
4. Powered wall/roof ventilators.
5. Fans outside the scope of AMCA 205.
6. Fans that are intended to operate only during emergency conditions.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

FAN EFFICIENCY GRADE (FEG). A numerical rating identifier that specifies the fan's aerodynamic ability to convert shaft power, or impeller power in the case of a direct driven fan, to air power. FEGs are based on fan peak (optimum) energy efficiency that indicates the quality of the fan energy usage and the potential for minimizing the fan energy usage.

Add new standard to Chapter 5 as follows:

AMCA

AMCA 205-12 Energy Efficiency Classification for Fans

Reason: The IECC Commercial Provisions do not currently have any provisions for fan efficiency. ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to address the minimum efficiency of air system fans.

C403.2.10 of the IECC Commercial Provisions addresses air system design and control and should be updated to include the criteria from ASHRAE Standard 90.1-2010 as enhanced by this addendum in order to retain technical compatibility between the IECC Commercial Provisions and standard 90.1. This change ensures continued consistency between the two documents.

Certified FEG ratings are calculated from test data taken during fan air-performance tests as part of routine participation in routine certified ratings program administered by AMCA International. Certified FEG ratings will not create a burden to designers and will not significantly increase cost of construction because dozens of fan manufacturers have already certified FEG ratings for hundreds of fan models.

Careful consideration has been given to the exceptions which are intended to provide relief for fans in certified packaged equipment, and fan types and sizes that do not easily conform to AMCA 205, or which, by virtue of their operating pressure, could lead to unwarranted incremental costs.

Cost Impact: The code change proposal will not significantly increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, AMCA 205-2012 Energy Efficiency Classification for Fans, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Note: The term 'fan efficiency grade' is currently defined in the IgCC. The wording of this proposal is identical to the IgCC definition.

Public Hearing Results

For staff analysis of the content of AAMCA 205-12 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Modified**

Modify the proposal as follows:

FAN EFFICIENCY GRADE (FEG). A numerical rating ~~identifier~~ that ~~specifies~~ identifies the fan's aerodynamic ability to convert shaft power, or impeller power in the case of a direct driven fan, to air power. ~~FEG's are based on fan peak (optimum) energy efficiency that indicates the quality of the fan energy usage and the potential for minimizing the fan energy usage.~~

(Portions of proposal not shown remain unchanged)

Committee Reason: The modified to improve the readability and to remove the final sentence which is more appropriate for commentary. The proposal improves efficiency in HVAC design by taking away the temptation of contractors to buy the cheapest equipment rather than the most efficient.

Assembly Action: **None**

Final Hearing Results

CE234-13 **AM**

Code Change No: CE235-13

Original Proposal

Section(s): C403.2.10.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.10.1 Allowable fan ~~floor~~ horsepower. Each HVAC system at fan system design conditions shall not exceed the allowable *fan system motor nameplate hp* (Option 1) or *fan system bhp* (Option 2) as shown in Table C403.2.10.1(1). This includes supply fans, exhaust fans, return/relief fans, and fan-powered terminal units associated with systems providing heating or cooling capability. Single *zone* variable-air-volume systems shall comply with the constant volume fan power limitation.

> **Exceptions:** ~~The following fan systems are exempt from allowable fan floor horsepower requirement.~~
>
> 1. Hospital, vivarium and laboratory systems that utilize flow control devices on exhaust and/or return to maintain space pressure relationships necessary for occupant health and safety or environmental control shall be permitted to use variable volume fan power limitation.
> 2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less are exempt from the allowable fan horsepower requirement.

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Reason: This proposal involves editorial clarification and simplification of provisions for allowable fan horsepower. The proposal inserts the words "exhaust fans" that are missing from C403.2.10.1, even though exception 2 is for exhaust fans and the definition for *fan system motor nameplate hp* referred to in the section include exhaust fans. The parent section is clear as to scope (fan horsepower) however the two exceptions have different basis. The first exception allows use of the less strict variable fan formula from the table for certain constant volume systems, while what is covered in the second exemption is a blanket exemption. It is appropriate to delete the introductory reason and provide the extent of exception separately for each exception. The term "floor" does not appear to be appropriate within the context of this section. The intent is to limit fan horsepower so the term floor is removed.

Cost Impact: The code change proposal does not increase the cost of construction.

Public Hearing Results

The following errata were not posted to the ICC website.

2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less ~~2. Individual exhaust fans with motor nameplate horsepower of 1 hp or less~~ are exempt from the allowable fan horsepower requirement.

(Portions of proposal not shown remain unchanged)

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies that exhaust fans are also regulated. Further it clarifies the application of the exception.

Assembly Action: **None**

Final Hearing Results

CE235-13 **AS**

Code Change No: CE236-13

Original Proposal

Section(s): Table C403.2.10.1(2)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

TABLE C403.2.10.1(2)
FAN POWER LIMITATION PRESSURE DROP ADJUSTMENT

DEVICE	ADJUSTMENT
Credits	
Fully ducted return and/or exhaust air systems	0.5 inch w.c. (2.15 in w.c. for laboratory and vivarium systems)
Return and/or exhaust air flow control devices	0.5 inch w.c.
Exhaust filters, scrubbers, or other exhaust treatment.	The pressure drop of device calculated at fan system design condition
Particulate filtration credit: MERV 9 thru 12	0.5 inch w.c.
Particulate filtration credit: MERV 13 thru 15	0.9 inch. w.c.
Particulate filtration credit: MERV 16 and greater and electronically enhanced filters	Pressure drop calculated at 2x clean filter pressure drop at fan system design condition.
Carbon and other gas-phase air cleaners	Clean filter pressure drop at fan system design condition.
Biosafety cabinet	Pressure drop of device at fan system design condition.
Energy recovery device, other than coil runaround loop	(2.2 × energy recovery effectiveness) – 0.5 inch w.c. for each airstream
Coil runaround loop	0.6 inch w.c. for each airstream
Evaporative humidifier/cooler in series with another cooling coil	Pressure drop of device at fan system design conditions
Sound attenuation section <u>(fans serving spaces with design background noise goals below NC35)</u>	0.15 inch w.c.
Exhaust system serving fume hoods	0.35 inch w.c.
Laboratory and vivarium exhaust systems in high-rise buildings	0.25 inch w.c./100 feet of vertical duct exceeding 75 feet
<u>**Deductions**</u>	
<u>Systems without central cooling device</u>	<u>- 0.6 in. w.c.</u>
<u>Systems without central heating device</u>	<u>- 0.3 in. w.c.</u>
<u>Systems with central electric resistance heat</u>	<u>- 0.2 in. w.c.</u>

w.c. = water column
For SI: 1 inch w.c. = 249 Pa, 1 inch = 25.4 mm.

Reason: This proposal does the following:

1. Adds a requirement that the sound attenuation credit is only available if there are background noise criteria requirements.

2. Adds a deduction for systems without any central heating or cooling device. Since the base level fan power allowances include the assumption that those components are present, the deduction is warranted for those systems that do not include those component.
3. Adds a deduction for systems with electric resistance heating. Since the base level fan power allowances include the assumption that hydronic heating coils are present, systems with electric resistance heating coils that have less pressure drop do not need the full allowance assumed in the base level.

The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Clarifies the use of sound attenuation in the pressure drop adjustment.

Assembly Action: **None**

Final Hearing Results

CE236-13 **AS**

Code Change No: CE237-13

Original Proposal

Section(s): C403.2.10.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.2.10.2 Motor nameplate horsepower. For each fan, the fan brake horse power shall be indicated on the construction documents and the selected motor shall be no larger than the first available motor size greater than the following: ~~brake horsepower. The fan brake horse power shall be indicated on the design documents to allow for compliance verification by the code official.~~

~~Exceptions:~~

1. For fans less than 6 bhp (4413 W), ~~where the first available motor larger than the brake horsepower has a nameplate rating within 50 percent of the bhp, selection of the next larger nameplate motor size is allowed.~~ 1.5 times the fan brake horsepower
2. For fans 6 bhp (4413 W) and larger, ~~where the first available motor larger than the bhp has a nameplate rating within 30 percent of the bhp, selection of the next larger nameplate motor size is allowed.~~ 1.3 times the fan brake horsepower.

Reason: This proposal simplifies provisions for motor nameplate horsepower by replacing complicated exceptions with positive statements of what is required. The complex exceptions are replaced with a positive statement of what is required. This will reduce confusion over the maximum horsepower requirement and foster implementation and compliance verification.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The change improves the clarity of the code text and its application. There are no technical changes included.

Assembly Action: **None**

Final Hearing Results

CE237-13	**AS**

Code Change No: CE238-13

Original Proposal

Section(s): C403.2.10.2

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.2.10.2 Motor nameplate horsepower. For each fan, the selected fan motor shall be no larger than the first available motor size greater than the brake horsepower (bhp). The fan brake horsepower (bhp) shall be indicated on the design documents to allow for compliance verification by the *code official*.

Exceptions:

1. For fans less than 6 bhp (4413 W), where the first available motor larger than the brake horsepower has a nameplate rating within 50 percent of the bhp, selection of the next larger nameplate motor size is allowed.
2. For fans 6 bhp (4413 W) and larger, where the first available motor larger than the bhp has a nameplate rating within 30 percent of the bhp, selection of the next larger nameplate motor size is allowed.
3. Systems complying with Section C403.2.10.1 *fan system motor nameplate hp* (Option 1).

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to eliminate unnecessary documentation of fan bhp in certain cases. The change ensures continued consistency between the IECC Commercial Provisions and standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal eliminates the potential for conflict with new text in Section C403.2.10.1.

Assembly Action: **None**

Final Hearing Results

CE238-13 **AS**

Code Change No: CE239-13

Original Proposal

Section(s): C403.2.12 (NEW), Table C403.2.12(1) (NEW), Table C403.2.12 (2) (NEW), Chapter 5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.12 Refrigeration equipment performance. Refrigeration equipment shall have an energy use in kWh/day not greater than the values of Tables C403.2.12(1) and C403.2.12(2) when tested and rated in accordance with AHRI Standard 1200. The energy use shall be verified through certification under an approved certification program or, where no certification program exists, the energy use shall be supported by data furnished by the equipment manufacturer.

TABLE C403.2.12(1)
MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL REFRIGERATION

Equipment Type	Application	Energy Use Limits (kWh per day) [a]	Test Procedure
Refrigerator with solid doors	Holding Temperature	0.10 x V + 2.04	AHRI 1200
Refrigerator with transparent doors		0.12 x V + 3.34	
Freezers with solid doors		0.40 x V + 1.38	
Freezers with transparent doors		0.75 x V + 4.10	
Refrigerators/freezers with solid doors		the greater of 0.12 x V + 3.34 or 0.70	
Commercial refrigerators	Pulldown	0.126 x V + 3.51	

[a] V = volume of the chiller or frozen compartment as defined in AHAM-HRF-1

TABLE C403.2.12(2)
MINIMUM EFFICIENCY REQUIREMENTS: COMMERCIAL REFRIGERATORS AND FREEZERS

Equipment Type				Energy Use Limits (kWh/day) as of 1/1/2012 [a,b]	Test Procedure
Equipment Class[c]	Family Code	Operating Mode	Rating Temperature		
VOP.RC.M	Vertical Open	Remote Condensing	Medium Temperature	0.82 × TDA + 4.07	AHRI 1200
SVO.RC.M	Semivertical Open	Remote Condensing	Medium Temperature	0.83 × TDA + 3.18	
HZO.RC.M	Horizontal Open	Remote Condensing	Medium Temperature	0.35 × TDA + 2.88	
VOP.RC.L	Vertical Open	Remote Condensing	Low	2.27 × TDA + 6.85	

Equipment Type				Energy Use Limits (kWh/day) as of 1/1/2012 [a,b]	Test Procedure
Equipment Class[c]	Family Code	Operating Mode	Rating Temperature		
			Temperature		
HZO.RC.L	Horizontal Open	Remote Condensing	Low Temperature	0.57 × TDA + 6.88	
VCT.RC.M	Vertical Transparent Door	Remote Condensing	Medium Temperature	0.22 TDA + 1.95	
VCT.RC.L	Vertical Transparent Door	Remote Condensing	Low Temperature	0.56 × TDA + 2.61	
SOC.RC.M	Service Over Counter	Remote Condensing	Medium Temperature	0.51 × TDA + 0.11	
VOP.SC.M	Vertical Open	Self Contained	Medium Temperature	1.74 × TDA + 4.71	
SVO.SC.M	Semivertical Open	Self Contained	Medium Temperature	1.73 × TDA + 4.59	
HZO.SC.M	Horizontal Open	Self Contained	Medium Temperature	0.77 × TDA + 5.55	
HZO.SC.L	Horizontal Open	Self Contained	Low Temperature	1.92 × TDA + 7.08	
VCT.SC.I	Vertical Transparent Door	Self Contained	Ice Cream	0.67 × TDA + 3.29	
VCS.SC.I	Vertical Solid Door	Self Contained	Ice Cream	0.38 × V + 0.88	
HCT.SC.I	Horizontal Transparent Door	Self Contained	Ice Cream	0.56 × TDA + 0.43	
SVO.RC.L	Semivertical Open	Remote Condensing	Low Temperature	2.27 × TDA + 6.85	
VOP.RC.I	Vertical Open	Remote Condensing	Ice Cream	2.89 × TDA + 8.7	
SVO.RC.I	Semivertical Open	Remote Condensing	Ice Cream	2.89 × TDA + 8.7	
HZO.RC.I	Horizontal Open	Remote Condensing	Ice Cream	0.72 × TDA + 8.74	
VCT.RC.I	Vertical Transparent Door	Remote Condensing	Ice Cream	0.66 × TDA + 3.05	
HCT.RC.M	Horizontal Transparent Door	Remote Condensing	Medium Temperature	0.16 × TDA + 0.13	
HCT.RC.L	Horizontal Transparent Door	Remote Condensing	Low Temperature	0.34 × TDA + 0.26	
HCT.RC.I	Horizontal Transparent Door	Remote Condensing	Ice Cream	0.4 × TDA + 0.31	
VCS.RC.M	Vertical Solid Door	Remote Condensing	Medium Temperature	0.11 × V + 0.26	
VCS.RC.L	Vertical Solid Door	Remote Condensing	Low Temperature	0.23 × V + 0.54	

Equipment Type				Energy Use Limits (kWh/day) as of 1/1/2012 [a,b]	Test Procedure
Equipment Class[c]	Family Code	Operating Mode	Rating Temperature		
VCS.RC.I	Vertical Solid Door	Remote Condensing	Ice Cream	0.27 × V + 0.63	
HCS.RC.M	Horizontal Solid Door	Remote Condensing	Medium Temperature	0.11 × V + 0.26	
HCS.RC.L	Horizontal Solid Door	Remote Condensing	Low Temperature	0.23 × V + 0.54	
HCS.RC.I	Horizontal Solid Door	Remote Condensing	Ice Cream	0.27 × V + 0.63	
HCS.RC.I	Horizontal Solid Door	Remote Condensing	Ice Cream	0.27 × V + 0.63	
SOC.RC.L	Service Over Counter	Remote Condensing	Low Temperature	1.08 × TDA + 0.22	
SOC.RC.I	Service Over Counter	Remote Condensing	Ice Cream	1.26 × TDA + 0.26	
VOP.SC.L	Vertical Open	Self Contained	Low Temperature	4.37 × TDA + 11.82	
VOP.SC.I	Vertical Open	Self Contained	Ice Cream	5.55 × TDA + 15.02	
SVO.SC.L	Semivertical Open	Self Contained	Low Temperature	4.34 × TDA + 11.51	
SVO.SC.I	Semivertical Open	Self Contained	Ice Cream	5.52 × TDA + 14.63	
HZO.SC.I	Horizontal Open	Self Contained	Ice Cream	2.44 × TDA + 9.0	
SOC.SC.I	Service Over Counter	Self Contained	Ice Cream	1.76 × TDA + 0.36	
HCS.SC.I	Horizontal Solid Door	Self Contained	Ice Cream	0.38 × V + 0.88	

[a] V = Volume of the case, as measured in accordance with Appendix C of AHRI 1200.
[b] TDA = Total display area of the case, as measured in accordance with Appendix D of AHRI 1200.
[c] Equipment class designations consist of a combination (in sequential order separated by periods(AAA).(BB).(C)) of:

(AAA) An equipment family code where:
VOP=vertical open
SVO=semivertical open
HZO=horizontal open,
VCT=vertical transparent doors
VCS=vertical solid doors
HCT=horizontal transparent doors
HCS=horizontal solid doors
SOC=service over counter

(BB) An operating mode code, either
RC=remote condensing, or
SC=self-contained).

(C) A rating temperature code, either:
M=medium temperature (38 °F)
L=low temperature (0 °F), or
I=ice-cream temperature (15 °F).

For example, ''VOP.RC.M'' refers to the ''vertical open, remote condensing, medium temperature'' equipment class.

Add new standards to Chapter 5 as follows:

AHRI

1200-10 Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets.

AHAM

HRF-1 2007 Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to address energy efficiency opportunities available from commercial refrigeration and freezing equipment. In buildings where such equipment is located it contributes to the energy use of the building and now that there is a test procedure for efficiency of this equipment and minimum efficiencies are in standard 90.1-2010 it seems reasonable to include them in the IECC, noting this type of equipment is addressed in the IMC as to health and life safety. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code, AHRI 1200-2010 Performance Rating of Commercial Refrigerated Display Merchandisers and Storage Cabinets, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

A review of the standard proposed for inclusion in the code, AHAM-HRF-1-2007 Energy, Performance and Capacity of Household Refrigerators, Refrigerator-Freezers and Freezers, with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Public Hearing Results

For staff analysis of the content of AHRI 1200-10 and AHAM HRF-1 2007 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: The proposal incorporates new federal standards applicable to freezers and commercial refrigeration installations.

Assembly Action: **None**

Final Hearing Results

CE239-13 **AS**

Code Change No: CE240-13

Original Proposal

Section(s): C202 (NEW), C403.2.12 (NEW), C403.2.13 (NEW), C403.5 (NEW), C403.5.1 (NEW), C403.5.2 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.2.12 Walk-in Coolers and Walk-in Freezers. Site assembled or site constructed *walk-in coolers* and *walk-in freezers* shall comply with the following:

1. Automatic door closers shall be provided that fully close walk-in doors that have been closed to within 1 inch of full closure.

   Exception: Closers are not required for doors over 3 feet 9 inches wide or 7 feet tall.

2. Doorways shall be provided with strip doors, curtains, spring-hinged doors, or other method of minimizing infiltration when the doors are open.

3. Walls shall be provided with insulation having a thermal resistance of not less than R–25, ceilings shall be provided with insulation having a thermal resistance of not less than R–25 and doors of *walk-in coolers* and *walk –in freezers* shall be provided with insulation having a thermal resistance of not less than R–32.

   Exception: Insulation is not required for glazed portions of doors or at structural members associated with the walls, ceiling or door frame.

4. The floor of *walk-in freezers* shall be provided with insulation having a thermal resistance of not less than R–28.

5. Evaporator fan motors that are less than 1 horsepower and less than 460 volts shall be electronically commutated motors or 3-phase motors.

6. Light sources shall have an efficacy of not less than 40 lumens per Watt, including any ballast losses or shall be provided with a device that automatically turns off the lights within 15 minutes of when the *walk-in cooler* or *walk-in freezer* was last occupied.

7. Transparent reach-in doors for and windows in opaque walk-*in freezer* doors shall be provided with triple-pane glass having the interstitial spaces filled with inert gas or provided with heat-reflective treated glass.

8. Transparent reach-in doors for and windows in opaque *walk-in cooler* doors shall be double-pane heat-reflective treated glass having the interstitial space gas filled;

9. Anti-sweat heaters that are not provided with anti-sweat heater controls shall have a total door rail, glass, and frame heater power draw not greater than 7.1 Watts per square foot of door opening for *walk-in freezers*, and not greater than 3.0 Watts per square foot of door opening for *walk-in coolers*.

10. Anti-sweat heater controls shall be capable of reducing the energy use of the anti-sweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.

11. Condenser fan motors that are less than 1 horsepower in capacity shall be of the electronically commutated or permanent split capacitor-type or shall be 3-phase motors.

    Exception: Fan motors in *walk-in coolers* and *walk-in freezers* combined in a single enclosure greater than 3,000 square feet in floor area are exempt.

C403.2.13 Refrigerated display cases. Site assembled or site constructed refrigerated display cases shall comply with the following:

1. Lighting in refrigerated display cases and glass doors installed on walk-in coolers and freezers shall be controlled by one of the following;

   1.1 Automatic time switch controls to turn off lights during non-business hours. Timed overrides for display cases or walk-in coolers and freezers may be used to turn the lights on for up to one hour and shall automatically time out to turn the lights off.

   1.2 Motion sensor controls on each display case or walk-in door section that reduce lighting power by at least 50 percent within 3 minutes after the area within the sensor range is vacated. how about is 'unoccupied' as you have used in other proposals.

2. All low temperature display cases shall incorporate temperature based defrost termination control with a time limit default. The defrost cycle shall terminate first on an upper temperature limit breach and second upon a time limit breach.

3. Anti-sweat heater controls shall reduce the energy use of the anti-sweat heater as a function of the relative humidity in the air outside the door or to the condensation on the inner glass pane.

C403.5 Refrigeration systems Refrigerated display cases, *walk-in coolers* or *walk-in freezers* that are served by remote compressors and remote condensers not located in a *condensing unit*, shall meet the requirements of Section C403.5.and C403.5.2.

Exception: Systems where the working fluid in the refrigeration cycle goes through both subcritical and supercritical states (transcritical) or systems that use ammonia refrigerant are exempt.

C403.5.1 Condensers serving refrigeration systems. Fan-powered condensers shall comply with the following:

1. The design *saturated condensing temperatures* for air-cooled condensers shall not exceed the design dry bulb temperature plus 10°F for *low temperature refrigeration* systems, and the design dry bulb temperature plus 15°F for *medium temperature refrigeration* systems where the s*aturated condensing temperature* for blend refrigerants shall be determined using the average of liquid and vapor temperatures as converted from the condenser drain pressure

2. Condenser fan motors that are less than 1 horsepower shall use electronically commutated motors, permanent split capacitor-type motors or 3-phase motors.

3. All condenser fans for air-cooled condensers, evaporatively cooled condensers, air or water cooled fluid coolers or cooling towers shall reduce fan motor demand to no more than 30% of design wattage at 50% of design air volume, and incorporate one of the following continuous variable speed fan control approaches:

3.1 Refrigeration system condenser control for air-cooled condensers shall use variable setpoint control logic to reset the condensing temperature setpoint in response to ambient drybulb temperature.

3.2 Refrigeration system condenser control for evaporatively cooled condensers shall use variable setpoint control logic to reset the condensing temperature setpoint in response to ambient wetbulb temperature.

4. Multiple fan condensers shall be controlled in unison.

5. The minimum condensing temperature setpoint shall be no greater than 70˚F.

C403.5.2 Compressor systems. Refrigeration compressor systems shall comply with the following:

1. Compressors and multiple-compressor systems suction groups shall include control systems that use floating suction pressure control logic to reset the target suction pressure temperature based on the temperature requirements of the attached refrigeration display cases or walk-ins.

   Exception. Controls are not required for the following:

   1. Single compressor systems that do not have variable capacity capability.

   2. Suction groups that have a design saturated suction temperature of 30˚F or higher, suction groups that comprise the high stage of a two-stage or cascade system or suction groups that primarily serve chillers for secondary cooling fluids.

2. Liquid sub-cooling shall be provided for all low temperature compressor systems with a design cooling capacity equal to or greater than 100,000 Btu/hr with a design saturated suction temperature of -10˚F or lower. The sub-cooled liquid temperature shall be controlled at a maximum temperature setpoint t of 50˚F at the exit of the sub-cooler using either compressor economizer (inter-stage) ports or a separate compressor suction group operating at a saturated suction temperature of 18˚F or higher.

   2.1 Insulation for liquid lines with a fluid operating temperature less than 60˚F are shall comply with Table C403.2.8.

3. All compressors that incorporate internal or external crankcase heaters shall provide a means to cycle the heaters off during compressor operation.

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

BUBBLE POINT. The refrigerant liquid saturation temperature at a specified pressure

CONDENSING UNIT. A factory-made assembly of refrigeration components designed to compress and liquefy a specific refrigerant. The unit consists of one or more refrigerant compressors, refrigerant condensers (air-cooled, evaporatively – cooled, and/or water-cooled), condenser fans and motors (where used) and factory-supplied accessories.

REFRIGERANT DEW POINT. The refrigerant vapor saturation temperature at a specified pressure.

REFRIGERATION SYSTEM, LOW TEMPERATURE. Systems for maintaining food product in a frozen state in refrigeration applications.

REFRIGERATION SYSTEM, MEDIUM TEMPERATURE. Systems for maintaining food product above freezing in refrigeration applications.

SATURATED CONDENSING TEMPERATURE. The saturation temperature corresponding to the measured refrigerant pressure at the condenser inlet for single component and azeotropic refrigerants, and the arithmetic average of the dew point and *bubble point* temperatures corresponding to the refrigerant pressure at the condenser entrance for zeotropic refrigerants.

WALK-IN COOLER. An enclosed storage space less than 3,000 square feet in floor area, designed to maintain the space warmer than 32°F but cooler than 55°F that has a ceiling height of not less than 7 feet

WALK-IN FREEZER. An enclosed storage space less than 3,000 square feet in floor area, designed to maintain the space at no greater than 32°F that has a ceiling height of not less than 7 feet

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to address the energy efficiency associated with refrigeration systems and coolers. These systems and equipment are prevalent in many building types and should be addressed in the IECC because they represent an opportunity to save additional energy. The change ensures continued consistency between the IECC and standard 90.1.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Provides construction and efficiency standards for walk-in coolers and freezers as well as similar refrigeration equipment and systems consistent with new federal standards.

Assembly Action: **None**

Final Hearing Results

CE240-13 **AS**

Code Change No: CE241-13

Original Proposal

Section(s): C403.1, C403.3, C403.3.1.1 (New), C403.1.1.1, C403.3.3.1.1.2, C403.3.1.2 (New), C403.3.1.1.3, Table C403.3.1.1(1), Table C403.3.1.1.3(2), C403.3.1.1.4, C403.3.1.4 (New), C403.3.1.4.1 (New), C403.3.1.4.2 (New), C403.3.2, C403.4 through C403.4.3.5

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C403.1 General. Mechanical systems and equipment serving the building heating, cooling or ventilating needs shall comply with Section C403.2 (referred to as the mandatory provisions) and ~~either:~~ shall comply with Sections C403.3 and C403.4 based on the equipment and systems provided.

~~1. Section C403.3 (Simple systems); or~~
~~2. Section C403.4 (Complex systems).~~

C403.3 ~~Simple HVAC systems and equipment~~ Economizers (Prescriptive). This section applies to buildings served by ~~unitary or packaged~~ HVAC equipment listed in Tables C403.2.3(1) through C403.2.3(8). ~~, each serving one *zone* and controlled by a single thermostat in the *zone* served. It also applies to two-pipe heating systems serving one or more *zones*, where no cooling system is installed~~

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.4.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table C403.3.1(2).

C403.3.1.1 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load.

Exceptions:

1. Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.

2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.

C403.3.1.2 Economizer heating system impact. HVAC system design and economizer controls shall be such that economizer operation does not increase the building heating energy use during normal operation.

Exception: Economizers on VAV systems that cause *zone* level heating to increase due to a reduction in supply air temperature.

TABLE C403.3.1(1)
ECONOMIZER REQUIREMENTS

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems ≥ 33,000 Btu/h[a]

For SI: 1 British thermal unit per hour = 0.2931 W.
a. The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per *building*, or 20 percent of its air economizer capacity, whichever is greater.

TABLE C403.3.1(2)
EQUIPMENT EFFICIENCY
PERFORMANCE EXCEPTION FOR ECONOMIZERS

CLIMATE ZONES	COOLING EQUIPMENT PERFORMANCE IMPROVEMENT (EER OR IPLV)
2B	10% Efficiency Improvement
3B	15% Efficiency Improvement
4B	20% Efficiency Improvement

~~C403.3.1.1~~ C403.3.1.3 Air economizers. Air economizers shall comply with Sections ~~C403.3.1.1.1 through C403.3.1.1.4~~. C403.3.1.3.1 through C403.3.1.3.4.

~~C403.3.1.1.1~~ C403.3.1.3.1 Design capacity. Air economizer systems shall be capable of modulating *outdoor air* and return air dampers to provide up to 100 percent of the design supply air quantity as *outdoor air* for cooling.

~~C403.3.1.1.2~~ C403.3.1.3.2 Control signal. Economizer dampers shall be capable of being sequenced with the mechanical cooling equipment and shall not be controlled by only mixed air temperature.

Exception: The use of mixed air temperature limit control shall be permitted for systems controlled from space temperature (such as single-*zone* systems).

~~C403.3.1.1.3.~~ C403.3.1.3.3 High-limit shutoff. Air economizers shall be capable of automatically reducing *outdoor air* intake to the design minimum *outdoor air* quantity when *outdoor air* intake will no longer reduce cooling energy usage. High-limit shutoff control types for specific climates shall be chosen from Table ~~C403.3.1.1.3(1)~~ C403.3.1.3.3(1). High-limit shutoff control settings for these control types shall be those specified in Table ~~C403.3.1.1(2)~~ C403.3.1.3.3(2).

TABLE ~~C403.3.1.1(1)~~ C403.3.1.3.3(1)
HIGH-LIMIT SHUTOFF CONTROL OPTIONS FOR AIR ECONOMIZERS

CLIMATE ZONES	ALLOWED CONTROL TYPES	PROHIBITED CONTROL TYPES
1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	Fixed dry bulb Differential dry bulb Electronic enthalpy[a] Differential enthalpy Dew-point and dry-bulb temperatures	Fixed enthalpy
1A, 2A, 3A, 4A	Fixed dry bulb Fixed enthalpy Electronic enthalpy[a] Differential enthalpy Dew-point and dry-bulb temperatures	Differential dry bulb
All other climates	Fixed dry bulb Differential dry bulb Fixed enthalpy Electronic enthalpy[a] Differential enthalpy Dew-point and dry-bulb temperatures	—

a. Electronic enthalpy controllers are devices that use a combination of humidity and dry-bulb temperature in their switching algorithm.

TABLE ~~C403.3.1.1.3(2)~~C403.3.1.3.3(2)
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS

DEVICE TYPE	CLIMATE ZONE	REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN):	
		EQUATION	DESCRIPTION
Fixed dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	$T_{OA} > 75°F$	Outdoor air temperature exceeds 75°F
	5A, 6A, 7A	$T_{OA} > 70°F$	Outdoor air temperature exceeds 70°F
	All other zones	$T_{OA} > 65°F$	Outdoor air temperature exceeds 65°F
Differential dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	$T_{OA} > T_{RA}$	Outdoor air temperature exceeds return air temperature
Fixed enthalpy	All	$h_{OA} > 28$ Btu/lb[a]	Outdoor air enthalpy exceeds 28 Btu/lb of dry air[a]
Electronic Enthalpy	All	$(T_{OA}, RH_{OA}) > A$	Outdoor air temperature/RH exceeds the “A” setpoint curve[b]
Differential enthalpy	All	$h_{OA} > h_{RA}$	Outdoor air enthalpy exceedsreturn air enthalpy
Dew-point and dry bulb temperatures	All	$DP_{OA} > 55°F$ or $T_{OA} > 75°F$	Outdoor air dry bulb exceeds 75°F or outside dew point exceeds 55°F (65 gr/lb)

For SI: °C = (°F - 32) × 5/9 , 1 Btu/lb = 2.33 kJ/kg.

a. At altitudes substantially different than sea level, the Fixed Enthalpy limit shall be set to the enthalpy value at 75°F and 50-percent relative humidity. As an example, at approximately 6,000 feet elevation the fixed enthalpy limit is approximately 30.7 Btu/lb.

b. Setpoint “A” corresponds to a curve on the psychometric chart that goes through a point at approximately 75°F and 40-percent relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.

~~C403.3.1.1.~~**4** **C403.3.1.3.4 Relief of excess outdoor air.** Systems shall be capable of relieving excess *outdoor air* during air economizer operation to prevent over-pressurizing the building. The relief air outlet shall be located to avoid recirculation into the building.

C403.3.1.4 Water-side economizers. Water-side economizers shall comply with Sections C403.3.1.4.1 through C403.3.1.4.2

C403.3.1.4.1 Design capacity. Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) and below.

> **Exception:** Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) shall satisfy 100 percent of the expected system cooling load at 45°F dry bulb (7.2°C dry bulb)/40°F wet bulb (4.5°C wet bulb).

C403.3.1.4.2 Maximum pressure drop. Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet (4572 mm) of water or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (noneconomizer) mode.

~~**C403.3.2 Hydronic system controls.** Hydronic systems of at least 300,000 Btu/h (87 930 W) design output capacity supplying heated and chilled water to comfort conditioning systems shall include controls that meet the requirements of Section C403.4.3.~~

C403.4 ~~Complex~~ Hydronic and multi-zone HVAC system controls and equipment. (Prescriptive). This section applies to buildings served by HVAC equipment and systems not covered in Section C403.3. Hydronic and multi-zone HVAC system controls and equipment shall comply with this section.

~~**C403.4.1 Economizers.** Economizers shall comply with Sections C403.4.1.1 through C403.4.1.4.~~

~~**C403.4.1.1 Design capacity.** Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) and below.~~

> ~~**Exception:** Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) shall satisfy 100 percent of the expected system cooling load at 45°F dry bulb (7.2°C dry bulb)/40°F wet bulb (4.5°C wet bulb).~~

~~**C403.4.1.2 Maximum pressure drop.** Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet (4572 mm) of water or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (noneconomizer) mode.~~

~~**C403.4.1.3 Integrated economizer control.** Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load.~~

> ~~**Exceptions:**~~
>
> 1. ~~Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.~~

2. ~~Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.~~

~~**C403.4.1.4 Economizer heating system impact.** HVAC system design and economizer controls shall be such that economizer operation does not increase the building heating energy use during normal operation.~~

~~**Exception:** Economizers on VAV systems that cause *zone* level heating to increase due to a reduction in supply air temperature.~~

~~C403.4.2~~ C403.4.1 Variable air volume (VAV) fan control. Individual VAV fans with motors of 7.5 horsepower (5.6 kW) or greater shall be:

1. Driven by a mechanical or electrical variable speed drive;
2. Driven by a vane-axial fan with variable-pitch blades; or
3. The fan shall have controls or devices that will result in fan motor demand of no more than 30 percent of their design wattage at 50 percent of design airflow when static pressure set point equals one-third of the total design static pressure, based on manufacturer's certified fan data.

~~C403.4.2.1~~ C403.4.1.1 Static pressure sensor location. Static pressure sensors used to control VAV fans shall be placed in a position such that the controller setpoint is no greater than one-third the total design fan static pressure, except for systems with *zone* reset control complying with Section C403.4.2.2. For sensors installed down-stream of major duct splits, at least one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

~~C403.4.2.2~~ C403.4.1.2 Set points for direct digital control. For systems with direct digital control of individual *zone* boxes reporting to the central control panel, the static pressure set point shall be reset based on the *zone* requiring the most pressure, i.e., the set point is reset lower until one *zone* damper is nearly wide open.

~~C403.4.3~~ C403.4.2 Hydronic systems controls. The heating of fluids that have been previously mechanically cooled and the cooling of fluids that have been previously mechanically heated shall be limited in accordance with Sections ~~C403.4.3.1 through C403.4.3.3~~ C403.4.2.1 through C403.4.2.3. Hydronic heating systems comprised of multiple-packaged boilers and designed to deliver conditioned water or steam into a common distribution system shall include automatic controls capable of sequencing operation of the boilers. Hydronic heating systems comprised of a single boiler and greater than 500,000 Btu/h (146 550 W) input design capacity shall include either a multistaged or modulating burner.

~~C403.4.3.1~~ C403.4.2.1 Three-pipe system. Hydronic systems that use a common return system for both hot water and chilled water are prohibited.

~~C403.4.3.2~~ C403.4.2.2 Two-pipe changeover system. Systems that use a common distribution system to supply both heated and chilled water shall be designed to allow a dead band between changeover from one mode to the other of at least 15°F (8.3°C) outside air temperatures; be designed to and provided with controls that will allow operation in one mode for at least 4 hours before changing over to the other mode; and be provided with controls that allow heating and cooling supply temperatures at the changeover point to be no more than 30°F (16.7°C) apart.

~~C403.4.3.3~~ C403.4.2.3 Hydronic (water loop) heat pump systems. Hydronic heat pump systems shall comply with Sections ~~C403.4.3.3.1~~ C403.4.2.3.1, through ~~C403.4.3.3.3~~ C403.4.2.3.2.

~~C403.4.3.3.1~~ C403.4.2.3.1 Temperature dead band. Hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition shall have controls that are capable of providing a heat pump water supply temperature dead band of at least 20°F (11.1°C) between initiation of heat rejection and heat addition by the central devices.

Exception: Where a system loop temperature optimization controller is installed and can determine the most efficient operating temperature based on realtime conditions of demand and capacity, dead bands of less than 20°F (11°C) shall be permitted.

~~C403.4.3.3.2~~ C403.4.2.3.2 Heat rejection. Heat rejection equipment shall comply with Sections ~~C403.4.3.3.2.1 and C403.4.3.3.2.2~~. C403.4.2.3.2.1 and C403.4.2.3.2.2

Exception: Where it can be demonstrated that a heat pump system will be required to reject heat throughout the year.

~~C403.4.3.3.2.1~~ C403.4.2.3.2.1 Climate Zones 3 and 4. For climate zones 3 and 4:

1. If a closed-circuit cooling tower is used directly in the heat pump loop, either an automatic valve shall be installed to bypass all but a minimal flow of water around the tower, or lower leakage positive closure dampers shall be provided.
2. If an open-circuit tower is used directly in the heat pump loop, an automatic valve shall be installed to bypass all heat pump water flow around the tower.
3. If an open- or closed-circuit cooling tower is used in conjunction with a separate heat exchanger to isolate the cooling tower from the heat pump loop, then heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop.

~~C403.4.3.3.2.2~~ C403.4.2.3.2.2 Climate Zones 5 through 8. For Climate Zones 5 through 8, if an open- or closed-circuit cooling tower is used, then a separate heat exchanger shall be provided to isolate the cooling tower from the heat pump loop, and heat loss shall be controlled by shutting down the circulation pump on the cooling tower loop and providing an automatic valve to stop the flow of fluid.

~~C403.4.3.3.3~~ C403.4.2.3.3. Two position valve. Each hydronic heat pump on the hydronic system having a total pump system power exceeding 10 horsepower (hp) (7.5 kW) shall have a two-position valve.

~~C403.4.3.4~~ C403.4.3.3 Part load controls. Hydronic systems greater than or equal to 300,000 Btu/h (87 930 W) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that have the capability to:

1. Automatically reset the supply-water temperatures using zone-return water temperature, building-return water temperature, or outside air temperature as an indicator of building heating or cooling demand. The temperature shall be capable of being reset by at least 25 percent of the design supply-to-return water temperature difference; or
2. Reduce system pump flow by at least 50 percent of design flow rate utilizing adjustable speed drive(s) on pump(s), or multiple-staged pumps where at least one-half of the total pump horsepower is capable of being automatically turned off or control valves designed to modulate or step down, and close, as a function of load, or other *approved* means.

~~C403.4.3.5~~ C403.4.3.4 Pump isolation. Chilled water plants including more than one chiller shall have the capability to reduce flow automatically through the chiller plant when a chiller is shut down. Chillers piped in series for the purpose of increased temperature differential shall be considered as one chiller.

Boiler plants including more than one boiler shall have the capability to reduce flow automatically through the boiler plant when a boiler is shut down.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this specific proposal:

2012C has multiple conflicts:

a. Air economizer only applied to simple systems.
b. Water systems and references to "cooling" within the Simple System language (C403.3.1)
c. Directing language that should apply to all economizer types was only under Complex (Integrated economizer, economizer control, relief of outdoor air). This language moved to Section 403.3.1 (basic economizer requirements, which requires either air or water economizers).
d. Section C403.3.2, Hydronic system controls (under Simple Systems) references "chilled water", which is not a simple system. This same language is duplicated under Section C403.4.3.4 (Part Load controls). All hydronic controls are combined under this proposal to be under the retitled Section "C403.4 ~~Complex~~ Hydronic and multi-zone HVAC systems controls and equipment. (Prescriptive)". Any special multi-zone or hydronic requirements (formerly complex system) are under this section.
e. A complex system could have air and water economizers. Where exceptions apply becomes a complicated process.
f. Language in Section 403.3 (simple systems), includes references to Tables C403.2.3(1) through C403.2.3(8), which includes all equipment, including centrifugal chillers and cooling towers (always part of a complex system).

Complex and simple systems do not have a use in the IECC. These systems have no definitions. There are no other references to these systems anywhere else in the IECC. The need for these divisions in the IECC is no longer necessary and only leads to confusion and/or conflicting code requirements as noted in this proposal.

The intent of this proposal is to do the following:

1. An Economizer section with general requirements for all economizers in the same location. Requirements for Air and Water economizers are outlined. Exceptions are the same for either economizer type.
2. Complex Systems becomes a general prescriptive section for hydronic and multiple zone systems and the control of these systems.

A key element to making the revised provisions work, is revision to Section 403.1. As it stands in the 2012 code, Section 403.1 has a serious flaw that allows you to pick and choose a compliance path by saying "use either simple or complex" path requirements. The language is an "either A or B". It does not have a path to use both simple and complex when you have a building with both equipment types. It also allows cherry-picking of a path.

Section 403.1 does NOT require that a chilled water systems use the complex system Section 403.4 control/pump requirements. It can pick the Section 403.3 simple system path. A building can install an air economizer on a 100 ton (chilled water) VAV rooftop and not have to meet ANY of the requirements of Section 403.4 for VAV systems… And since an air economizer is included with most every VAV rooftop, that creates a gaping hole in code. And very little applies code will apply to a boiler or chiller you may have on the site.

Cost Impact: The 2012 code was flawed and the result would be inconsistent application of the economizer provisions. Because the 2012 does state specifically that an economize is required for complex systems, this could be viewed as an increase to the cost of construction. However since the energy savings envisioned by the balance of the HVAC requirements would not be realized without an installed economizer, most systems would be provided with one (or more) anyway.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: While the committee saw the value in reorganizing these provisions and making their application clearer, the proposal needed to better address chilled water.

Assembly Action: **Approved as Submitted**

Public Comments

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair; Jeremiah Williams, U.S. Department of Energy, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.1 General. Mechanical systems and equipment serving the building heating, cooling or ventilating needs shall comply with Section C403.2 (referred to as the mandatory provisions) and shall comply with Sections C403.3 and C403.4 based on the equipment and systems provided.

C403.3 Economizers (Prescriptive). ~~This section applies to buildings served HVAC equipment listed in Tables C403.2.3(1) through C403.2.3(8).~~ **~~C403.3.1 Economizers.~~** Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections ~~C403.3.1.1~~ C403.3.1 through ~~C403.3.1.1.4~~ C403.3.4.

> **Exception:** Economizers are not required for the systems listed below.
>
> 1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table ~~C403.3.1(1).~~ C403.3(1)
> 2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
> 3. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table C403.3~~.1~~(1).
> 4. Systems expected to operate less than 20 hours per week.
> 5. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.
> 6. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table ~~C403.3.1(2).~~ C403.3(2)

~~C403.3.1.1~~ C403.3.1 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load.

> **Exceptions:**
>
> 1. Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.
> 2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling
>
> .

~~C403.3.1.2~~ C403.3.2 Economizer heating system impact. HVAC system design and economizer controls shall be such that economizer operation does not increase the building heating energy use during normal operation.

> **Exception:** Economizers on VAV systems that cause *zone* level heating to increase due to a reduction in supply air temperature.

Table ~~C403.3.1(1)~~ C403.3(1)
ECONOMIZER REQUIREMENTS

Table ~~C403.3.1(2)~~ C403.3(2)
EQUIPMENT EFFICIENCY
PERFORMANCE EXCEPTION FOR ECONOMIZERS

~~C403.3.1.3~~ C403.3.3 Air economizers. Air economizers shall comply with Sections ~~C403.3.1.3.1~~ C403.3.3.1 through ~~C403.3.1.3.4.~~ C403.3.3.4

~~C403.3.1.3.1~~ C403.3.3.1 Design capacity. Air economizer systems shall be capable of modulating *outdoor air* and return air dampers to provide up to 100 percent of the design supply air quantity as *outdoor air* for cooling.

~~C403.3.1.3.2~~ C403.3.3.2 Control signal. Economizer dampers shall be capable of being sequenced with the mechanical cooling equipment and shall not be controlled by only mixed air temperature.

> **Exception:** The use of mixed air temperature limit control shall be permitted for systems controlled from space temperature (such as single-*zone* systems).

~~**C403.3.1.3.3**~~ **C403.3.3.3 High-limit shutoff.** Air economizers shall be capable of automatically reducing *outdoor air* intake to the design minimum *outdoor air* quantity when *outdoor air* intake will no longer reduce cooling energy usage. High-limit shutoff control types for specific climates shall be chosen from Table ~~C403.3.1.3.3(1).~~ C403.3.3.3(1) High-limit shutoff control settings for these control types shall be those specified in Table ~~C403.3.1.3.3(2).~~ C403.3.3.3(2)

Table ~~C403.3.1.3.3(1)~~ C403.3.3.3(1)
HIGH-LIMIT SHUTOFF CONTROL OPTIONS FOR AIR ECONOMIZERS

Table ~~C403.3.1.3.3(2)~~ C403.3.3.3(2)
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS

~~**C403.3.1.3.4**~~ **C403.3.3.4 Relief of excess outdoor air.** Systems shall be capable of relieving excess *outdoor air* during air economizer operation to prevent over-pressurizing the building. The relief air outlet shall be located to avoid recirculation into the building.

~~**C403.3.1.4**~~ **C403.3.4 Water-side economizers.** Water-side economizers shall comply with Sections ~~C403.3.1.4.1~~ C403.3.4.1 through ~~C403.3.1.4.2~~ C403.3.4.2

~~**C403.3.1.4.1**~~ **C403.3.4.1 Design capacity.** Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) and below.

> **Exception:** Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb (10°C dry bulb)/45°F wet bulb (7.2°C wet bulb) shall satisfy 100 percent of the expected system cooling load at 45°F dry bulb (7.2°C dry bulb)/40°F wet bulb (4.5°C wet bulb).

~~**C403.3.1.4.2**~~ **C403.3.4.2. Maximum pressure drop.** Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet (4572 mm) of water or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (non-economizer) mode.

C403.4 Hydronic and multi-zone HVAC system controls and equipment. (Prescriptive). ~~This section applies to buildings served by HVAC equipment and systems not covered in Section C403.3.~~ Hydronic and multi-zone HVAC system controls and equipment shall comply with this section.

(Portions of proposal not shown remain unchanged)

Commenter's Reason:
(Thompson): At the code development hearing it was noted that the language originally intended to define simple systems was applied to economizers in the proposal. As a result, the new economizer charging paragraph no longer included requirements for economizers on air handlers with chilled water coils, as they are not listed in Tables C403.2.3(1) through C403.2.3(8). The stated intent of the original proposal was to eliminate the distinction between simple and complex systems and reduce confusion in the code. There was no intent to reduce economizer requirements in the code, which was the reason given by the committee for disapproval.

The modifications proposed in this public comment addresses the committee's reason for disapproval by maintaining the current economizer requirements, and renumbering the sections and tables as needed. There is also remaining language related to the complex and simple systems in section C403.4 that the proposed modification removes. The SEHPCAC believes that the modification adjusts the proposal to align with the original proponent's intent and corrects the unintended oversight noted by the committee that would have reduced the provisions in the code for economizers on air handling units associated with chilled water coils.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

(Williams): At the code development hearing, DOE noted that the language originally intended to define simple systems was applied to economizers in the proposal. As a result, the new economizer charging paragraph no longer included requirements for economizers on air handlers with chilled water coils, as they are not listed in Tables C403.2.3(1) through C403.2.3(8). The stated intent of the original proposal was to eliminate the distinction between simple and complex systems, and reduce confusion in the code. We believe there was no intent to reduce economizer requirements in the code, which was the reason given by the committee for disapproval.

The modification proposed in the public comment addresses the committee reason for disapproval by maintaining the current economizer requirements, and renumbering the sections and tables as needed. There is also remaining language related to the complex and simple systems in section C403.4 that the proposed modification removes. DOE believes the modification adjusts the proposal to align with the original proponent's intent, and corrects the unintended oversight by the proponent noted by the committee that would have reduced the provisions in the code for economizers on air handling units associated with chilled water coils.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

CE241-13 **AMPC**

Code Change No: CE243-13

Original Proposal

Section(s): C403.3.1, Table C403.3.1(1)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C403.3 Simple HVAC systems and equipment (Prescriptive). This section applies to buildings served by unitary or packaged HVAC equipment listed in Tables C403.2.3(1) through C403.2.3(8), each serving one *zone* and controlled by a single thermostat in the *zone* served. It also applies to two-pipe heating systems serving one or more *zones*, where no cooling system is installed.

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.4.

Exception: Economizers are not required for the systems listed below.

~~1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).~~
1. In cooling systems for buildings located in climate zones 1A and 1B.
2. In climate zones other than 1A and 1B, where individual cooling units have a capacity of less than 33,000 Btu/h. The total supply capacity of all fan-cooling units not provide with economizers shall not exceed 20 percent of the total supply capacity of all fan-cooling units in the building nor 300,000 Btu/h, whichever is greater.
~~2.~~ 3. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
~~3.~~ 4. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
~~4.~~ 5. Systems expected to operate less than 20 hours per week.
~~5.~~ 6. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.
~~6.~~ 7. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table C403.3.1(2).

~~TABLE C403.3.1(1)~~
~~ECONOMIZER REQUIREMENTS~~

~~CLIMATE ZONES~~	~~ECONOMIZER REQUIREMENT~~
~~1A, 1B~~	~~No requirement~~
~~2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8~~	~~Economizers on all cooling systems ≥ 33,000 Btu/h[a]~~

~~For SI: 1 British thermal unit per hour = 0.2931 W.~~

~~a. The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per *building*, or 20 percent of its air economizer capacity, whichever is greater.~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in

terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.
Reasons for this specific proposal:

The interaction between exception #1 and Table C403.3.1(1) is unclear. The exception states where economizers are not to be required, but the table appears to be a listing of economizer requirements. The intent is unclear as written. The proposal replaces the table with 2 exceptions which are clearly exceptions from an economizer requirement. The first exception addresses climate zones 1A and 1B where no economizers are required regardless of the system capacity. The second exception addresses the other climate zones currently covered by the last line of the table and the footnote. Similar revision was made to the Massachusetts Stretch Code to address the confusion of this section and table.

The same format occurs in a parallel section in the IgCC. If this proposal is successful, the SEHPCAC will submit a companion proposal in 2014 for the IgCC.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is editorial in nature and will have no impact on the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the code without any technical change to the requirement.

Assembly Action: **None**

Final Hearing Results

CE243-13 **AS**

Code Change No: CE244-13

Original Proposal

Section(s): C403.3.1, Table C403.3.1(1)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.4.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table C403.3.1(2).
7. Systems under 110,000 Btu/h total cooling capacity that utilize multiple stage cooling capacity control and multiple speed fan control.

TABLE C403.3.1(1)
ECONOMIZER REQUIREMENTS

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems ~~≥ 33,000~~ ≥ 54,000 Btu/h[a]

For SI: 1 British thermal unit per hour = 0.2931 W.

a. The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per *building*, or 20 percent of its air economizer capacity, whichever is greater.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this specific proposal:

The current trigger values for economizers are in conflict with current ASHRAE Standard 90.1. The modification to the 2012 IECC was based on the Green standard 189.1 additional energy measures; prescriptive requirements should not come from an optional code or standard. ASHRAE 90.1 reduced their trigger to 54,000 Btu/h in the 2010 version and is not decreasing the trigger in any addenda for the 2013 version. Intent is to align the code and standard. For 2013, California Title 24 revisited economizers and did not drop their trigger value below 54,000 Btu/h. No other mandatory code or standard has reduced below 54,000 Btu/h.

The first part of this proposal recommends matching Table C403.3.1(1) to the trigger to other codes and standards.

The second part of this proposal allows for one additional exception: small units (under 110,000 Btu/h) are not required to have an economizer if the units have multiple speed fans and multiple stage cooling capacity.

For this proposal, the efficiency measure is similar to a prescriptive requirement that California added for small units. We are proposing <u>an exception to economizers for small units</u>. As part of the 2013 California Title 24 proposals, multiple stage compressor and fan control for small HVAC units (under the current 110,000 Btu/h trigger for multiple speed fans) was economically viable as a prescriptive measure and was included in Title 24.

http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Nonresidential/HVAC/2013_CASE_NR_Fan_Control_Integrated_Economizers_Sept_2011.pdf has the complete report. Taylor Engineering performed the energy modeling. They report a possible 2-year payback for addition of multi-speed compressor & fan.

Per cost figures furnished to California by Dick Lord of Carrier, this proposed exception would be less than or equal to the cost of an economizer. So there is no cost impact.

Oregon BCD energy modeling used the Taylor Engineering baseline concept. We looked at the same building with these small HVAC units. We compared a building without economizers (not required in California for the HVAC size range) with the same units with economizer and with just the multi-speed configuration. Adding multi-speed configuration saves nearly 4-times more energy than adding an economizer.

So the proposed exception not only has an equal or lower cost, it will save a greater amount of energy.

Additional study performed by PNNL of economizers and other measures for small packaged HVAC equipment provides additional insight. PNNL Study #PNNL-20995 (http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20955.pdf), even though relative to retrofit of existing equipment, gives insight on the relative effectiveness of economizers, multi-speed control and Demand Control Ventilation (DCV). Multi-speed control is a more effective conservation measure than an economizer. See page 37:

• Multi-speed fan control and DCV are the two control strategies that contribute most to the HVAC energy savings. Specifically, multi-speed fan control dominates the impact in a small number of cases, including all four building types in Miami and the small office building in Houston, Phoenix and Los Angeles. DCV dominates the impact for all other cases. The multi-speed fan contribution to savings can be negative in cold climates (e.g, Duluth and Fairbanks for all building types).

• Adding an air-side economizer after multi-speed fan control does not have a large impact on HVAC energy savings except for a few cases, such as the small office building in Los Angeles. In comparison with a nonintegrated economizer, the integrating economizer has negligible impact on HVAC energy savings.

Overall, this proposal provides both alignment with other standards and codes and is an improvement in energy conservation for anyone taking the new exception path.

So we are basing a request for modifying the levels on additional analysis conducted by Oregon Building Codes Division.

The analysis methods referenced for this proposal use the same energy models developed by ASHRAE and the Department of Energy (PNNL) for the Final Determination of ASHRAE 90.1-2010 in the Federal Register. We used the US DOE prototype energy model files and EnergyPlus software. NO new models were used; the simulation software was the same. Weighting of building types was the same as used by PNNL. Only buildings from the 90.1 determination that have packaged HVAC units in this size range were considered (not office buildings with VAV units). See these studies by PNNL for the analysis:

1. For the description for the modeling method
   http://www.energycodes.gov/sites/default/files/documents/BECP_Energy_Cost_Savings_STD2010_May2011_v00.pdf
2. The DOE certification of 90.1-2010 (references the linked PNNL-20405 above)
   http://www.energycodes.gov/sites/default/files/documents/BECP_FinalQuantitativeAnalysisReport901-2010Determination_Oct2011_v00.pdf

The national weighted-average annual energy savings per economizer for systems between 33,000 Btu/h and 110,000 Btu/h is $41 per year per economizer. Using a first cost of $750/economizer (including installation, set-up, initial testing) and a 15-year life cycle, economizers never provide a return on the cost premium, much less recover the cost of maintenance. On the basis of these models, we feel the trigger levels should be re-examined. Weighting of life cycle costs were based on EIA national average utility costs, 15-year life cycle and 3% discount rate for the $750 average first cost and $50/year for maintenance.

The table below is the raw data of savings per economizer by building type and climate zone. Weighting used the same data from the DOE/PNNL studies. Green highlights show over $85/year, which <u>might</u> cover first costs and maintenance.

ANNUAL SAVINGS PER ECONOMIZER (RAW DATA)

BUILDING PROTOTYPE/ CLIMATE ZONE	2A	2B	3A	3B	3C	4A	4B	4C	5A	5B	6A	6B	7	8
Fast Food Restaurant					$ 65		$ 135	$ 94		$ 87		$ 82	$ 69	$ 38
Small Hotel	$ 109	$ 123	$ 128	$ 108		$ 85		$ 80	$ 80	$ 67	$ 82		$ 63	
Strip Mall Retail	$ 18	$ 26	$ 16	$ 41	$ 76	$ 22	$ 32	$ 75	$ 29	$ 50	$ 54	$ 58	$ 37	$ 31
Strip Mall Office	$ 18	$ 4	$ 11	$ 23		$ 26	$ 34	$ 33	$ 25	$ 29	$ 35	$ 32	$ 28	$ 23
Warehouse	$ 11	$ (14)	$ 9	$ 10		$ 0	$ (1)	$ (3)		$ (2)	$ (3)	$ (4)		$ (3)
Stand Alone Retail	$ 76	$ 99	$ 96	$ 105	$ 210	$ 102	$ 152	$ 130	$ 99	$ 122	$ 123	$ 134	$ 126	$ 119
Primary School	$ 31	$ 35	$ 31	$ 39	$ 105	$ 42	$ 57	$ 48	$ 41	$ 49	$ 42	$ 135	$ 160	$ 163

When looking at the Life Cycle Costs by building type, there is not a return on investment. And this simulation considers a perfectly functioning economizer. If the weighting were to include a factor for non-functioning economizers, becomes difficult to justify any economizer below 110,000 Btu/h.

WEIGHTED LIFE CYCLE COST BY BUILDING TYPE							
BUILDING TYPE	FAST FOOD	SMALL HOTEL	STRIP MALL	SMALL OFFICE	WAREHOUSE	STAND-ALONE RETAIL	PRIMARY SCHOOL
WEIGHTED LCC	($288)	($201)	($1,014)	($1,097)	($1,286)	($128)	($875)

Buildings are more efficient due to improvements in the codes. Contributing reasons why these systems no longer viable at the current triggers:

1. Improvements to the building envelope: glazing improvements reduce solar gain; envelope insulation delays thermal conductivity gains.
2. Reduced lighting power: 30-45% reductions from 2006 levels.
3. Equipment efficiency improvements: 30% increase in SEER requirement for 60,000 Btu/h (5-ton) units and smaller.

With less cooling required during the year (the building is more efficient), there is a smaller “pool of energy use” to reduce with this measure. And because of the improved building characteristics, there are fewer hours where cooling needs overlap with outdoor conditions suitable for economizer operation. An economizer on units in this size range has little chance of paying back its cost premium during the life cycle of the unit. The effects of code improvements over the years could not be analyzed without a full energy model. And the DOE/PNNL files are among the best available and are used by DOE for analyzing 90.1.

The current 33,000 Btu/h trigger (thru 110,000 Btu/h) only returns its cost over the life of the equipment when there are either high load conditions (computer closets) or nearly continuous operation (18-24 hours per day, 7-days per week). And positive returns are only found in a few climate zones, not on a national weighting by building type. The 33,000 Btu/h figure should only remain if there are exceptions for smaller units with operating hours of under 112 hours per week (above the 20 hour per week exception already in code) or if there are high internal loads. But this is difficult to put into enforceable code language.

We propose to match the current 90.1-2010 level of 54,000 Btu/h; 90.1 is not considering any further revisions below this level. The weighted average economizer savings increases slightly closer to a level where it might pay back.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: Disapproved

Committee Reason: The proposal removes too many buildings from needing to comply with the economizer requirements.

Assembly Action: None

Public Comments

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.4.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling *efficiency* meets or exceeds the *efficiency* requirements in Table C403.3.1(2).
7. ~~Systems under 110,000 Btu/h total cooling capacity that utilize multiple stage cooling capacity control and multiple speed fan control.~~

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The Commercial IECC Development Committee concluded that the original proposal would result in too many systems being exempted from the economizer requirement. The proposal is amended to remove the proposed exception 7 which would be the cause of many systems being exempted. The SEHPCAC believes the change from 33,000 to 54,000 in the table is still valid based on the reasons originally submitted, which provides alignment with ASHRAE 90.1 and CE245-13 submitted by ASHRAE, and should be approved. Item 7 has been deleted as its inclusion is not necessary to achieve the stated intent of the original proposal to simply align the economizer requirements with ASHRAE 90.1.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

Final Hearing Results

CE244-13 **AMPC**

Code Change No: CE245-13

Original Proposal

Section(s): C403.3.1, Table C403.3.1(1), C403.3.1.4, C4033.1.1.5 (NEW), Table C403.3.1.1.3(2), C403.3.1.2 (NEW), C403.3.1.2.1 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through ~~C403.3.1.1.4.~~ C403.3.1.1.5.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve residential spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling efficiency meets or exceeds the efficiency requirements in Table C403.3.1(2).
7. Systems that include a heat recovery system in accordance with Section C403.4.6.
8. Systems that serve spaces whose sensible cooling load at design conditions, excluding transmission and *infiltration* loads, is not more than the transmission and *infiltration* losses at an outdoor temperature of 60°F.

TABLE C403.3.1(1)
ECONOMIZER REQUIREMENTS

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems ≥ ~~33,000~~ 54,000 Btu/h[a]

For SI: 1 British thermal unit per hour = 0.2931 W.

a. The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per *building*, or 20 percent of its air economizer capacity, whichever is greater.

C403.3.1.1.4 Dampers. Return, exhaust/relief, and outdoor air dampers shall in accordance with Section C402.4.5.2

C403.3.1.1.5 Relief of excess outdoor air. Systems shall be capable of relieving excess outdoor air during air economizer operation to prevent over-pressurizing the building. The relief air outlet shall be located to avoid recirculation into the building.

TABLE C403.3.1.1.3(2)
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS

DEVICE TYPE	CLIMATE ZONE	REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN): EQUATION	DESCRIPTION
Fixed dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	*TOA* > 75°F	Outdoor air temperature exceeds 75°F
	~~5A, 6A, 7A~~	*TOA* > 70°F	Outdoor air temperature exceeds 70°F
	~~All other zones~~	~~*TOA* > 65°F~~	~~Outdoor air temperature exceeds 65°F~~
Differential dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	*TOA* > *TRA*	Outdoor air temperature exceeds return air temperature
Fixed enthalpy	~~All~~ 2A, 3A, 4A, 5A, 6A	*hOA* > 28 Btu/lb[a]	Outdoor air enthalpy exceeds 28 Btu/lb of dry air[a]
Electronic Enthalpy	All	(*TOA*, *RHOA*) > *A*	Outdoor air temperature/RH exceeds the "A" setpoint curve[b]
Differential enthalpy	All	*hOA* > *hRA*	Outdoor air enthalpy exceeds return air enthalpy
Dew-point and dry bulb temperatures	All	*DPOA* > 55°F or *TOA* > 75°F	Outdoor air dry bulb exceeds 75°F or outside dew point exceeds 55°F (65 gr/lb)

For SI: °C = (°F - 32) × $^5/_9$, 1 Btu/lb = 2.33 kJ/kg.

a. At altitudes substantially different than sea level, the Fixed Enthalpy limit shall be set to the enthalpy value at 75°F and 50-percent relative humidity. As an example, at approximately 6,000 feet elevation the fixed enthalpy limit is approximately 30.7 Btu/lb.

b. Setpoint "A" corresponds to a curve on the psychometric chart that goes through a point at approximately 75°F and 40-percent relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.

C403.3.1.2 Water economizers. Water economizers shall comply with Sections C403.3.1.2.1 through C403.3.1.2.2.

C403.3.1.2.1 Design capacity. Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at outdoor air temperatures not greater than 50°F dry bulb/45°F wet bulb.

Exceptions:

1. Systems primarily serving computer rooms in which 100 percent of the expected system cooling load at 40°F dry bulb/35°F wet bulb is met with evaporative water economizers.
2. Systems primarily serving computer rooms with dry cooler water economizers which satisfy 100 percent of the expected system cooling load at 35°F dry bulb.
3. Systems where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb/45°F wet bulb and where 100 percent of the expected system cooling load at 45°F(7°C) dry bulb/40°F (4°C) wet bulb is met with evaporative water economizers.

C403.3.1.2.2 Maximum pressure drop. Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet of water (45 kPa) or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (non-economizer) mode.

Reason: This proposal makes the air economizer requirements consistent with ANSI/ASHRAE/IES Standard 90.1. Quite a bit of collaboration has gone into this proposal to achieve consensus, and is a result of many years of research investigating the cost effectiveness of economizer use in each climate zone.

In addition, new requirements for water economizers are being added.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee found the proposed exception #8 to Section 403.3.1 to be vague.

Assembly Action: **None**

Public Comments

Public Comment 1:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.5.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve residential spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling efficiency meets or exceeds the efficiency requirements in Table C403.3.1(2).
7. Systems that include a heat recovery system in accordance with Section C403.4.6.
8. Systems that serve spaces whose sensible cooling load at design conditions, excluding transmission and *infiltration* loads, is not more than the transmission and *infiltration* losses at an outdoor temperature of 60°F.

TABLE C403.3.1(1)
ECONOMIZER REQUIREMENTS

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems ≥ 54,000 Btu/h[a]

For SI: 1 British thermal unit per hour = 0.2931 W.

a. The total capacity of all systems without economizers shall not exceed 300,000 Btu/h per *building*, or 20 percent of its air economizer capacity, whichever is greater.

C403.3.1.1.4 Dampers. Return, exhaust/relief, and outdoor air dampers shall in accordance with Section C402.4.5.2

C403.3.1.1.5 Relief of excess outdoor air. Systems shall be capable of relieving excess outdoor air during air economizer operation to prevent over-pressurizing the building. The relief air outlet shall be located to avoid recirculation into the building.

~~TABLE C403.3.1.1.3(1)~~
~~HIGH LIMIT SHUTOFF CONTROL OPTIONS FOR AIR ECONOMIZERS~~

TABLE C403.3.1.1.3(2)
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS[b]

DEVICE TYPE	CLIMATE ZONE	REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN):	
		EQUATION	DESCRIPTION
Fixed dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	T_{OA} > 75°F	Outdoor air temperature exceeds 75°F
	5A, 6A	T_{OA} > 70°F	Outdoor air temperature exceeds 70°F
	1a, 2a, 3a, 4a	T_{OA} > 65°F	Outdoor air temperature exceeds 65°F
Differential dry bulb	1B, 2B, 3B, 3C, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	$T_{OA} > T_{RA}$	Outdoor air temperature exceeds return air temperature
Fixed enthalpy with fixed dry-bulb temperature	All ~~2A, 3A, 4A, 5A, 6A~~	h_{OA} > 28 Btu/lb[a] or T_{OA} > 75°F	Outdoor air enthalpy exceeds 28 Btu/lb of dry air[a] or Outdoor air temperature exceeds 75°F
~~Electronic Enthalpy~~	~~All~~	~~(T_{OA}, RH_{OA}) > A~~	~~Outdoor air temperature/RH exceeds the "A" setpoint curve[b]~~
Differential enthalpy with fixed dry-bulb temperature	All	$h_{OA} > h_{RA}$ or T_{OA} > 75	Outdoor air enthalpy exceeds return air enthalpy or Outdoor air temperature exceeds 75°F
~~Dew-point and dry bulb temperatures~~	~~All~~	~~DP_{OA} > 55°F or T_{OA} > 75°F~~	~~Outdoor air dry bulb exceeds 75°F or outside dew point exceeds 55°F (65 gr/lb)~~

For SI: °C = (°F - 32) × $^5/_9$, 1 Btu/lb = 2.33 kJ/kg.

a. At altitudes substantially different than sea level, the Fixed Enthalpy limit shall be set to the enthalpy value at 75°F and 50-percent relative humidity. As an example, at approximately 6,000 feet elevation the fixed enthalpy limit is approximately 30.7 Btu/lb.

b. ~~Setpoint "A" corresponds to a curve on the psychometric chart that goes through a point at approximately 75°F and 40-percent relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.~~ Devices with selectable setpoints shall be capable of being set to within 2°F and 2 Btu/lb of the setpoint listed.

C403.3.1.2 Water economizers Water economizers shall comply with Sections C403.3.1.2.1 through C403.3.1.2.2.

C403.3.1.2.1 Design capacity. Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at outdoor air temperatures not greater than 50°F dry bulb/45°F wet bulb.

Exceptions:

1. Systems primarily serving computer rooms in which 100 percent of the expected system cooling load at 40°F dry bulb/35°F wet bulb is met with evaporative water economizers.
2. Systems primarily serving computer rooms with dry cooler water economizers which satisfy 100 percent of the expected system cooling load at 35°F dry bulb.
3. Systems where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb/45°F wet bulb and where 100 percent of the expected system cooling load at 45°F(7°C) dry bulb/40°F (4°C) wet bulb is met with evaporative water economizers.

C403.3.1.2.2 Maximum pressure drop. Precooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 feet of water (45 kPa) or a secondary loop shall be created so that the coil or heat exchanger pressure drop is not seen by the circulating pumps when the system is in the normal cooling (non-economizer) mode.

Commenter's Reason: This comment incorporates modifications from a new addendum has been approved to Standard 90.1, which will be incorporated into 90.1-2013. Analysis has shown that temperature and humidity sensor measurement error has a large impact on energy performance of air economizer high limit devices. The analysis shows that by far the most reliable device is the simply dry-blub switch. Even with ±2°F error, it is the best in most climates at set points that are adjusted by climate, lower in humid climates and higher in dryer climates. Differential enthalpy sensors can have the worst performance of all devices because they have four sensors (return air dry bulb and RH and outdoor air dry-blub and RH) each of which can have error. This is true even with very accurate RH sensors, but studies at the Iowa Energy Center have shown that actual accuracy is much worse than nominal accuracy. Thus to ensure enthalpy high limits maintain good performance despite sensor error and when coils are dry, this modification requires that they be used along with fixed dry bulb switches.

Fixed dry-blub switches set to 65ºF in humid climates are reinstated. They was allowed in the 2007 and earlier versions of Standard 90.1 at this setpoint. They were eliminated in 2010 due to concerns about high resulting space humidity, but that concern only applies to single compressor DX units with two stage thermostats and the impact is minimized by the low 65ºF setpoint. With fully integrated economizers, high limit switches have no space humidity impact.

Electronic enthalpy switches are eliminated because they have been supplanted in the marketplace by better performing and lower cost switches that use superior fixed enthalpy plus fixed dry-blub logic.

The dewpoint high limit that was added in the 2004 version is also proposed to be deleted since does not make sense theoretically and did not perform well in our simulations.

The comment also adds tolerances to the high limit change over sensors which are aligned with tolerances recently added to Title 24 2013

Public Comment 2:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.3.1 Economizers. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Sections C403.3.1.1 through C403.3.1.1.4.

Exception: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1).
2. Where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F (1.7 °C) dew-point temperature to satisfy process needs.
3. Systems that serve residential spaces where the system capacity is less than five times the requirement listed in Table C403.3.1(1).
4. Systems expected to operate less than 20 hours per week.
5. Where the use of outdoor air for cooling will affect supermarket open refrigerated casework systems.
6. Where the cooling efficiency meets or exceeds the efficiency requirements in Table C403.3.1(2).
7. Systems that include a heat recovery system in accordance with Section C403.4.6.
8. ~~Systems that serve spaces whose sensible cooling load at design conditions, excluding transmission and *infiltration* loads, is not more than the transmission and *infiltration* losses at an outdoor temperature of 60°F.~~

Commenter's Reason: During the development of 90.1-2013, it was also determined that economizers should not be required for systems that include heat recovery. Exception 7, proposed in the original proposal, reflects that finding. This public comment removes proposed Exception 8, in response to committee comments. Note that Exception 7 will be retained, as originally proposed in this code change proposal. During the development of 90.1-2013, it was also determined that economizers should not be required for systems that include heat recovery. Exception 7, proposed in the original proposal, reflects that finding. This public comment is primarily intended to allow consideration of this exception on its own merits.

Final Hearing Results

CE245-13	**AMPC1, 2**

Code Change No: CE246-13

Original Proposal

Section(s): C202 (NEW), Table C403.3.1.1.3(1)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C403.3.1.1.3(1)
HIGH-LIMIT SHUTOFF CONTROL OPTIONS FOR AIR ECONOMIZERS

CLIMATE ZONES	ALLOWED CONTROL TYPES	PROHIBITED CONTROL TYPES
1B, 2B, 3B, 3C, 4B, 4C, 5B, 5C, 6B, 7, 8	Fixed dry bulb Differential dry bulb Electronic enthalpy~~[a]~~ Differential enthalpy Dew-point and dry-bulb temperatures	Fixed enthalpy
1A, 2A, 3A, 4A	Fixed dry bulb Fixed enthalpy Electronic enthalpy~~[a]~~ Differential enthalpy Dew-point and dry-bulb temperatures	Differential dry bulb
All other climates	Fixed dry bulb Differential dry bulb Fixed enthalpy Electronic enthalpy~~[a]~~ Differential enthalpy Dew-point and dry-bulb temperatures	—

~~a. Electronic enthalpy controllers are devices that use a combination of humidity and dry-bulb temperature in their switching algorithm.~~

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

<u>**ELECTRONIC ENTHALPY CONTROLLER.** A device that uses a combination of humidity and dry bulb temperature in its switching algorithm.</u>

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The footnote is a definition of a device. It provides no information that enhances the enforcement of the table other than defining one of the pieces of equipment. Chapter 2 is the preferred location for definitions. If this is approved, the SEHPCAC will submit a companion code change in 2014 to address parallel provisions in the IgCC.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposed definition doesn't address devices which may be digital or analog.

Assembly Action: **None**

Public Comment

Public Comment:

Brenda Thompson, CBCO, Manager Building Inspections, Clark County Development Services, ICC Sustainability, Energy and High Performance Code Action Committee (SEHPCAC) Chair requests Approval as Submitted.

Commenter's Reason: The Commercial IECC Development Committee disapproved this simple proposal based on the concept that there were multiple types of electronic enthalpy devices. While there may be, the SEHPCAC proposal was simple, take what appears to be an existing definition, buried in a footnote and relocate it to Chapter 2 – the home of definitions. If there is a change in technology, we leave it to others to address changing the code to address that issue. Our proposal is a simple relocation of existing text.

This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held numerous open meetings and workgroup calls which included members of the SEHPCAC, as well as interested parties, to discuss and debate proposed changes and public comments.

Final Hearing Results

CE246-13 **AS**

Code Change No: CE247-13

Original Proposal

Section(s): C403.3.1.1, C403.3.1.1.5 (NEW)

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA International (amanda@intercodeinc.com)

Revise as follows:

C403.3.1.1 Air economizers. Air economizers shall comply with Sections C403.3.1.1.1 through ~~C403.3.1.1.4~~ C403.3.1.1.5.

C403.3.1.1.5 Economizer dampers. Dampers used in economizers shall comply with the requirements of Section C402.4.5.2.

Reason: This change will ensure that economizer intake dampers are low-leakage, and that the low-leakage ratings are certified to ensure the design intent and energy savings. Having them labeled will also make this provision easier to enforce.

This is a companion change to the proposal we submitted to C402.4.5.2 Outdoor air intakes and exhausts.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides an appropriate reference to ensure dampers are in compliance with the code.

Assembly Action: **None**

Final Hearing Results

CE247-13	**AS**

Code Change No: CE249-13

Original Proposal

Section(s): C403.4.1, Table C403.4.1 (NEW)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C403.4.1 Economizers. ~~Economizers shall comply with~~ Each cooling system shall include either an air economizer in compliance with Section C403.3.1.1 or water economizer in compliance with Sections C403.4.1.1 through C403.4.1.4.

Exceptions: Economizers are not required for the systems listed below.

1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table C403.3.1(1) that either:
   1.1. Have direct expansion cooling coils, or
   1.2. Where the total chilled water system capacity less the capacity of fan units with air economizers is less than the minimum listed in Table C403.4.1.
2. Chilled-water cooling systems that are passive (without a fan) or use induction where the total chilled water system capacity less the capacity of fan units with air economizers is less than the minimum listed in Table C403.4.1.
3. Individual cooling units that are in compliance with exceptions 2 through 6 to economizers under Section C403.3.1.

TABLE C403.4.1
MINIMUM CHILLED WATER SYSTEM COOLING CAPACITY FOR DETERMINING ECONOMIZER COOLING REQUIREMENTS

Climate Zones (Cooling)	Total Chilled Water System Capacity Less Capacity of Cooling Units with Air Economizers	
	Local Water-Cooled Chilled Water Systems	Air-cooled Chilled Water Systems or District Chilled Water Systems
1a	No economizer requirement	No economizer requirement
1b, 2a, 2b	960,000 Btu/h (280 kW)	1,250,000 Btu/h (365 kW)
3a, 3b, 3c, 4a, 4b, 4c	720,000 Btu/h (210 kW)	940,000 Btu/h (275 kW)
5a, 5b, 5c, 6a, 6b, 7, 8	1,320,000 Btu/h (385 kW)	1,720,000 Btu/h (505 kW)

Reason: This proposal improves cooling efficiency by requiring a water-side economizer for non-fan systems (e.g. radiant cooling, passive chilled beam systems), and for systems with small individual fan systems served by chilled water systems at least 50 tons in size. Such systems include fan coil units, radiant cooling systems, and chilled beam cooling systems.

During part-load cooling situations, cooling towers can be used to provide chilled water to meet cooling load. This technology can apply to small individual fan systems served by chilled water and to non-fan systems such as radiant cooling and passive chilled beam systems. There are a number of approaches to meeting the proposed requirements: (1) a separate closed circuit cooling tower (evaporative fluid cooler) that pre-cools chilled water return before it enters the chiller that is sized to meet the requirements of section C403.4.1.1, (2) an integrated operation with return chilled water precooled by the chiller tower and then completely cooled by the chiller, or (3) an either/or approach, where the chilled water is generated by the tower until load can no longer be met and then only the chiller is used. To analyze cost effectiveness, option 1 was analyzed, as it is most straightforward, and has clearly defined cost boundaries.

There is a cost impact associated with this proposed change since a heat exchanger or more expensive closed-circuit cooling tower and additional pipes, pumps, and controls will typically be required. A cost effectiveness analysis found that with reduced chiller operation the requirement for the waterside economizer was cost effective. Based on a system life of 22 years, a discounted cost effective payback threshold is 13.1 years. The simple paybacks in all of the climate zones where waterside economizers would be required under this proposal are well below this cost effective threshold.

References:

R. Hart. 2012. *Supporting Analyses for proposed changes to the commercial provisions of the 2012 IECC: Water-side Economizer for Non-Fan Cooling Systems.*
http://www.energycodes.gov/development/commercial/2015IECC

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal allows for an alternative to water economizer that is cost effective.

Assembly Action: **None**

Final Hearing Results

CE249-13 **AS**

Code Change No: CE250-13

Original Proposal

Section(s): C403.4.1.3, Table C403.4.1.3 (NEW), C403.4.2.1 (NEW), Table C403.4.2.1 (NEW), C403.4.2.1, C403.4.2.2, C403.4.7

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.4.1.3 Integrated economizer control. Economizer systems shall be integrated with the mechanical cooling system and be capable of providing partial cooling even where additional mechanical cooling is required to meet the remainder of the cooling load. Controls shall not be capable of creating a false load the mechanical cooling systems by limiting or disabling the economizer or any other means, such as hot gas bypass except at the lowest stage of mechanical cooling.

Units that include an air economizer shall comply with the following:

1. Unit controls shall have the mechanical cooling capacity control interlocked with the air economizer controls such that the outdoor air damper is at the 100 percent open position when *mechanical cooling* is on and the outdoor air damper does not begin to close to prevent coil freezing due to minimum compressor run time until the leaving air temperature is less than 45°F.
2. DX units that control 75,000 Btu/h or greater of rated capacity of the capacity of the mechanical cooling directly based on occupied space temperature shall have no fewer than 2 stages of mechanical cooling capacity
3. All other DX units including those that control space temperature by modulating the airflow to the space shall be in accordance with Table C403.4.1.3

~~**Exceptions:**~~

~~1. Direct expansion systems that include controls that reduce the quantity of *outdoor air* required to prevent coil frosting at the lowest step of compressor unloading, provided this lowest step is no greater than 25 percent of the total system capacity.~~
~~2. Individual direct expansion units that have a rated cooling capacity less than 54,000 Btu/h (15 827 W) and use nonintegrated economizer controls that preclude simultaneous operation of the economizer and mechanical cooling.~~

TABLE C403.4.1.3
DX COOLING STATESTAGE REQUIREMENTS FOR MODULATING AIRFLOW UNITS

Rating Capacity	Minimum Number of Mechanical Cooling Stages	Minimum Compressor Displacement[a]
≥65,000 Btu/h and <240,000 Btu/h	3 stages	≤35% of full Load
≥240,000 Btu/h	4 stages	≤25% full load

a. For *mechanical cooling* stage control that does not use variable compressor displacement the percent displacement shall be equivalent to the mechanical cooling capacity reduction evaluated at the full load rating conditions for the compressor.

C403.4.2 ~~**Variable air volume (VAV)**~~ **fan control.** ~~Individual VAV fans with motors of 7.5 horsepower (5.6 kW) or greater shall be:~~

~~1. Driven by a mechanical or electrical variable speed drive;~~
~~2. Driven by a vane-axial fan with variable-pitch blades; or~~
~~3. The fan shall have controls or devices that will result in fan motor demand of no more than 30 percent of their design wattage at 50 percent of design airflow when static pressure set point equals one-third of the total design static pressure, based on manufacturer's certified fan data~~

C403.4.2.1 Fan airflow control Each cooling system listed in Table C403.4.2.1 shall be designed to vary the indoor fan airflow as a function of load and shall comply with the following requirements.

1. DX and chilled water cooling units that control the capacity of the mechanical cooling directly based on space temperature shall have no fewer than 2 stages of fan control. Low or minimum speed shall not exceed 66 percent of full speed. At low or minimum speed the fan system shall draw no more than 40 percent of the fan power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation only operation.

2. All other units including DX cooling units and chilled water units that control the space temperature by modulating the airflow to the space shall have modulating fan control. Minimum speed shall not exceed 50 percent of full speed. At minimum speed the fan system shall draw no more than 30 percent of the power at full fan speed. Low or minimum speed shall be used during periods of low cooling load and ventilation only operation.

3. Units that include an airside economizer to meet the requirements of Section C403.3.1 shall have no fewer than of 2 speeds of fan control during economizer operation

   Exceptions:

   1. Modulating fan control is not required for chilled water and evaporative cooling units with fan moters of less than 1 HP where the units are not used to provide *ventilation air* and the indoor fan cycles with the load.

   2. Where the volume of outdoor air required to meet the *ventilation* requirements of the *International Mechanical Code* at low speed exceeds the air that would be delivered at the speed defined in Section C403.4.2 then the minimum speed shall be selected to provide the required *ventilation air*.

TABLE C403.4.2.1
EFFECTIVE DATES FOR FAN CONTROL

Cooling System Type	Fan Motor Size	Mechanical Cooling Capacity
DX Cooling	any	≥75,000 Btu/h (before 1/1/2016)
		≥65,000 Btu/h (after 1/1/2016
Chilled Water and Evaporative cooling	≥5 HP	Any
	≥1/4 HP	Any

~~C403.4.2.1~~ **C403.2.2 VAV Static pressure sensor location.** Static pressure sensors used to control VAV fans shall be placed in a position such that the controller setpoint is no greater than one-third the total design fan static pressure, except for systems with *zone* reset control complying with Section C403.4.2.2. For sensors installed down-stream of major duct splits, at least one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

~~C403.4.2.2~~ **C403.4.2.3 VAV Set points for direct digital control.** For systems with direct digital control of individual *zone* boxes reporting to the central control panel, the static pressure set point shall be reset based on the *zone* requiring the most pressure, i.e., the set point is reset lower until one *zone* damper is nearly wide open.

C403.4.7 Hot gas bypass limitation. Cooling systems shall not use hot gas bypass or other evaporator pressure control systems unless the system is designed with multiple steps of unloading or continuous capacity modulation. The capacity of the hot gas bypass shall be limited as indicated in Table C403.4.7 as limited by Section C403.4.1.3

> ~~**Exception:** Unitary packaged systems with cooling capacities not greater than 90,000 Btu/h (26 379 W).~~

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, does not contain the exceptions that are shown in the IECC. Those exceptions were in standard 90.1-2007 but were removed in standard 90.1-2010. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee did not feel sufficient justification for the change was provided.

Assembly Action: **None**

Final Hearing Results

CE250-13 **AS**

Code Change No: CE251-13

Original Proposal

Section(s): C403.4.2.1, C403.4.2.2

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.4.2.1 Static pressure sensor location. Static pressure sensors used to control VAV fans shall be ~~placed in a position~~ located such that the controller setpoint is no greater than ~~one-third the total design fan static pressure, except for systems with *zone* reset control complying with Section C403.4.2.2~~ 1.2 inches w.c. ~~For sensors~~ Where this results in one or more sensors being ~~installed~~ located down-stream of major duct splits, at least one sensor shall be located on each major branch to ensure that static pressure can be maintained in each branch.

C403.4.2.2 Set points for direct digital control. For systems with direct digital control of individual ~~*zone* boxes~~ zones reporting to the central control panel, the static pressure set point shall be reset based on the zone requiring the most pressure, i.e., the set point is reset lower until one *zone* damper is nearly wide open. The direct digital controls shall be capable of monitoring zone damper positions; or shall have an alternative method of indicating the need for static pressure which is capable of all of the following:

1. Automatically detecting any zone which excessively drives the reset logic;
2. Generating an alarm to the system operational location; and
3. Allowing an operator to readily remove one or more zones from the reset algorithm.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised with respect to controls for certain aspects of HVAC systems. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will increase the cost of construction where controls will now be required.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the location of static pressure sensors in relationship to VAV fans and systems with direct digital controls.

Assembly Action: **None**

Final Hearing Results

CE251-13	**AS**

Code Change No: CE253-13

Original Proposal

Section(s): C403.4.3.4

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com

Revise as follows:

C403.4.3.4 Part load controls. Hydronic systems greater than or equal to ~~300,000~~ 500,000 Btu/h (87 930W) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that have the capability to:

1. Automatically reset the supply-water temperatures in response to varying building heating and cooling demand using: coil valve position, zone-return water temperature, building-return water temperature, or out-side air temperature ~~as an indicator of building heating or cooling demand~~. The temperature shall be capable of being reset by at least 25 percent of the design supply-to-return water temperature difference; ~~or~~ and
2. Automatically vary fluid flow for hydronic systems with a combined motor capacity of 10 hp (7.5 kW) or larger with three or more ~~Reduce systems pump flow by at least 50 percent of design flow rate utilizing adjustable speed drive(s) on pump(s), or multiple-staged pumps where at least one-half of the total pump horsepower is capable of being automatically turned off or~~ control valves or other devices by reducing the system design flow rate by at least 50 percent by designed valves that modulate or step open ~~down,~~ and close, or pumps that modulate or turn on and off as a function of load ~~or other approved means~~; and
3. Automatically vary pump flow on chilled water systems and heat rejection loops serving water cooled unitary air-conditioners with a combined motor capacity of 10 hp (7.5 kW) or larger by reducing ~~system~~ pump design flow by at least 50 percent ~~of design flow rate~~ utilizing adjustable speed drive(s) on pump(s), or multiple-staged pumps where at least one-half of the total pump horsepower is capable of being automatically turned off ~~or control valves designed to modulate or step down, and close, as a function of load, or other *approved* means.~~ Pump flow shall be controlled to maintain one control valve nearly wide open or to satisfy the minimum differential pressure.

Exceptions:

1. Supply-water temperature reset for chilled water systems supplied by offsite district chilled water or chilled water from ice storage systems.
2. Minimum flow rates other than 50 percent as required by the equipment manufacturer for proper operation of equipment where using flow bypass or end-of-line 3-way valves.
3. Variable pump flow on dedicated equipment circulation pumps where configured in primary / secondary design to meet minimum flow requirements required by the equipment manufacturer for proper operation of equipment,

Reason: It's recommended this code section is revised for the following reasons:

Increase Hydronic System Capacity Threshold: This proposal recommends the current 300,000 Btu/h (25 tons) hydronic system capacity threshold is increased to 500,000 Btu/h (42 tons). As shown in the table below, these capacities represent small building sizes (~ 20,000 sqft) which generally are not served by hydronic heating and cooling systems. For example, a hydronic system serving the minimum capacity would have a circulation pump of only 1 or 2 HP. Supply water temperature reset has small energy benefits on small hydronic systems relative to the added control costs and complexity. The 500,000 Btu/h capacity also aligns with boilers requiring a multistage or modulating burner controls, see section C403.4.3.

Hyrdonic System Capacity Btu/h	Equivalent Capacity in Tons	Estimate of Building Size - Sqft		
		Eff Bldg	Std Bldg	Less Eff Bldg
		20 Btuh / Sqft	25 Btuh / Sqft	30 Btuh / Sqft
300,000	25.0	15,000	12,000	10,000
500,000	41.7	25,000	20,000	16,667
750,000	62.5	37,500	30,000	25,000
1,000,000	83.3	50,000	40,000	33,333

Requirements Additive and Not Mutually Exclusive: The requirements shouldn't exclude one another, but should add to each other. As currently written only one of the following control requirements need to be implemented. With the revised code language and added exceptions, all three of the following control requirements should be implemented.

- Supply Water Temperature Reset
- Variable Flow Control
- Variable or Stepped Pumping

Variable flow control (requirement 2) in hydronic systems is needed in order to implement variable or stepped pumping (requirement 3). Therefore requirement 2 is defined prior to requirement 3. Requirement 2 applies to all other hydronic systems since 2-way valve control is less expensive than 3-way valve control. This requirement also aligns with section C403.3.3.3, which requires 2-way valve control on heat pump hydronic systems.

Cooling System Variable Flow or Stepped Pumping: Cooling systems with pump capacity 10hp or greater should have variable flow using variable speed drives or stepped pumping. Allowing cooling pumps to vary flow and ride the pump curve should not be allowed on larger pumping systems. Heating only hydronic systems of any size are excluded from this requirement since pump inefficiencies are recaptured as a heat source in the hydronic heating system. A cost effective analysis, as shown in the table below, indicates cooling systems with a pump capacity of 10HP to be cost effective. The analysis assumes an average pump run time of 2000 hours. This is thought to be a conservative chilled water pump run time from a national prospective. This analysis only accounts for pump motor energy savings and doesn't account for the reduced heat rejected from the cooling pump into the chilled water system.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Increases the category of equipment subject to part load controls. Such controls provide important energy savings.

Assembly Action: **None**

Final Hearing Results

CE253-13 **AS**

Code Change No: CE254-13

Original Proposal

Section(s): C202 (NEW), C403.4.3.5 (NEW), Table C403.4.3.5 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.4.3.5 Boiler Turndown. *Boiler systems* with design input of greater than 1,000,000 Btu/h shall comply with the turndown ratio specified in Table 403.4.3.5.

The system turndown requirement shall be met through the use of multiple single input boilers, one or more *modulating boilers* or a combination of single input and modulating boilers.

TABLE 403.4.3.5
BOILER TURNDOWN

Boiler System Design Input (Btu/h)	Minimum Turndown Ratio
≥ 1,000,000 and less than or equal to 5,000,000	3 to 1
> 5,000,000 and less than or equal to 10,000,000	4 to 1
> 10,000,000	5 to 1

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

BOILDER, MODULATING. A boiler that is capable of more than a single firing rate in response to a varying temperature or heating load.

BOILER SYSTEM. One or more boilers, their piping and controls that work together to supply steam or hot water to heat output devices remote from the boiler.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to include boiler turndown requirements for boilers larger than 1,000,000 Btu/h. These requirements are in addition to the efficiency requirements in TABLE C403.2.8. The change ensures continued consistency between the IECC and Standard 90.1-2010.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The definitions are needed to properly regulate boilers. The provision for part loads allow the boilers to be more efficient.

Assembly Action: **None**

Final Hearing Results

CE254-13	**AS**

Code Change No: CE255-13

Original Proposal

Section(s): C403.4.4, C403.4.4.1 (NEW), C403.4.4.2 (NEW), C403.4.4.2.1 (NEW), C403.4.4.2.2 (NEW), C403.4.4.3, C403.4.4.4 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C403.4.4 Heat rejection equipment ~~fan speed control~~. Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at two-thirds of full speed or less, and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

Exception: Factory-installed heat rejection devices within HVAC equipment tested and rated in accordance with Tables C403.2.3(6) and C403.2.3(7).

C403.4.4.1 General. Heat rejection equipment such as air-cooled condensers, dry coolers, open-circuit cooling towers, closed-circuit cooling towers, and evaporative condensers used for comfort cooling applications shall comply with this section.

Exception: Heat rejection devices whose energy usage is included in the equipment efficiency ratings listed in Tables C403.2.3 (6) and C403.2.3 (7).

C403.4.4.2 Fan speed control. The fan speed shall be controlled as follows:

C403.4.4.2.1 Fan motors at least 7.5 hp. Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at two-thirds of full speed or less, and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature/pressure of the heat rejection device.

Exceptions: The following fan motors over 7.5 hp are exempt:

1. Condenser fans serving multiple refrigerant circuits.
2. Condenser fans serving flooded condensers.
3. Installations located in climate zones 1 and 2.

C403.4.4.2.2 Multiple cell heat rejection equipment. Multiple cell heat rejection equipment with variable speed fan drives shall:

1. Be controlled to operate the maximum number of fans allowed that comply with the manufacturer's requirements for all system components, and
2. Be controlled so all fans can operate at the same fan speed required for the instantaneous cooling duty as opposed to staged (on/off) operation.

Minimum fan speed shall be the minimum allowable speed of the fan drive system in accordance with the manufacturer's recommendations.

C403.4.4.3 Limitation on centrifugal fan open-circuit cooling towers. Centrifugal fan open-circuit cooling towers with a combined rated capacity of 1100 gpm or greater at 95°F condenser water return, 85°F condenser water supply, and 75°F outdoor air wet-bulb temperature shall meet the energy efficiency requirement for axial fan open-circuit cooling towers listed in Table C403.2.3(8).

Exception: Centrifugal open-circuit cooling towers that designed with inlet or discharge ducts or require external sound attenuation.

C403.4.4.4 Tower flow turndown. Open circuit cooling towers used on water cooled chiller systems that are configured with multiple or variable speed condenser water pumps shall be designed so that all open circuit cooling tower cells can be run in parallel with the larger of the flow that is produced by the smallest pump at its minimum expected flow rate or at 50 percent of the design flow for the cell.

Reason: ASHRAE/IES Standard 90.1, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised to enhance the provisions applicable to cooling tower controls and supports further reductions in energy use. The change ensures continued consistency between the IECC and 90.1.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Enhances standards for cooling tower controls and will allow a savings of energy. Industry has developed these improved standards

Assembly Action: **None**

Final Hearing Results

CE255-13 **AS**

Code Change No: CE257-13

Original Proposal

Section(s): C403.4.5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferuson@ashrae.org)

Revise as follows:

C403.4.5 Requirements for complex mechanical systems serving multiple zones. Sections C403.4.5.1 through C403.4.5.3 shall apply to complex mechanical systems serving multiple zones. Supply air systems serving multiple zones shall be VAV systems which, during periods of occupancy, are designed and capable of being controlled to reduce primary air supply to each *zone* to one of the following before reheating, recooling or mixing takes place:

1. Thirty percent of the maximum supply air to each *zone*.
2. Three hundred cfm (142 L/s) or less where the maximum flow rate is less than 10 percent of the total fan system supply airflow rate.
3. The minimum ventilation requirements of Chapter 4 of the *International Mechanical Code.*
4. Any higher rate that can be demonstrated to reduce overall system annual energy use by offsetting reheat/recool energy losses through a reduction in *outdoor air* intake for the system, as *approved* by the *code official*.
5. The air flow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.

Exception: The following define where individual *zones* or where entire air distribution systems are exempted from the requirement for VAV control:

~~1.~~ ~~*Zones* where special pressurization relationships or cross-contamination requirements are such that VAV systems are impractical.~~
~~2.~~ 1. *Zones* or supply air systems where at least 75 percent of the energy for reheating or for providing warm air in mixing systems is provided from a site-recovered or site-solar energy source.
~~3.~~ 2. *Zones* where special humidity levels are required to satisfy process needs.
~~4.~~ 3. *Zones* with a peak supply air quantity of 300 cfm (142 L/s) or less and where the flow rate is less than 10 percent of the total fan system supply airflow rate.
~~5.~~ 4. *Zones* where the volume of air to be reheated, recooled or mixed is no greater than the volume of outside air required to meet the minimum ventilation requirements of Chapter 4 of the *International Mechanical Code*.
~~6.~~ 5. *Zones* or supply air systems with thermostatic and humidistatic controls capable of operating in sequence the supply of heating and cooling energy to the *zones* and which are capable of preventing reheating, recooling, mixing or simultaneous supply of air that has been previously cooled, either mechanically or through the use of economizer systems, and air that has been previously mechanically heated.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, contains an important exception to zone minimum airflow that is not included in the IECC. The exception is important to allow optimization of multi-zone system ventilation, and saves significant energy nationally. The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Provides for optimization of multi-zones systems and gives the code official the authority to accept systems which are shown to be more energy efficient. There was concern that the wording, especially of new item 4 was vague.

Assembly Action: **None**

Final Hearing Results

CE257-13 **AS**

Code Change No: CE258-13

Original Proposal

Section(s): C403.4.5.4 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.4.5.4 Fractional HP fan motors. Motors for fans that are 1/12 HP or greater and less than 1 HP shall be electronically-commutated motors or shall have a minimum motor efficiency of 70 percent rated in accordance with DOE 10 CFR 431 . These motors shall also have the means to adjust motor speed for either balancing or remote control. The use of belt-driven fans to sheave adjustments for airflow balancing in lieu of a varying motor speed shall be permitted.

> **Exception** Motors in the airstream within fan-coils and terminal units that only provide heating to the space served.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, contains an important exception to zone minimum airflow that is not included in the IECC. Research conducted by the Califronia Energy Commission and others indicates that Electronically Commutated Motors (ECM) are more efficient and are cost effective compared to standard (e.g. PSC) motors in applications where the fan runs many hours per day (e.g. toilet exhaust fans, series fan-powered VAV boxes, and fan-coil units) other than those in the airstream that operate only when heating a space since the motor in that case behave essentially as an electric resistance heater. ECMs also reduce energy because their speed can be adjusted for balancing rather than throttling dampers. (ECMs can also be used for variable speed capacity control but that is not a requirement of this section.). The change ensures continued consistency between the IECC and standard 90.1-2010.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Modified**

Modified the proposal as follows:

~~**Exception**~~ **Exceptions:**

1. Motors in the airstream within fan-coils and terminal units that only provide heating to the space served.
2. Motors in space conditioning equipment that comply with Section C403.2.3.

(Portions of proposal not shown remain unchanged)

Committee Reason: The modification provides coordination with motors regulated by Section C403.2.3. The proposal adds efficiency requirements for smaller motors not regulated by Section C403.2.3.

Assembly Action: **None**

Public Comments

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C403.4.5.4 Fractional HP fan motors. Motors for fans that are 1/12 HP or greater and less than 1 HP shall be electronically-commutated motors or shall have a minimum motor efficiency of 70 percent rated in accordance with DOE 10 CFR 431 . These motors shall also have the means to adjust motor speed for either balancing or remote control. The use of belt-driven fans to sheave adjustments for airflow balancing in lieu of a varying motor speed shall be permitted.

Exceptions: The following motors are not required to comply with this section:

1. Motors in the airstream within fan-coils and terminal units that only provide heating to the space served.
2. Motors in space conditioning equipment that comply with Section C403.2.3 or C403.2.10.
3. Motors that comply with C405.8

Commenter's Reason: Proposal CE331 was approved as submitted by the code development committee, which adds requirements for electric motors covered by federal law in Section C403.4.5.4. Previously this section of the code did not exist.

The intent of this modification is to be consistent with CE-331, and to exempt those motors that currently have and will have their efficiency requirements established by the US Department of Energy. In other words, this comment will exempt those electric motors that are already covered by federal law as shown in CE-331.

In addition, section 403.2.10 exempts individual exhaust fans less than 1 hp, and the intent of this proposal was not to address the efficiency of those exhaust fan motors.

Final Hearing Results

CE258-13 **AMPC**

Code Change No: CE259-13

Original Proposal

Section(s): C403.4.5.5 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

C403.4.5.5 Multiple-zone VAV system ventilation optimization control. Multiple-zone VAV systems with direct digital control of individual zone boxes reporting to a central control panel shall have automatic controls configured to reduce outdoor air intake flow below design rates in response to changes in *system ventilation efficiency* (E_v) as defined by the *International Mechanical Code*.

Exceptions:

1. VAV systems with zonal transfer fans that recirculate air from other zones without directly mixing it with outdoor air, dual-duct dual-fan VAV systems, and VAV systems with fan-powered terminal units.
2. Systems having exhaust air energy recovery complying with Section C403.2.6.
3. Systems where total design exhaust airflow is more than 70 percent of total design outdoor air intake flow requirements.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has requirements for ventilation optimization control on VAV systems that are not included in the IECC. These provisions provide significant energy savings. The change ensures continued consistency between the IECC and standard 90.1-2010 and provides significant energy savings in IECC.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Where VAV's are optimized for multi-zone designs significant energy savings can be realized.

Assembly Action: **None**

Final Hearing Results

CE259-13	**AS**

Code Change No: CE262-13

Original Proposal

Section(s): Table C404.2, C404.2.1 (New)

Proponent: Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

Revise as follows:

TABLE C404.2
MINIMUM PERFORMANCE OF WATER-HEATING EQUIPMENT

EQUIPMENT TYPE	SIZE CATEGORY (input)	SUBCATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED [a,b]	TEST PROCEDURE
Water heaters, electric	≤ 12 kW[d]	Resistance	0.97 - 0.00 132*V*, EF	DOE 10 CFR Part 430
	> 12 kW	Resistance	~~1.73*V*+ 155 SL, Btu/h~~ (0.3 + 27/V_m), %/h	ANSI Z21.10.3
	≤ 24 amps and ≤ 250 volts	Heat pump	0.93 - 0.00 132*V*, EF	DOE 10 CFR Part 430
Storage water heaters, oil	≤ 105,000 Btu/h	≥ 20 gal	0.59 - 0.0019*V*, EF	DOE 10 CFR Part 430
	≥ 105,000 Btu/h	< 4,000 Btu/h/gal	~~78%~~ 80% E_t $(Q/800 + 110\sqrt{V})$SL, Btu/h	ANSI Z21.10.3
Heat pump pool heaters	All	50ºF dry bulb and 44.2ºF wet bulb outdoor air and 80.0ºF entering water	4.0 COP	AHRI 1160

b. Standby loss (SL) is the maximum Btu/h based on a nominal 70°F temperature difference between stored water and ambient requirements. In the SL equation, *Q* is the nameplate input rate in Btu/h. ~~and~~ In the ~~SL~~ equations for electric water heaters, *V* is the rated volume in gallons and *Vm* is the measured volume in gallons. In the SL equation for oil and gas water heaters and boilers, *V* is the rated volume in gallons.

d. Electric water heaters with an input rating of 12kW or less that are designed to heat water to temperatures of 180°F or greater shall comply with the requirements for electric water heaters that have an input rating greater than 12kW.

(Portions of Table not shown remain unchanged)

C402.2.1 High input-rated service water heating systems. This section shall apply only to gas fired water heating equipment installed in new buildings. Where a singular piece of water heating equipment serves the entire building and the input rating of the equipment is 1,000,000 Btu/h (293 kW) or greater, such equipment shall have a thermal efficiency, E_t, of not less than 90 percent. Where multiple pieces of water heating equipment serve the building and the combined input rating of the water heating equipment is 1,000,000 Btu/h (293 kW) or greater, the combined input-capacity-weighted-average thermal efficiency, E_t, shall be not less than 90 percent.

Exceptions:

1. Where 25 percent of the annual *service water heating* requirement is provided by site-solar or site-recovered energy, the minimum thermal efficiency requirements of this section shall not apply.
2. The input rating of water heaters installed in individual dwelling units shall not be required to be included in the total input rating of *service water heating* equipment for a building.
3. The input rating of water heaters with an input rating of not greater than 100,000 Btu/h (29.3 kW) shall not be required to be included in the total input rating of *service water heating* equipment for a building.

Reason: This proposal adds requirement for the use of gas condensing service water heaters in newly constructed buildings. Additionally, the proposed addendum makes several changes to Table C404.2 to reflect current Federal energy regulations for electric water heaters, to match the requirements of the newest edition ASHRAE 146 heat pump pool heater standard and to increase the minimum efficiency for certain oil storage water heaters from 78 to 80 percent. This makes the IECC consistent with 90.1.

Cost Impact: This code change proposal will increase the cost of construction.

Public Hearing Results

For staff analysis of the content of AAMCA 205-12 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Modified**

Modify the proposal as follows:

TABLE C404.2
MINIMUM PERFORMANCE OF WATER-HEATING EQUIPMENT

EQUIPMENT TYPE	SIZE CATEGORY (input)	SUBCATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED [a,b]	TEST PROCEDURE
Heat pump pool heaters	All	~~50ºF dry bulb and 44.2ºF wet bulb outdoor air and 80.0ºF entering water~~	4.0 COP	AHRI 1160

(Portions of proposal not shown remain unchanged)

Committee Reason: Modification was made because it is not necessary to have the rating condition spelled out in the table; the standard takes care of this. Changes will require improved efficiencies for service water heating systems brings values in compliance with federal regulations.

Assembly Action: **None**

Final Hearing Results

CE262-13 **AM**

Code Change No: CE263-13

Original Proposal

Section(s): Table C404.2

Proponent: Jennifer. Hatfield, J. Hatfield & Associates, PL representing Association of Pool & Spa Professionals (APSP) (jhatfield@apsp.org)

Revise as follows:

TABLE C404.2
MINIMUM PEFORMANCE OF WATER-HEATING EQUIPMENT

EQUIPMENT TYPE	SIZE CATEGORY (input)	SUBCATEGORY OR RATING CONDITION	PERFORMANCE REQUIRED[a,b]	TEST PROCEDURE
Pool heaters, gas and oil	All	--	~~78~~ 82% E_t	ASHRAE 146

(Portions of Table not shown remain unchanged)

Reason: Per federal Department of Energy requirements, the minimum efficiency level for pool gas heaters went from 78% to 82%, effective April 2013. This change ensures consistency with federal requirements.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The change aligns the IECC with federal standards.

Assembly Action: **None**

Final Hearing Results

CE263-13 **AS**

Code Change No: CE264-13

Original Proposal

Section(s): C404.2

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C404.2 Service water-heating equipment performance. Water-heating equipment and hot water storage tanks shall meet the requirements of Table C404.2. The efficiency shall be verified through data furnished by the manufacturer of the equipment or through certification under an *approved* certification program. Water heating equipment also intended to be used to provide space heating shall meet the applicable provisions of Table C404.2.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has a provision to address the efficiency of equipment used to provide both space heating and service water heating functions. This situation is not addressed in the IECC and needs to be to ensure consistency between standard 90.1-2010 and the IECC.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides clarifying language. No technical change results from the proposal.

Assembly Action: **None**

Final Hearing Results

CE264-13	**AS**

Code Change No: CE271-13, Part I

Original Proposal

Section(s): C202 (NEW), C404.5, C404.5.1 (NEW), Table C404.5.1 (NEW), C404.5.2 (NEW), C404.5.3 (NEW), IPC [E]607.5

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS TWO SEPARATE CODE CHANGES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, gary@aim4sustainability.com

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.5 ~~Pipe~~ Insulation of piping. ~~For automatic-circulating hot water and heat-traced systems, piping shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K). The first 8 feet (2438 mm) of piping in non-hot-water-supply temperature maintenance systems served by equipment without integral heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K).~~ Piping to the inlet of a water heater and piping conveying water heated by a water heater shall be insulated in accordance with Sections C404.5.1, C404.5.2 and C404.5.2.3. Where tubular pipe insulation is used for insulating piping, the thermal conductivity, k, of such insulation shall be not greater than 0.28 Btu per inch/h•ft² • F [0.40 W/(m•K)] for water temperatures less than or equal to 140°F (60°C) and not greater than 0.29 Btu per inch/h•ft² • F [0.42 W/(m•K)] for water temperatures greater than 140°F (60°C) and less than or equal to 200°F (93.3°C). Tubular pipe insulation shall be installed in accordance with the insulation manufacturer's instructions. Pipe insulation shall be continuous except where the piping passes through a framing member. The minimum insulation thickness requirements of this section shall not supersede any greater insulation thickness requirements necessary for the protection of piping from freezing temperatures or the protection of personnel against external surface temperatures on the insulation. This section shall not be construed as requiring insulation on the following:

> ~~**Exception:** Heat-traced piping systems shall meet the insulation thickness requirements per the manufacturer's installation instructions. Untraced piping within a heat traced system shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft² • °F (1.53 W per 25 mm/m² • K).~~

1. The tubing from the connection at the termination of the fixture supply piping to a fixture fitting or a water consuming appliance.
2. Valves, pumps, strainers and threaded unions in piping that is 1 inch or less in nominal diameter
3. Piping from user-controlled shower and bath mixing valves to the water outlets.
4. Cold water piping of a demand recirculation water system.
5. Tubing from a hot drinking-water heating unit to the water outlet.
6. Piping at locations where a vertical support of the piping is installed.

C404.5.1 Circulating system piping and heat-traced piping. Heated water circulation system piping shall be insulated in accordance with Table C404.5.1. Piping that is heat-traced to maintain heated water temperature shall be insulated in accordance with Table C404.5.1 or shall have insulation thickness in accordance with the heat tracing manufacturer's requirements. Untraced piping within a heat-traced system shall be insulated in accordance with Table C404.5.1.

TABLE C404.5.1
MINIMUM TUBULAR PIPE INSULATION WALL THICKNESS

NOMINAL PIPE OR TUBE DIAMETER (inches)	MINIMUM INSULATION WALL THICKNESS (inches)	
	≤140 °F WATER TEMPERATURE	>140 °F to 200°F WATER TEMPERATURE
≤3/8	3/8	3/8
> 3/8 to <3/4	1/2	1/2
≥ 3/4 to <1	3/4	1
≥1 to <1 1/2	1	1 1/2
≥1 ½ to <4	1 1/2	2
≥4 to <8	1 1/2	2
≥8	1 1/2	2

For SI: 1 inch = 25.4 mm, °C= [(°F – 32)/1.8]

C404.5.2 Inlet piping connecting to water heaters and storage tanks. Where a water heater or a heated water storage tank is not equipped with integral heat traps, the inlet piping within 8 feet (2438 mm) of piping length of the water heater or storage tank shall be insulated in accordance with Table C404.5.1. This requirement shall not supersede the water heater manufacturer's requirements for a greater insulation thickness on the inlet piping.

Exceptions:

1. Inlet piping or tubing to a water heater serving only *plumbing fixtur*es or *plumbing appliances* that are within 8 feet (2438 mm) piping length of the water heater shall not be required to be insulated.

2. Valves, pumps, strainers and threaded unions in water heater or heated water storage inlet piping that is 1 inch (25.4 mm) nominal diameter or less shall not be required to be insulated.

C404.5.3 Other heated water piping. Piping conveying heated water that is not addressed by Sections C404.5.1 and C404.5.2 shall have insulation with a wall thickness of not less than that indicated in Table C404.5.1.

Exceptions:

1. Outlet piping or tubing from a water heater serving only *plumbing fixtur*es or *plumbing appliances* that are within 8 feet (2438 mm) piping length of the water heater shall not be required to be insulated.

2. Piping or tubing that is completely surrounded by not less than 1 inch (25.4 mm) thickness of building thermal envelope insulation in walls, attics and crawl spaces shall not be required to be insulated with tubular pipe insulation provided that the piping or tubing is 1 inch (25.4 mm) nominal diameter or smaller.

Add new definition as follows:

WATER HEATER. Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.

Commenter's Reason: This section has generated a lot of questions over the many years since it was put into the IECC. Some people believe that this section requires all hot water piping to have 1 inch insulation. Others believe that this section only requires that hot water circulating system piping (or heat traced piping) have 1 inch of insulation. Another question that arises is what is meant by "hot water" as there is not a definition of such in the IECC. Other questions that arise are "Is the insulation required to be continuous along the piping?" and "Should really small piping and tubing be insulated?" The exception really isn't an exception but requirements for heat-traced systems.

There is no other place in the Commercial Provisions of the IECC that covers the insulation of Service Water Heating piping. This subject is important! In summary, the language in this section is a mess and the words do not clearly state the intended requirements. Let's stop dancing around this important aspect of lessening energy consumption.

The proposed revisions and why:

C404.5
The intent of the struck-out language can be found in new sections C404.5.1 and C404.5.2. The new language for this struck language is discussed later in this reason statement.

The phrase "water heated by a water heater" was used instead of "hot water" because the IECC does not have a definition for hot water. Code users could refer to the definition found in the IRC and the IPC for hot water which says water of a temperature 110F or greater. But what about tempered water (IPC definition of 85F to 110F)? Keep in mind that ASHRAE 90.1-2007 only requires insulation of service water piping conveying water of 105F of greater. It doesn't seem reasonable to say only "hot water" (as defined by the IPC). If necessary, the committee could request a public comment to amend this section to indicate that the section only covers water 105F and greater.

The statement about protection of personnel from external insulation temperatures and freezing conditions is really common sense but it is added for clarity. It also serves as a reminder for the designer to consider these important issues.

The language "The insulation shall be continuous along the piping." was added to answer the obvious and most often asked question. But keep in mind that this requirement could have serious structural implications when piping is routed through light frame construction members (wood studs and joist, metal studs and solid web joists). The holes to accommodate the piping diameter and insulation could become quite large and in some cases, making piping installation very difficult to perform unless soffits and chases are added and wall thicknesses are increased. Again, the committee could express its opinion on this issue by requesting that a public comment for *not* having insulation be continuous through wood studs and joist/metal studs and solid web joists. Either way, this question needs to be answered in a definitive manner.

The list of items where pipe insulation is not required is almost common sense but still, these items need to be stated to avoid confusion and possible misinterpretations by the code officials. Insulating valves is time consuming and if the right type of valve is not used, insulating is almost impossible (think ball valve without a raised handle). A few uninsulated valves in the system are not going to lose a lot of heat. Pumps are also difficult to insulate and in some cases, insulation might cause overheating of the pump motor. Threaded unions usually only occur in smaller diameter piping systems and are time consuming to insulate. Again, a small amount of heat loss compared to the entire system. Piping or tubing from a small tankless water heater serving one sink is too small to easily insulate. The heat loss is negligible.

C404.5.1
The first sentence of this section is saying exactly what the first struck out sentence in C404.5 says. The second sentence picks up the intent of the requirement in the first sentence of the struck out exception.

C404.5.2
The first sentence picks up the intent of the second sentence of struck-out language in C404.5. If a water heater (or heated water storage tank) does not have integral heat traps, there will be standby heat losses from convection of the heated water into the water inlet and outlet piping of the storage water heater or heated water storage tank. Insulating the inlet and outlet piping for 8 feet mitigates this heat loss. But it is not necessary to include the outlet piping in this section because new Section C404.5.3 requires insulating all other piping (which would include the heater or storage tank outlet piping). If the water (or heated water storage tank) serves a circulating system, then there is no convection of heat water into the piping connected to the heater and storage tank--the water is circulating and Section C404.5.1 takes care of the insulating requirement.

The statement about the water heater manufacturer's insulation thickness requirements is necessary because energy compliance listing for the water heater could require that the inlet and outlet piping be insulated with a thickness greater than ½ inch. And this section should not apply to tankless water heaters as they do not have storage that leads to standby heat losses.

C404.5.3
This section covers the insulation requirements for all other heated water piping that isn't addressed in the two preceding sections. The table of insulation thicknesses mirrors what is required by ASHRAE 90.1-2007 except an entry was added for 3/8 inch pipe or tubing. Some people would like to have the insulation thickness be 1 inch for all piping for "simplicity". But what they fail to realize is that such a requirement would make the installation of smaller piping near or at the ends (outlets) of the system very difficult to accomplish. For example, imagine trying to install ½ inch copper (or PEX) tubing (now 2 5/8 inch diameter with the required insulation) in a 3 ½ inch deep wall cavity with other piping crossing over. Or making that large diameter pass through wood or light frame steel members for a 3 ½ inch deep wall cavity. While ½ inch insulation thickness on ½ inch tubing is still a challenge to install, it is easier. Ideally, many fixtures could be installed using 3/8 inch tubing (only about 1 ¼ inch diameter with the required insulation) inside 3 ½ inch wall cavities. Let's be reasonable and in touch with how buildings are constructed.

Part II – IPC
Section 607.5 did not read exactly the same way as the IECC section (C404.5) that drives this section although the intent was the same. The proposal changes Section 607.5 makes the section read exactly the same way as proposed changes to C404.5. Also, because the IPC covers plumbing for Group R2, R3, R4 occupancies that are 3 stories or less above grade plane, Section 607.5

must have a statement to *exclude* those occupancies because there are different IECC requirements (the Residential provisions of IECC) for those occupancies.

Cost impact: None

Public Hearing Results

Both parts of this code changes were heard by the Commercial Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The existing section language is much simpler. There is no justification for adding such a complex set of rules for insulating piping.

Assembly Action: None

Public Comments

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C404.5 Insulation of piping. Piping ~~to the inlet of a water heater and piping~~ ~~conveying water heated by~~ from a water heater to the termination of the heated water fixture supply pipe shall be insulated in accordance with Table C403.2.8. On both the inlet and outlet piping of a storage water heater or heated water storage tank, the piping to a heat trap or the first 8 feet (2438 mm) of piping, whichever is less, shall be insulated. Piping that is heat traced shall be insulated in accordance with Table C403.2.8 or the heat trace manufacturer's instructions. ~~Sections C404.5.1, C404.5.2 and C404.5.2.3. Where tubular pipe insulation is used for insulating piping, the thermal conductivity, k, of such insulation shall be not greater than 0.28 Btu per inch/h•ft2 • F [0.40 W/(m•K)] for water temperatures less than or equal to 140◦F (60◦C) and not greater than 0.29 Btu per inch/h•ft2 • F [0.42 W/(m•K)] for water temperatures greater than 140◦F (60◦C) and less than or equal to 200◦F (93.3◦C).~~ Tubular pipe insulation shall be installed in accordance with the insulation manufacturer's instructions. Pipe insulation shall be continuous except where the piping passes through a framing member. The minimum insulation thickness requirements of this section shall not supersede any greater insulation thickness requirements necessary for the protection of piping from freezing temperatures or the protection of personnel against external surface temperatures on the insulation. ~~This section shall not be construed as requiring insulation on the following:~~

Exception: Tubular pipe insulation shall not be required on the following:

1. The tubing from the connection at the termination of the fixture supply piping to a plumbing fixture or plumbing appliance ~~fixture fitting or a water consuming appliance~~.
2. Valves, pumps, strainers and threaded unions in piping that is 1 inch or less in nominal diameter
3. Piping from user-controlled shower and bath mixing valves to the water outlets.
4. Cold water piping of a demand recirculation water system.
5. Tubing from a hot drinking-water heating unit to the water outlet.
6. Piping at locations where a vertical support of the piping is installed.
7. Piping surrounded by building insulation with a thermal resistance (R-value) of not less than R-3.

~~**C404.5.1 Circulating system piping and heat-traced piping.** Heated water circulation system piping shall be insulated in accordance with Table C404.5.1. Piping that is heat-traced to maintain heated water temperature shall be insulated in accordance with Table C404.5.1 or shall have insulation thickness in accordance with the heat tracing manufacturer's requirements. Untraced piping within a heat-traced system shall be insulated in accordance with Table C404.5.1.~~

~~**TABLE C404.5.1**~~
~~**MINIMUM TUBULAR PIPE INSULATION WALL THICKNESS**~~

~~**NOMINAL PIPE OR TUBE DIAMETER (inches)**~~	~~**MINIMUM INSULATION WALL THICKNESS (inches)**~~	
	~~**≤140 °F WATER TEMPERATURE**~~	~~**>140 °F to 200°F WATER TEMPERATURE**~~
~~≤3/8~~	~~3/8~~	~~3/8~~
~~> 3/8 to <3/4~~	~~1/2~~	~~1/2~~
~~≥ 3/4 to <1~~	~~3/4~~	~~1~~
~~≥1 to <1 1/2~~	~~1~~	~~1 1/2~~
~~≥1 ½ to <4~~	~~1 1/2~~	~~2~~
~~≥4 to <8~~	~~1 1/2~~	~~2~~
~~≥8~~	~~1 1/2~~	~~2~~

~~For SI: 1 inch = 25.4 mm, °C= [(°F – 32)/1.8]~~

~~**C404.5.2 Inlet piping connecting to water heaters and storage tanks.** Where a water heater or a heated water storage tank is not equipped with integral heat traps, the inlet piping within 8 feet (2438 mm) of piping length of the water heater or storage tank shall be insulated in accordance with Table C404.5.1. This requirement shall not supersede the water heater manufacturer's requirements for a greater insulation thickness on the inlet piping.~~

~~**Exceptions:**~~

1. ~~Inlet piping or tubing to a water heater serving only *plumbing fixtur*es or *plumbing appliances* that are within 8 feet (2438 mm) piping length of the water heater shall not be required to be insulated.~~
2. ~~Valves, pumps, strainers and threaded unions in water heater or heated water storage inlet piping that is 1 inch (25.4 mm) nominal diameter or less shall not be required to be insulated.~~

~~**C404.5.3 Other heated water piping.** Piping conveying heated water that is not addressed by Sections C404.5.1 and C404.5.2 shall have insulation with a wall thickness of not less than that indicated in Table C404.5.1.~~

~~**Exceptions:**~~

1. ~~Outlet piping or tubing from a water heater serving only *plumbing fixtur*es or *plumbing appliances* that are within 8 feet (2438 mm) piping length of the water heater shall not be required to be insulated.~~
2. ~~Piping or tubing that is completely surrounded by not less than 1 inch (25.4 mm) thickness of building thermal envelope insulation in walls, attics and crawl spaces shall not be required to be insulated with tubular pipe insulation provided that the piping or tubing is 1 inch (25.4 mm) nominal diameter or smaller.~~

Reason: Hot water supply piping should be insulated from the source of heated water to the termination of the fixture supply pipe for plumbing fixtures and plumbing appliances. The existing code text, while simple, is incomplete, covering only a portion of some systems.

We attempted to have these changes heard at the development hearing, but the floor modification was not accepted for discussion.

The key features are: reference to existing insulation provisions in the IECC-Commercial chapter that specify the wall thickness of pipe insulation for different diameter piping; clarifying that insulation does not need to be continuous when it passes through framing members; providing a list of exemptions specific to heated water piping and clarifying the insulation on the inlet and outlet piping to storage tanks.

We urge your support of this code change.

Final Hearing Results

CE271-13, Part I AMPC

Code Change No: CE274-13

Original Proposal

Section(s): C202 (New), C404.5 (New), C404.5.1 (New), C404.5.1 (New), Table C404.5.1 (New), C404.5.2 (New), C404.5.2.1 (New)

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, gary@aim4sustainability.com

Add new text as follows:

C404.5 Efficient heated water supply piping. Heated water supply piping shall be in accordance with Section C404.5.1 or Section C404.5.2. The flow rate through ¼ inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).

C404.5.1 Maximum allowable pipe length method. The maximum allowable piping length from the nearest source of heated water to the termination of the fixture supply pipe for *plumbing fixtures* and *plumbing appliances* shall be in accordance with the maximum piping length column in Table C404.5.1. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table C404.5.1.

TABLE C404.5.1
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

NOMINAL PIPE SIZE (inch)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)	
		WATER FROM A WATER HEATER	WATER FROM A RECIRCULATION LOOP OR HEAT TRACED PIPE
1/4	0.33	50	50
5/16	0.5	50	48
3/8	0.75	50	32
1/2	1.5	43	16
5/8	2	32	12
3/4	3	21	8
7/8	4	16	6
1	5	13	5
1 ¼	8	8	3
1 ½	11	6	2
2 or larger	18	4	1

1 Gallon = 128 ounces. For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

C404.5.2 Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section C404.5.2.1. The maximum volume from the nearest source of heated water to the termination of the fixture supply pipe for a *plumbing fixture* or *plumbing appliance* shall be 0.5 gallon (1.89 L) where the source of heated water is a water heater; and 0.19 gallon (0.7 L) where the source of heated water is a recirculating system or heat-traced piping.

C404.5.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table C404.5.1. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

WATER HEATER. Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.

Reason: This change speeds hot water to the user, saves energy and water, and potentially lowers construction costs. All these are accomplished by limiting the volume of water in the pipes.

We have all have turned on the hot water and waited for it to get hot. While we wait water runs down the drain, wasting clean water. While we wait, our time is wasted. When we are done there is still hot water in the pipes, water which cools thereby wasting as much energy as it took to heat the water in the pipes. Pipes with larger volumes take longer to fill, waste more and are potentially more expensive to build.

This proposal remedies the problems above by reducing the water volume between the source of heated water and the use. The first method (Section R403.4.2.1) requires no calculation; it limits the water volume in the pipes by limiting the pipe length. The second option (Section R403.4.2.1) requires a calculation of volume in the pipes, but provides a table that translates the pipe length into a volume (columns 1 and 2); and provides quick options for different pipe assumptions in columns 3 and 4.

In simple form, cutting the volume in half: cuts the wait time in half, cuts the clean water wasted down the drain in half, cuts the energy loss while water goes through the pipes in half, and cuts the loss of energy from hot water left in the pipes after use in half.

Why is the maximum volumes 0.5 gallon when the source of heated water is a water heater? So that following standard practice for plumbing engineers and meeting the minimum requirements in the energy code will be aligned. At present, they are not, with the result that hot water delivery times are greater than 30 seconds after the tap is opened; unacceptable performance according to the American Society of Plumbing Engineers.

The American Society of Plumbing Engineers (ASPE) provides plumbing engineers with the guidance for hot water distribution system design as shown in Figure 1. I believe that the minimum energy code should have at least marginal performance at typical actual flow rates. These actual flow rates generally range from 1-2 gpm for private lavatory faucets, showerheads, dishwashers and washing machines. This is true even though faucets are allowed to be 2.2 gpm @ 60 psi and showerheads 2.5 gpm @80 psi. The reason for actual flow rates being lower than rated flow rates is due to the fact that the pressure in the building is often less than the rated pressure. With fixed orifice aerators, common in minimally legal faucets and showerheads, the flow rate drops off rather rapidly as the pressure decreases.

It makes sense to me that the minimum code should provide for at least marginal performance in buildings that are supplied with low pressure. This means that we need to be sure that the time-to-tap is still reasonable even when flow rates are at the lower end of the typical range; that is close to 1 gpm. According to ASPE, marginal performance would mean that hot water needs to arrive in no longer than 30 seconds after the tap is opened. Figure 2 shows that this will be true when the volume of water between the source and the use does not exceed 0.5 gallon.

Figure 1 ASPE Time-to-Tap Performance Criteria

	Acceptable Performance	1 – 10 seconds
	Marginal Performance	11 – 30 seconds
	Unacceptable Performance	31+ seconds

Source: Domestic Water Heating Design Manual – 2nd Edition, ASPE, 2003, page 234

Figure 2 Converting Flow Rate and Pipe Volume to Time-to-Tap

Volume in the Pipe		**Minimum Time-to-Tap (seconds) at Selected Flow Rates**					
Gallons	**Ounces**	**0.25 gpm**	**0.5 gpm**	**1 gpm**	**1.5 gpm**	**2 gpm**	**2.5 gpm**
0.02	**2**	4	1.9	0.9	0.6	0.5	0.4
0.03	**4**	8	4	1.9	1.3	0.9	0.8
0.06	**8**	15	8	4	2.5	1.9	1.5
0.13	**16**	30	15	8	5	4	3
0.19	**24**	45	23	11	8	6	5
0.25	**32**	60	30	15	10	8	6
0.50	**64**	120	60	30	20	15	12
1.00	**128**	240	120	60	40	30	24

Why is the maximum volume 0.19 gallon when the source of heated water is a circulation loop or heat-traced pipe? In exchange for the flexibility in the location of the water heater relative to the plumbing fixtures and plumbing appliances, the allowable volume that will be wasted has been reduced and the time-to-tap improved so that it will almost always fall into ASPE's range for Acceptable Performance.

The definition proposed is used in both the IPC and the IRC.

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: There are several ways to meet the requirements of this proposal, many of which cost less than current piping practices. I would recommend that builders and developers select one of the less expensive methods.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: There needs to be a better cost analysis to justify this complexity in piping design. The lengths seem to be too short for the recirculation loop column.

Assembly Action: **Approved as Submitted**

Public Comments

Public Comment 1:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C404.5.1
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

NOMINAL PIPE SIZE (inch)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)	
		~~WATER FROM A WATER HEATER~~	~~WATER FROM A RECIRCULATION LOOP OR HEAT TRACED PIPE~~
1/4	0.33	50	~~50~~
5/16	0.5	50	~~48~~
3/8	0.75	50	~~32~~
1/2	1.5	43	~~16~~
5/8	2	32	~~12~~
3/4	3	21	~~8~~
7/8	4	16	~~6~~
1	5	13	~~5~~
1 ¼	8	8	~~3~~
1 ½	11	6	~~2~~
2 or larger	18	4	~~1~~

1 Gallon = 128 ounces. For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

C404.5.2 Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section C404.5.2.1. The maximum volume from the nearest source of heated water to the termination of the fixture supply pipe for a *plumbing fixture* or *plumbing appliance* shall be 0.5 gallon (1.89 L). ~~where the source of heated water is a water heater; and 0.19 gallon (0.7 L) where the source of heated water is a recirculating system or heat-traced piping.~~ Water heaters, circulating water systems and heat trace temperature maintenance systems shall be considered sources of heated water.

Commenter's Reason: At this time hot water distribution systems in commercial buildings are required to limit the length between the source of hot water and the plumbing fixtures and plumbing appliances to 50 feet of developed length in accordance with provisions in the IPC.

However, meeting the maximum length provision does not ensure that hot water will arrive at fixtures in a timely manner. It also wastes energy. It also means that plumbing engineers cannot meet their standards of practice.

The purpose of this proposal is to provide better, more energy efficient, hot water service to the occupants of our buildings. We have all experienced the problem of waiting for hot water to arrive at plumbing fixtures. Installing the hot water piping so that the delivery is more efficient will stay with the building for 50-100 years. Similarly the pain of an inefficient system will last just as long.

This proposal brings the length limitation from the IPC into the IECC. Simplifying the original proposal further, there is now only one maximum length column. The length (and the volume) from all sources of heated water to any plumbing fixture or appliance will be the same.

Supporting this proposal will result in correlating the IECC with the marginal performance standards of practice for plumbing engineers (See the orange row in Figure 1).

Figure 1. ASPE Time-to-Tap Performance Criteria

	Acceptable Performance	1 – 10 seconds
	Marginal Performance	11 – 30 seconds
	Unacceptable Performance	31+ seconds

Source: Domestic Water Heating Design Manual – 2nd Edition, ASPE, 2003, page 234

Most plumbing fixtures operate from 1 – 2.5 gpm. Figure 2 shows that the volume in the piping will be a <u>maximum</u> of 64 ounces for plumbing fixtures with these flow rates. As can be seen, the same volume in the piping results in improved performance when the flow rates are at the higher end of the range.

Figure 2 Comparing Pipe Volume, Plumbing Fixture Flow Rate and the Time-to-Tap

Volume in the Pipe (ounces)	**<u>Minimum</u> Time-to-Tap (seconds) at Selected Flow Rates**					
	0.25 gpm	**0.5 gpm**	**1 gpm**	**1.5 gpm**	**2 gpm**	**2.5 gpm**
2	4	1.9	0.9	0.6	0.5	0.4
4	8	4	1.9	1.3	0.9	0.8
8	15	8	4	2.5	1.9	1.5
16	30	15	8	5	4	3
24	45	23	11	8	6	5
32	60	30	15	10	8	6
64	120	60	30	20	15	12
128	240	120	60	40	30	24

I urge your support.

Final Hearing Results

CE274-13 **AMPC1**

Code Change No: CE275-13

Original Proposal

Section(s): C202 (NEW), C404.5 (NEW), C404.5.1 (NEW), Table C404.5.1 (NEW), C404.5.2 (NEW), C404.5.2.1 (NEW)

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

Add new text as follows:

C404.5 Efficient heated water supply piping. Heated water supply piping shall be in accordance with Section C404.5.1 or Section C404.5.2. The flow rate through ¼ inch piping shall not exceed 0.5 gpm (1.9 Lpm). The flow rate through 5/16 inch piping shall not exceed 1 gpm (3.8 Lpm). The flow rate through 3/8 inch piping shall not exceed 1.5 gpm (5.7 Lpm).

C404.5.1 Maximum allowable pipe length method. The maximum piping length from the nearest source of heated water to the termination of the fixture supply pipe for a public lavatory faucet shall be in accordance with the maximum piping length column in Table C404.5.1. Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table C404.5.1.

TABLE C404.5.1
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

NOMINAL PIPE SIZE (inch)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)
		LAVATORY FAUCETS—PUBLIC
1/4	0.33	6
5/16	0.5	4
3/8	0.75	3
1/2	1.5	2
5/8	2	1
3/4	3	0.5
7/8	4	0.5
1	5	0.5
1 ¼	8	0.5
1 ½	11	0.5
2 or larger	18	0.5

For SI: 1 inch=25.4 mm, 1 foot = 304.8 mm, 1 liquid ounce = 0.030 L

C404.5.2 Maximum allowable pipe volume method. The maximum piping volume from the nearest source of heated water to the termination of the fixture supply pipe for a public lavatory faucet shall be 2 ounces (0.06 L). The water volume in the piping shall be calculated in accordance with Section C404.5.2.1.

C404.5.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe. The volume in the piping shall be determined from the volume column in Table

C404.5.1. The volume contained within fixture shut off valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination. Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

WATER HEATER. Any heating appliance or equipment that heats potable water and supplies such water to the potable hot water distribution system.

Reason: The problem of heated water taking an excessively long time to arrive at lavatory faucets in public restrooms is well known. The length of time the faucets are used during each hand washing event is very short, often around 5 seconds. Federal law requires low flow rate or small, metered volumes for the faucets in these applications. Health codes expect heated water for washing hands in these applications. The dilemma is that the volume of not-hot water in the piping from the source of hot water to the faucets is much too large for the heated water to arrive in a timely fashion; even at the 50-foot limit currently required in the 2012 IPC.

Supporting this proposal will correlate the IECC with Federal law and local health codes by providing heated water for hand washing in a timely matter.

The delivery of hot water to public lavatory faucets needs to be considered separately because of potential health issues. The events are short and the flow rates are low. Table 1 shows the time-to-tap performance based on the requirements in the proposal. The 0.25 and 0.5 gpm columns are typical of the flow rates for public lavatory faucets. The volume in the pipe was chosen so that heated water would arrive in the first part of the hot water event so that every person who uses the public lavatory will have the benefits of hot water.

Table 1 Time-to-Tap Performance when the Volume in the Piping from the Source to the Use is 2 ounces

Volume in the Pipe (ounces)	**Minimum Time-to-Tap (seconds) at Selected Flow Rates**					
	0.25 gpm	**0.5 gpm**	**1 gpm**	**1.5 gpm**	**2 gpm**	**2.5 gpm**
2	3.8	1.9	0.9	0.6	0.5	0.4

The energy savings comes from not losing the heat from the water as it tries to arrive at the faucets.
For more information and background on issues related to hot water distribution please read the 4-part series at:
http://www.allianceforwaterefficiency.org/Residential_Hot_Water_Distribution_System_Introduction.aspx

Cost impact: There are several ways to meet the requirements of this proposal, some of which cost less than current heated water system practices. I would recommend that builders and developers select one of the less expensive methods.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee couldn't grasp the energy savings issue of the proposal. This seems to be more of a comfort issue that is really not the concern of the IECC.

Assembly Action: **None**

Final Hearing Results

CE275-13 **AS**

Code Change No: CE278-13, Part I

Original Proposal

Section(s): C404.6, C404.7 (NEW), IPC [E] 607.2.1, IPC [E] 607.2.1.1 (NEW)

Proponent: Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.6 Hot water temperature maintenance system controls. For hot water distribution system circulating ~~hot water~~ ~~system~~ pumps ~~or~~ and heat trace, the pumps and heat trace shall be arranged to be turned off ~~either~~ automatically ~~or manually~~ when there is ~~limited~~ not hot water demand. Operating controls shall be *readily accessible* .

C404.7.1 Storage tank hot water circulation systems. Circulating pumps intended to maintain storage tank water temperature shall have controls that will limit operation of the pump from heating cycle start up to not greater than 5 minutes after the end of the cycle. *Ready access* shall be provided to the operating controls.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the criteria of the IECC Commercial Provisions, has a provision to circulating system pump controls. This situation is not addressed in the IECC and needs to be to ensure consistency between standard 90.1-2010 and the IECC.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Both parts of this code changes were heard by the Commercial Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Disapproved**

Committee Reason: The language of the proposal is too specific such that it would restrict new technologies.

Assembly Action: **Approved as Modified**

Modify the proposal as follows:

~~**C404.7.1 Storage tank hot water circulation systems.** Circulating pumps intended to maintain storage tank water temperature shall have controls that will limit operation of the pump from heating cycle start up to not greater than 5 minutes after the end of the cycle. *Ready access* shall be provided to the operating controls.~~

C404.6.1 Controls for hot water storage. The controls on pumps that circulate water between a water heater and a heated water storage tank shall limit operation of the pump from heating cycle startup to not greater than 5 minutes after the end of the cycle.

Final Hearing Results

CE278-13, Part I **AMF**

Code Change No: CE278-13, Part II

Original Proposal

Section(s): C404.6, C404.7 (NEW), IPC [E] 607.2.1, IPC [E] 607.2.1.1 (NEW)

Proponent: Steve Ferguson representing the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (sferguson@ashrae.org)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

PART II–IPC

Revise as follows:

[E] 607.2.1 Hot water temperature maintenance system controls. ~~Automatic~~ For hot water distribution system circulating ~~hot water~~ ~~system~~ pumps ~~or~~ and heat trace, the pumps and heat trace shall be arranged to be ~~conveniently~~ turned off ~~either~~ automatically ~~or manually~~ when there ~~hot water system~~ ~~is not in operation~~. is ~~limited~~ not hot water demand. *Ready access* shall be provided to the operating controls. This section and Section 607.2.1.1 shall not apply to hot water temperature maintenance system controls in Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Hot water temperature maintenance system controls in Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane shall be in accordance with Section R403.4.1 of the *International Energy Conservation Code.*

> **[E] 607.2.1.1 Storage tank hot water circulation systems.** Circulating pumps intended to maintain storage tank water temperature shall have controls that will limit operation of the pump from heating cycle start up to not greater than 5 minutes after the end of the cycle. *Ready access* shall be provided to the operating controls.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the criteria of the IECC Commercial Provisions, has a provision to circulating system pump controls. This situation is not addressed in the IECC and needs to be to ensure consistency between standard 90.1-2010 and the IECC.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Both parts of this code changes were heard by the Commercial Energy Conservation Code Development Committee.

PART II – IPC
Committee Action: **Approved as Modified**

Modify the proposal as follows:

~~**[E] 607.2.1.1 Storage tank hot water circulation systems.** Circulating pumps intended to maintain storage tank water temperature shall have controls that will limit operation of the pump from heating cycle start up to not greater than 5 minutes after the end of the cycle. *Ready access* shall be provided to the operating controls.~~

[E] 607.2.1.1 Controls for hot water storage. The controls on pumps that circulate water between a water heater and a heated water storage tank shall limit operation of the pump from heating cycle startup to not greater than 5 minutes after the end of the cycle.

Committee Reason: The modification was made to address concerns about what pumps are being discussed. The overall proposal was approved because The *International Plumbing Code* needs to make the correct references to sections in the IECC.

Assembly Action: **None**

Final Hearing Results

CE278-13, Part II **AMF**

Code Change No: CE279-13, Part I

Original Proposal

Section(s): C404.6, C404.6.1 (NEW), C404.6.2 (NEW), Chapter 5, IPC [E]607.2.1, IPC [E]607.2.1.1 (NEW), IPC [E]607.2.1.1.1 (NEW), IPC [E]607.2.1.1.2 (NEW), IPC Chapter 14

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND TWO WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I-IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.6 ~~Circulating~~ ~~hot~~ Heated water circulating and temperature maintenance systems ~~controls~~ (Mandatory). ~~Circulating hot water systems shall be provided with an automatic or readily *accessible* manual switch that can turn off the hot-water circulating pump when the system is not in use~~ Heated water circulation systems shall be in accordance with Section C404.6.1. Heat trace temperature maintenance systems shall be in accordance with Section C404.6.2. Automatic controls, temperature sensors and pumps shall be *accessible*. Manual controls shall be *readily accessible*.

C404.6.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).

C404.6.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add new standard to Chapter 5 as follows:

IEEE The Institute of Electrical and Electronic Engineers, Inc.
3 Park Avenue
New York, NY 1016-5997

515.1-2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications

Reason: There are 2 primary reasons for this proposed change. 1) Correlate the language in the IECC and the IPC; 2) Clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

The current code language is not the same in the IECC and the IPC. It should be.

The current language allows for continuously operating circulation pumps, which creates inefficiency in the hot water distribution system. It also does not address the use of heat trace in both codes and there is currently no requirement that the heat trace be suitable for the application. The consequence is that water heating energy consumption is increased.

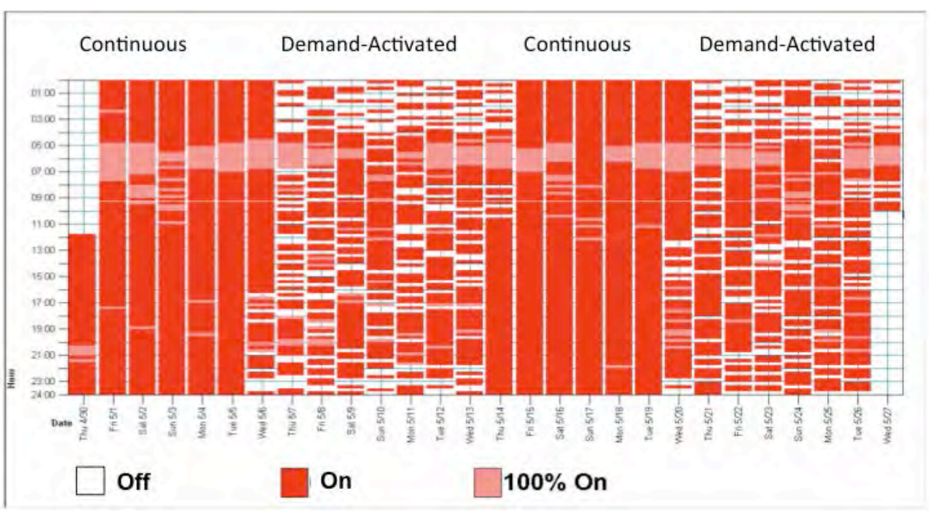
Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						Demand Activated Circulation
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

Figure 2 shows the differences in run-time at the water heater (or boiler) between a continuously pumped recirculation loop and one that has a demand activated pump control. Blank space (white) means the water heater was off. Red means some percent of run-time between zero and continuous. Pink means the water heater or boiler was running continuously. The test results come from studies done by Southern California Gas Company on a sample of more than 300 multi-family buildings with central water heaters and recirculation systems. Most systems tested were built before insulation was required on hot water recirculation loops. Savings ranged from 10-30 percent of the water heating energy use and 84 percent of the pump electricity use. The costs for installing the retrofit were paid back in just about one year. In new construction, the marginal costs would be recovered in just a few months

Figure 2 Run-time of Water Heater with Two Different Pump Controls



Why is demand-activated circulation such an efficient strategy? The 2012 IECC, IPC and IRC require that the hot water piping in automatic temperature maintenance systems in new buildings be insulated with pipe insulation. This means the water in the circulation loop will stay hot for a very long time – up to 45 minutes for ¾ inch nominal pipe up to 2 hours for 2-inch nominal pipe – even if the circulating pump is shut off. If this is the case, why run the pump when the water is still hot? Why run the pump when no one is in the building or when no one is demanding hot water? The only time it makes sense to run the pump is shortly before hot water is needed: hence the requirement that the pump be controlled on-demand.

The requirements for heat trace are partly to ensure that the systems can be operated in the most energy efficient manner consistent with providing heated water to the occupancy. The reference standards are included to ensure that installed systems are safe for the intended application. The energy consequences of using heat trace are very reasonable. Figure 3 presents the energy requirements for a heat trace system with the same hot water supply piping as the circulation systems shown in Figure 1. The energy requirements of keeping the trunk line hot – the same as keeping the supply portion of the loop hot in a circulating system – are 701 kWh per year, assuming 12 hours at high temp (115F) and 12 hours at economy temp (105F). This is equivalent to operating the loop about 3 hours per day, but with hot water available 24/7 in the supply trunk! This is a significant savings when water heating is done electrically or with a similarly expensive fuel. If the branches are also traced, we can deliver heated water even more quickly to the fixtures using only 1,682 kWh per year, which is the same energy as running the loop a little more than 6 hours a day.

Figure 3. Annual Energy Needed for Electric Heat Trace Systems

Heat Trace			
	(kWh per year)		
	Trunk	**Br**	**T-Br**
Supply Heat Losses			
High Temp	394	552	946
Economy Temp	307	429	736
Total Electricity	701	981	1,682

Cost impact: The proposal does not require either circulation or heat trace; however if either is selected, it clarifies the requirements for installation. Most recirculation systems today are installed with some form of control, usually a timer, a bandwidth thermostat (aquastat) or both. Some come with more sophisticated controls, such as programmable or are connected to an energy management system. In some cases, switching from these control strategies to demand activated controls will cost less. In other cases, the demand-activated controls will cost more.

Analysis: A review of the standards proposed for inclusion in the code, CSA 22.2 No. 130 and UL 515 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1 2013.

Public Hearing Results

Both parts of this code changes were heard by the Commercial Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Disapproved

Committee Reason: The proposal has too many holes and would create problems with heat trace manufacturers that already list and label their products to UL 515.

Assembly Action: None

Public Comments

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C404.6 Heated water circulating and temperature maintenance systems ~~(Mandatory).~~ Heated water circulation systems shall be in accordance with Section C404.6.1. Heat trace temperature maintenance systems shall be in accordance with Section C404.6.2. Automatic controls, temperature sensors and pumps shall be *accessible*. Manual controls shall be *readily accessible*.

C404.6.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. ~~Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).~~ Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

Reason: The purpose of this proposal is to clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

At the development hearing we were unable to hear a floor modification that would have resolved the Committee's concerns. The modifications shown in this comment remove the holes. The IECC-RE development Committee was able to hear these modifications and approved RE125 as modified by the committee. Those provisions are incorporated into this comment.

Supporting this modification will correlate the language in the Commercial and Residential chapters of the IECC. Circulating systems and heat trace cannot tell what occupancy they have been installed in and the energy efficiency issues are similar enough that the provisions should be the same for all occupancies.

I urge your support.

Final Hearing Results

CE279-13, Part I AMPC

Code Change No: CE282-13, Part I

Original Proposal

Section(s): C404.7 (New), IPC Chapter 2, IPC [E]607.2.1.1 (New)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND TWO WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I – IECC-COMMERCIAL PROVISIONS

Add new text as follows:

C404.7 Demand recirculation controls. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a *demand recirculation water system.* Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the temperature entering the cold water piping to 102ºF (38.9 ºC).

Reason: The purpose of this code change proposal is to clarify the requirements for installing circulation pumps in applications that use a cold water supply pipe to circulate the water back to the water heater. Demand recirculation water systems are significantly more energy efficient than other recirculation systems and are inherently safer when the cold water supply is used as the return.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						**Demand Activated Circulation**
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

The inherently better safety comes from the fact that the controls specified for demand recirculation water systems limit the flow of water from the hot water supply into the cold water supply to only minutes a day and because they limit the temperature of the water that is allowed to go into the cold water supply. There are five other control strategies for heated water recirculation systems (thermosyphon (gravity), continuous pumping, timer controlled, bandwidth temperature sensor (aquastat) controlled and a combination of timer and bandwidth temperature sensor (aquastat) controlled and none of them has the ability to meet these stringent requirements.

The requirements of this section should be identical in both the IECC and the IPC, since the language for the controls does not depend on occupancy

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: This proposal will not increase the cost of construction, as it does not require the use of demand recirculation water systems. In addition, the ability to use cold-water supply piping as a return pipe may reduce the cost of installing a circulation loop.

Public Hearing Results

Both parts of this code changes were heard by the Commercial Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: Approved as Submitted

Committee Reason: The proposal was approved to be consistent with a similar proposal that was approved for the IECC-Residential Provisions.

Assembly Action: None

Public Comments

Public Comment 2:

Greg Towsley, Grundfos representing self, requests Approval as Modified by this Public Comment

Modify the proposal as follows:

[E] 607.2.1.1 Demand recirculation controls. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a demand recirculation water system. Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture, or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the ~~water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the~~ temperature of the water entering the cold water piping to ~~102ºF (38.9 ºC)~~ 104°F (40°C).

Commenter's Reason: The addition of the comma after fixture clarifies that there are three (3) options on how the pump will start. Eliminating the requirement of a temperature rise allows for innovation and reduces restriction of technology from only one design. Most thermostats available in the market are designed for 104°F, not 102°F.

Final Hearing Results

CE282-13, Part I AMPC2

Code Change No: CE282-13, Part II

Original Proposal

Section(s): C404.7 (New), IPC Chapter 2, IPC [E]607.2.1.1 (New)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PARTS I AND TWO WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART II-IPC

Add new text as follows:

[E] 607.2.1.1 Demand recirculation controls. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a *demand recirculation water system.* Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the temperature entering the cold water piping to 102ºF (38.9 ºC).

Add definition as follows:

DEMAND RECIRCULATION WATER SYSTEM. A water distribution system where one more pumps prime the service hot water piping with heated water upon demand for hot water.

Reason: The purpose of this code change proposal is to clarify the requirements for installing circulation pumps in applications that use a cold water supply pipe to circulate the water back to the water heater. Demand recirculation water systems are significantly more energy efficient than other recirculation systems and are inherently safer when the cold water supply is used as the return.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

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The inherently better safety comes from the fact that the controls specified for demand recirculation water systems limit the flow of water from the hot water supply into the cold water supply to only minutes a day and because they limit the temperature of the water that is allowed to go into the cold water supply. There are five other control strategies for heated water recirculation systems (thermosyphon (gravity), continuous pumping, timer controlled, bandwidth temperature sensor (aquastat) controlled and a combination of timer and bandwidth temperature sensor (aquastat) controlled and none of them has the ability to meet these stringent requirements.

The requirements of this section should be identical in both the IECC and the IPC, since the language for the controls does not depend on occupancy

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: This proposal will not increase the cost of construction, as it does not require the use of demand recirculation water systems. In addition, the ability to use cold-water supply piping as a return pipe may reduce the cost of installing a circulation loop.

Public Hearing Results

Both parts of this code changes were heard by the Commercial Energy Conservation Code Development Committee.

PART II – IPC
Committee Action: Approved as Submitted

Committee Reason: The proposal properly aligns the *International Plumbing Code* with the IECC-CE and adds a necessary definition to the IPC.

Assembly Action: None

Public Comments

Public Comment 2:

Greg Towsley, Grundfos, representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

[E] 607.2.1.1 Demand recirculation controls. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a demand recirculation water system. Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture, or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the ~~water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the~~ temperature of the water entering the cold water piping to ~~102ºF (38.9 ºC)~~ 104°F (40°C).

Commenter's Reason: The addition of the comma after fixture clarifies that there are three (3) options on how the pump will start. Eliminating the requirement of a temperature rise allows for innovation and reduces restriction of technology from only one design. Most thermostats available in the market are designed for 104°F, not 102°F.

Final Hearing Results

CE282-13, Part II AMPC2

Code Change No: CE283-13, Part I

Original Proposal

Section(s): C404.7 (NEW), Table C407.5.1(1), Chapter 5, R403.4.3 (NEW) (N1103.5 (NEW)), Chapter 5, IRC P2903.11 (NEW)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IECC-COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART III WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gerald Van Decker, RenewABILTY Energy Inc., representing self (gerald@renewability.com), Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART I IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.7 Drain water heat recovery units. Drain water heat recovery units shall comply with CSA 55.2. Potable water-side pressure loss shall be less than 10 psi at maximum design flow. For Group R occupancies, the efficiency of drain water heat recovery unit efficiency shall be in accordance with CSA 55.1.

TABLE C407.5.1(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Service water weating[f,g,h,j]	Fuel type: same as proposed	As proposed
	Efficiency: in accordance with Table C404.2	For Group R, as proposed multiplied by SWHF For other than Group R, as proposed multiplied by efficiency as provided by the manufacturer of the DWHR unit.
	Capacity: same as proposed	As proposed
	Where a service water hot water system does not exist or is not specified in the proposed design, a service hot water heating shall not be modeled.	

(Portions of Table not shown remain unchanged)

j. SWHF means service water heat recovery factor. DWHR means drain water heat recovery. The SWHF shall be applied as follows:

= (1 – (DWHR unit efficiency x 0.36))
where potable water from the DWHR unit supplies not less than 1 shower and not greater than 2 showers, of which the

drain water from the same showers flows through the DWHR unit.
= (1 – (DWHR unit efficiency x 0.33))
where potable water from the DWHR unit supplies not less than 3 showers and not greater than 4 showers, of which the drain water from the same showers flows through the DWHR unit.
= (1 – (DWHR unit efficiency x 0.26))
where potable water from the DWHR unit supplies not less than 5 showers and not greater than 6 showers, of which the drain water from the same showers flows through the DWHR unit,
= 1.0
where the other conditions are not met.

Add new standards to Chapter 5 as follows:

CSA

CSA 55.1-2012 Test method for measuring efficiency and pressure loss of drain water heat recovery units

CSA 55.2-2012 Drain water heat recovery units

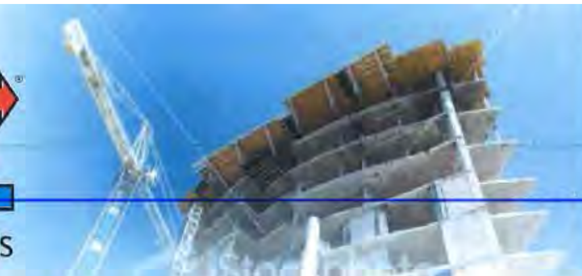
Reason: There are two reasons for this proposal.1) To enable developers to take credit for efficiency improvements due to the use of drain water heat recovery devices in the performance calculations in the energy code; and 2) to make comparisons of the efficiency of different units based on an existing standard.

Drain water heat recovery (DWHR) works particularly well where heated water flows down the drain at the same time as water flows in that needs to be heated; this “coincident flow” occurs in occupancies with showering and lavatory use. Performance of a DWHR unit is characterized by both efficiency and pressure loss. It is important to ensure that DWHR devices do not impose large pressure losses in the piping in order to minimize the impact on water flow in the building. Given the available DWHR efficiencies, savings are typically 10% to 35% of the energy used for heating water. Over 25,000 drain water heat recovery units have been installed in homes in Canada and the United States.

This change adds two standards for drain water heat recovery units (DWHR units). Drain water heat recovery is often a cost effective way to add to energy efficiency by recapturing hot water energy that is literally “going down the drain”. The proposed standards have already been in use by designers for 10 years and the resulting ratings are in use by a variety of energy efficiency programs. Commercial (i.e. non multi-unit residential) applications are engineered systems while multi-unit residential applications are non-engineered and straightforward.

CSA B55.2 standard is for fabrication and material quality of DWHR units. The CSA B55.1 standard is for testing and labeling of DWHR units efficiency and pressure loss at 2.5gpm (9.5lpm). These existing standards were developed through a consensus process by the Canadian Standards Association and are referenced by the Ontario Building Code.

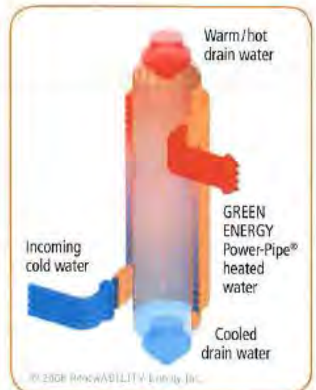
A typical drain water heat recovery unit is shown below:



POWER-PIPE®

Drain Water Heat Recovery Systems

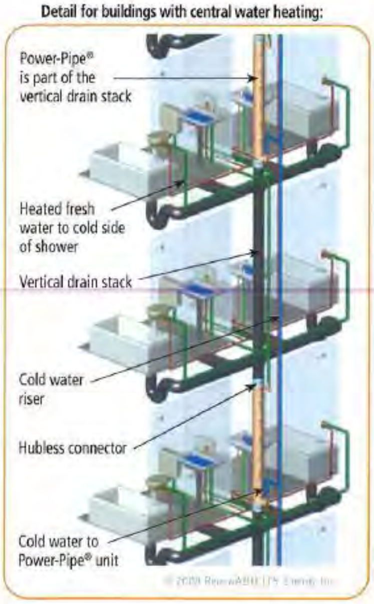
Reduce Operating Costs
for Multi-Unit Residential Buildings



Cost-Effective Green Energy Technology

- The Power-Pipe® is **proven, practical, affordable** and in use today saving energy for thousands of residential suites.
- **Water heating is typically the second highest energy cost** in multi-unit residential buildings; in fact it can even be the highest energy cost.

Detail for buildings with central water heating:



- As building envelopes have become more efficient in recent years water heating has become an even larger portion of the remaining energy costs.
- Much of the drain water leaving a residential building carries with it valuable and recoverable heat energy.
- The all copper Power-Pipe is a double-wall heat exchanger that can **reduce water heating costs by 20-40%** by recovering heat energy from drain (waste) water in multi-residential building drain (waste) stacks.
- The patented and patent pending Power-Pipe design is the only heat exchanger that efficiently allows for up to 4 apartment suites to be plumbed without noticeable loss in water pressure... in fact this results in a **2 to 4 times faster payback** than other heat exchangers.
- The Power-Pipe is very **simple to specify and install** and its savings typically translate to a **3 to 4 year simple payback**; even faster with government or utility incentives.

How It Works

1. As drain water falls down any vertical drain stack it clings to the inner wall, rather than going down the middle of the pipe. This results in a quickly falling thin film.
2. The energy (heat) from this falling film of drain water is easily and efficiently transferred through the copper to the fresh cold water which is flowing around the drain pipe in the outer coils.
3. Cold fresh water is plumbed into the bottom of the Power-Pipe from the main cold water riser.
4. Power-Pipe heated water is then plumbed to either:
   - the cold side of up to 4 showers, for buildings with central water heating, thereby reducing hot water demand
   - the cold side of the shower and water heater, for buildings with in-suite water heaters

877-606-5559
www.renewability.com

Advantages of the Power-Pipe®

- The Power-Pipe® is **very simple to install** during new construction and it integrates with any plumbing system
- The Power-Pipe **can be retrofit** in buildings where there is access to the drain stacks and fresh water lines
- Maintenance-free, 50+ year life
- The Power-Pipe will increase effective hot water capacity, thereby reducing the risk of running out of hot water
- **Quality** is never compromised; the coils of every Power-Pipe unit consist of 100% Type L or heavier copper tube
- The Power-Pipe also provides significant cost-effective **reductions in green house gases** as a result of reduced primary energy demand
- The performance of the Power-Pipe has been **verified by the Canadian Government** *(Ministry of Natural Resources Canada and the University of Waterloo)* in independent third-party testing
- The Power-Pipe will **assist in obtaining LEED Certification** (and similar programs) for your building
- Many Governments and Utilities also offer **financial incentives** resulting in a quicker payback
- The Power-Pipe is the most proven, most used drain water heat recovery technology; many building designers have been specifying the Power-Pipe as a standard in their buildings for many years now, there are now thousands of suites in which Power-Pipes are saving money and energy daily.

Applications Include:

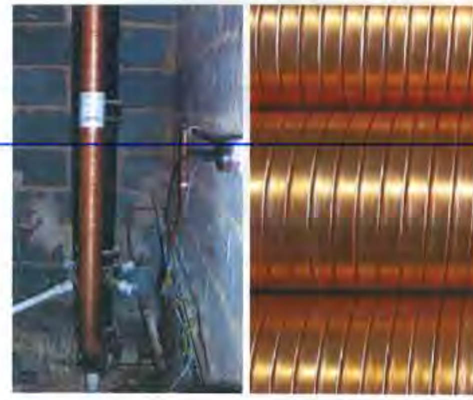
• CONDOMINIUMS	• STUDENT DORMS
• APARTMENT BUILDINGS	• HOSPITALS
• HOTELS	• PRISONS
• AFFORDABLE HOUSING	• TOWNHOUSES

Developed and manufactured by:

RenewABILITY ENERGY INC.

What We Provide:

- We provide free and full support including feasibility analysis, design consultation, CAD drawing elements, and training.
- 10 Year Warranty



Sampling of Projects

Regent Park
Toronto, Ontario
New Construction – Affordable Housing

OMHM
Montreal, Quebec
New Construction – Affordable Housing

University of Toronto
Toronto, Ontario
Student Dorm

University of Oregon
Eugene, Oregon
Student Dorm

Yee Kang Centre
Montreal, Quebec
New Construction – Affordable Housing

Bury Court
Bedford, England
Retrofit – Affordable Housing

Prison
North Bend, Oregon
Retrofit – Government Facility

University of Waterloo
Waterloo, Ontario
Student Townhouses

Adelaide Project
Toronto, Ontario
New Construction – Affordable Housing

Hotel
North Battleford, Saskatchewan
New Construction

National Defense
Halifax, Nova Scotia
Officers Residence

Eastern Oregon University
Eugene, Oregon
Student Dorm

Maison Transitionelle
Montreal, Quebec
New Construction – Affordable Housing

Benny Farms
Montreal, Quebec
LEED Platinum Status and International Award

ETS
Montreal, Quebec
Student Dorm

Cloverdale Housing Coop
Montreal, Quebec
Retrofit – Affordable Housing

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Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, CSA B55.1 and B55.2 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Public Hearing Results

PART I – IECC - Commercial

Committee Action: Disapproved

Committee Reason: Drain waste heat recovery seems to be a valuable energy saving idea but there is some confusion about whether the proposal has the correct computational method to adjust (increase) the efficiency of the service water heating system when these products are installed.

Assembly Action: None

Public Comment

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self; Gerald Van Decker, RenewABILITY Energy Inc, representing self, request Approval as Submitted

Commenter's Reason: I agree with the Committee's reason that it is important for code officials, contractors and building owners to have recognized standards regarding safety and performance for building components. This code change provides these standards for drain water heat recovery units, and I urge your support of this code change.

Final Hearing Results

CE283-13 Part I AS

Code Change No: CE283-13, Part II

Original Proposal

Section(s): C404.7 (NEW), Table C407.5.1(1), Chapter 5, R403.4.3 (NEW) (N1103.5 (NEW)), Chapter 5, IRC P2903.11 (NEW)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IECC-COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART III WILL BE HEARD BY THE IRC-PLUMBING COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gerald Van Decker, RenewABILTY Energy Inc., representing self (gerald@renewability.com), Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART II IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R403.4.3 (N1103.4.3) Drain water heat recovery units. Drain water heat recovery units shall comply with CSA 55.2. Drain water heat recovery units shall be in accordance with CSA 55.1. Potable water-side pressure loss of drain water heat recovery units shall be less than 3 psi (20.7 kPa) for individual units connected to one or two showers. Potable water-side pressure loss of drain water heat recovery units shall be less than 2 psi (13.8 kPa) for individual units connected to three or more showers.

Add new standards to Chapter 5 as follows:

CSA

CSA 55.1-2012 Test method for measuring efficiency and pressure loss of drain water heat recovery units

CSA 55.2-2012 Drain water heat recovery units

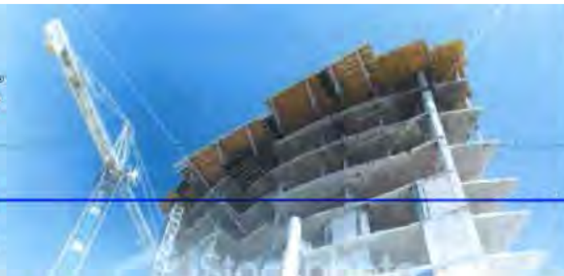
Reason: There are two reasons for this proposal.1) To enable developers to take credit for efficiency improvements due to the use of drain water heat recovery devices in the performance calculations in the energy code; and 2) to make comparisons of the efficiency of different units based on an existing standard.

Drain water heat recovery (DWHR) works particularly well where heated water flows down the drain at the same time as water flows in that needs to be heated; this “coincident flow” occurs in occupancies with showering and lavatory use. Performance of a DWHR unit is characterized by both efficiency and pressure loss. It is important to ensure that DWHR devices do not impose large pressure losses in the piping in order to minimize the impact on water flow in the building. Given the available DWHR efficiencies, savings are typically 10% to 35% of the energy used for heating water. Over 25,000 drain water heat recovery units have been installed in homes in Canada and the United States.

This change adds two standards for drain water heat recovery units (DWHR units). Drain water heat recovery is often a cost effective way to add to energy efficiency by recapturing hot water energy that is literally “going down the drain”. The proposed standards have already been in use by designers for 10 years and the resulting ratings are in use by a variety of energy efficiency programs. Commercial (i.e. non multi-unit residential) applications are engineered systems while multi-unit residential applications are non-engineered and straightforward.

CSA B55.2 standard is for fabrication and material quality of DWHR units. The CSA B55.1 standard is for testing and labeling of DWHR units efficiency and pressure loss at 2.5gpm (9.5lpm). These existing standards were developed through a consensus process by the Canadian Standards Association and are referenced by the Ontario Building Code.

A typical drain water heat recovery unit is shown below:



POWER-PIPE®

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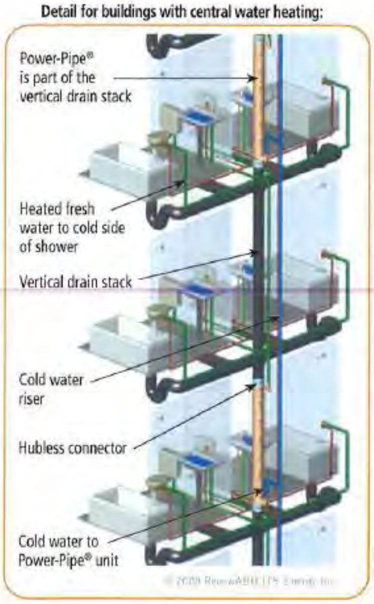
Cost-Effective Green Energy Technology

- The Power-Pipe® is **proven, practical, affordable** and in use today saving energy for thousands of residential suites.
- **Water heating is typically the second highest energy cost** in multi-unit residential buildings; in fact it can even be the highest energy cost.

Detail for buildings with central water heating:



- As building envelopes have become more efficient in recent years water heating has become an even larger portion of the remaining energy costs.
- Much of the drain water leaving a residential building carries with it valuable and recoverable heat energy.
- The all copper Power-Pipe is a double-wall heat exchanger that can **reduce water heating costs by 20-40%** by recovering heat energy from drain (waste) water in multi-residential building drain (waste) stacks.
- The patented and patent pending Power-Pipe design is the only heat exchanger that efficiently allows for up to 4 apartment suites to be plumbed without noticeable loss in water pressure... in fact this results in a **2 to 4 times faster payback** than other heat exchangers.
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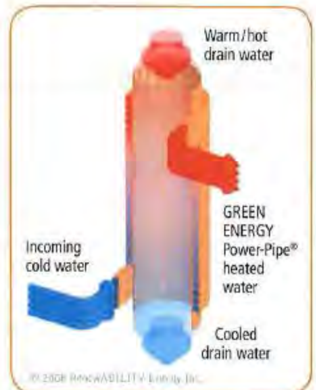

How It Works

1. As drain water falls down any vertical drain stack it clings to the inner wall, rather than going down the middle of the pipe. This results in a quickly falling thin film.
2. The energy (heat) from this falling film of drain water is easily and efficiently transferred through the copper to the fresh cold water which is flowing around the drain pipe in the outer coils.
3. Cold fresh water is plumbed into the bottom of the Power-Pipe from the main cold water riser.
4. Power-Pipe heated water is then plumbed to either:
   - the cold side of up to 4 showers, for buildings with central water heating, thereby reducing hot water demand
   - the cold side of the shower and water heater, for buildings with in-suite water heaters

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Advantages of the Power-Pipe®

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- **Quality** is never compromised; the coils of every Power-Pipe unit consist of 100% Type L or heavier copper tube
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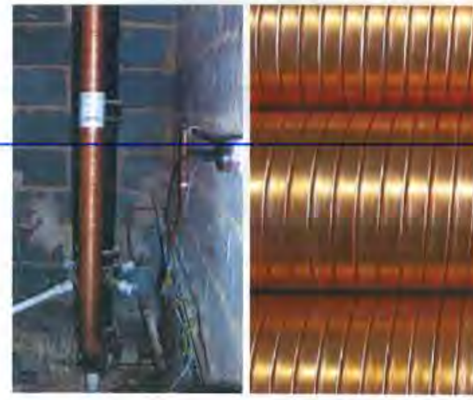

Applications Include:

• CONDOMINIUMS	• STUDENT DORMS
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What We Provide:

- We provide free and full support including feasibility analysis, design consultation, CAD drawing elements, and training.
- 10 Year Warranty

Sampling of Projects

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Retrofit – Affordable Housing

Prison
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Retrofit – Government Facility

University of Waterloo
Waterloo, Ontario
Student Townhouses

Adelaide Project
Toronto, Ontario
New Construction – Affordable Housing

Hotel
North Battleford, Saskatchewan
New Construction

National Defense
Halifax, Nova Scotia
Officers Residence

Eastern Oregon University
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Student Dorm

Maison Transitionelle
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Benny Farms
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LEED Platinum Status and International Award

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Cloverdale Housing Coop
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Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, CSA B55.1 and B55.2 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Public Hearing Results

PART II – IECC – Residential
Committee Action: **Approved As Submitted**

Committee Reason: Massachusetts recognizes drain waste heat recovery units in their "stretch" code. If these units are going to be installed, then there needs to be requirements to make sure the units operate properly and provide the intended performance.

Assembly Action: **None**

Final Hearing Results

CE283-13 Part II **AS**

Code Change No: CE283-13, Part III

Original Proposal

Section(s): C404.7 (NEW), Table C407.5.1(1), Chapter 5, R403.4.3 (NEW) (N1103.5 (NEW)), Chapter 5, IRC P2903.11 (NEW)

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Proponent: Gerald Van Decker, RenewABILTY Energy Inc., representing self (gerald@renewability.com), Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART III IRC-P

Add new text as follows:

P2903.11 Drain water heat recovery units. Drain water heat recovery units shall be in accordance with Section N1103.4.3

Reason: There are two reasons for this proposal.1) To enable developers to take credit for efficiency improvements due to the use of drain water heat recovery devices in the performance calculations in the energy code; and 2) to make comparisons of the efficiency of different units based on an existing standard.

Drain water heat recovery (DWHR) works particularly well where heated water flows down the drain at the same time as water flows in that needs to be heated; this "coincident flow" occurs in occupancies with showering and lavatory use. Performance of a DWHR unit is characterized by both efficiency and pressure loss. It is important to ensure that DWHR devices do not impose large pressure losses in the piping in order to minimize the impact on water flow in the building. Given the available DWHR efficiencies, savings are typically 10% to 35% of the energy used for heating water. Over 25,000 drain water heat recovery units have been installed in homes in Canada and the United States.

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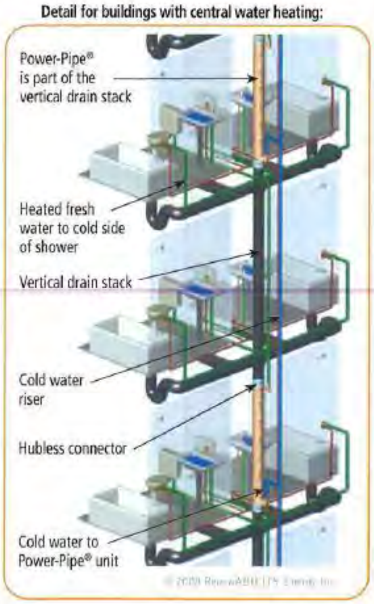

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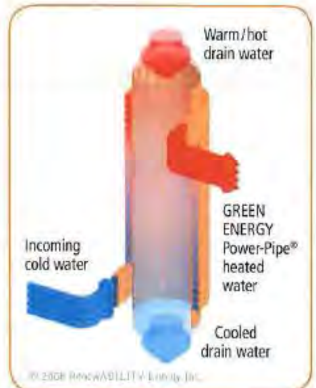

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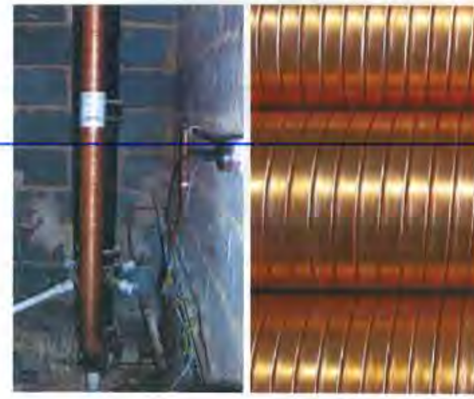

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Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standards proposed for inclusion in the code, CSA B55.1 and B55.2 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee, Part II was heard by the Residential Energy Conservation Code Development Committee and Part III was heard by the Residential Plumbing Code Development Committee.

For staff analysis of the content of CSA 55.1-2012 and CSA 55.2-2012 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

PART III – IRC – Plumbing
Committee Action: Disapproved

Committee Reason: There is no need to have this pointer in the plumbing chapter as the information is contained in the IRC and not some other publication.

Assembly Action: None

Public Comments

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self; Gerald Van Decker, RenewABILITY Energy Inc, representing self, request Approval as Modified by this Public Comment.

Modify proposal as follows:

P2903.11 Drain water heat recovery units. Drain water heat recovery units that are installed for heat recovery shall ~~be in accordance with~~ meet the requirements of Section N1103.4.3.

Commenter's Reason: Drain water heat recovery systems are relatively uncommon in residential construction at this time. Their installation affects the design and layout of the overall domestic piping supply and may affect other building subsystems. Having a reference in the plumbing chapter will help to avoid lapses in coordination with other trades and will improve the ease of compliance.

Final Hearing Results

CE283-13, Part III

Code Change No: CE284-13

Original Proposal

Section(s): C404.8 (NEW), C408.1, C408.2, C408.2.3.2, C408.2.4, C408.2.4.1, C408.2.5.2, C408.2.5.4

Proponent: Jeremiah Williams / U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C404.8 Service water heating systems commissioning and completion requirements. *Service water heating systems*, swimming pool water heating systems, spa water heating systems and the controls for those systems shall be commissioned and completed in accordance with Section C408.2.

C408.1 General. This section covers the commissioning of the building mechanical systems in Section C403, service water heating systems in Section C404, and electrical power and lighting systems in Section C405.

C408.2 Mechanical systems and service water heating systems commissioning and completion requirements. Prior to passing the final mechanical and plumbing inspections, the *registered design professional* shall provide evidence of mechanical systems and service water heating systems *commissioning* and completion in accordance with the provisions of this section.
Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

Exception: The following systems are exempt from the commissioning requirements:

1. Mechanical systems and service water heating systems in buildings where the total ~~mechanical~~ equipment capacity is less than 480,000 Btu/h (140 690 W) cooling capacity and 600,000 Btu/h (175 860 W) combined service water heating and space heating capacity.
2. Systems included in Section C403.3 that serve dwelling units and sleeping units in hotels, motels, boarding houses or similar units.

C408.2.3.2 Controls. HVAC and service water heating control systems shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications. Sequences of operation shall be functionally tested to document they operate in accordance with *approved* plans and specifications.

C408.2.4 Preliminary commissioning report. A preliminary report of commissioning test procedures and results shall be completed and certified by the *registered design professional* or *approved agency* and provided to the building owner. The report shall be organized with mechanical and service hot water findings in separate sections to allow independent review. The report shall be identified as "Preliminary Commissioning Report" and shall identify:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.
2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.

C408.2.4.1 Acceptance of report. *Buildings*, or portions thereof, shall not pass the final mechanical <u>and plumbing</u> inspection<u>s</u>, until such time as the *code official* has received a letter of transmittal from the *building* owner acknowledging that the *building* owner has received the Preliminary Commissioning Report.

C408.2.5.2 Manuals. An operating and maintenance manual shall be provided and include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. HVAC <u>and service hot water</u> controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined setpoints shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
5. A narrative of how each system is intended to operate, including recommended setpoints.

C408.2.5.4 Final commissioning report. A report of test procedures and results identified as "Final Commissioning Report" shall be delivered to the building owner ~~and shall include~~. <u>The report shall be organized with mechanical system and service hot water system findings in separate sections to allow independent review. The report shall include the following:</u>

1. Results of functional performance tests.
2. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.
3. Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provided herein for repeatability.

Exception: Deferred tests which cannot be performed at the time of report preparation due to climatic conditions.

Reason: This proposal increases HVAC commissioning scope to also include the building service water heating systems.
The value of commissioning a commercial building has been documented and was included for mechanical and lighting systems during the prior code development cycle as a new Section C408 in the IECC. Those provisions are intended to ensure that the building has been "tuned" prior to occupancy to make sure it is properly operating and capable of continuing to operate properly. Many hot water systems have recirculation or heat trace systems that need to be checked to verify that time or other controls are in place to avoid excessive unoccupied piping heat loss. This extends the value and validity of the code provisions because there is little value in requiring something be provided in a building if it is not properly installed and ready to perform its intended function.

The commissioning of the service hot water system is the next logical step in enhancing the value of the IECC. As noted above, there is no reason to add something to the code if there is no review process to make sure it is properly installed and can perform its intended function.

The proposed change expands the scope of mechanical commissioning to include service hot water systems. For buildings not exempt from commissioning, service hot water and mechanical systems are often integrated and the controls and commissioning are likely to be completed by the same parties. For integral tank temperature controls, the commissioning authority can design appropriate simple testing such as a spot check of delivered water temperature to verify proper control operation. The provisions require that the preliminary and final commissioning reports be organized so that mechanical and service hot water results are separate and can be independently reviewed. This will allow mechanical and plumbing inspectors to separately review the results where appropriate.

There is a cost impact associated with this proposed change to the degree that the commissioning activity is currently not being performed and would have to be performed and documented in the proposed change. The cost would be modest, as it could be accomplished by the same staff completing the mechanical commissioning and would be included in the same commissioning report. There should also be a decrease in costs because such commissioning reduces the burden on state and local government to ensure and document compliance with the code. Without commissioning to ensure the code-required controls and other systems are in place, the cost effectiveness of other energy code provisions is in jeopardy. A study of 643 commissioned building in 26 states found that new building commissioning had a median payback of 4.2 years.

References:
Evan Mills. 2009. Building Commissioning: A golden opportunity for Reducing Energy Costs and Greenhouse-Gas Emissions. http://cx.lbl.gov/2009-assessment.html

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: An appropriate addition to the commissioning standards. Service water heating systems can only provide the energy savings where the system runs properly.

Assembly Action: **None**

Final Hearing Results

CE284-13 **AS**

Code Change No: CE285-13, Part I

Original Proposal

Section(s): C202, C405.1, R202 (IRC N1109.1) R404.1 (IRC N1104.1)

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AND PART II WILL BE HEARD BY THE RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE.

Proponent: Deborah Frankhouser, Four Point Lighting Design, representing the International Association of Lighting Designers (deborah@fourpointlighting.com)

PART I – IECC-COMMERCIAL PROVISIONS

Revise as follows:

C405.1 General (Mandatory). This section covers lighting system controls, the connection of ballasts, the maximum lighting power for interior applications, electrical energy consumption, and minimum acceptable lighting equipment for exterior applications.

> **Exception:** Dwelling units within commercial buildings shall not be required to comply with Sections C405.2 through C405.5 provided that they comply with Section R404.1. ~~not less than 75 percent of the permanently installed light fixtures, other than low voltage lighting, shall be fitted for, and contain only, high efficacy lamps.~~

Delete definition without substitution as follows:

SECTION C202
GENERAL DEFINITIONS

~~**HIGH-EFFICACYLAMPS.** Compact fluorescent lamps, T-8 or smaller diameter fluorescent lamps, or lamps with a minimum efficacy of:~~

1. ~~60 lumens per watt for lamps over 40 watts,~~
2. ~~50 lumens per watt for lamps over 15 watts to 40 watts,~~
3. ~~40 lumens per watt for lamps 15 watts or less.~~

Reason: (Part I) The exception to C405.1 establishes a different standard for lighting efficiency in dwellings from Section R404.1. Section C405.1 is a luminaire-based standard, whereas Section R404.1 is a lamp-based standard. There is no reason for the code to set an efficiency standard for lighting within dwelling units in multi-family buildings that is different from the standard for lighting in detached houses. Residential lighting is the same regardless of the building it is located in.

References:
Several reports document savings from using controls residentially, such as:

- http://www.lrc.rpi.edu/programs/lightingTransformatio/economics/table2.asp [shows 20% to 40% savings depending on space type for using occupancy sensors]
- http://www.energy.ca.gov/title24/2013standards/prerulemaking/documents/current/Reports/Residential/Lighting/ open Residential Lighting PDF and see page 32 [shows 10% savings from dimmers, 30% savings from occupancy sensors]
- Heschong Mahone Group Lighting Efficiency Technology Report Vol. 1, see page 83. www.energy.ca.gov/efficiency/lighting/VOLUME01.PDF [shows 20% savings from dimmers and 54% savings from occupancy sensors]

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: Lighting within residential units should comply with consistent standards. Those are provided best in the Residential portion of the IECC.

Assembly Action: **None**

Final Hearing Results

CE285-13 Part I	**AS**

Code Change No: CE287-13

Original Proposal

Section(s): C202 (New), C405.2, C405.2.1, C405.2.1.1, C405.2.2, C405.2.2.1, C405.2.1.1, C405.2.1.2, C405.2.2, C405.2.2.1, C405.2.2.3, C405.2.2.3.1, C405.2.2.3.2, C405.2.2.3.3, C405.2.3, C405.2.4

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C405.2 Lighting Controls (Mandatory). Lighting systems shall be provided with controls as specified in Sections C405.2.1, C405.2.2, C405.2.3, ~~and~~ C405.2.4, and C405.2.5.

Exceptions: Lighting controls are not required for the following:

1. Areas designated as security or emergency areas that are required to be continuously lighted;
2. Stairways and corridors; and
3. Emergency egress lighting that is normally off.

~~**C405.2.1 Manual lighting controls.** All buildings shall include manual lighting controls that meet the requirements of Sections C405.2.1.1 and C405.2.1.2.~~

~~**C405.2.2.2**~~ **C405.2.1 Occupant ~~sensors~~ sensor controls.** *Occupant* ~~sensors~~ *sensor controls* shall be installed in all classrooms, conference/meeting rooms, employee lunch and break rooms, private offices, restrooms, storage rooms and janitorial closets, and other spaces 300 square feet (28 m^2) or less that are enclosed by floor-to-ceiling height partitions. ~~These automatic control devices shall be installed to~~

C405.2.1.1 Occupant sensor control function. Occupant sensor controls shall comply with the following:

1. Automatically turn off lights within 30 minutes of all occupants leaving the space; ~~and~~
2. Shall either be manual on or shall be controlled to automatically turn the lighting on to not more than 50 percent power; and
3. Shall incorporate a *manual control* to allow occupants to turn lights off.

Exception: Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants

~~**C405.2.1.1 Interior lighting controls.** Each area enclosed by walls or floor-to-ceiling partitions shall have at least one manual control for the lighting serving that area. The required controls shall be located within the area served by the controls or be a remote switch that identifies the lights served and indicates their status.~~

~~**Exceptions:**~~

1. ~~Areas designated as security or emergency areas that need to be continuously lighted.~~
2. ~~Lighting in stairways or corridors that are elements of the means of egress.~~

C405.2.2 ~~Additional lighting~~ Time switch controls. ~~Each area that is required to have a manual control shall also have controls that meet the requirements of Sections C405.2.2.1, C405.2.2.2 and C405.2.2.3.~~ Each area of the building that is not provided with *occupant sensor controls* complying with Section C405.2.1.1 shall be provided with *time switch controls* complying with Section C405.2.2.1.

Exceptions: Where a *manual control* provides light reduction in accordance with Section C405.2.2.2, automatic controls ~~additional lighting controls~~ ~~need not be provided~~ shall not be required for the following:

1. *Sleeping units*.
2. Spaces where patient care is directly provided.
3. Spaces where an automatic shutoff would endanger occupant safety or security.
4. Lighting intended for continuous operation.

C405.2.2.1 ~~Automatic~~ Time switch control ~~devices~~ function. ~~Automatic time switch controls shall be installed to control lighting in all areas of the building.~~ Each space provided with *time switch controls* shall also be provided with a *manual control* for light reduction in accordance with Section C405.2.2.2. *Time switch controls* shall include an override switching device that complies with the following:

~~**Exceptions:**~~

~~1. Emergency egress lighting does not need to be controlled by an automatic time switch.~~
~~2. Lighting in spaces controlled by occupancy sensors does not need to be controlled by automatic time switch controls.~~

~~The automatic time switch control device shall include an override switching device that complies with the following:~~

1. The override switch shall be a *manual control* ~~in a readily accessible location;~~
~~2. The override switch shall be located where the lights controlled by the switch are visible; or the switch shall provide a mechanism which announces the area controlled by the switch;~~
~~3. The override switch shall permit manual operation;~~
2.~~4.~~ The override switch, when initiated, shall permit the controlled lighting to remain on for a maximum duration of 2 hours; and
3. Any individual override switch shall control the lighting for a maximum area of 5,000 square feet (465 m^2).

Exceptions:

1. Within malls, arcades, auditoriums, single tenant retail spaces, industrial facilities and arenas:
   - ~~1.~~ 1.1. The time limit shall be permitted to exceed 2 hours provided the override switch is a captive key device; and
   - ~~2.~~ 1.2. The area controlled by the override switch is permitted to exceed 5,000 square feet (465 m^2), but shall not exceed 20,000 square feet (1860 m^2).
2. Where provided with *manual control*, the following areas are not required to have light reduction control:
   - 2.1. Spaces that have only one luminaire with a rated power of less than 100 watts;
   - 2.2. Spaces that use less than 0.6 watts per square foot (6.5 W/m^2); and
   - 2.3. Corridors, equipment rooms, public lobbies, electrical or mechanical rooms.

~~C405.2.1.2~~ C405.2.2.2 Light reduction controls. ~~Each area that is required to have a manual control shall also allow the occupant to~~ Spaces required to have light reduction controls shall have a *manual control* that allows the occupant to reduce the connected lighting load in a reasonably uniform pattern by at least 50 percent. Lighting reduction shall be achieved by one of the following or other *approved* methods:

1. Controlling all lamps or luminaires;
2. Dual switching of alternate rows of luminaires, alternate luminaires, or alternate lamps;
3. Switching the middle lamp luminaires independently of the outer lamps; or
4. Switching each luminaire or each lamp.

Exception: Light reduction controls ~~need not be provided in the following areas and spaces:~~ are not required in daylight zones with *daylight responsive controls* complying with C405.3.2.

~~1. Areas that have only one luminaire, with rated power less than 100 watts.~~
~~2. Areas that are controlled by an occupant-sensing device.~~
~~3. Corridors, equipment rooms, storerooms, restrooms, public lobbies, electrical or mechanical rooms.~~
~~4. Sleeping unit (see Section C405.2.3).~~
~~5. Spaces that use less than 0.6 watts per square foot (6.5 W/m^2).~~
~~6. Daylight spaces complying with Section C405.2.2.3.2.~~

C405.2.2.3 Manual controls. *Manual controls* for lights shall meet the following requirements:

1. Shall be readily accessible to occupants; and
2. Shall be located where the controlled lights are visible; or the control shall identify the area served by the lights and indicate their status.

~~C405.2.2.3~~ C405.3 Daylight zone control. *(Portions of text not shown remains unchanged)*

~~C405.2.2.3.1~~ C405.3.1 Manual daylight controls. *(Portions of text not shown remains unchanged)*

~~C405.2.2.3.2 Automatic daylight controls.~~ C405.3.2 Daylight responsive controls. *(Portions of text not shown remains unchanged)*

~~C405.2.2.3.3~~ C405.3.3 Multi-level lighting controls. *(Portions of text not shown remains unchanged)*

~~C405.2.3~~ C405.2.4 Specific application controls. *(Portions of text not shown remains unchanged)*

~~C405.2.4~~ C405.2.5 Exterior lighting controls. *(Portions of text not shown remains unchanged)*

Add new definitions as follows:

SECTION C202
GENERAL DEFINITIONS

TIME SWITCH CONTROL. An automatic control device or system that controls lighting or other loads, including switching off, based on time schedules.

OCCUPANT SENSOR CONTROL. An automatic control device or system that detects the presence or absence of people within an area and causes lighting, equipment, or appliances to be regulated accordingly.

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides automatic control of electric light levels based on the amount of daylight in a space.

Reason: This public comment is submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 2 open meetings and over 15 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this proposal are as follows:

Overview:

This proposal reorganizes, but does not delete requirements related to lighting controls in the 2012 IECC.

Section C405.2 of the 2012 IgCC is confusing. It puts information that is often irrelevant first, and surprises with essential and relevant information only after one has suffered through trying to decipher what the implications of the irrelevant information might be. Section C405.2 also contains redundant information and the relationship of various subsections of C405.2 to one another is often unclear and ambiguous. This proposal reorganizes Section C405.2 to provide the clarity that is necessary for its proper application and enforcement. This proposal is a reorganization only and does not contain technical changes or increases or decreases in stringency.

Section C405.2:

According to the IBC, all interior stairways and corridors are elements of the means of egress. The original intent of this language may have been to exempt corridors and stairways which are part of an exit as defined by the IBC, but the way the code is currently written it also exempts exit access and exit discharge components, i.e. the entire building. Exceptions 1 and 2 are moved here from deleted former Section C405.2.1.1.

Proposed Exception 3 to Section C405.2:

"Emergency egress lighting that is normally off" does not seem to be exempt from controls requirements in the current code, but it needs to be.

Section C405.2.1.1:

This proposal deletes existing Section C405.2.1.1 and replaces it with new text. The way the code is currently structured most users probably would not realize that a manual switch is always required, even with automatic-on occupant sensors. This clarifies the fact that a manual switch is always required.

Exception to Proposed Section C405.1.1:

Former Section C405.2.2 is proposed to be moved and split into two sections: Sections C405.2.1 and C405.2.1.1. The requirements under proposed new Section C405.2.1.1 have been itemized for clarity. Note that the requirement for occupant sensor controls in "other spaces 300 square feet or less" is extremely broad and will encompass all of the lighting on smaller projects. For example, this is applicable to sleeping units, dwelling units, etc. Whether or not this was the original intention, this is how the code currently reads, and this proposal is intended to provide clarity, it is not intended to make technical changes.

Exception 1 to Section C405.2.2:

Note that the current code does not offer an exception for dwelling units. Dwelling units that are not exempt from all of 405.2 are required to comply with the requirements for automatic controls and light reduction controls.

Exception 4 to Section C405.2.2:

The exception that is currently in the code is for "lighting" that is intended for continuous operation, not for "spaces". This is an important distinction, because it allows light fixtures that are intended for night lighting of unoccupied spaces to be left off the automatic control system (like retail stores for security reasons, where select lights might be left on all night long.

The current code does not offer a blanket exemption for continuously operational emergency egress "night" lighting. Under current code, all emergency egress lighting that is not located in a corridor or stairwell must have a manual control device for override, even though it does not need to be automatically controlled.

Exception 2 to Section C405.2.1 and Section C405.2.1.2:

This exception is derived from 2012 IECC Section C405.2.1.2, which this proposal deletes. Storerooms and restrooms should not be in this list because they are required to be provided with occupant sensor controls.

Sections C405.2.1.1, C405.2.2.1 and C405.2.2.3:

This new section is a combination of the requirements in existing Sections C405.2.1.1 and C405.2.2.1 that pertain to manual controls. Therefore, existing Section C405.2.1.1 is proposed to be deleted and Section C405.2.2.1 is proposed to be revised. Existing Section C405.2.2.3 is not replaced, it is renumbered, as are all affected subsequent sections.

Please note that the SEHPCAC has also submitted other proposals that are coordinated with this proposal and are intended to clarify and improve the usability of the code's prescriptive building thermal envelope provisions. This proposal, however, is intended to stand alone and is not contingent upon the success of other SEHPCAC proposals.

Cost Impact: The code change proposal will not increase the cost of construction. This proposal is a clarification and, as such, will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The lighting control section needed to be reorganized into a more logical format. The rearrangement will eliminate much confusion.

Assembly Action: **None**

Public Comments

Public Comment 1:

Jack Bailey, One Lux Studio, representing International Association of Lighting Designers, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2 Lighting controls (Mandatory). Lighting systems shall be provided with controls as specified in Sections C405.2.1, C405.2.2, C405.2.3, C405.2.4, and C405.2.5.

Exceptions: Lighting controls are not required for the following:

1. Areas designated as security or emergency areas that are required to be continuously lighted;
<u>2</u>. Emergency egress lighting that is normally off; <u>and</u>
~~2. Stairways and corridors; and~~
<u>3. Interior exit stairways, interior exit ramps, and exit passageways.</u>

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The current exception in the code makes no sense. Why should lighting in a corridor, which is an exit access component, be exempt from the controls requirements in this code while lighting in an exit passageway is not?

This proposal would conform imprecise language in the IECC with the IBC, resulting in more consistent interpretation and enforcement of the code. It would also avoid potential conflicts between lighting controls requirements in this code and lighting requirements for luminous egress path markings in exits in Section 1024 of the IBC.

Public Comment 2:

Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.1 Occupant sensor controls. *Occupant sensor controls* shall be installed <u>to control lights</u> in <u>the following space types:</u>

1. Classroom~~s~~<u>/lecture/training rooms</u>,
2. Conference/meeting ~~rooms~~/<u>multi-purpose rooms</u>,
<u>3. Copy/print rooms</u>,
<u>4. Lounges</u>,
5. Employee lunch and ~~-~~break rooms,
6. Private offices,
7. Restrooms,
8. Storage rooms, ~~and~~
9. Janitorial closets,
<u>10. Locker rooms</u>,
11. Other spaces 300 square feet (28 m^2) or less that are enclosed by floor-to-ceiling height partitions.

(Portions of proposal not shown remain unchanged)

Commenter's Reason: The purpose of Proposal CE287 is to add clarity to the lighting controls requirements in the code. This comment further revises the paragraph that stipulates where occupant sensor controls must be used. The phrase "to control lights" is added to make it clear that the sensors not only have to be installed, but have to function. For clarity, the space types are presented as a list. Also for clarity, the space type names are revised to be consistent with the space type names used for determination of lighting power density. This comment also requires the use of occupancy sensors in certain additional space types where occupancy sensors can be used effectively.

Final Hearing Results

CE287-13	**AMPC1, 2**

Code Change No: CE290-13

Original Proposal

Section(s): C405.2.2

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.2.2 Additional lighting controls. Each area that is required to have a manual control shall also have controls that meet the requirements of Sections C405.2.2.1, C405.2.2.2 and C405.2.2.3.

Exception: Additional lighting controls need not be provided in the following spaces:

1. *Sleeping units*.
2. Spaces where patient care is directly provided.
3. Spaces where an automatic shutoff would endanger occupant safety or security.
4. Lighting intended for continuous operation
5. <u>Shop and laboratory classrooms</u>.

Reason: Currently, lighting controls are required in shop and laboratory classrooms. These spaces are similar to spaces where patient care is directly provided, however there are instances (in a classroom setting) where lighting controls are not needed, but no patient care is being provided. This exception is consistent with ANSI/ASHRAE/IES Standard 90.1.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Automatic controls are inappropriate for these spaces,

Assembly Action: **None**

Final Hearing Results

CE290-13	**AS**

Code Change No: CE291-13

Original Proposal

Section(s): C405.2.2.1

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C405.2.2.1 Automatic time switch controls ~~devices~~. Automatic time switch controls shall be installed to control lighting in all areas of the building.

Exceptions:

1. Emergency egress lighting does not need to be controlled by an automatic time switch.
2. Lighting in spaces controlled by occupancy sensors does not need to be controlled by automatic time switch controls.

~~The~~ Automatic time switch controls ~~device~~ shall comply with the following:

1. Have a minimum 7 day clock;
2. Be capable of being set for 7 different day types per week;
3. Incorporate an automatic holiday "shut-off" feature, which turns off all controlled lighting loads for at least 24 hours and then resumes normally scheduled operations.
4. Have program back-up capabilities, which prevent the loss of program and time settings for at least 10 hours, if power is interrupted; and
5. Include an override switch ~~device~~ that complies with the following:
   - 5.1. The override switch shall be in a readily accessible location;
   - 5.2. The override switch shall be located where the lights controlled by the switch are visible; or the switch shall provide a mechanism which announces the area controlled by the switch;
   - 5.3. The override switch shall permit manual operation;
   - 5.4. The override switch, when initiated, shall permit the controlled lighting to remain on for a maximum of 2 hours; and
   - 5.5. Any individual override switch shall control the lighting for a maximum area of 5,000 square feet (465 m^2).

     Exception: Within malls, arcades, auditoriums, single tenant retail spaces, industrial facilities and arenas:

     1. The time limit shall be permitted to exceed 2 hours provided the override switch is a captive key device; and
     2. The area controlled by the override switch is permitted to exceed 5,000 square feet (465 m^2), but shall not exceed 20,000 square feet (1860 m^2).

Reason: These additional details clarify that a 7-day clock and holiday override features are required. This prevents lights from automatically turning on during weekends and holidays if not needed, and allows customization for unique schedules that require lighting earlier or later than usual on certain days, without keeping lights on for those extra hours on the other days of the week. The word "devices" is unnecessary and deleted for consistency in the language.

Washington State's experience has been that the power-loss memory feature is invaluable in restoring normal operations after a brief power interruption, at little extra cost.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The controls with these features currently exist. As more are required, the cost should come down in the future.

Assembly Action: **None**

Final Hearing Results

CE291-13	**AS**

Code Change No: CE292-13

Original Proposal

Section(s): C405.2.2.2

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C405.2.2.2 Occupancy sensors. Occupancy sensors shall be installed in all classrooms, conference/meeting rooms, employee lunch and break rooms, private offices, restrooms, warehouse spaces, storage rooms and janitorial closets, and other spaces 300 square feet (28 m^2) or less enclosed by floor-to-ceiling height partitions. These automatic control devices shall be installed to automatically turn off lights within 30 minutes of all occupants leaving the space, and shall either be manual on or shall be controlled to automatically turn the lighting on to not more than 50 percent power.

> **Exception:** Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants

Reason: This provision adds warehouses to the list of areas requiring occupancy sensors for lighting control. Since most areas in a warehouse are unoccupied most of the time, while other spaces are in use, the savings on lighting energy are substantial. This has been an integral part of the Washington State Energy Code for many years.

Cost Impact: The code change proposal will increase the cost of construction**.**

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee was concerned about the potential safety issues of having lights turn off automatically in a warehouse. The committee suggested working with proponent of CE293-13 to develop a coordinated public comment.

Assembly Action: **None**

Public Comments

Public Comment:

Tim Nogler, Washington State Building Code Council, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.2.2 Occupancy sensors. Occupancy sensors shall be installed in all classrooms, conference/meeting rooms, employee lunch and break rooms, private offices, restrooms, ~~warehouse spaces~~, storage rooms and janitorial closets, and other spaces 300 square feet (28 m^2) or less enclosed by floor-to-ceiling height partitions.. ~~These~~ The automatic control devices in these spaces shall be installed to automatically turn off lights within 30 minutes of all occupants leaving the space, and shall either be manual on or shall be controlled to automatically turn the lighting on to not more than 50 percent power. In aisle ways and open areas in warehouses, lighting shall be controlled with occupancy sensors that automatically reduce lighting power by at least 50 percent when the areas are unoccupied. The occupancy sensors in warehouses shall control lighting in each aisle way independently, and shall not control lighting beyond the aisle way being controlled by the sensor.

Exception: Full automatic-on controls shall be permitted to control lighting in public corridors, stairways, restrooms, warehouses, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants.

Commenter's Reason: The committee asked that the proponents of this proposal CE292 and the related proposal CE293 coordinate to provide a combined Public Comment to address lighting energy conservation in warehouses. This Comment addresses the safety concerns expressed at the Dallas hearing by requiring only a 50% lighting power reduction after 30 minutes of inactivity, rather than a full-off control, and by limiting the controlled areas to aisles and open spaces only. The proposed language is adapted from the California Title 24 code.

Final Hearing Results

CE292-13 **AMPC**

Code Change No: CE294-13

Original Proposal

Section(s): C202, Figure C405.1 (NEW), Figure C405.2 (NEW), C405.2.2.3, C405.2.2.3.1 (NEW), C405.2.2.3.2 (NEW), C405.2.2.3.3 (NEW), Figure C405.3 (NEW), Figure C405.4 (NEW)

Proponent: Jack Bailey, One Lux Studio, representing International Association of Lighting Designers (jbailey@oneluxstudio.com), Jim Edelson, New Buildings Institute (jim@newbuildings.org)

Revise as follows:

~~**C405.2.2.3 Daylight zone control.** Daylight zones shall be designed such that lights in the daylight zone are controlled independently of general area lighting and are controlled in accordance with either Section C405.2.2.3.1 or Section C405.2.2.3.2. Each daylight control zone shall not exceed 2,500 square feet (232 m²). Contiguous daylight zones adjacent to vertical fenestration are allowed to be controlled by a single controlling device provided that they do not include zones facing more than two adjacent cardinal orientations (i.e., north, east, south, west). Daylight zones under skylights more than 15 feet (4572 mm) from the perimeter shall be controlled separately from daylight zones adjacent to vertical fenestration.~~

> ~~**Exception:** Daylight zones enclosed by walls or ceiling height partitions and containing two or fewer light fixtures are not required to have a separate switch for general area lighting.~~

C405.2.2.3 Daylight responsive controls. *Daylight responsive controls* complying with Section C405.2.2.3.1 shall be provided to control the electric lights within *daylight zones* in the following spaces:

1. Spaces with a total of more than 150 watts of *general lighting* within sidelight *daylight zones* complying with Section C405.2.2.3.2. *General lighting* does not include lighting that is required to have specific application control in accordance with Section C405.2.3.
2. Spaces with a total of more than 150 watts of *general lighting* within toplight *daylight zones* complying with Section C405.2.2.3.3.

Exceptions: Daylight responsive controls are not required for the following:

1. Spaces in health care facilities where patient care is directly provided.
2. Dwelling units and sleeping units.
3. Lighting that is required to have specific application control in accordance with Section C405.2.3.

C405.2.2.3.1 Daylight responsive control function. Where required, *daylight responsive controls* shall be provided within each space for control of lights in that space and shall comply with all of the following:

1. Lights in toplight *daylight zones* in accordance with Section C405.2.2.3.3 shall be controlled independently of lights in sidelight *daylight zones* in accordance with Section C405.2.2.3.2;
2. *Daylight responsive controls* within each space shall be configured so that they can be calibrated from within that space by authorized personnel;
3. Calibration mechanisms shall be *readily accessible*;
4. When located in offices, classrooms, laboratories, and library reading rooms, *daylight responsive controls* shall dim lights continuously from full light output to 10 percent of full light output or lower;
5. *Daylight responsive controls* shall be capable of a complete shut off of all controlled lights; and

6. Lights in sidelight *daylight zones* in accordance with Section C405.2.2.3.2 facing different cardinal orientations (i.e. within 45 degrees of due north, east, south, west) shall be controlled independently of each other.

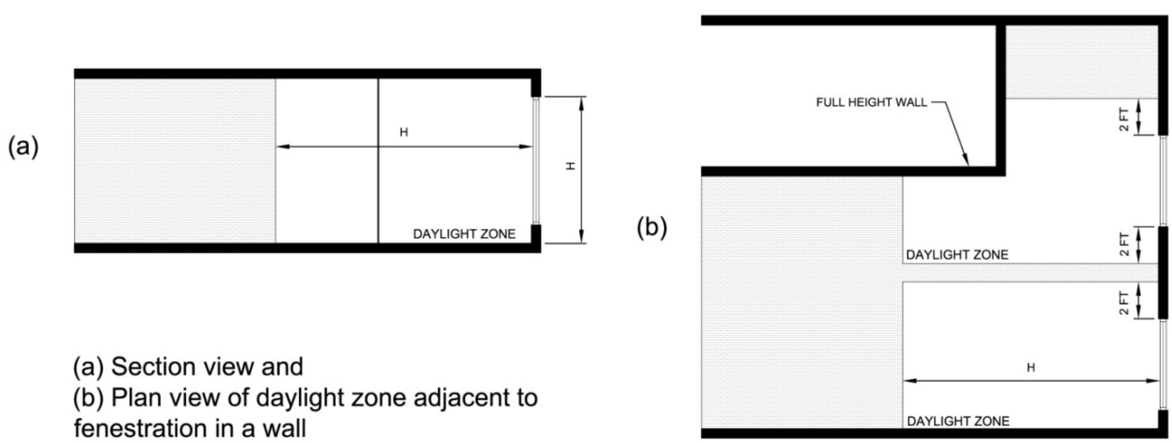
   Exception: Up to 150 watts of lighting in each space is permitted to be controlled together with lighting in a daylight zone facing a different cardinal orientation.

C405.2.2.3.2 Sidelight daylight zone. The sidelight *daylight zone* is the floor area adjacent to vertical *fenestration* which complies with all of the following:

1. Where the *fenestration* is located in a wall, the *daylight zone* shall extend laterally to the nearest full height wall, or up to 1.0 times the height from the floor to the top of the *fenestration*, and longitudinally from the edge of the fenestration to the nearest full height wall, or up to 2 feet (610 mm), whichever is less, as indicated in Figure C405.1;
2. Where the *fenestration* is located in a rooftop monitor, the *daylight zone* shall extend laterally to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 1.0 times the height from the floor to the bottom of the *fenestration*, whichever is less, and longitudinally from the edge of the *fenestration* to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.25 times the height from the floor to the bottom of the *fenestration*, whichever is less, as indicated in Figures C405.2 and C405.3;
3. The area of the *fenestration* is at least 24 square feet;
4. The distance from the *fenestration* to any building or geological formation which would block access to daylight is greater than the height from the bottom of the *fenestration* to the top of the building or geologic formation; and
5. Where located in existing buildings, the *visible transmittance* of the *fenestration* is no less than 0.25.

C405.2.2.3.3 Toplight daylight zone. The toplight *daylight zone* is the floor area underneath a roof *fenestration* assembly which complies with all of the following:

1. The *daylight zone* shall extend laterally and longitudinally beyond the edge of the roof *fenestration* assembly to the nearest obstruction that is taller than 0.7 times the ceiling height, or up to 0.7 times the ceiling height, whichever is less, as indicated in Figure C405.4;
2. No building or geological formation blocks direct sunlight from hitting the roof *fenestration* assembly at the peak solar angle on the summer solstice; and
3. Where located in existing buildings, the product of the *visible transmittance* of the roof *fenestration* assembly and the area of the rough opening of the roof fenestration assembly, divided by the area of the daylight zone is no less than 0.008.



(a) Section view and
(b) Plan view of daylight zone adjacent to fenestration in a wall

FIGURE C405.1
***DAYLIGHT ZONE* ADJACENT TO FENESTRATION IN A WALL**

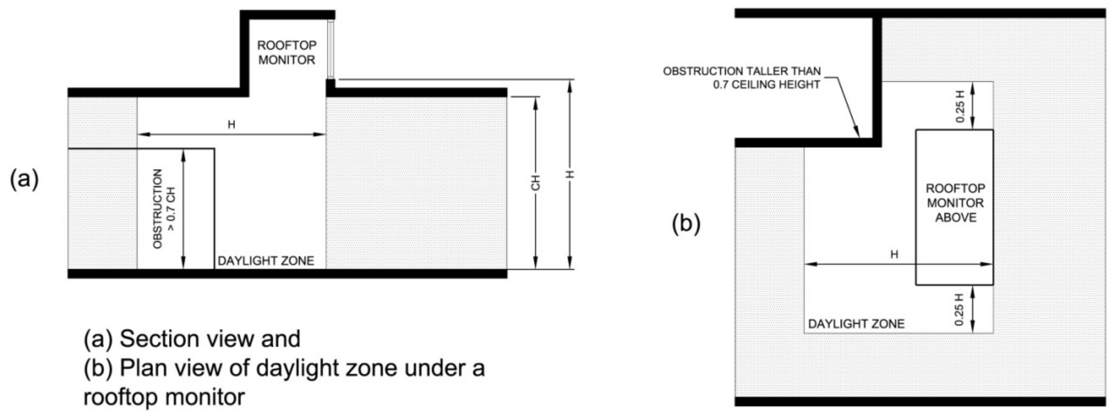


FIGURE C405.2
***DAYLIGHT ZONE* UNDER A ROOFTOP MONITOR**

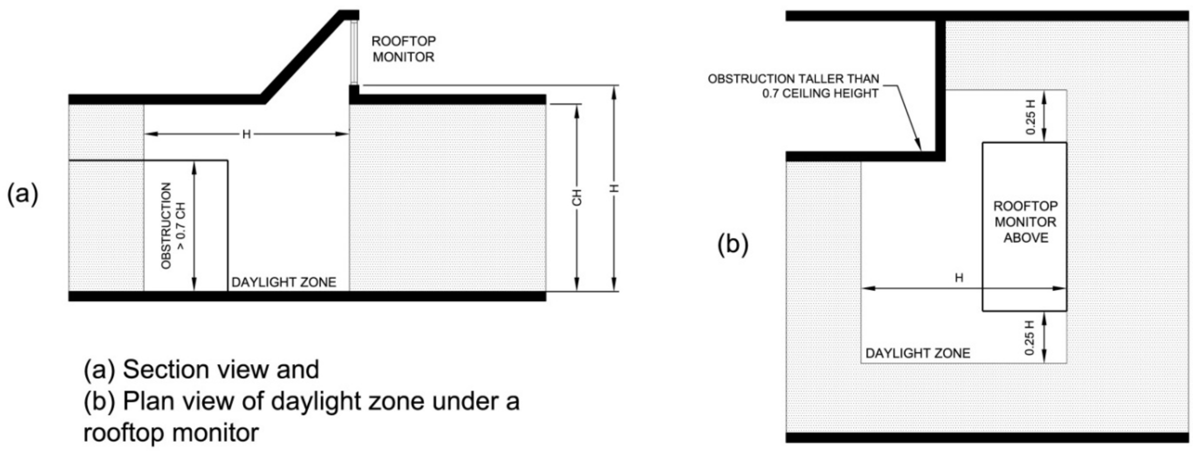


FIGURE C405.3
***DAYLIGHT ZONE* UNDER A SLOPED ROOFTOP MONITOR**

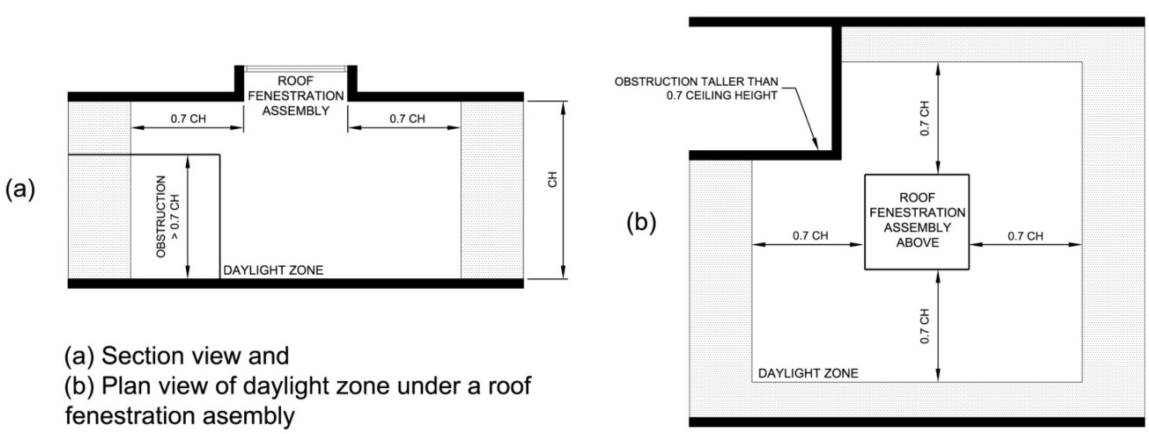


FIGURE C405.4
***DAYLIGHT ZONE* UNDER A ROOF FENESTRATION ASSEMBLY**

Revise definitions as follows:

SECTION C202
GENERAL DEFINITIONS

DAYLIGHT RESPONSIVE CONTROL. A device or system that provides automatic control of electric light levels based on the amount of daylight in a space.

DAYLIGHT ZONE. That portion of a building's interior floor area that is illuminated by natural light.

~~1. **Under skylights.** The area under skylights whose horizontal dimension, in each direction, is equal to the skylight dimension in that direction plus either the floor-to-ceiling height or the dimension to a ceiling height opaque partition, or one-half the distance to adjacent skylights or vertical fenestration, whichever is least.~~
~~2. **Adjacent to vertical fenestration.** The area adjacent to vertical fenestration which receives daylight through the fenestration. For purposes of this definition and unless more detailed analysis is provided, the daylight *zone* depth is assumed to extend into the space a distance of 15 feet (4572 mm) or to the nearest ceiling height opaque partition, whichever is less. The daylight *zone* width is assumed to be the width of the window plus 2 feet (610 mm) on each side, or the window width plus the distance to an opaque partition, or the window width plus one-half the distance to adjacent skylight or vertical fenestration, whichever is least.~~

Reason: This proposal would replace the provisions in the code related to control of electric lights in daylight zones. It would not alter any of the envelope provisions in the code, nor would it set any minimum requirements for fenestration. The proposed changes are needed for two reasons:

1. The existing IECC code language is technically inadequate and confusing, and
2. There is a tremendous untapped potential for energy savings in buildings just by turning off electric lights in daylit spaces.

Inadequate and Confusing Language in 2012 IECC

1. The code describes all sidelight daylight zones as being 15 feet deep, regardless of whether the window is 5 feet high or 50 feet high. Lighting controls will not function properly if the daylight zone size is wrong, and the 15 foot depth requirement in the current code is actually an impediment to successful implementation of daylight responsive controls. New definitions that are based on the geometry of the building are proposed, and diagrams are provided to make the code easier to use. The proposed diagrams are modified slightly from the diagrams published in the 2012 IGCC, and if this proposal is approved these modifications should be proposed for the IGCC diagrams as well.
2. The code provides no clear guidance about the daylight zone associated with a rooftop monitor. This proposal clearly describes the daylight zone associated with rooftop monitors.
3. Small windows, windows with low-VT glass, and windows which are overshadowed by adjacent buildings are common in urban areas with older building stock. Daylight responsive controls should not be required in situations where they will be ineffective. The current code does not provide exceptions for these situations, but the proposed language does.
4. The code requires that separate control be provided for lights in each daylight zone. On facades where windows are spaced more than 4 feet apart, each window establishes a separate daylight zone, and hence a separate lighting control zone. This adds unnecessary cost and complexity to the lighting controls. The proposed daylight responsive control requirements in Section 405.2.2.3.1 resolve this issue and clarify which lights can be grouped together for control in a more sensible way.
5. The code allows step-switching in offices, laboratories, classrooms, and reading rooms, where we know this is objectionable to occupants. This proposal would require dimming in those areas, while still allowing less costly switching systems to be used in other areas.
6. The code is not specific enough about how daylight responsive controls should be required to function. An owner, developer, designer, or builder who looks for the lowest first-cost solution that meets the current code will likely end up with a lighting control system that doesn't work. The proposed Section 405.2.2.3.1 would establish minimum requirements for these systems to function properly. The code is not a design guideline, but it should prevent obvious shortcuts which subvert the intent of the code.

Additional Energy Savings from Daylight Responsive Controls

The IECC requires that daylight responsive controls only be provided in buildings following the prescriptive path which fail to meet certain fenestration requirements. This is obviously a very limited requirement, as most lighting installations are completed as part of alterations to existing buildings that do not include envelope alterations.

This proposal would require that daylight responsive controls be provided whenever more than 150 watts of lighting is installed in an area which receives effective daylight. Necessary exceptions are included for lighting in dwelling units, sleeping units, health care, etc. The 150 watt threshold was found to be cost effective by PNNL and HMG in research done to support the ASHRAE 90.1

Committee. If approved, this proposal would align the stringency of the lighting control requirements in the IECC with those of ASHRAE / ANSI / IESNA Standard 90.1 – 2013, but would still leave the IECC less stringent than California Title 24 – 2013.

Lighting in commercial buildings is responsible for 38% of electricity consumption in commercial buildings nationally. As a portion total energy use, lighting is the largest individual use of energy, accounting for one fifth (20%) of the combined energy total. This occurs despite the fact that many buildings have ample access to a free light source – daylight. A recent meta-analysis report on lighting controls in commercial buildings (Lighting Controls in Commercial Buildings, Williams, Atkins et al, 2012) estimated a 28% average lighting energy savings potential for buildings that incorporated daylighting strategies.

Guidelines published by NBI (http://patternguide.advancedbuildings.net) show that there are multiple ways to provide high quality daylight in most buildings. In addition to many energy code entities, almost every voluntary rating system has been increasing their reliance on daylighting to reduce energy consumption in commercial buildings. This proposal ensures that the IECC incorporates the energy saving priority that if sufficient daylight is available, then controls should be included to turn off the electric lights.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: Approved as Submitted

Committee Reason: Daylight zones are already required and must be shown on the construction documents. This proposal clarifies the appropriate controls for each type of daylight space.

Assembly Action: None

Public Comments

Public Comment 1:

Jack Bailey, One Lux Studio, representing International Association of Lighting Designers; Jim Edelson, New Buildings Institute, Glenn Heinmiller, Lam Partners, representing self, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.2.2.3 Daylight Responsive Controls. *Daylight responsive controls* complying with Section C405.2.2.3.1 shall be provided to control the electric lights within *daylight zones* in the following spaces:

1. Spaces with a total of more than 150 watts of *general lighting* within sidelight *daylight zones* complying with C405.2.2.3.2. *General lighting* does not include lighting that is required to have specific application control in accordance with C405.2.3.
2. Spaces with a total of more than 150 watts of *general lighting* within toplight *daylight zones* complying with C405.2.2.3.3.

Exceptions:

1. Spaces in health care facilities where patient care is directly provided.
2. Dwelling units and sleeping units.
3. Lighting that is required to have specific application control in accordance with C405.2.3.
4. <u>Sidelight *daylight zones* on the first floor above grade in Group A-2 and Group M occupancies.</u>

C405.2.2.3.1 Daylight responsive control function. Where required, *daylight responsive controls* shall be provided within each space for control of lights in that space and shall comply with all of the following:

4. Where located in offices, classrooms, laboratories, and library reading rooms, *daylight responsive controls* shall dim lights continuously from full light output to ~~10~~ <u>15</u> percent of full light output or lower

C405.2.2.3.2 Sidelight Daylight Zone. The sidelight *daylight zone* is the floor area adjacent to vertical *fenestration* which satisfies the following criteria:

5. Where located in existing buildings, the *visible transmittance* of the *fenestration* is no less than ~~0.25~~ <u>0.20</u>.

(Portions of proposal not shown remain unchanged)

Commenter's Reason:
Bailey/Edelson: The sponsors of CE294 have worked with a group of interested parties to offer one consolidated public comment with several proposed revisions:

1. Add an exception for restaurants, bars, and retailers who often want to leave lights on during the day in their street level storefronts to draw attention to their establishment, and to convey to passersby that they are open for business. This seems like a reasonable exception, and Seattle already has a similar provision in place in their code.
2. Relax the requirement for lights in offices, classrooms, laboratories, and library reading rooms to dim to 10%. Changing this requirement to 15% will allow a much wider variety of lighting products to be used.
3. Reduce the VT exception for fenestration in existing buildings from 0.25 to 0.20. This will make daylight responsive controls more widely applicable in existing buildings, and will also discourage the use of lower transmittance fenestration in new construction. In many cases, permits for new construction do not include interior fitout, and interior fitout is subsequently filed as an alteration to the new building. When this happens, daylight controls will not be required if low VT fenestration is used. This creates a perverse incentive for the designers of the new building to select a lower transmittance fenestration assembly to avoid the requirement for daylight responsive controls inside the building. Lowering the threshold for this exception will make it less likely that this will happen, as most designers would not select fenestration with a VT lower than 0.20 for aesthetic reasons.

Heinmiller: This public comment incorporates three separate changes to the original proposal:

1. Add an exception for restaurants, bars, and retailers who often want to leave lights on during the day in their street level storefronts to draw attention to their establishment, and to convey to passersby that they are open for business. This seems like a reasonable exception, and Seattle already has a similar provision in place in their code.
2. Relax the requirement for lights in offices, classrooms, laboratories, and library reading rooms to dim to 10%. Changing this requirement to 15% will allow a much wider variety of lighting products to be used.
3. Reduce the VT exception for fenestration in existing buildings from 0.25 to 0.20. This will make daylight responsive controls more widely applicable in existing buildings, and will also discourage the use of lower transmittance fenestration in new construction. In many cases, permits for new construction do not include interior fitout, and interior fitout is subsequently filed as an alteration to the new building. When this happens, daylight controls will not be required if low VT fenestration is used. This creates a perverse incentive for the designers of the new building to select a lower transmittance fenestration assembly to avoid the requirement for daylight responsive controls inside the building. Lowering the threshold for this exception will make it less likely that this will happen, as most designers would not select fenestration with a VT lower than 0.20 for aesthetic reasons.

Public Comment 3:

Duane Jonlin, City of Seattle, Department of Planning and Development, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

~~**C405.2.2.3.1 Manual daylighting controls.** Manual controls shall be installed in daylight zones unless automatic controls are installed in accordance with Section C405.2.3.5.~~

~~**C405.2.2.3.2 Automatic daylighting controls.** Set-point and other controls for calibrating the lighting control device shall be readily accessible.~~

~~Daylighting controls device shall be capable of automatically reducing the lighting power in response to available daylight by either one of the following methods:~~

1. ~~Continuous dimming using dimming ballasts and daylight-sensing automatic controls that are capable of reducing the power of general lighting in the daylit zone continuously to less than 35 percent of rated power at maximum light output.~~
2. ~~Stepped dimming using multi-level switching and daylight-sensing controls that are capable of reducing lighting power automatically. The system shall provide a minimum of two control channels per zone and be installed in a manner such that at least one control step is between 50 percent and 70 percent of design lighting power and another control step is no greater than 35 percent of design power.~~

~~**C405.2.2.3.3 Multi-level lighting controls.** Where multi-level lighting controls are required by this code, the general lighting in the daylight zone shall be separately controlled by at least one multi-level lighting control that reduces the lighting power in response to daylight available in the space. Where the daylit illuminance in the space is greater than the rated illuminance of the general lighting of daylight zones, the general lighting shall be automatically controlled so that its power draw is no greater than 35 percent of its rated power. The multi-level lighting control shall be located so that calibration and set point adjustment controls are readily accessible and separate from the light sensor.~~

C402.3 Fenestration (Prescriptive). Fenestration shall comply with Table C402.3. ~~Automatic daylighting~~ Daylight responsive controls specified by this section shall comply with Section ~~C405.2.2.3.3.~~ C405.2.2.3

C402.3.2.1 Lighting controls in daylight zones under skylights. All lighting in the daylight zone shall be controlled by ~~multilevel lighting~~ daylight responsive controls that comply with Section ~~C405.2.2.3.3.~~ C405.2.2.3

Exceptions (Remain unchanged.)

(The remainder of the proposal is not modified.)

Commenter's Reason: This public comment deletes unnecessary language from the code. If CE294 is approved, the sections proposed for deletion above would then remain in the code, but would not be referenced by any other sections. This would be confusing for users of the code.

Final Hearing Results

CE294-13	**AMPC1, 3**

Code Change No: CE299-13

Original Proposal

Section(s): C405.2.3

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.2.3 Specific application controls. Specific application controls shall be provided for the following:

1. Display and accent light shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space
2. Lighting in cases used for display case purposes shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
3. Hotel and motel sleeping units and guest suites shall have a master control device ~~at the main room entry that controls all permanently installed luminaires and switched receptacles~~ that is capable of switching off all installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

   Exception: Lighting and switched receptacles controlled by captive key systems.

4. Supplemental task lighting, including permanently installed under-shelf or under-cabinet lighting, shall have a control device integral to the luminaires or be controlled by a wall-mounted control device provided the control device is readily accessible.
5. Lighting for nonvisual applications, such as plant growth and food warming, shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.
6. Lighting equipment that is for sale or for demonstrations in lighting education shall be controlled by a dedicated control which is independent of the controls for other lighting within the room or space.

Reason: For consistency with ASHRAE/IES 90.1. These revisions introduce automatic lighting control to guestroom type spaces for additional energy savings and allow captive key systems that provide similar savings control to also comply.

Cost Impact: The code change proposal will increase the cost of construction when lighting controls are required in parking garages.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

3. Hotel and motel sleeping units and guest suites shall have a master control device that is capable of automatically switching off all installed luminaires and switched receptacles within 20 minutes after all occupants leave the room.

(Balance of the proposal is unchanged.)

Committee Reason: The modification was approved to correct the readability of the sentence. The turning off of power when sleeping units are occupied will save significant energy.

Assembly Action: **None**

Final Hearing Results

CE299-13 **AM**

Code Change No: CE303-13

Original Proposal

Section(s): C405.2.4

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Delete and substitute as follows:

~~**C405.2.4 Exterior lighting controls.** Lighting not designated for dusk-to-dawn operation shall be controlled by either a combination of a photosensor and a time switch, or an astronomical time switch. Lighting designated for dusk-to-dawn operation shall be controlled by an astronomical time switch or photosensor. All time switches shall be capable of retaining programming and the time setting during loss of power for a period of at least 10 hours.~~

C405.2.4 Exterior lighting controls. Exterior lighting shall be controlled by either an astronomical time switch or a photo sensor and a time switch. Time switches shall be capable of retaining programming and the time setting for at least 10 hours without power.

> **Exception:** Lighting designed for dusk to dawn operation shall be permitted to have a photo sensor without a time switch.

Reason: This proposal simplifies the provisions covering exterior lighting controls in the code, to foster the ability to implement and verify compliance with the code.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Clarifies the text of the section. There are no technical changes resulting from the revision.

Assembly Action: **None**

Final Hearing Results

CE303-13	**AS**

Code Change No: CE304-13

Original Proposal

Section(s): C405.2.4

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Delete and substitute as follows:

~~**C405.2.4 Exterior lighting controls.** Lighting not designated for dusk-to-dawn operation shall be controlled by either a combination of a photosensor and a time switch, or an astronomical time switch. Lighting designated for dusk-to-dawn operation shall be controlled by an astronomical time switch or photosensor. All time switches shall be capable of retaining programming and the time setting during loss of power for a period of at least 10 hours~~

C405.2.4 Exterior lighting controls. Lighting for exterior applications other than emergency lighting that is intended to be automatically off during building operation, lighting specifically required to meet health and life safety requirements or decorative gas lighting systems shall:

1. Be provided with a control that automatically turns off the lighting as a function of available daylight.
2. Where lighting the building façade or landscape the lighting shall have controls that automatically shut off the lighting as a function of dawn/dusk and a set opening and closing time.
3. Where not covered in Item 2 the lighting shall have controls configured to automatically reduce the connected lighting power by at least 30 percent from no later than 12 midnight to 6 a.m. or from one hour after business closing to one hour before business opening or during any period when no activity has been detected for a time of no longer than 15 minutes.

All time switches shall be able to retain programming and the time setting during loss of power for a period of at least ten hours.

Exception: Lighting for covered vehicle entrances or exits from buildings or parking structures where required for safety, security, or eye adaptation.

Reason: For consistency with ASHRAE/IES 90.1-2010. Section 9.4.1.7 of that document contains provisions for exterior lighting controls that differ from those in Section C405.2.4 of the IECC Commercial Provisions. As that standard is an alternative path to compliance with the IECC and there is a desire to maintain equivalency of the IECC with 90.1 this change is needed.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the requirements as well as providing 2 additional compliance options. This proposal does leave the lights on, versus completely shutting them off. Many exterior lights are provided for safety purposes and should remain on to a certain level.

Assembly Action: **None**

Final Hearing Results

CE304-13	**AS**

Code Change No: CE308-13

Original Proposal

Section(s): C405.3

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Delete without substitution as follows:

~~**C405.3 Tandem wiring (Mandatory).** The following luminaires located within the same area shall be tandem wired:~~

1. ~~Fluorescent luminaires equipped with one, three or odd-numbered lamp configurations, that are recess- mounted within 10 feet (3048 mm) center-to-center of each other.~~
2. ~~Fluorescent luminaires equipped with one, three or any odd-numbered lamp configuration that are pendant- or surface-mounted within 1 foot (305 mm) edge-to-edge of each other.~~

   ~~**Exceptions:**~~

   1. ~~Where electronic high-frequency ballasts are used.~~
   2. ~~Luminaires on emergency circuits.~~
   3. ~~Luminaires with no available pair in the same area.~~

Reason: Simplify the code by removing an obsolete provision. This provision refers to obsolete magnetic ballast technology and no longer serves any purpose. Electronic ballasts are now used for all fluorescent luminaires, and since luminaires with electronic ballasts are exempt, then this provision would never apply and is pointless. It was removed from the 2010 version of Standard 90.1 for these reasons.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The provisions address obsolete technology.

Assembly Action: **None**

Public Comments

Public Comment:

Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.1 General (Mandatory). This section covers lighting system controls, ~~the connection of ballasts~~, the maximum lighting power for interior and exterior applications, electrical energy consumption, and minimum acceptable lighting equipment for exterior applications.

Commenter's Reason: This proposal CE308 removes the only requirement in the code covering the "connection of ballasts". The general description in C405.1 needs to be modified to reflect this

Final Hearing Results

CE308-13	**AMPC**

Code Change No: CE309-13

Original Proposal

Section(s): C405.5.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power ~~(watts)~~ shall be ~~the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4~~ determined in accordance with Equation 4-6.

TCLP = [SL + LV + LTPB + Other] **(Equation 4-6)**

where:

TCLP = total connected lighting power (watts)
SL = labeled wattage of luminaires for screw in lamps
LV = wattage of the transformer supplying low-voltage lighting
LTPB = wattage of line-voltage lighting tracks and plug-in busways as the specified wattage of the luminaires but at least 30 W/lin. ft. (100 W/lin m), or the wattage limit of the system's circuit breaker, or the wattage limit of other permanent current limiting devices on the system
Other = the wattage of all other luminaires and lighting sources not covered above and associated with interior lighting verified by data supplied by the manufacturer or other *approved* sources.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   1.1. Professional sports arena playing field lighting.
   1.2. *Sleeping unit* lighting in hotels, motels, boarding houses or similar buildings.
   1.3. Emergency lighting automatically off during normal building operation.
   1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age-related issues.
   1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
   1.6. Casino gaming areas.
2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
   2.1. Task lighting for medical and dental purposes.
   2.2. Display lighting for exhibits in galleries, museums and monuments.
3. Lighting for theatrical purposes, including performance, stage, film production and video production.
4. Lighting for photographic processes.
5. Lighting integral to equipment or instrumentation and is installed by the manufacturer.
6. Task lighting for plant growth or maintenance.
7. Advertising signage or directional signage.

8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
9. Lighting equipment that is for sale.
10. Lighting demonstration equipment in lighting education facilities.
11. Lighting *approved* because of safety or emergency considerations, inclusive of exit lights.
12. Lighting integral to both open and glass-enclosed refrigerator and freezer cases.
13. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
14. Furniture mounted supplemental task lighting that is controlled by automatic shutoff.

Reason: The provisions in Section C405.5.1 deal with the determination of a value for the actual connected interior lighting power in a building that is more appropriately addressed as an equation. This proposal simplifies the provisions associated with connected interior lighting power to present as an equation what is now text that guides how the connected lighting power is calculated. The objective of this proposal is to simplify the code to foster implementation and compliance verification.

Cost Impact: The code change proposal does not increase the cost of construction.

Public Hearing Results

The following errata were not posted to the ICC website. The proposal also includes deleting the following sections.

~~**C405.5.1.1 Screw lamp holders.** The wattage shall be the maximum *labeled* wattage of the luminaire.~~

~~**C405.5.1.2 Low-voltage lighting.** The wattage shall be the specified wattage of the transformer supplying the system.~~

~~**C405.5.1.3 Other luminaires.** The wattage of all other lighting equipment shall be the wattage of the lighting equipment verified through data furnished by the manufacturer or other *approved* sources.~~

~~**C405.5.1.4 Line-voltage lighting track and plug-in busway.** The wattage shall be:~~

1. ~~The specified wattage of the luminaires included in the system with a minimum of 30 W/lin ft. (98 W/lin. m);~~
2. ~~The wattage limit of the system's circuit breaker; or~~
3. ~~The wattage limit of other permanent current limiting device(s) on the system.~~

(Portions of proposal not shown remain unchanged)

Committee Action: **Approved as Submitted**

Committee Reason: The proposal takes existing text in 4 subsections and replaces them with an equation that does the same thing. The committee felt the proposal simplified the code without any resulting technical change.

Assembly Action: **None**

Final Hearing Results

CE309-13 **AS**

Code Change No: CE310-13

Original Proposal

Section(s): C405.5.1, C405.5.3 (NEW), Table C405.5.2(1), Table C405.5.2(2)

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   1.1. Professional sports arena playing field lighting.
   1.2. *Sleeping unit* lighting in hotels, motels, boarding houses or similar buildings, provided that the lighting complies with Section R404.1.
   1.3. Emergency lighting automatically off during normal building operation.
   1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age-related issues.
   1.5. Lighting in interior spaces that have been specifically designated as a registered interior historic landmark.
   1.6. Casino gaming areas.
   1.7. Mirror lighting in dressing rooms.

(Portions of text not shown remains unchanged)

C405.5.3 Additional interior lighting power. Where using the Space-by-Space Method, an increase in the interior lighting power allowance is permitted for specific lighting functions. Additional power shall be permitted only where the specified lighting is installed and automatically controlled, separately from the general lighting, to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose. An increase in the interior lighting power allowance is permitted in the following cases:

1. For spaces in which lighting is specified to be installed in addition to the general lighting for the purpose of decorative appearance or for highlighting art or exhibits, provided that the additional lighting power shall not exceed 1.0 W/ft^2 of such spaces.

TABLE C405.5.2(1)
INTERIOR LIGHTING POWER ALLOWANCES: BUILDING AREA METHOD

BUILDING AREA TYPE	LPD (w/ft2)
Automotive facility	~~0.9~~ 0.80
Convention center	~~1.2~~ 1.01

BUILDING AREA TYPE	**LPD (w/ft2)**
Courthouse	~~1.2~~ 1.01
Dining: bar lounge/leisure	~~1.3~~ 1.01
Dining: cafeteria/fast food	~~1.4~~ 0.9
Dining: family	~~1.6~~ 0.95
Dormitory	~~1.0~~ 0.57
Exercise center	~~1.0~~ 0.84
Fire station	~~0.8~~ 0.67
Gymnasium	~~1.1~~ 0.94
Health care clinic	~~1.0~~ 0.90
Hospital	~~1.2~~ 1.05
Hotel/Motel	~~1.0~~ 0.87
Library	~~1.3~~ 1.19
Manufacturing facility	~~1.3~~ 1.17
~~Motel~~	~~1.0~~
Motion picture theater	~~1.2~~ 0.76
Multifamily	~~0.7~~ 0.51
Museum	~~1.1~~ 1.02
Office	~~0.9~~ 0.82
Parking garage	~~0.3~~ 0.21
Penitentiary	~~1.0~~ 0.81
Performing arts theater	~~1.6~~ 1.39
Police station	~~1.0~~ 0.87
Post office	~~1.1~~ 0.87
Religious building	~~1.3~~ 1.0
Retail	~~1.4~~ 1.26
School/University	~~1.2~~ 0.87
Sports arena	~~1.1~~ 0.91

BUILDING AREA TYPE	LPD (w/ft2)
Town hall	~~1.1~~ 0.89
Transportation	~~1.0~~ 0.70
Warehouse	~~0.6~~ 0.66
Workshop	~~1.4~~ 1.19

TABLE C405.5.2(2)
INTERIOR LIGHTING POWER ALLOWANCES:
SPACE-BY-SPACE METHOD

COMMON SPACE-BY-SPACE TYPES	LPD (w/ft2)
Atrium - ~~First~~ that is < 40 feet in height	0.03 per ft. in total height ~~ht.~~
Atrium - ~~Above~~ that is > 40 feet in height	0.40 + 0.02 per ft. in total height ~~ht.~~
Audience/seating area - permanent For auditorium For performing arts theater For motion picture theater	 ~~0.9~~ 0.63 ~~2.6~~ 2.43 ~~1.2~~ 1.14
Classroom/lecture/training	~~1.30~~ 1.24
Conference/meeting/multipurpose	~~1.2~~ 1.23
Copy/Print room	0.72
Corridor/transition	~~0.7~~ 0.66
Computer Room	1.71
Dining area Bar/lounge/leisure dining Family dining area Cafeteria/Fast Food Dining	 ~~1.40~~ 1.07 ~~1.40~~ 0.89 0.65
Dressing/fitting room in performing arts theater	~~1.1~~ 0.61
Electrical/mechanical	~~1.10~~ 0.42
Emergency Vehicle Garage	0.56
Food preparation	~~1.20~~ 1.21
Laboratory for classrooms	~~1.3~~ 1.43
Laboratory for medical/industrial/research	~~1.8~~ 1.81
Laundry/Washing area	0.60
Loading Dock (interior)	~~0.47~~
Lobby	~~1.10~~ 0.90
Lobby for performing arts theater	~~3.3~~ 2.00
Lobby for motion picture theater	~~1.0~~ 0.59
Lobby - elevator	0.64

Lobby for Hotel	1.06
Locker room	~~0.80~~ 0.75
Lounge/~~ recreation~~ Breakroom	~~0.8~~ 0.73
Office- enclosed	~~1.1~~ 1.11
Office- open plan	~~1.0~~ 0.98
Pharmacy Area	1.68
Restroom	~~1.0~~ 0.98
Sales area	~~1.6[a]~~ 1.44
Stairway	~~0.70~~ 0.69
Storage	~~0.8~~ 0.63
Vehicular Maintenance Area	0.67
Workshop	~~1.60~~ 1.59
BUILDING SPECIFIC SPACE-BY-SPACE TYPES	
Courthouse/police station/penitentiary Courtroom Confinement cells ~~Judge chambers~~ Penitentiary audience seating Penitentiary classroom Penitentiary dining	 ~~1.90~~ 1.72 ~~1.1~~ 0.81 ~~1.3~~ ~~0.5~~ 0.28 ~~1.3~~ 1.34 ~~1.1~~ 0.96
~~Automotive- service/repair~~	~~0.70~~
Bank/office- banking activity area	~~1.5~~ 1.01
Dormitory ~~living quarters~~ bedrooms	~~1.10~~ 0.38
Gymnasium/fitness center ~~Fitness~~ Exercise area Gymnasium audience/seating Playing area	 ~~0.9~~ 0.72 ~~0.40~~ 0.65 ~~1.40~~ 1.2
Healthcare clinic/hospital Corridors/transition Exam/treatment ~~Emergency~~ ~~Public and staff lounge~~ Medical supplies Nursery Nurse station Physical therapy Patient room ~~Pharmacy~~ Radiology/imaging Operating room Recovery Lounge/Breakroom ~~Laundry - washing~~	 ~~1.00~~ 0.99 ~~1.7~~ 1.66 ~~2.70~~ ~~0.80~~ ~~1.40~~ 0.74 ~~0.9~~ 0.88 ~~1.00~~ 0.71 ~~0.90~~ 0.91 ~~0.70~~ 0.62 ~~1.20~~ ~~1.3~~ 1.51 ~~2.20~~ 2.48 ~~1.2~~ 1.15 ~~0.8~~ 0.92 ~~0.60~~

~~Hotel~~ ~~Dining area~~ ~~Guest rooms~~ ~~Hotel lobby~~ ~~Highway lodging dining~~ ~~Highway lodging guest rooms~~	 ~~1.30~~ ~~1.10~~ ~~2.10~~ ~~1.20~~ ~~1.10~~
Library Stacks ~~Card file and cataloguing~~ Reading area	 ~~1.70~~ 1.71 ~~1.10~~ ~~1.20~~ 1.06
Manufacturing Corridors/transition Detailed manufacturing Equipment room Extra high bay (>50-foot floor-ceiling height) High bay (25-- 50-foot floor-ceiling height) Low bay(< 25-foot floor-ceiling height)	 ~~0.40~~ 0.41 ~~1.3~~ 1.29 ~~1.0~~ 0.74 ~~1.1~~ 1.05 ~~1.20~~ 1.23 ~~1.2~~ 1.19
Museum General exhibition Restoration	 ~~1.00~~ 1.05 ~~1.70~~ 1.02
Parking garage - garage areas	~~0.2~~ 0.19
Convention center Exhibit space Audience/seating area	 ~~1.50~~ 1.45 ~~0.90~~ 0.82
~~Fire stations~~ ~~Engine room~~ Fire Station Sleeping Quarters	 ~~0.80~~ ~~0.30~~ 0.22
Post office Sorting area	~~0.9~~ 0.94
Religious building Fellowship hall Audience seating Worship pulpit/choir	 ~~0.60~~ 0.64 ~~2.40~~ 1.53 ~~2.40~~ 1.53
Retail Dressing/fitting area Mall concourse Sales area	 ~~0.9~~ 0.71 ~~1.6~~ 1.10 ~~1.6~~ 1.59
Sports arena Audience seating ~~Court sports~~ Playing area - Class 4 ~~Court sports~~ Playing area - Class 3 ~~Court sports~~ Playing area - Class 2 ~~Court sports~~ Playing area - Class 1 ~~Ring sports area~~	 ~~0.4~~ 0.43 ~~0.7~~ 1.20 ~~1.2~~ 1.80 ~~1.9~~ 2.40 ~~3.0~~ 3.68 ~~2.7~~
Transportation Air/train/bus baggage area Airport concourse Terminal - ticket counter	 ~~1.00~~ 0.53 ~~0.60~~ 0.36 ~~1.50~~ 0.80
Warehouse ~~Fine material storage~~ small hand-carried items Medium/bulky material, palletized items	 ~~1.40~~ 0.95 ~~0.60~~ 0.58

(Portions of Table not shown remain unchanged)

Reason: The purpose of this change is to adjust the lighting power density allowances to the best available values. "Best" means values and methodology for determining allowances that will lead to high energy-efficiency while still allowing high-quality lighting and sufficient light levels. We believe that the best source for these values are the models maintained by Pacific Northwest National Lab (PNNL) for the DOE in support of ASHRAE/IES Standard 90.1 development. Recently the models were updated to account for some changes in recommended light levels in the new Lighting Handbook, 10th Edition from the Illuminating Engineering Society (IES). Additionally several new space types were added and some space types renamed or removed for clarity. Also, the Building Area Method values were based on a larger data set with 56% additional representative buildings.

Additional explanation of proposed changes by section:

Exception 1.2 to C405.5.1, (Sleeping Unit exception to lighting power limits)

Sleeping Units should be subject to the same requirements as Dwelling Units and residential buildings covered by Chapter 4 [RE].

Add exception for Mirror Lighting in Dressing Rooms.

Because this exception is in Standard 90.1, we assume that the LPD for Dressing/Fitting Room space types was developed with mirror lighting excluded. Without this exception the LPD limit for Dressing Rooms would be too low.

Add "Additional Interior Lighting Power" section.

This provision is an integral part of the space-by-space method. IECC-2012 already includes the additional power for retail as a footnote to the LPD table. The proposal adds the special allowance for decorative lighting and lighting for art and exhibits. IECC-2012 is missing this allowance, which is why some of the LPD values in IECC-2012 for some space types are higher than 90.1-2010. This allowance is a "use it or lose it" addition that can only be used for certain types of lighting. This provision gives the designer more flexibility but should not result in significant increase or decrease in stringency. The proposed new space-by-space LPD values were developed with the understanding that this additional allowance is available to the designer. The LPDs would not be valid for many space types without this additional allowance.

Revise Building Area Method LPDs (Table C405.5.2(1))

As mentioned above, these proposed values are from current PNNL models. These values were published in the public review draft of Addendum "co" to ASHRAE/IES Standard 90.1.

Revise Space-by-space Method LPDs (Table C405.5.2(2))

As mentioned above, these proposed values and space types are from current PNNL models. These values were published in the public review draft of Addendum "bh" to ASHRAE/IES Standard 90.1. The formatting and the ordering of space types that is in the IECC-2012 table were changed as little as possible. In order to accommodate the new space types, and the renaming or removal of a few space types, some rearrangement was necessary.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The changes proposed increase the usability of the IECC. Designers are already using these revised provisions in their designs.

Assembly Action: **None**

Public Comments

Public Comment:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

TABLE C405.5.2(2)
INTERIOR LIGHTING POWER ALLOWANCES:
SPACE-BY-SPACE METHOD

~~COMMON SPACE-BY-SPACE TYPES~~	~~LPD (w/ft2)~~
~~Atrium -that is < 40 feet in height~~	~~0.03 per ft. in total height ht.~~
~~Atrium - that is > 40 feet in height~~	~~0.40 + 0.02 per ft. in total height ht.~~

~~Audience/seating area - permanent~~ ~~For auditorium~~ ~~For performing arts theater~~ ~~For motion picture theater~~	 ~~0.63~~ ~~2.43~~ ~~1.14~~
~~Classroom/lecture/training~~	~~1.24~~
~~Conference/meeting/multipurpose~~	~~1.23~~
~~Copy/Print room~~	~~0.72~~
~~Corridor/transition~~	~~0.66~~
~~Computer Room~~	~~1.71~~
~~Dining area~~ ~~Bar/lounge/leisure dining~~ ~~Family dining area~~ ~~Cafeteria/Fast Food Dining~~	 ~~1.07~~ ~~0.89~~ ~~0.65~~
~~Dressing/fitting room in performing arts theater~~	~~0.61~~
~~Electrical/mechanical~~	~~0.42~~
~~Emergency Vehicle Garage~~	~~0.56~~
~~Food preparation~~	~~1.21~~
~~Laboratory for classrooms~~	~~1.43~~
~~Laboratory for medical/industrial/research~~	~~1.81~~
~~Laundry/Washing area~~	~~0.60~~
~~Loading Dock (interior)~~	~~0.47~~
~~Lobby~~	~~0.90~~
~~Lobby for performing arts theater~~	~~2.00~~
~~Lobby for motion picture theater~~	~~0.59~~
~~Lobby - elevator~~	~~0.64~~
~~Lobby for Hotel~~	~~1.06~~
~~Locker room~~	~~0.75~~
~~Lounge/Breakroom~~	~~0.73~~
~~Office- enclosed~~	~~1.11~~
~~Office- open plan~~	~~0.98~~
~~Pharmacy Area~~	~~1.68~~
~~Restroom~~	~~0.98~~
~~Sales area~~	~~1.44~~
~~Stairway~~	~~0.69~~
~~Storage~~	~~0.63~~
~~Vehicular Maintenance Area~~	~~0.67~~
~~Workshop~~	~~1.59~~
~~BUILDING SPECIFIC SPACE-BY-SPACE TYPES~~	
~~Courthouse/police station/penitentiary~~ ~~Courtroom~~ ~~Confinement cells~~ ~~Penitentiary audience seating~~ ~~Penitentiary classroom~~ ~~Penitentiary dining~~	 ~~1.72~~ ~~0.81~~ ~~0.28~~ ~~1.34~~ ~~0.96~~
~~Bank/office- banking activity area~~	~~1.01~~

~~Dormitory bedrooms~~	~~0.38~~
~~Gymnasium/fitness center~~	
~~Exercise area~~	~~0.72~~
~~Gymnasium audience/seating~~	~~0.65~~
~~Playing area~~	~~1.2~~
~~Healthcare clinic/hospital~~	
~~Corridors/transition~~	~~0.99~~
~~Exam/treatment~~	~~1.66~~
~~Medical supplies~~	~~0.74~~
~~Nursery~~	~~0.88~~
~~Nurse station~~	~~0.71~~
~~Physical therapy~~	~~0.91~~
~~Patient room~~	~~0.62~~
~~Radiology/imaging~~	~~1.51~~
~~Operating room~~	~~2.48~~
~~Recovery~~	~~1.15~~
~~Lounge/Breakroom~~	~~0.92~~
~~Library~~	
~~Stacks~~	~~1.71~~
~~Reading area~~	~~1.06~~
~~Manufacturing~~	
~~Corridors/transition~~	~~0.41~~
~~Detailed manufacturing~~	~~1.29~~
~~Equipment room~~	~~0.74~~
~~Extra high bay (>50-foot floor-ceiling height)~~	~~1.05~~
~~High bay (25-- 50-foot floor-ceiling height)~~	~~1.23~~
~~Low bay(< 25-foot floor-ceiling height)~~	~~1.19~~
~~Museum~~	
~~General exhibition~~	~~1.05~~
~~Restoration~~	~~1.02~~
~~Parking garage - garage areas~~	~~0.19~~
~~Convention center~~	
~~Exhibit space~~	~~1.45~~
~~Audience/seating area~~	~~0.82~~
~~Fire Station Sleeping Quarters~~	~~0.22~~
~~Post office Sorting area~~	~~0.94~~
~~Religious building~~	
~~Fellowship hall~~	~~0.64~~
~~Audience seating~~	~~1.53~~
~~Worship pulpit/choir~~	~~1.53~~
~~Retail~~	
~~Dressing/fitting area~~	~~0.71~~
~~Mall concourse~~	~~1.10~~
~~Sales area~~	~~1.59~~
~~Sports arena~~	
~~Audience seating~~	~~0.43~~
~~Playing area - Class 4~~	~~1.20~~
~~Playing area - Class 3~~	~~1.80~~
~~Playing area - Class 2~~	~~2.40~~
~~Playing area - Class 1~~	~~3.68~~
~~Transportation~~	
~~Air/train/bus baggage area~~	~~0.53~~
~~Airport concourse~~	~~0.36~~
~~Terminal - ticket counter~~	~~0.80~~
~~Warehouse~~	
~~small hand-carried items~~	~~0.95~~
~~Medium/bulky material, palletized items~~	~~0.58~~

TABLE C405.5.2(2)
INTERIOR LIGHTING POWER ALLOWANCES:
SPACE-BY-SPACE METHOD

Common Space Types[a]	LPD (watts/sq.ft)

Atrium	
… that is < 20' in height	0.03 per foot in total height
… that is ≥ 20' and ≤ 40' in height	0.03 per foot in total height
… that is > 40' in height	0.40 + 0.02 per foot in total height
Audience Seating Area	
... in an auditorium	0.63
... in a convention center	0.82
… in a gymnasium	0.65
... in a motion picture theater	1.14
... in a penitentiary	0.28
... in a performing arts theater	2.43
... in a religious building	1.53
... in a sports arena	0.43
… otherwise	0.43
Banking Activity Area	1.01
Breakroom (See Lounge/Breakroom)	
Classroom/Lecture Hall/Training Room	
… in a penitentiary	1.34
… otherwise	1.24
Conference/Meeting/Multipurpose Room	1.23
Confinement Cells	0.81
Copy/Print Room	0.72
Corridor[b]	
… in a Facility for the Visually Impaired (and not used primarily by the staff)[c]	0.92
… in a hospital	0.79
… in a manufacturing facility	0.41
… otherwise	0.66
Courtroom	1.72
Computer Room	1.71
Dining Area	
… in a penitentiary	0.96
… in a Facility for the Visually Impaired (and not used primarily by the staff)[c]	1.9
… in Bar/Lounge or Leisure Dining	1.07
… in Cafeteria or Fast Food Dining	0.65
… in Family Dining	0.89
… otherwise	0.65
Electrical/Mechanical Room	~~0.42~~ 0.95
Emergency Vehicle Garage	0.56
Food Preparation Area	1.21
Guest Room	0.47
Laboratory	
… in or as a classroom	1.43
… otherwise	1.81
Laundry/Washing Area	0.6
Loading Dock, Interior	0.47

Lobby	
… in a Facility for the Visually Impaired (and not used primarily by the staff)[c]	1.8
… for an elevator	0.64
… in a hotel	1.06
… in a motion picture theater	0.59
… in a performing arts theater	2
… otherwise	0.9
Locker Room	0.75
Lounge/Breakroom	
… in a healthcare facility	0.92
… otherwise	0.73
Office	
… enclosed and <= 250 sq.ft	1.11
… enclosed and > 250 sq.ft	1.11
… open plan	0.98
Parking Area, Interior	0.19
Pharmacy Area	1.68
Restroom	
… in a Facility for the Visually Impaired (and not used primarily by the staffs[c]	1.21
… otherwise	0.98
Sales Area	1.59
Seating Area, General	0.54
Stairway	See space containing stairway
Stairwell	0.69
Storage Room	
… < 50 sq.ft	0.63
… >= 50 sq.ft and <= 1,000 sq.ft	0.63
… otherwise	0.63
Vehicular Maintenance Area	0.67
Workshop	1.59
Building Type Specific Space Types[a]	**LPD (watts/sq.ft)**
Facility for the Visually Impaired[c]	
… in a chapel (and not used primarily by the staff)	2.21
… in a recreation room (and not used primarily by the staff)	2.41
Automotive (See Vehicular Maintenance Area above)	
Convention Center - Exhibit Space	1.45
Dormitory - Living Quarters	0.38
Fire Station - Sleeping Quarters	0.22
Gymnasium/Fitness Center	
… in an Exercise Area	0.72
… in a Playing Area	1.2
Healthcare Facility	
… in an Exam/Treatment Room	1.66
… in an Imaging Room	1.51
….in a Medical Supply Room	0.74
… in a Nursery	0.88
… in a Nurse's Station	0.71
… in an Operating Room	2.48

… in a Patient Room	0.62
… in a Physical Therapy Room	0.91
… in a Recovery Room	1.15
Library	
… in a Reading Area	1.06
… in the Stacks	1.71
Manufacturing Facility	
… in a detailed manufacturing area	1.29
… in an Equipment Room	0.74
… in an Extra High Bay Area (> 50' floor-to-ceiling height)	1.05
… in a High Bay Area (25-50' floor-to-ceiling height)	1.23
… in a Low Bay Area (< 25' floor-to-ceiling height)	1.19
Museum	
… in a General Exhibition Area	1.05
… in a Restoration Room	1.02
Performing Arts Theater - Dressing Room	0.61
Post Office - Sorting Area	0.94
Religious Buildings	
… in a Fellowship Hall	0.64
… in a Worship/Pulpit/Choir Area	1.53
Retail Facilities	
… in a Dressing/Fitting Room	0.71
… in a Mall Concourse	1.1
Sports Arena - Playing Area	
… for a Class I facility	3.68
… for a Class II facility	2.4
… for a Class III facility	1.8
… for a Class IV facility	1.2
Transportation Facility	
… in a baggage/carousel Area	0.53
… in an Airport Concourse	0.36
… at a Terminal Ticket Counter	0.8
Warehouse - Storage Area	
…for medium to bulky, palletized items	0.58
… for smaller, hand-carried items	0.95

a. In cases where both a common space type and a building area specific space type are listed, the building area specific space type shall apply
b. In corridors, the extra LPD allowance is not based on the RCR and shall be permitted when the width of the corridor is less than 8 feet
c. A 'Facility for the Visually Impaired' is a facility that is licensed or will be licensed by local or state authorities for either senior long-term care, adult daycare, senior support and/or people with special visual needs.

(Portions of the proposal not shown remain unchanged)

Commenter's Reason: The intent of the original proposal is to have the space by space lighting power densities in the IECC match the lighting power densities in 90.1. Standard 90.1-2013 will also be published to include a reformatted space by space table which is intended to have consistent formatting, and hopefully more readable and usable. For example, the current Table in the IECC has separate rows for Atriums less than 40 feet in height, and Atriums greater than 40 feet in height, then in the next row for audience/seating areas, there are three rows in the group. This comment makes it so similar types of spaces are grouped together, then if there are separate requirements for different types of spaces in a similar grouping, the requirements are broken out in a consistently formatted manner.

This proposal will make the values in the table, and the formatting of the table consistent with how they will be published in 90.1-2013.

Final Hearing Results

CE310-13 **AMPC**

Code Change No: CE312-13

Original Proposal

Section(s): C405.5.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   - 1.1. Professional sports arena playing field lighting.
   - 1.2. Lighting in *sleeping units* ~~lighting in hotels, motels, boarding houses or similar buildings~~.
   - 1.3. Emergency lighting automatically off during normal building operation.
   - 1.4. Lighting in spaces specifically designed for use by occupants with special lighting needs including the visually impaired visual impairment and other medical and age-related issues.
   - 1.5. Lighting in interior spaces that have been specifically designated as a reg-istered interior historic landmark.
   - 1.6. Casino gaming areas.
2. Lighting equipment used for the following shall be exempt provided that it is in addition to general lighting and is controlled by an independent control device:
   - 2.1. Task lighting for medical and dental purposes.
   - 2.2. Display lighting for exhibits in galleries, museums and monuments.
3. Lighting for theatrical purposes, including performance, stage, film production and video production.
4. Lighting for photographic processes.
5. Lighting integral to equipment or instrumentation and is installed by the manufacturer.
6. Task lighting for plant growth or maintenance.
7. Advertising signage or directional signage.
8. In restaurant buildings and areas, lighting for food warming or integral to food preparation equipment.
9. Lighting equipment that is for sale.
10. Lighting demonstration equipment in lighting education facilities.
11. Lighting *approved* because of safety or emergency considerations, inclusive of exit lights.
12. Lighting integral to both open and glass-enclosed refrigerator and freezer cases.
13. Lighting in retail display windows, provided the display area is enclosed by ceiling-height partitions.
14. Furniture mounted supplemental task lighting that is controlled by automatic shutoff.

Reason: This proposal simplifies the exception to the interior lighting power in sleeping units. The definition of sleeping unit is such that there is no further need to delineate the building type in which the sleeping unit is located. In fact, the delineation suggests there are others that are not "similar" to hotels, motels, and boarding houses where the exception would not apply (e.g., dormitories).

Cost Impact: The code change proposal does not increase the cost of construction.

Public Hearing Results

The following errata were not posted to the ICC website. The added text 'Lighting in' should have been underlined.

Exceptions:

1. The connected power associated with the following lighting equipment is not included in calculating total connected lighting power.
   1.1. Professional sports arena playing field lighting.
   1.2. Lighting in *sleeping units*.

Committee Action: Disapproved

Committee Reason: The committee is concerned that reducing the text to sleeping units, that the application to guest rooms that are full dwelling units is unclear.

Assembly Action: None

Public Comment

Public Comment:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Submitted.

Commenter's Reason: At the code development hearing, there was no opposition to proposal CE312-13 from the floor. After it went to committee, there was a concern raised that the proposal language would open the door to exempting suites from the lighting provisions in the code. As it had gone to committee, there was no further opportunity to provide a response. The apparent confusion about sleeping units was enough to create doubt, and the code change proposal was disapproved with a vote of 5 to 4.

Proposal CE312-13 is simply a clarification to the code. The term "lighting in" is needed to provide a subject for the exception, and is consistent with other exceptions to Section C405.5.1 and general criteria in Section C405. The code currently uses a vague and undefined term "other similar buildings" that leads to interpretation issues when considering buildings other than hotels, motels, or boarding houses. Most important, regardless of the above two clarifications in the code, the end result is the current code exempts lighting in sleeping units from consideration in the LPD calculation, and the proposed code text does, as well.

The current code clearly intends that lighting in sleeping units not be included in the LPD calculations. *Sleeping unit* is defined in Chapter 2 of the code as:

> A room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a dwelling unit are not sleeping units.

As defined, there appears no need to indicate what types of buildings such a unit must be located in. For instance, if a suite meets the definition of a sleeping unit, then under the current code and proposed code it would be exempt. If it is not a sleeping unit, then, by definition, it is a dwelling unit and is **not** exempt – the distinction being a dwelling unit, unlike a sleeping unit, has **both** sanitation and kitchen facilities.

The reason given for disapproval was the unclear nature of the application of lighting requirements to guest rooms that are full dwelling units. Both terms are defined in the code, and the intent of proposal CE312-13 is not to change the definitions or requirements, but simply to clarify the exception. If a room, suite, area or other living space in any building is defined as a sleeping unit, then the code exempts the lighting in that space from the LPD criterion. If not a sleeping unit, then it is a dwelling unit and therefore not exempt. CE312-13 makes no change to those requirements. If there is a concern about the unclear application of the lighting criteria, it will remain in the existing code if this change is disapproved, because the terms used are defined in the current code without respect to the type of building in which the sleeping units or dwelling units are located.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

CE312-13 AS

Code Change No: CE314-13

Original Proposal

Section(s): C405.5.1

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

C405.5.1 Total connected interior lighting power. The total connected interior lighting power (watts) shall be the sum of the watts of all interior lighting equipment as determined in accordance with Sections C405.5.1.1 through C405.5.1.4.

Exceptions:

11. Lighting *approved* because of safety or emergency considerations, ~~inclusive of exit lights.~~

15. Exit signs.

(Portions of text not shown remains unchanged)

Reason: This change provides clarification to the code.
"Exit lights" is not an industry standard term and it is not clear what it means. It was likely meant to indicate exit signs, which should be a separate exception. Exit signs are a separate exception in Standard 90.1.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal replaces out of date term with current terminology consistent with the *International Building Code.*

Assembly Action: **None**

Final Hearing Results

CE314-13	**AS**

Code Change No: CE316-13

Original Proposal

Section(s): C405.5.2.1 (NEW), C405.5.2.2 (NEW), Table C405.5.2(2)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C405.5.2 Interior lighting power. The total interior lighting power allowance (watts) is determined according to Table C405.5.2(1) using the Building Area Method, or Table C405.5.2(2) using the Space-by-Space Method, for all areas of the building covered in this permit.

C405.5.2.1 Building area method. For the Building Area Method, the interior lighting power allowance is the floor area for each building area type listed in Table C405.5.2(1) times the value from Table C405.5.2(1) for that area. For the purposes of this method, an "area" shall be defined as all contiguous spaces that accommodate or are associated with a single building area type as listed in Table C405.5.2(1). Where this method is used to calculate the total interior lighting power for an entire building, each building area type shall be treated as a separate area.

C405.5.2.2 Space by space method. For the Space-by-Space Method, the interior lighting power allowance is determined by multiplying the floor area of each space times the value for the space type in Table C405.5.2(2) that most closely represents the proposed use of the space, and then summing the lighting power allowances for all spaces. Tradeoffs among spaces are permitted.

Exception: Additional lighting installed to highlight specific merchandise is permitted in accordance with the following:

1. The highlight lighting is switched or dimmed on circuits different from the circuits for general lighting.
2. The allowed lighting power shall be the smaller of the following:
   - 2.1, The actual wattage of the lighting equipment installed specifically for the merchandise; or
   - 2.2. The additional lighting determined in accordance with Equation 4-7.

$$\text{ARSA} = 500 \text{ watts} + (\text{Retail Area } 1 \times 0.6 \text{ W/ft}^2) + (\text{Retail Area } 2 \times 0.6 \text{ W/ft}^2) + (\text{Retail Area } 3 \times 1.4 \text{ W/ft}^2) + (\text{Retail Area } 4 \times 2.5 \text{ W/ft}^2). \qquad \textbf{(Equation 4-7)}$$

where:

ARSA =Additional interior retail sale lighting power allowance

Retail Area 1 = The floor area for all products not listed in Retail Area 2, 3 or 4.
Retail Area 2 = The floor area used for the sale of vehicles, sporting goods and small electronics.
Retail Area 3 = The floor area used for the sale of furniture, clothing, cosmetics and artwork.
Retail Area 4 = The floor area used for the sale of jewelry, crystal and china

Other merchandise categories are permitted to be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is *approved* by the code official.

3. The additional power determined in Item 2, shall be added to the interior lighting power determined for sales areas in Table C 405.5.2(2)

TABLE C405.5.2(2)
INTERIOR LIGHTING POWER ALLOWANCES:
SPACE-BY-SPACE METHOD

(Portions of Table not shown remain unchanged)

~~a. Where lighting equipment is specified to be installed to highlight specific merchandise in addition to lighting equipment specified for general lighting and is switched or dimmed on circuits different from the circuits for general lighting, the smaller of the actual wattage of the lighting equipment installed specifically for merchandise, or additional lighting power as determined below shall be added to the interior lighting power determined in accordance with this line item.~~

~~Calculate the additional lighting power as follows:~~

~~Additional Interior Lighting Power Allowance = 500 watts + (Retail Area 1 × 0.6 W/ft2) + (Retail Area 2 × 0.6 W/ft2) + (Retail Area 3 × 1.4 W/ft2) + (Retail Area 4 × 2.5 W/ft2).~~

~~where:~~

~~Retail Area 1 = The floor area for all products not listed in Retail Area 2, 3 or 4.~~

~~Retail Area 2 = The floor area used for the sale of vehicles, sporting goods and small electronics.~~

~~Retail Area 3 = The floor area used for the sale of furniture, clothing, cosmetics and artwork.~~

~~Retail Area 4 = The floor area used for the sale of jewelry, crystal and china~~

~~**Exception:** Other merchandise categories are permitted to be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is *approved* by the authority having jurisdiction.~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.
: The existing footnote a is an exception to the table. It is unusual in its format and distinctly different in its format from the typical format of International Codes. The footnote is a very important allowance for retail sales establishments. The footnote is also unusual in that it contains an equation as well as an exception to the equation.

The proposal does 3 things:

1. It moves the retail lighting exception from being a footnote at the end of a long table to a more prominent position in the text of the code directing the code users to the tables.
2. It reformats the provision into a series of items which more clearly specify the requirements and limits of the exception. It allows the equation to be numbered as all equations in the IECC are numbered.
3. It replaces the 'exception within the exception' to being a portion of the criteria – and properly identifies the code official as the person who will approve the additional display lighting.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is editorial in nature and will not affect the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides a clear replacement of the footnote into the body of the code text where it can be better applied.

Assembly Action: **None**

Final Hearing Results

CE316-13	**AS**

Code Change No: CE317-13

Original Proposal

Section(s): C405.5.3 (New), Table C405.5.2(2)

Proponent: Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

C405.5.3 Additional interior lighting power. Where using the Space-by-Space Method, an increase in the interior lighting power allowance is permitted for specific lighting functions. Additional power shall be permitted only where the specified lighting is installed and automatically controlled, separately from the general lighting, to be turned off during nonbusiness hours. This additional power shall be used only for the specified luminaires and shall not be used for any other purpose. An increase in the interior lighting power allowance is permitted in the following case:

1. For lighting equipment to be installed in sales areas specifically to highlight merchandise, the additional lighting power shall be determined in accordance with Equation 4-X

Additional Interior Lighting Power Allowance = 500 watts + (Retail Area 1 × 0.6 W/ft^2) + (Retail Area 2 × 0.6 W/ft^2) + (Retail Area 3 × 1.4 W/ft^2) + (Retail Area 4 × 2.5 W/ft^2). Equation 4-x

where:

Retail Area 1 = The floor area for all products not listed in Retail Area 2, 3 or 4.
Retail Area 2 = The floor area used for the sale of vehicles, sporting goods and small electronics.
Retail Area 3 = The floor area used for the sale of furniture, clothing, cosmetics and artwork.
Retail Area 4 = The floor area used for the sale of jewelry, crystal and china.

Exception: Other merchandise categories are permitted to be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is *approved* by the code official.

TABLE C405.5.2(2)
INTERIOR LIGHTING POWER ALLOWANCES:
SPACE-BY-SPACE METHOD

(Portions of table not shown remain unchanged)

~~a. Where lighting equipment is specified to be installed to highlight specific merchandise in addition to lighting equipment specified for general lighting and is switched or dimmed on circuits different from the circuits for general lighting, the smaller of the actual wattage of the lighting equipment installed specifically for merchandise, or additional lighting power as determined below shall be added to the interior lighting power determined in accordance with this line item.~~

~~Calculate the additional lighting power as follows:~~

~~Additional Interior Lighting Power Allowance = 500 watts + (Retail Area 1 × 0.6 W/ft^2) + (Retail Area 2 × 0.6 W/ft^2) + (Retail Area 3 × 1.4 W/ft^2) + (Retail Area 4 × 2.5 W/ft^2).~~

~~where:~~

~~Retail Area 1 = The floor area for all products not listed in Retail Area 2, 3 or 4.~~

~~Retail Area 2 = The floor area used for the sale of vehicles, sporting goods and small electronics.~~
~~Retail Area 3 = The floor area used for the sale of furniture, clothing, cosmetics and artwork.~~
~~Retail Area 4 = The floor area used for the sale of jewelry, crystal and china.~~

~~**Exception:** Other merchandise categories are permitted to be included in Retail Areas 2 through 4 above, provided that justification documenting the need for additional lighting power based on visual inspection, contrast, or other critical display is *approved* by the authority having jurisdiction.~~

Reason: Adds clarity to the code. The provision is too lengthy for a footnote. Formula has been properly listed. “Authority having jurisdiction” changed to “code official”.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal is a companion to CE316-13, but provides better organization for the relocation of the footnote. A requirement is preferred over an exception.

Assembly Action: **None**

Final Hearing Results

CE317-13	**AS**

Code Change No: CE319-13

Original Proposal

Section(s): C405.6, C405.6.1, C405.6.2

Proponent: Glenn Heinmiller, Lam Partners, International Association of Lighting Designers (glenn@lampartners.com)

Revise as follows:

C405.6 Exterior lighting (Mandatory). Where the power for exterior lighting is supplied through the energy service to the building, all exterior lighting, ~~other than low-voltage landscape lighting~~, shall comply with Section~~s~~ ~~C405.6.1 and~~ C405.6.2.

> **Exception:** Where *approved* because of historical, safety, signage or emergency considerations.

~~**C405.6.1 Exterior building grounds lighting.** All exterior building grounds luminaires that operate at greater than 100 watts shall contain lamps having a minimum efficacy of 60 lumens per watt unless the luminaire is controlled by a motion sensor or qualifies for one of the exceptions under Section C405.6.2.~~

C405.6.2 Exterior building lighting power. The total exterior lighting power allowance for all exterior building applications is the sum of the base site allowance plus the individual allowances for areas that are to be illuminated and are permitted in Table C405.6.2(2) for the applicable lighting zone. Tradeoffs are allowed only among exterior lighting applications listed in Table C405.6.2(2), Tradable Surfaces section. The lighting zone for the building exterior is deter- mined from Table C405.6.2(1) unless otherwise specified by the local jurisdiction. ~~Exterior lighting for all applications (except those included in the exceptions to Section C405.6.2) shall comply with the requirements of Section C405.6.1.~~

Exception: Lighting used for the following exterior applications is exempt where equipped with a control device independent of the control of the nonexempt lighting:

1. Specialized signal, directional and marker lighting associated with transportation;
2. Advertising signage or directional signage;
3. Integral to equipment or instrumentation and is installed by its manufacturer;
4. Theatrical purposes, including performance, stage, film production and video production;
5. Athletic playing areas;
6. Temporary lighting;
7. Industrial production, material handling, transportation sites and associated storage areas;
8. Theme elements in theme/amusement parks; and
9. Used to highlight features of public monuments and registered historic landmark structures or buildings.

Reason: Simplify the code without reducing stringency.
C405.6 -The exemption of "low-voltage landscape lighting" makes no sense and adds unnecessary complexity. This exemption is not in Standard 90.1.
C405.6.1 This is an obsolete and redundant provision that should have been removed from IECC when the lighting power density method was introduced for exterior lighting. The provision adds no value to the code and increases complexity.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Refines the requirement to focus on the system of lighting and not individual fixtures.

Assembly Action: **None**

Public Comments

Public Comment:

Glenn Heinmiller, Lam Partners, representing International Association of Lighting Designers, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C405.1 General (Mandatory). This section covers lighting system controls, the connection of ballasts, the maximum lighting power for interior <u>and exterior</u> applications, electrical energy consumption, ~~and minimum acceptable lighting equipment for exterior applications~~.

Commenter's Reason: This proposal CE319 removes the only requirement in the code covering the "minimum acceptable lighting equipment for exterior applications". Exterior lighting is regulated by limiting lighting power. The general description in C405.1 needs to be modified to reflect this.

Final Hearing Results

CE319-13	**AMPC**

Code Change No: CE320-13

Original Proposal

Section(s): Table C405.6.2(1)

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

TABLE C405.6.2(1)
EXTERIOR LIGHTING ZONES

LIGHTING ZONE	DESCRIPTION
1	Developed areas of national parks, state parks, forest land, and rural areas
2	Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use and residential mixed use areas
3	All other areas <u>not classified as lighting zone 1, 2 or 4.</u>
4	High-activity commercial districts in major metropolitan areas as designated by the local land use planning authority

Reason: This proposal clarifies the exterior lighting zone requirements to indicate that Zone 3 includes all areas that are not classified as lighting Zone 1, 2, or 4. The new language clarifies the meaning of “other areas.” The objective of this proposal is to clarify the code to foster implementation and compliance verification.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the text in this cell of the table.

Assembly Action: **None**

Final Hearing Results

CE320-13 **AS**

Code Change No: CE321-13

Original Proposal

Section(s): Table C405.6.2(2)

Proponent: Jack Bailey, One Lux Studio, representing International Association of Lighting Designers (jbailey@oneluxstudio.com)

Revise as follows:

TABLE C405.6.2(2)
INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS

		LIGHTING ZONES			
		Zone 1	**Zone 2**	**Zone 3**	**Zone 4**
Base Site Allowance (Base allowance is usable in tradable or nontradable surfaces.)		500 W	600 W	750 W	1300 W
Tradable Surfaces (Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas are tradable.)	**Uncovered Parking Areas**				
	Parking areas and drives	0.04 W/ft^2	0.06 W/ft^2	0.10 W/ft^2	0.13 W/ft^2
	Building Grounds				
	Walkways less than 10 feet wide	0.7 W/linear foot	0.7 W/linear foot	0.8 W/linear foot	1.0 W/linear foot
	Walkways 10 feet wide or greater, plaza areas special feature areas	0.14 W/ft^2	0.14 W/ft^2	0.16 W/ft^2	0.2 W/ft^2
	Stairways	0.75 W/ft^2	1.0 W/ft^2	1.0 W/ft^2	1.0 W/ft^2
	Pedestrian tunnels	0.15 W/ft^2	0.15 W/ft^2	0.2 W/ft^2	0.3 W/ft^2
	Building Entrances and Exits				
	Main entries	20 W/linear foot of door width	20 W/linear foot of door width	30 W/linear foot of door width	30 W/linear foot of door width
	Other doors	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width	20 W/linear foot of door width
	Entry canopies	0.25 W/ft^2	0.25 W/ft^2	0.4 W/ft^2	0.4 W/ft^2
	Sales Canopies				
	Free-standing and	0.6 W/ft^2	0.6 W/ft^2	0.8 W/ft^2	1.0 W/ft^2

	attached				
	Outdoor Sales				
	Open areas (including vehicle sales lots)	0.25 W/ft^2	0.25 W/ft^2	0.5 W/ft^2	0.7 W/ft^2
	Street frontage for vehicle sales lots in addition to "open area" allowance	No allowance	10 W/linear foot	10 W/linear foot	30 W/linear foot
Nontradable Surfaces (Lighting power density calculations for the following applications can be used only for the specific application and cannot be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table.)	Building facades	No allowance	~~0.1 W/ft^2 for each illuminated wall or surface or 2.5 W/linear foot for each illuminated wall or surface length~~ <u>0.075 W/ft^2 of gross above-grade wall area</u>	~~0.15 W/ft^2 for each illuminated wall or surface or 3.75 W/linear foot for each illuminated wall or surface length~~ <u>0.113 W/ft^2 of gross above-grade wall area</u>	~~0.2 W/ft^2 for each illuminated wall or surface or 5.0 W/linear foot for each illuminated wall or surface length~~ <u>0.15 W/ft^2 of gross above-grade wall area</u>
	Automated teller machines and night depositories	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location
	Entrances and gatehouse inspection stations at guarded facilities	0.75 W/ft^2 of covered and uncovered area	0.75 W/ft^2 of covered and uncovered area	0.75 W/ft^2 of covered and uncovered area	0.75 W/ft^2 of covered and uncovered area
	Loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.5 W/ft^2 of covered and uncovered area	0.5 W/ft^2 of covered and uncovered area	0.5 W/ft^2 of covered and uncovered area	0.5 W/ft^2 of covered and uncovered area
	Drive-up windows/doors	400 W per drive-through	400 W per drive-through	400 W per drive-through	400 W per drive-through
	Parking near 24-hour retail entrances	800 W per main entry	800 W per main entry	800 W per main entry	800 W per main entry

For SI: 1 foot = 304.8 mm, 1 watt per square foot = W/0.0929 m^2.

Reason:
How do you calculate the area of illuminated wall or surface? This sounds straightforward, but in many cases it is not. Consider the following examples:

1. Low wattage uplights are installed at the bottom of a 20-story building. By the time the light gets to the third or fourth floor it is not perceptible. What is the illuminated wall area? The entire 20-story façade, since some infinitesimally small amount of light reaches the top? Or only that portion of the façade that receives perceptible light? Perceptible to whom - the code official or the designer?

2. Lighting is proposed for the TV antenna at the top of a high-rise building (antennas are common on very tall buildings like the Freedom Tower in New York City). The antenna is an open space frame. How do you calculate the surface area?
3. Lights are integrated into a building façade to light directly out away from the building (this is common on casinos). No building façade surface area is illuminated. What is the lighting power allowance? Does the code only allow illumination of building surfaces, but not direct-view lighting applications?

In all of these examples the code is unclear and unenforceable.

This proposal would substitute the term "gross above-grade wall area" instead of "illuminated wall or surface area". "Gross above-grade wall area" already has to be determined to show compliance with the fenestration provisions in C402.3 and is a much more readily understood term.

To avoid making the code less efficient, lower W/ft^2 values are proposed for Table C405.6.2. These values are 75% of current code values, which means that a building which has lighting on 75% of its' above-grade wall area will get the same allowance as under current code. A building which has less than 75% of its' façade lighted will get a larger allowance than under current code, and a building which has more than 75% of its' façade lighted will get a smaller allowance than under current code.

Cost Impact: The code change proposal will not increase the cost of construction

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal simplifies the calculation of façade lighting and eliminates an undefined term which makes the current calculation difficult.

Assembly Action: **None**

Final Hearing Results

CE321-13 **AS**

Code Change No: CE322-13

Original Proposal

Section(s): C405.7

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C405.7 Electrical energy consumption (mandatory). ~~In buildings having individual~~ Every dwelling unit~~s, provisions shall be made to determine the electrical energy consumed by each tenant by separately metering individual dwelling units~~ in Use Group R-2 buildings shall have a separate electrical meter.

Reason: This proposal simplifies the electrical metering requirements to indicate that the dwelling units in Use Group R-2 buildings must be separately metered. The intent is to apply to R-2 buildings and there is no need to indicate in the code the reason for the criterion; only what is required. This will simplify the code to foster implementation and compliance verification.

Cost Impact: The code change proposal does not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies that the text applies to Group R-2 occupancies.

Assembly Action: **None**

Final Hearing Results

CE322-13	**AS**

Code Change No: CE329-13

Original Proposal

Section(s): C405.8 (NEW), Table C405.8 (NEW)

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.8 Electrical transformers (Mandatory). Electric transformers shall meet the minimum efficiency requirements of Table C405.8 as tested and rated in accordance with the test procedure listed in DOE 10 CFR 431. The efficiency shall be verified through certification under an approved certification program or, where no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the transformer manufacturer.

Exceptions: The following transformers are exempt:

1. Transformers that meet the Energy Policy Act of 2005 exclusions based on the DOE 10 CFR 431 definition of special purpose applications.
2. Transformers that meet the Energy Policy Act of 2005 exclusions that are not to be used in general purpose applications based on information provided in DOE 10 CFR 431
3. Transformers that meet the Energy Policy Act of 2005 exclusions with multiple voltage taps where the highest tap is at least 20 percent more than the lowest tap.
4. Drive transformers
5. Rectifier transformers
6. Auto-transformers
7. Uniterruptible power system transformers
8. Impendance transformers
9. Regulating transformers
10. Sealed and nonventilating transformers
11 Machine tool transformer
12. Welding transformer
13. Grounding transformer
15. Testing transformer

TABLE C405.8
Minimum Nominal Efficiency Levels for 10 CFR 431 Low Voltage Dry-Type Distribution Transformers

Single Phase Transformers		Three Phase Transformers	
kVA[a]	Efficiency (%)[b]	kVA[a]	Efficiency (%)[b]
15	97.7	15	97.0
25	98.0	30	97.5
37.5	98.2	45	97.7
50	98.3	75	98.0
75	98.5	112.5	98.2
100	98.6	150	98.3
167	98.7	225	98.5
250	98.8	300	98.6
333	98.9	500	98.7
		750	98.8
		1000	98.9

a. kiloVolt-Amp rating.
b. Nominal efficiencies shall be established in accordance with the DOE 10 CFR 431 test procedure for low voltage dry-type transformers.

Add new definitions as follows:

LOW VOLTAGE DRY-TYPE DISTRIBUTION TRANSFORMER: A transformer that is air-cooled, does not use oil as a coolant, has an input voltage less than or equal to 600 Volts, and is rated for operation at a frequency of 60 Hertz

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised with respect to electric low-voltage dry-type transformer efficiency provisions, an issue that is not currently addressed in the IECC Commercial Provisions. The change ensures continued consistency between the IECC and standard 90.1-2010/2013 and addresses an important component associated with improving building energy efficiency.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal is consistent with federal regulations of transformers and its placement in the code will restrict the reuse of older transformers. Some on the committee felt that this wasn't appropriate for inclusion in an energy code.

Assembly Action: **None**

Final Hearing Results

CE329-13 **AS**

Code Change No: CE331-13

Original Proposal

Section(s): C405.8 (NEW), Table C405.8(1) (NEW), Table C405.8(2) (NEW), C405.8(3) (NEW), Table C405.8(4) (NEW), Chapter 5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C405.8 Electrical motors (Mandatory). Electric motors shall meet the minimum efficiency requirements of Tables C405.8 (1) through C405.8 (4) when tested and rated in accordance with the DOE 10 CFR 431. The efficiency shall be verified through certification under an approved certification program or, where no certification program exists, the equipment efficiency ratings shall be supported by data furnished by the motor manufacturer.

Table C405.8 (1)
Minimum Nominal Full-Load Efficiency for 60 HZ NEMA *General Purpose Electric Motors*

***(Subtype I)* Rated 600 Volts or Less (Random Wound)[a]**

	Open Drip-Proof Motors			Totally Enclosed Fan-Cooled Motors		
Number of Poles ⇒	**2**	**4**	**6**	**2**	**4**	**6**
Synchronous Speed (RPM)	**3600**	**1800**	**1200**	**3600**	**1800**	**1200**
Motor Horsepower						
1	77.0	85.5	82.5	77.0	85.5	82.5
1.5	84.0	86.5	86.5	84.0	86.5	87.5
2	85.5	86.5	87.5	85.5	86.5	88.5
3	85.5	89.5	88.5	86.5	89.5	89.5
5	86.5	89.5	89.5	88.5	89.5	89.5
7.5	88.5	91.0	90.2	89.5	91.7	91.0
10	89.5	91.7	91.7	90.2	91.7	91.0
15	90.2	93.0	91.7	91.0	92.4	91.7
20	91.0	93.0	92.4	91.0	93.0	91.7
25	91.7	93.6	93.0	91.7	93.6	93.0
30	91.7	94.1	93.6	91.7	93.6	93.0
40	92.4	94.1	94.1	92.4	94.1	94.1
50	93.0	94.5	94.1	93.0	94.5	94.1
60	93.6	95.0	94.5	93.6	95.0	94.5
75	93.6	95.0	94.5	93.6	95.4	94.5
100	93.6	95.4	95.0	94.1	95.4	95.0
125	94.1	95.4	95.0	95.0	95.4	95.0

150	94.1	95.8	95.4	95.0	95.8	95.8
200	95.0	95.8	95.4	95.4	96.2	95.8
250	95.0	95.8	95.4	95.8	96.2	95.8
300	95.4	95.8	95.4	95.8	96.2	95.8
350	95.4	95.8	95.4	95.8	96.2	95.8
400	95.8	95.8	95.8	95.8	96.2	95.8
450	95.8	96.2	96.2	95.8	96.2	95.8
500	95.8	96.2	96.2	95.8	96.2	95.8

a Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.

Table C405.8 (2)
Minimum Nominal Full-Load Efficiency of *General Purpose Electric Motors (Subtype II)* and all Design B motors greater than 200 horsepower[a]

	Open Drip-Proof Motors				Totally Enclosed Fan Cooled Motors			
Number of Poles ==>	**2**	**4**	**6**	**8**	**2**	**4**	**6**	**8**
Synchronous Speed (RPM)==>	**3600**	**1800**	**1200**	**900**	**3600**	**1800**	**1200**	**900**
Motor Horsepower								
1	NR	82.5	80.0	74.0	75.5	82.5	80.0	74.0
1.5	82.5	84.0	84.0	75.5	82.5	84.0	85.5	77.0
2	84.0	84.0	85.5	85.5	84.0	84.0	86.5	82.5
3	84.0	86.5	86.5	86.5	85.5	87.5	87.5	84.0
5	85.5	87.5	87.5	87.5	87.5	87.5	87.5	85.5
7.5	87.5	88.5	88.5	88.5	88.5	89.5	89.5	85.5
10	88.5	89.5	90.2	89.5	89.5	89.5	89.5	88.5
15	89.5	91.0	90.2	89.5	90.2	91.0	90.2	88.5
20	90.2	91.0	91.0	90.2	90.2	91.0	90.2	89.5
25	91.0	91.7	91.7	90.2	91.0	92.4	91.7	89.5
30	91.0	92.4	92.4	91.0	91.0	92.4	91.7	91.0
40	91.7	93.0	93.0	91.0	91.7	93.0	93.0	91.0
50	92.4	93.0	93.0	91.7	92.4	93.0	93.0	91.7
60	93.0	93.6	93.6	92.4	93.0	93.6	93.6	91.7
75	93.0	94.1	93.6	93.6	93.0	94.1	93.6	93.0
100	93.0	94.1	94.1	93.6	93.6	94.5	94.1	93.0
125	93.6	94.5	94.1	93.6	94.5	94.5	94.1	93.6
150	93.6	95.0	94.5	93.6	94.5	95.0	95.0	93.6
200	94.5	95.0	94.5	93.6	95.0	95.0	95.0	94.1
250	94.5	95.4	95.4	94.5	95.4	95.0	95.0	94.5
300	95.0	95.4	95.4	NR	95.4	95.4	95.0	NR
350	95.0	95.4	95.4	NR	95.4	95.4	95.0	NR
400	95.4	95.4	NR	NR	95.4	95.4	NR	NR

450	95.8	95.8	NR	NR	95.4	95.4	NR	NR
500	95.8	95.8	NR	NR	95.4	95.8	NR	NR

a Nominal efficiencies shall be established in accordance with DOE 10 CFR 431.

NR—No requirement

Table C405.8 (3)
Minimum Average Full Load Efficiency for Polyphase *Small Electric Motors*[a]

	Open Motors		
Number of Poles ==>	**2**	**4**	**6**
Synchronous Speed (RPM)	**3600**	**1800**	**1200**
Motor Horsepower			
0.25	65.6	69.5	67.5
0.33	69.5	73.4	71.4
0.50	73.4	78.2	75.3
0.75	76.8	81.1	81.7
1	77.0	83.5	82.5
1.5	84.0	86.5	83.8
2	85.5	86.5	N/A
3	85.5	86.9	N/A

[a] Average full load efficiencies shall be established in accordance with 10 CFR 431.

Table C405.8 (4)
Minimum Average Full Load Efficiency for Capacitor-Start Capacitor-Run and Capacitor-Start Induction-Run *Small Electric Motors*[a]

	Open Motors		
Number of Poles ==>	**2**	**4**	**6**
Synchronous Speed (RPM)	**3600**	**1800**	**1200**
Motor Horsepower			
0.25	**66.6**	**68.5**	**62.2**
0.33	**70.5**	**72.4**	**66.6**
0.50	**72.4**	**76.2**	**76.2**
0.75	**76.2**	**81.8**	**80.2**
1	**80.4**	**82.6**	**81.1**
1.5	**81.5**	**83.8**	**N/A**
2	**82.9**	**84.5**	**N/A**
3	**84.1**	**N/A**	**N/A**

[a] Average full load efficiencies shall be established in accordance with 10 CFR 431.

Add new definitions as follows:

GENERAL PURPOSE ELECTRIC MOTOR (SUBTYPE I): A motor which is designed in standard ratings with either:

1. Standard operating characteristics and standard mechanical construction for use under usual service conditions, such as those specified in NEMA MG1, paragraph 14.02, "Usual Service Conditions," and without restriction to a particular application or type of application; or
2. Standard operating characteristics or standard mechanical construction for use under unusual service conditions, such as those specified in NEMA MG1, paragraph 14.03, "Unusual Service Conditions," or for a particular type of application, and which can be used in most general purpose applications.

General purpose electric motors (subtype I) are constructed in NEMA T-frame sizes, or IEC metric equivalent, starting at 143T.

GENERAL PURPOSE ELECTRIC MOTOR (SUBTYPE II). A motor incorporating the design elements of a general purpose electric motor (subtype I) that is configured as one of the following:
1. A U-frame motor
2. A Design C motor
3. A close-coupled pump motor
4. A footless motor
5. A vertical, solid-shaft, normal-thrust motor (as tested in a horizontal configuration)
6. An 8-pole motor (900 rpm)
7. A polyphase motor with voltage of not more than 600 volts (other than 230 or 460 volts)

SMALL ELECTRIC MOTOR. A general purpose, alternating current, single speed induction motor.

Add new standard to Chapter 5 as follows:

DOE

10 CFR 431 Subpart B, App B, Uniform Test Method for Measuring Nominal Full Load Efficiency of Electric Motors.

NEMA National Electrical Manufacturers Association
1300 North 17th Street, Suite 1752
Rosslyn, VA 22209

MG1-2011 Motors and Generators.

Reason: ASHRAE/IES Standard 90.1-2010, which is adopted by reference as an alternative to the IECC Commercial Provisions, has been revised with respect to electric motor efficiency provisions, an issue not currently addressed in the IECC Commercial Provisions. The change ensures continued consistency between the IECC and standard 90.1-2010 and addresses an important component associated with improving building energy efficiency.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

For staff analysis of the content o*f* DOE 10CFR 431 Subpart B, App. B, and NEMA MG1-2011 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: While the proposal integrates federal standard which need to be complied with in the manufacturer of new equipment, placing this in the code will act to limit after market use of existing equipment in new buildings.

Assembly Action: **None**

Final Hearing Results

CE331-13 **AS**

Code Change No: CE332-13

Original Proposal

Section(s): C405.8 (NEW), C405.8.1 (NEW)

Proponent: Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development (WABO TCD)

Add new text as follows:

C405.8 Variable speed escalators and moving walks. Escalators and moving walks shall be capable of reducing their operating speed to no more than 15 feet per minute when no passengers have been detected for a period of time not exceeding three times the amount of time required to transfer a passenger between landings.

> **Exception:** A power factor controller that reduces operating voltage in response to light loading conditions is permitted to be provided in place of the variable speed function.

C405.8.1 Regenerative drive. An escalator designed either for one-way down operation only or for reversible operation shall have a variable frequency regenerative drive that supplies electrical energy to the building electrical system when the escalator is loaded with passengers whose combined weight exceeds 750 pounds.

Reason: This proposal will result in reduced energy use and longer equipment life due to reduced wear and tear during the hours on standby mode or light loading conditions. These escalator controls have been standard in Canada, Europe and most of Asia for many years. The 2010 ANSI/ASME A17.1 safety standard for elevators and escalators now allows use of escalators and moving walks with “sleep mode” for reducing speed during unoccupied periods and provides for their safe operation. Sensors detect approaching passengers and bring the escalator or walk up to full speed before the passenger steps on. The 750-pound threshold for activation of the regenerative drive is derived from the 5-passenger threshold mentioned in manufacturers’ literature (5 passengers x 150# = 750).

Energy savings:

The energy consumed by a typical pair of escalators is approximately 24,000 – 36,000 kWh per year, and the predicted energy savings ranges between 25% and 60%. The higher figure applies to escalators that have bursts of usage at wide intervals, as occurs with performing arts or transportation facilities. The lower figure would apply where usage is scattered throughout the day, as in shopping malls or office buildings. Annual savings per pair of escalators would equate to an energy cost savings of $600 - $2,140. The installed cost of escalators would typically increase by 1% - 4%, although one major manufacturer now includes these capabilities as standard for all escalators.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The committee felt this proposal was inferior to later items. The standard for this equipment needs to be referenced as shown in CE333-13.

Assembly Action: **None**

Public Comments

Public Comment:

Lee Kranz, City of Bellevue, WA, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

~~**C405.8 Variable speed escalators and moving walks.** Escalators and moving walks shall be capable of reducing their operating speed to no more than 15 feet per minute when no passengers have been detected for a period of time not exceeding three times the amount of time required to transfer a passenger between landings.~~

> ~~**Exception:** A power factor controller that reduces operating voltage in response to light loading conditions is permitted to be provided in place of the variable speed function.~~

~~**C405.8.1**~~ **C405.8 Regenerative drive.** An escalator designed either for one-way down operation only or for reversible operation shall have a variable frequency regenerative drive that supplies electrical energy to the building electrical system when the escalator is loaded with passengers whose combined weight exceeds 750 pounds.

Commenter's Reason: A regenerative drive system for the "down" escalator supplies electricity back into the building's electrical system. If it becomes an IECC requirement, a regenerative drive system will be provided as a standard feature rather than a "special order" and costs will decrease. Regenerative drives are permitted by ASME A17.1 standard. As we explained in our original proposal, these systems can save as much as 60% of the energy used by an escalator.

Section C405.8 is proposed to be deleted because similar text was included in CE333-13 and was approved in Dallas. This public comment is proposed to be appended to CE333-13 if it is approved for the 2015 IECC.

Final Hearing Results

CE332-13	**AMPC**

Code Change No: CE333-13

Original Proposal

Section(s): C405 (NEW), C405.1 (NEW), C405.2 (NEW), Chapter 5

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Add new text as follows:

<u>**C405 Vertical and horizontal transportation systems and equipment.** Vertical and horizontal transportation systems and equipment shall comply with this section.</u>

<u>**C405.1 Elevator cabs.** For the luminaires in each elevator cab, not including signals and displays, the sum of the lumens divided by the sum of the watts shall be no less than 35 lumens per watt. Ventilation fans in elevators that do not have their own air conditioning system shall not consume more than 0.33 watts/cfm at the maximum rated speed of the fan. Controls shall be provided that will de-energize ventilation fans and lighting systems when the elevator is stopped, unoccupied and with its doors closed for over 15 minutes.</u>

<u>**C405.2 Escalators and moving walks. E**scalators and moving walks shall comply with ASME A17.1/CSA B44 and shall have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.</u>

Add new standard to Chapter 5 as follows:

ASME

<u>ASME/A17.1/CSA B44-2010 Safety Code for Elevators and Escalators</u>

Reason: Energy is used in lighting and ventilating elevators when in operation and when not in operation. ASHRAE/IES Standard 90.1-2010, which is adopted by reference in the IECC Commercial Provisions, contains provisions to reduce the amount of energy used by elevators. This change ensures consistency between the IECC Commercial Provisions and standard 90.1 and owners/developers who choose to comply with standard 90.1 via the IECC are afforded this opportunity to save energy and reduce their operating costs.

Cost Impact: The code change proposal will increase the cost of construction if controls for ventilation on fans and systems are required.

Public Hearing Results

For staff analysis of the content of ASME A17.1/CSA B44-2010 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: The proposal will lead to energy savings. The industry has developed the acceptable methodologies and included them in the referenced standards. There was some concern that the threshold for application of this new provision was unclear.

Assembly Action: **None**

Final Hearing Results

CE333-13	**AS**

Code Change No: CE336-13

Original Proposal

Section(s): C406.1.1 (NEW)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

SECTION C406
ADDITIONAL EFFICIENCY PACKAGE OPTIONS

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. Efficient HVAC Performance in accordance with Section C406.2.
2. Efficient Lighting System in accordance with Section C406.3.
3. On-Site Supply of Renewable Energy in accordance with Section C406.4.

C406.1.1. Tenant spaces. Except where an entire building is in compliance with Section C406.4, individual tenant spaces shall comply with either Section C406.2 or Section C406.3. ~~unless documentation can be provided that demonstrates compliance with Section C406.4 for the entire building~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The proposal is a reformat of the second paragraph to clarify how it should be applied. The phrasing 'unless documentation can be provided that demonstrates compliance' is unnecessary language within an International Code. Such phrases are redundant with the purposes and intent of Chapter C1 – Administration. All code compliance is documented by submitted plans and inspections. The intent of this section is to allow tenant spaces to be evaluated or approved on a space by space basis unless the building has already found to comply.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is editorial in nature and will not affect the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Provides clarity for this provision of the code.

Assembly Action: **None**

Final Hearing Results

CE336-13 **AS**

Code Change No: CE337-13

Original Proposal

Section(s): C202 (New), C406.1, C406.2, Table C406.2(1), Table C406.2(2), Table C406.2(3), Table C406.2(4), Table C406.2(5), Table C406.2(6), Table C406.2(7), C406.3, C406.4, C406.5 (New), C406.6 (New), C406.8 (New), C406.8.1 (New)

Proponent: Eric Makela, Britt/Makela Group, Inc., representing Northwest Energy Codes Group (eric@brittmakela.com), Jim Edelson, New Buildings Institute

Revise as follows:

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. More efficient HVAC equipment ~~performance~~ in accordance with Section C406.2.
2. Reduced ~~efficient~~ lighting power density system in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High efficiency service water heating in accordance with Section C406.8.

C406.2. More efficient HVAC equipment performance. Equipment shall exceed the minimum efficiency requirements listed in Tables C403.2.3(1) through 403.2.3(7) by 10 percent in addition to the requirements of Section C403. Where multiple performance requirements are provided, the equipment shall exceed all requirements by 10 percent. *Variable refrigerant flow systems* shall exceed the energy efficiency provisions of ANSI/ASHRAE/IES 90.1 by 10 percent. Equipment not listed in Tables C403.2.3(1) through 403.2.3(7) shall be limited to 10 percent of the total building system capacity.

~~TABLE C406.2(1)~~
~~UNITARY AIR CONDITIONERS AND CONDENSING UNITS, ELECTRICALLY OPERATED, EFFICIENCY REQUIREMENTS~~

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY~~	~~SUBCATEGORY OR RATING CONDITION~~	~~MINIMUM EFFICIENCY~~[a]	
			~~CLIMATE ZONES 1 - 5~~	~~CLIMATE ZONES 6 - 8~~
~~Air conditioners, air cooled~~	~~< 65,000 Btu/h~~	~~Split system~~	~~15.0 SEER~~ ~~12.5 EER~~	~~14 SEER~~ ~~12 EER~~
		~~Single package~~	~~15.0 SEER~~ ~~12.0 EER~~	~~14.0 SEER~~ ~~11.6 EER~~
	~~≥ 65,000 Btuh/h and < 240,000 Btu/h~~	~~Split system and single package~~	~~12.0 EER~~[b] ~~12.54 IEER~~[b]	~~11.5 EER~~[b] ~~12.0 IEER~~[b]
	~~≥ 240,000 Btu/h and < 760,000 Btu/h~~	~~Split system and single package~~	~~10.8 EER~~[b] ~~11.3 IEER~~[b]	~~10.5 EER~~[b] ~~11.0 IEER~~[b]
	~~≥ 760,000 Btu/h~~	—	~~10.2 EER~~[b] ~~10.7 IEER~~[b]	~~9.7 EER~~[b] ~~10.2 IEER~~[b]
~~Air conditioners, water~~	—	~~Split system and single package~~	~~14.0 EER~~	~~14.0 EER~~

~~and evaporatively cooled~~				

~~For SI: 1 British thermal unit per hour = 0.2931 W.~~
~~a. IEERs are only applicable to equipment with capacity modulation.~~
~~b. Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.~~

~~TABLE C406.2(2)~~
~~UNITARY AND APPLIED HEAT PUMPS, ELECTRICALLY OPERATED, EFFICIENCY REQUIREMENTS~~

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY~~	~~SUBCATEGORY OR RATING CONDITION~~	~~MINIMUM EFFICIENCY~~[a]	
			~~CLIMATE ZONES 1 - 5~~	~~CLIMATE ZONES 6 - 8~~
~~Air cooled (Cooling mode)~~	~~< 65,000 Btu/h~~	~~Split system~~	~~15.0 SEER, 12.5 EER~~	~~14.0 SEER, 12.0 EER~~
		~~Single package~~	~~15.0 SEER, 12.0 EER~~	~~14.0 SEER 11.6 EER~~
	~~≥ 65,000 Btu/h and < 240,000 Btu/h~~	~~Split system and single package~~	~~12.0 SEER, 12.4 EER~~	~~11.5 EER~~[b]~~, 12.0 IEER~~[b]
	~~≥ 240,000 Btu/h~~	~~Split system and single package~~	~~12.0 SEER, 12.4 EER~~	~~10.5 EER~~[b]~~, 10.5 IEER~~[b]
~~Water sources (Cooling mode)~~	~~< 135,000 Btu/h~~	~~85°F entering water~~	~~14.0 EER~~	~~14.0 EER~~
~~Air cooled (Heating mode)~~	~~< 65,000 Btu/h (Cooling capacity)~~	~~Split system~~	~~9.0 HSPF~~	~~8.5 HSPF~~
		~~Single package~~	~~8.5 HSPF~~	~~8.0 HSPF~~
	~~≥ 65,000 Btu/h and < 135,000 Btu/h (Cooling capacity)~~	~~47°F db/43°F wb outdoor air~~	~~3.4 COP~~	~~3.4 COP~~
		~~17°F db/15°F wb outdoor air~~	~~2.4 COP~~	~~2.4 COP~~
	~~≥ 135,000 Btu/h (Cooling capacity)~~	~~47°F db/43°F wb outdoor air~~	~~3.2 COP~~	~~3.2 COP~~
		~~77°F db/15°F wb outdoor air~~	~~2.1 COP~~	~~2.1 COP~~
~~Water sources (Heating mode)~~	~~< 135,000 Btu/h (Cooling capacity)~~	~~70°F entering water~~	~~4.6 COP~~	~~4.6 COP~~

~~For SI: °C = [(°F) - 32] / 1.8, 1 British thermal unit per hour = 0.2931 W.~~
~~db = dry-bulb temperature, °F; wb = wet-bulb temperature, °F.~~
~~a. IEERs and Part load rating conditions are only applicable to equipment with capacity modulation.~~
~~b. Deduct 0.2 from the required EERs and IPLVs for units with a heating section other than electric resistance heat.~~

~~TABLE C406.2(3)~~
~~PACKAGED TERMINAL AIR CONDITIONERS AND PACKAGED TERMINALHEAT PUMPS~~

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY~~	~~MINIMUM EFFICIENCY~~
~~Air conditioners and heat pumps (cooling mode)~~	~~< 7,000 Btu/h~~	~~11.9 EER~~
	~~7,000 Btu/h and < 10,000 Btu/h~~	~~11.3 EER~~
	~~10,000 Btu/h and ≤ 13,000 Btu/h~~	~~10.7 EER~~
	~~> 13,000 Btu/h~~	~~9.5 EER~~

~~TABLE C406.2(4)~~
~~WARM AIR FURNACES AND COMBINATION WARM AIR FURNACES/AIR-CONDITIONING UNITS, WARM AIR DUCT FURNACES AND UNIT HEATERS, EFFICIENCY REQUIREMENTS~~

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY (INPUT)~~	~~SUBCATEGORY OR RATING CONDITION~~	~~MINIMUM EFFICIENCY~~	~~TEST PROCEDURE~~
~~Warm air furnaces, gas fired~~[a]	~~< 225,000 Btu/h~~	~~—~~	~~For Climate Zones 1 and 2 NR~~	~~DOE 10 CFR Part 430 or ANSI Z21.47~~
			~~For Climate Zones 3 and 4 90 AFUE or 90~~ E_t[c]	
			~~For Climate Zones 4 – 8 92 AFUE or 92~~ E_t[c]	
	~~≥ 225,000 Btu/h~~	~~Maximum capacity~~	~~90%~~ E_c[b]	~~ANSI Z21.47~~
~~Warm air furnaces, oil fired~~[a]	~~< 225,000 Btu/h~~	~~—~~	~~For Climate Zones 1 and 2 NR~~	~~DOE 10 CFR Part 430 or UL 727~~
			~~For Climate Zones 3 – 8 85 AFUE or 85~~ E_t[c]	
	~~≥ 225,000 Btu/h~~	~~Maximum capacity~~	~~85%~~ E_t[b]	~~UL 727~~
~~Warm air duct furnaces, gas fired~~[a]	~~All capacities~~	~~Maximum capacity~~	~~90%~~ E_c	~~ANSI Z83.8~~
~~Warm air unit heaters, gas fired~~	~~All capacities~~	~~Maximum capacity~~	~~90%~~ E_c	~~ANSI Z83.8~~
~~Warm air unit heaters, oil fired~~	~~All capacities~~	~~Maximum capacity~~	~~90%~~ E_c	~~UL 731~~

~~For SI: 1 British thermal unit per hour = 0.2931 W.~~
E_t ~~= Thermal efficiency.~~ E_c ~~= Combustion efficiency (100 percent less flue losses).~~
~~a. Efficient furnace fan: Fossil fuel furnaces in climate zones 3 to 8 shall have a furnace electricity ratio not greater than 2 percent and shall include a manufacturer's designation of the furnace electricity ratio.~~
~~b. Units shall also include an IID (intermittent ignition device), have jacket losses not exceeding 0.75 percent of the input rating, and have either power venting or a flue damper. A vent damper is an acceptable alternative to a flue damper for those furnaces where combustion air is drawn from the conditioned space.~~
~~c. Where there are two ratings for units not covered by NAECA (3-phase power or cooling capacity greater than or equal to 65,000 Btu/h [19 kW]), units shall be permitted to comply with either rating.~~

~~TABLE C406.2(5)~~
~~BOILER, EFFICIENCY REQUIREMENTS~~

~~EQUIPMENT TYPE~~	~~FUEL~~	~~SIZE CATEGORY~~	~~TEST PROCEEDURE~~	~~MINIMUM EFFICIENCY~~
~~Steam~~	~~Gas~~	~~< 300,000 Btu/h~~	~~DOE 10 CFR Part 430~~	~~83% AFUE~~
		~~> 300,000 Btu / h and > 2.5 m Btu/h~~	~~DOE 10 CFR Part 431~~	~~81%~~ E_t
		~~>2.5 m Btu/h~~		~~82%~~ E_c
	~~Oil~~	~~< 300,000 Btu/h~~	~~DOE 10 CFR Part 430~~	~~85% AFUE~~

~~EQUIPMENT TYPE~~	~~FUEL~~	~~SIZE CATEGORY~~	~~TEST PROCEEDURE~~	~~MINIMUM EFFICIENCY~~
		~~> 300,000 Btu/h and > 2.5 m Btu/h~~	~~DOE 10 CFR Part 431~~	~~83% E_t~~
		~~>2.5 m Btu/h~~		~~84% E_c~~
~~Hot water~~	~~Gas~~	~~< 300,000 Btu/h~~	~~DOE 10 CFR Part 430~~	~~97% AFUE~~
		~~> 300,000 Btu/h and > 2.5 m Btu/h~~	~~DOE 10 CFR Part 431~~	~~97% E_t~~
		~~>2.5 m Btu/h~~		~~94% E_c~~
	~~Oil~~	~~< 300,000 Btu/h~~	~~DOE 10 CFR Part 430~~	~~90% AFUE~~
		~~> 300,000 Btu/h and > 2.5 m Btu/h~~	~~DOE 10 CFR Part 431~~	~~88% E_t~~
		~~>2.5 m Btu/h~~		~~87% E_c~~

~~For SI: 1 British thermal unit per hour = 0.2931 W.~~

~~E_t = Thermal efficiency. E_c = Combustion efficiency (100 percent less flue losses).~~

~~TABLE C406.2(6)~~
~~CHILLERS—EFFICIENCY REQUIREMENTS~~

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY~~	~~UNITS~~	~~MINIMUM EFFICIENCY[a] (I-P)~~				~~Test Procedure[b]~~
			~~Path A~~		~~Path B[c]~~		
			~~Full Load~~	~~IPLV~~	~~Full Load~~	~~IPLV~~	
~~Air-cooled chillers with condenser, electrically operated~~	~~< 150 tons~~	~~EER~~	~~10.000~~	~~12.500~~	~~NA~~	~~NA~~	~~AHRI 550/590[f]~~
	~~≥ 150 tons~~	~~EER~~	~~10.000~~	~~12.750~~	~~NA~~	~~NA~~	
~~Air-cooled without condenser, electrical operated~~	~~All capacities~~	~~EER~~	~~Condenserless units shall be rated with matched condensers~~				~~AHRI 550/590[f]~~
~~Water-cooled, electrically operated, positive displacement (reciprocating)~~	~~All capacities~~	~~kw/ton~~	~~Reciprocating units required to comply with water cooled positive displacement requirements~~				~~AHRI 550/590[f]~~
~~Water-cooled electrically operated, positive displacement~~	~~< 75 tons~~	~~kw/ton~~	~~0.780~~	~~0.630~~	~~0.800~~	~~0.600~~	~~AHRI 550/590[f]~~
	~~≥ 75 tons and < 150 tons~~	~~kw/ton~~	~~0.775~~	~~0.615~~	~~0.790~~	~~0.586~~	
	~~≥ 150 tons and < 300 tons~~	~~kw/ton~~	~~0.680~~	~~0.580~~	~~0.718~~	~~0.540~~	
	~~≥ 300 tons~~	~~kw/ton~~	~~0.620~~	~~0.540~~	~~0.639~~	~~0.490~~	
~~Water-cooled electrically operated, centrifugal[d]~~	~~< 150 tons~~	~~kw/ton~~	~~0.634~~	~~0.596~~	~~0.639~~	~~0.450~~	~~AHRI 550/590[f]~~
	~~≥ 150 tons and < 300 tons~~	~~kw/ton~~	~~0.634~~	~~0.596~~	~~0.639~~	~~0.450~~	
	~~≥ 300 tons and < 600 tons~~	~~kw/ton~~	~~0.576~~	~~0.549~~	~~0.600~~	~~0.400~~	
	~~≥ 600 tons~~	~~kw/ton~~	~~0.570~~	~~0.539~~	~~0.590~~	~~0.400~~	

~~EQUIPMENT TYPE~~	~~SIZE CATEGORY~~	~~UNITS~~	~~MINIMUM EFFICIENCY[a] (I-P)~~				~~Test Procedure[b]~~
			~~Path A~~		~~Path B[c]~~		
			~~Full Load~~	~~IPLV~~	~~Full Load~~	~~IPLV~~	
~~Air-cooled absorption single effect[e]~~	~~All capacities~~	~~COP~~	~~0.600~~	~~NR~~	~~NA~~	~~NA~~	~~AHRI 560~~
~~Water-cooled absorption single effect[e]~~	~~All capacities~~	~~COP~~	~~0.700~~	~~NR~~	~~NA~~	~~NA~~	
~~Absorption double effect indirect-fired~~	~~All capacities~~	~~COP~~	~~1.000~~	~~1.050~~	~~NA~~	~~NA~~	
~~Absorption double effect direct fired~~	~~All capacities~~	~~COP~~	~~1.000~~	~~1.000~~	~~NA~~	~~NA~~	

~~For SI: 1 Ton = 3516 W.~~

~~NA = Not applicable and cannot be used for compliance. NR = No minimum requirements.~~

a. ~~Compliance with this standard can be obtained by meeting the minimum requirements of Path A or Path B. However both the full load and IPLV shall be met to fulfill the requirements of Path A and Path B.~~

b. ~~Chapter 6 of the referenced standard contains a complete specification of the referenced test procedure, including the referenced year version of the test procedure.~~

c. ~~Path B is intended for applications with significant operating time at part load. All Path B machines shall be equipped with demand limiting capable controls.~~

d. ~~The chiller equipment requirements do not apply for chillers used in low-temperature applications where the design leaving fluid temperature is greater than 40°F.~~

e. ~~Only allowed to be used in heat recovery applications.~~

f. ~~Packages that are not designed for operation at ARI Standard 550/590 test conditions (and, thus, cannot be tested to meet the requirements of Table C-3) of 44°F leaving chilled-water temperature and 85°F entering condenser-water temperature with 3 gpm/ton condenser-water flow shall have maximum full-load kW/ton and *NPLV* ratings adjusted using the following equation:~~

~~Adjusted maximum full load kW/ton rating = (full load kW/ton from Table C-3)/~~K_{adj}

~~Adjusted maximum NPLV rating = (IPLV from Table C-3)/~~K_{adj}

~~where:~~

K_{adj} = $6.174722 - 0.303668(X) + 0.00629466(X)^2 - 0.000045780(X)^3$

X = DT_{std} + LIFT (°F)

DT_{std} = [(24 + (full load kW/ton from Table C-3) × 6.83)]/flow (°F)

~~Flow = condenser-water flow (gpm) / cooling full load capacity (tons)~~

~~LIFT = CEWT – CLWT (°F)~~

~~CEWT = full load entering condenser-water temperature (°F)~~

~~CLWT = full load leaving chilled-water temperature (°F)~~

~~The adjusted full load and *NPLV* values are only applicable over the following full-load design ranges:~~

~~Minimum leaving chilled-water temperature: 38°F~~

~~Maximum condenser entering water temperature: 102°F~~

~~Condenser-water flow: 1 to 6 gpm/ton~~

~~$X \geq 39$°F and ≤ 60°F~~

~~TABLE C406.2(7)~~
~~ABSORPTION CHILLERS—EFFICIENCY REQUIREMENTS~~

~~EQUIPMENT TYPE~~	~~MINIMUM EFFICIENCY FULL LOAD COP (IPLV)~~
~~Air cooled, single effect~~	~~0.60, allowed only in heat recovery applications~~
~~Water cooled, single effect~~	~~0.70, allowed only in heat recovery applications~~
~~Double effect – direct fired~~	~~1.0 (1.05)~~
~~Double effect – indirect~~	~~1.20~~

~~fired~~	

C406.3 **Reduced lighting power density** The total interior lighting power (watts) of the building shall be determined by using 90 percent of the lighting power values in Table C405.5.2(1)~~the reduced whole building interior lighting power in Table C406.3~~ times the floor area of the building types~~.~~ or by using 90 percent of the interior lighting power allowance calculated by the Space by Space method in section C405.5.2.

C406.4 Enhanced digital lighting controls. Interior lighting in the building shall have the following enhanced lighting controls which shall be located, scheduled, and operated in accordance with Section C405.2.2.

1. Luminaires shall be capable of continuous dimming.
2. Luminaires shall be capable of being addressed individually. Where individual addressability is not available for the luminaire class type, a controlled group of no more than 4 luminaries shall be allowed.
3. No more than 8 luminaires shall be controlled together in a *daylight zone*
4. Fixtures shall be controlled through a digital control system that includes the following function:
    - 1.1. Control reconfiguration based on digital addressability
    - 1.2. Load shedding
    - 1.3. Individual user control of overhead general illumination in open offices
    - 1.4. Occupancy sensors shall be capable of being reconfigured through the digital control system.
5. Construction documents shall include submittal of a Sequence of Operations, including a specification outlining each of the functions in Item 4 of Section C406.4.
6. Functional testing of lighting controls shall comply with Section 408.

~~C406.4~~ C406.5 On-site renewable energy Total minimum ratings of on-site renewable energy systems shall comply with one of the following:

1. Provide not less than 1.75 btu's, or not less than 0.50 watts, per square foot of conditioned floor area.
2. Provide not less than 3 percent of the energy used within the building for building mechanical and service water heating equipment and lighting regulated in Chapter 4;

C406.6 Dedicated outdoor air system. Buildings covered by Section C403.4 shall be equipped with an independent ventilation system designed to provide no less than the minimum 100 percent outdoor air to each individual occupied space as specified by the *International Mechanical Code*, to each individual occupied space. The ventilation system shall be capable of total energy recovery. The HVAC system shall include supply-air temperature controls that automatically reset the supply-air temperature in response to representative building loads, or to outdoor air temperatures. The controls shall reset the supply air temperature at least 25 percent of the difference between the design supply-air temperature and the design room air temperature.

C406.7 Reduced energy use in service water heating. Buildings shall be of the following types to use this compliance method:

1. Group R-1, Boarding houses, Hotels or motels;
2. Group I-2, Hospitals, mental hospitals, and nursing homes;
3. Group A-2, Restaurants and Banquet halls or buildings containing food preparation areas;
4. Group F, Laundries;
5. Group R-2 Buildings with residential occupancies;
6. Group A-3 Health clubs and spas; or
7. Buildings showing a service hot water load of 10 percent or more of total building energy loads as shown with an energy analysis as described in Section C407.

C406.7.1 Load fraction. The building service water heating system shall have one or more of the following that are sized to provide at least 60 percent of hot water requirements, or sized to provide 100 percent of hot water requirements if the building must otherwise comply with Section C403.4.6:

1. Waste heat recovery from service hot water, heat recovery chillers, building equipment, process equipment, or a combined heat and power system.
2. Solar water heating systems.

Add new definition as follows:

SECTION C202
GENERAL DEFINITIONS

VARIABLE REFRIGERANT FLOW SYSTEM. An engineered direct expansion (DX) refrigerant system that incorporates a common condensing unit, at least one variable capacity compressor, a distributed refrigerant piping network to multiple indoor fan heating and cooling units each capable of individual zone temperature control, through integral zone temperature control devices and common communications network. Variable refrigerant flow utilizes three or more steps of control on common inter-connecting piping.

Reason: This proposal increases the number of optional packages in the IECC from three to six for compliance with Section C406, in addition to the modeling options available both in Section 507 of the IECC and the Energy Cost Budget method of ASHRAE 90.1. The purpose of this section is to provide flexibility for compliance, and to recognize that all buildings may not be able to meet higher levels of efficiency in today's prescriptive model codes without providing options. The specifications included in the six approximately equal energy packages were based on preliminary modeling done by New Buildings Institute.

HVAC

The equipment tables have been removed and replaced with a requirement for a 10% increase in efficiency over the base requirements. This will ensure that the HVAC equipment efficiency levels contained in this section provide the necessary energy savings over equipment efficiencies contained in Section C403. This will allow the base efficiencies to be increased in future code cycles without needing to make corresponding changes to Section C406. The proposed option limits the use of heating and cooling equipment not listed in the C403 tables to no more than 10% of the total building capacity. This would allow some systems, e.g. electric resistance heat, to be used in a limited capacity for the proposed project and still allow the code user to use this option. Under the 2012 IECC all systems must comply with the equipment efficiency requirements.

LPD

The LPD tables have been removed and replaced with a requirement for a 10% increase in efficiency over the base requirements for whole building or space-by-space. This will ensure that the LPD levels contained in this section provide the necessary energy savings over the LPDs contained in Section C405. This will allow the base efficiencies to be increased in future code cycles without needing to make corresponding changes to Section C406. The 2012 IECC Additional Package Options only allowed whole building LPDs to be used. This proposal allows the use of space-by-space LPDs to provide more flexibility to the code user thereby increasing the viability of this option. The values proposed in this section are similar to those included as part of ASHRAE Standard 189.1.

The renewable option has not been modified from the 2012 IECC and provides three straightforward compliance approaches: electricity generation, thermal collection, and a calculation method for any type or combination of energy production. A path to include purchase of renewable power or credits was carefully considered, but not included based on concerns regarding verification and permanence of the transaction after the certificate of occupancy has been issued.

The Dedicated Outdoor Air System package is based on technical specifications from the 50% Technical Support Documents of the Pacific Northwest National Lab. The measure requires that adequate quantity of outside air is delivered separately to spaces in the buildings while employing 100% energy recovery. This reduces the need for excess outdoor air or supply air, and uses less energy for terminal reheating.

The Enhanced Lighting Controls Package provides a non-LPD lighting alternative package requires a digital control system to allow continuous dimming and a significant level of controllability on individual luminaires, or groups of no more than eight luminaires.

The Service Water Heating Package language is modified from similar language in the IgCC and the 2012 North Carolina commercial code. The requirements for use of waste energy to heat service hot water are in excess of what is otherwise required in Section C403 of the IECC, when applicable. Solar thermal water heating systems may also be used. This package is independent of the package offered in Section C406.5 since only one package is required for compliance with Section 406 in total.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal both simplifies the provisions for additional efficiency packages and increases the options open to designers of each building. The existing tables have known flaws and replacing the HVAC proposal with a simple percentage increase in savings increases flexibility.

Assembly Action: **None**

Public Comments

Public Comment 1:

Eric Makela, Britt/Makela Group, representing Northwest Energy Codes Group; Jim Edelson, New Buildings Institute, request Approval as Modified by this Public Comment.

Modify the proposal as follows:

C401.2 Application. Commercial buildings shall comply with one of the following:

1. The requirements of ANSI/ASHRAE/IESNA 90.1.
2. The requirements of Sections C402, C403, C404 and C405. In addition, commercial buildings shall comply with ~~either~~ Section ~~C406.2, C406.3 or C406.4~~ Section C406, and tenant spaces shall comply with Section C406.1.1.
3. The requirements of Section C407, C402.4, C403.2, C404, C405.2, C405.3, C405.4, C405.6 and C405.7. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.

C406.1 Requirements. Buildings shall comply with at least one of the following:

1. More efficient HVAC equipment in accordance with Section C406.2.
2. Reduced lighting power density system in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High efficiency service water heating in accordance with Section C406.8.

~~Individual tenant spaces shall comply with either Section C406.2 or Section C406.3 unless documentation can be provided that demonstrates compliance with Section C406.4 for the entire building.~~

C406.1.1 Tenant Spaces. Tenant spaces shall comply with Section C406.2, C406.3, C406.4, C406.6 or C406.7. Alternatively tenant spaces shall comply with Section C406.5 when the entire building is in compliance.

~~**C406.3 Efficient Lighting System** Whole building lighting power density shall comply with the requirements of Section C406.3.1.~~

~~**C 406.3.1**~~ **C406.3** **Reduced lighting power density** The total interior lighting power (watts) of the building shall be determined by using 90 percent of the lighting power values in Table C405.5.2(1) times the floor area of the building types or by using 90 percent of the interior lighting power allowance calculated by the Space by Space method in section C405.5.2.

~~**TABLE C406.3**~~
~~**REDUCED INTERIOR LIGHTING POWER**~~

Commenter's Reason: CE 337 was Approved as Submitted because it was recognized to simplify the provisions, increase flexibility by providing more options for compliance, and eliminating tables with errors.

A few technical and editorial issues were brought to the attention of the Proponents. This Comment accomplishes three objectives in addressing those issues:

1. Corrects the pointer language in C401.2
2. Clarifies and updates the Tenant Space application language in C406.1.1
3. Deletes orphaned language in 406.3 and renumbers accordingly.

Final Hearing Results

CE337-13 **AMPC1**

Code Change No: CE339-13

Original Proposal

Section(s): C406.2, Table C406.2(7)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

C406.2 Efficient HVAC performance. Equipment shall meet the minimum efficiency requirements of Tables C406.2(1) through ~~C406.2(7)~~ C406.2(6) in addition to the requirements in Section C403. This section shall only be used where the equipment efficiencies in Tables C406.2(1) through ~~C406.2(7)~~ C406.2(6) are greater than the equipment efficiencies listed in Table C403.2.3(1) through ~~403.2.3(7)~~ 403.2.3(6) for the equipment type.

~~TABLE C406.2(7)~~
~~ABSORPTION CHILLERS EFFICIENCY REQUIREMENTS~~

~~EQUIPMENT TYPE~~	~~MINIMUM EFFICIENCY FULL LOAD COP (IPLV)~~
~~Air cooled, single effect~~	~~0.60, allowed only in heat recovery applications~~
~~Water cooled, single effect~~	~~0.70, allowed only in heat recovery applications~~
~~Double effect - direct fired~~	~~1.0 (1.05)~~
~~Double effect - indirect fired~~	~~1.20~~

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this specific proposal:
Absorption chillers for air cooled, single effect and water cooled, single effect, absorption double effect indirect fired, and absorption double effect direct fired are listed in both Tables C406.2(6) and C406.2(7). The data is the same in the tables except for double effect- indirect fired minimum efficiency full load COP (IPLV) requirements. The data shown in Table C406.2(6) is correct and agrees with ASHRAE 90.1. Delete Table C406.2(7) as data is in Table C406.2(6). Revise Section C406.2 as it references Table C406.2(7) and it is deleted. This will resolve the overlap in the two tables regulating 'absorption chillers.'

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is editorial in nature and will have no impact on the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal is editorial. It doesn't change the technical requirements of the code. If CE337-13 is sustained by final action, this action is redundant.

Assembly Action: **None**

Final Hearing Results

CE339-13 **AS**

Code Change No: CE345-13

Original Proposal

Section(s): C407.4.1, C407.6

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Revise as follows:

C407.4.1 Compliance report. ~~Compliance software tools shall generate~~ Permit submittals shall include a report that documents that the *proposed design* has annual energy costs less than or equal to the annual energy costs of the *standard reference design.* The compliance documentation shall include the following information:

1. Address of the building;
2. An inspection checklist documenting the building component characteristics of the *proposed design* as *listed* in Table C407.5.1(1). The inspection checklist shall show the estimated annual energy consumption for both the *standard reference design* and the *proposed design;*
3. Name of individual completing the compliance report; and
4. Name and version of the compliance software tool.

C407.6 Calculation software tools. Calculation procedures used to comply with this section shall be software tools capable of calculating the annual energy consumption of all building elements that differ between the *standard reference design* and the *proposed design* and shall include the following capabilities.

~~1.~~ ~~Computer generation of the *standard reference design* using only the input for the *proposed design.* The calculation procedure shall not allow the user to directly modify the building component characteristics of the *standard reference design.*~~
~~2.~~ 1. Building operation for a full calendar year (8,760 hours).
~~3.~~ 2. Climate data for a full calendar year (8,760 hours) and shall reflect *approved* coincident hourly data for temperature, solar radiation, humidity and wind speed for the building location.
~~4.~~ 3. Ten or more thermal zones.
~~5.~~ 4. Thermal mass effects.
~~6.~~ 5. Hourly variations in occupancy, illumination, receptacle loads, thermostat settings, mechanical ventilation, HVAC equipment availability, service hot water usage and any process loads.
~~7.~~ 6. Part-load performance curves for mechanical equipment.
~~8.~~ 7. Capacity and efficiency correction curves for mechanical heating and cooling equipment.
~~9.~~ 8. Printed *code official* inspection checklist listing each of the *proposed design* component characteristics from Table C407.5.1(1) determined by the analysis to provide compliance, along with their respective performance ratings (e.g., *R*-value, *U*-factor, SHGC, HSPF, AFUE, SEER, EF, etc.).

Reason: The proposal addresses the issue that no existing software tools are capable of meeting the requirements described in this section. If the language remains as written, the Total Building Performance path cannot be used.

This correction maintains a complete performance path for compliance with the Code, which promotes innovation and flexibility in design and construction.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The revisions clarify that the report isn't generated by the computer program, but based on information generated by the programs.

Assembly Action: **None**

Final Hearing Results

CE345-13	**AS**

Code Change No: CE347-13

Original Proposal

Section(s): Table C407.5.1(1)

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

TABLE C407.5.1(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Space use classification	Same as proposed	The space use classification shall be chosen in accordance with Table C405.5.2 for all areas of the building covered by this permit. Where the space use classification for a building is not known, the building shall be categorized as an office building.
Roofs	Type: Insulation entirely above deck	As proposed
	Gross area: same as proposed	As proposed
	U-factor: from Table C402.1.2	As proposed
	Solar absorptance: 0.75	As proposed
	Emittance: 0.90	As proposed
Walls, above-grade	Type: Mass wall if proposed wall is mass; otherwise steel-framed wall	As proposed
	Gross area: same as proposed	As proposed
	U-factor: from Table C402.1.2	As proposed
	Solar absorptance: 0.75	As proposed
	Emittance: 0.90	As proposed
Walls, below-grade	Type: Mass wall	As proposed
	Gross area: same as proposed	As proposed
	U-Factor: from Table C402.1.2 with insulation layer on interior side of walls	As proposed
Floors, above-grade	Type: joist/framed floor	As proposed
	Gross area: same as proposed	As proposed
	U-factor: from Table C402.1.2	As proposed
Floors, slab-on-grade	Type: Unheated	As proposed
	F-factor: from Table C402.1.2	As proposed

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Opaque Doors	Type: Swinging Area: Same as proposed *U*-factor: from Table C402.2	As proposed As proposed As proposed
~~Glazing~~ Vertical Fenestration other than Opaque Doors	Area 1. The proposed glazing area; where the proposed glazing area is less than 40 percent of above-grade wall area. 2. 40 percent of above-grade wall area; where the proposed glazing area is 40 percent or more of the above-grade wall area. *U*-factor: from Table C402.3 SHGC: from Table C402.3 except that for climates with no requirement (NR) SHGC = 0.40 shall be used External shading and PF: None	As proposed As proposed As proposed As proposed
Skylights	Area 1. The proposed skylight area; where the proposed skylight area is less than 3 percent of gross area of roof assembly. 2. 3 percent of gross area of roof assembly; where the proposed skylight area is 3 percent or more of gross area of roof assembly *U*-factor: from Table C402.3 SHGC: from Table C402.3 except that for climates with no requirement (NR) SHGC = 0.40 shall be used.	As proposed As proposed As proposed
Lighting, interior	The interior lighting power shall be determined in accordance with Table C405.5.2. Where the occupancy of the building is not known, the lighting power density shall be 1.0 Watt per square foot (10.73 W/m^2) based on the categorization of buildings with unknown space classification as offices.	As proposed
Lighting, exterior	The lighting power shall be determined in accordance with Table C405.6.2(2). Areas and dimensions of tradable and nontradable surfaces shall be the same as proposed.	As proposed
Internal gains	Same as proposed	Receptacle, motor and process loads shall be modeled and estimated based on the space use classification. All end-use load components within and associated with the building shall be modeled to include, but not be limited to, the following: exhaust fans, parking garage ventilation fans, exterior building lighting, swimming pool heaters and pumps, elevators, escalators, refrigeration equipment and cooking equipment.
Schedules	Same as proposed	Operating schedules shall include hourly profiles for daily operation and shall account for variations between weekdays, weekends, holidays and any seasonal operation. Schedules shall model the time-dependent variations in occupancy, illumination, receptacle loads, thermostat settings, mechanical ventilation, HVAC equipment availability, service hot water usage and any process loads. The schedules shall be typical of the proposed building type as determined by the designer

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
		and approved by the jurisdiction.
Mechanical ventilation	Same as proposed	As proposed, in accordance with Section C403.2.5.
Heating systems	Fuel type: same as proposed design	As proposed
	Equipment type[a]: from Tables C407.5.1(2) and C407.5.1(3)	As proposed
	Efficiency: from Tables C403.2.3(4) and C403.2.3(5)	As proposed
	Capacity[b]: sized proportionally to the capacities in the proposed design based on sizing runs, and shall be established such that no smaller number of unmet heating load hours and no larger heating capacity safety factors are provided than in the proposed design.	As proposed
Cooling systems	Fuel type: same as proposed design	As proposed
	Equipment type[c]: from Tables C407.5.1(2) and C407.5.1(3)	As proposed
	Efficiency: from Tables C403.2.3(1), C403.2.3(2) and C403.2.3(3)	As proposed
	Capacity[b]: sized proportionally to the capacities in the proposed design based on sizing runs, and shall be established such that no smaller number of unmet cooling load hours and no larger cooling capacity safety factors are provided than in the proposed design.	As proposed
	Economizer[d]: same as proposed, in accordance with Section C403.4.1.	As proposed
Service water heating	Fuel type: same as proposed	As proposed
	Efficiency: from Table C404.2	As proposed
	Capacity: same as proposed Where no service water hot water system exists or is specified in the proposed design, no service hot water heating shall be modeled.	As proposed

a. Where no heating system exists or has been specified, the heating system shall be modeled as fossil fuel. The system characteristics shall be identical in both the standard reference design and proposed design.
b. The ratio between the capacities used in the annual simulations and the capacities determined by sizing runs shall be the same for both the standard reference design and proposed design.
c. Where no cooling system exists or no cooling system has been specified, the cooling system shall be modeled as an air-cooled single-zone system, one unit per thermal zone. The system characteristics shall be identical in both the standard reference design and proposed design.
d. If an economizer is required in accordance with Table C403.3.1(1), and if no economizer exists or is specified in the proposed design, then a supply air economizer shall be provided in accordance with Section C403.4.1.

Reason: This corrects the terminology in the performance path table to be consistent with the rest of the chapter. "Doors" can include both glazed and opaque doors, but the intent was clearly meant to be opaque doors, since it is referring to only the U-factor in Table C402.2. It is then unclear where to put glazed doors. This proposal clarifies the three fenestration rows as “opaque doors”, “vertical fenestration other than opaque doors”, and “skylights”.

Cost Impact: This proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the application of two rows of the table through fixes to the building component description.

Assembly Action: **None**

Final Hearing Results

CE347-13 **AS**

Code Change No: CE348-13

Original Proposal

Section(s): Table C407.5.1(1)

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

TABLE C407.5.1(1)
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Cooling systems	Fuel type: same as proposed design	As proposed
	Equipment type[c]: from Tables C407.5.1(2) and C407.5.1(3)	As proposed
	Efficiency: from Tables C403.2.3(1), C403.2.3(2) and C403.2.3(3)	As proposed
	Capacity[b]: sized proportionally to the capacities in the proposed design based on sizing runs, and shall be established such that no smaller number of unmet cooling load hours and no larger cooling capacity safety factors are provided than in the proposed design.	As proposed
	Economizer[d]: same as proposed, in accordance with Section ~~C403.4.1~~ C403.3.1.	As proposed

(Portions of Table not shown remain unchanged)

a. Where no heating system exists or has been specified, the heating system shall be modeled as fossil fuel. The system characteristics shall be identical in both the standard reference design and proposed design.
b. The ratio between the capacities used in the annual simulations and the capacities determined by sizing runs shall be the same for both the standard reference design and proposed design.
c. Where no cooling system exists or no cooling system has been specified, the cooling system shall be modeled as an air-cooled single-zone system, one unit per thermal zone. The system characteristics shall be identical in both the standard reference design and proposed design.
d. If an economizer is required in accordance with Table C403.3.1(1), and if no economizer exists or is specified in the proposed design, then a supply air economizer shall be provided in the reference design in accordance with Section ~~C403.4.1~~ C403.3.1.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

In the 2009 code this footnote refers to a section of the code that addressed supply air economizers in Complex HVAC systems. Now it refers to a section that regulates water economizers in complex HVAC systems. Unless water economizers are 'supply air economizers – the footnote is referring to a section that doesn't address the same topic. The table and footnote are corrected to show that if a building is required to have an economizer, yet the proposed design does not have an economizer, the baseline building shall be designed with an air-side economizer (not water-side). Air economizer is the baseline code. This appears to have been a modeling requirement for several code cycles: IECC and Standard 90.1 do not to allow water-side economizer as the baseline (standard reference) model when no economizer is included in the proposed design case model. If a water-side economizer is included in the proposed design, then there is a 1:1 comparison of water-side in the baseline reference and proposed design. (Please note that if SEHPCAC proposal E20A is approved this proposed change to a reference to Section C403.3.1 will also correlate with the revised provisions.)

Cost Impact: The code change proposal will not increase the cost of construction. The change is editorial in nature. It will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

d. If an economizer is required in accordance with Table C403.3.1(1), and if no economizer exists or is specified in the proposed design, then a supply air economizer shall be provided in the standard reference design in accordance with Section C403.3.1.

Committee Reason: The modification is to provide the correct phrasing of "standard reference design". The proposal corrects the references and clarifies the footnote.

Assembly Action: **None**

Final Hearing Results

CE348-13 **AM**

Code Change No: CE349-13

Original Proposal

Section(s): C407.6.3 (NEW)

Proponent: Tim Nogler, Washington State Building Code Council (tim.nogler@des.wa.gov)

Add new text as follows:

C407.6.3 Exceptional calculation methods. When the simulation program does not model a design, material, or device of the *proposed design*, an exceptional calculation method shall be used where approved by the *code official*. Where there are multiple designs, materials, or devices that the simulation program does not model, each shall be calculated separately and exceptional savings determined for each. At no time shall the total exceptional savings constitute more than half of the difference between the baseline building performance and the proposed building performance. All applications for approval of an exceptional method shall include:

1. Step-by-step documentation of the exceptional calculation method performed detailed enough to reproduce the results;
2. Copies of all spreadsheets used to perform the calculations;
3. A sensitivity analysis of energy consumption when each of the input parameters is varied from half to double the value assumed;
4. The calculations shall be performed on a time step basis consistent with the simulation program used;
5. The performance rating calculated with and without the exceptional calculation method.

Reason: It is not unusual for the design team to want to claim credit for an energy-efficiency measure that the hourly energy analysis software is not capable of directly modeling. Consequently, designers would submit simple hand-calculations as an “add-on” to the complex calculations made by the hourly energy analysis software. This is an important challenge because it does not make sense to treat hand-calculations as comparable to those coming from sophisticated hourly energy analysis software. It is not uncommon to see designs where a single energy-efficiency measure was being proposed to make up for multiple shortfalls in the proposed design.

ASHRAE/IESNA Standard 90.1, Appendix G, Section G2.5, Exceptional Calculation Methods, has been updated and expanded in the 2010 version. The updated language from ASHRAE/IESNA Standard 90.1-2010 addresses this issue.
This will provide guidance to designers and modelers, as well as to building department staff. The result should be more consistent implementation of the annual energy analysis compliance option.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal allows flexibility in the design and gives guidance to the code user.

Assembly Action: **None**

Final Hearing Results

CE349-13 **AS**

Code Change No: CE351-13

Original Proposal

Section(s): C408.2, C408.2.1, C408.2.2.1, C408.2.2.2, C408.3.1

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

SECTION C408
SYSTEM COMMISSIONING

C408.1 General. This section covers the commissioning of the building mechanical systems in Section C403 and electrical power and lighting systems in Section C405.

C408.2 Mechanical systems commissioning and completion requirements. Prior to passing the final mechanical inspection, the *registered design professional* or *approved agency* shall provide evidence of mechanical systems *commissioning* and completion in accordance the provisions of this section.

Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

Exception: The following systems are exempt from the commissioning requirements:

1. Mechanical systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140 690 W) cooling capacity and 600,000 Btu/h (175 860 W) heating capacity.
2. Systems included in Section C403.3 that serve dwelling units and sleeping units in hotels, motels, boarding houses or similar units.

C408.2.1 Commissioning plan. A *commissioning plan* shall be developed by a *registered design professiona*l or approved *agency* and shall include the following items:

1. A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities.
2. A listing of the specific equipment, appliances or systems to be tested and a description of the tests to be performed.
3. Functions to be tested, including, but not limited to calibrations and economizer controls.
4. Conditions under which the test will be performed. ~~At a minimum,~~ Testing shall affirm winter and summer design conditions and full outside air conditions.
5. Measurable criteria for performance.

C408.2.2 Systems adjusting and balancing. HVAC systems shall be balanced in accordance with generally accepted engineering standards. Air and water flow rates shall be measured and adjusted to deliver final flow rates within the tolerances provided in the product specifications. Test and balance activities shall include air system and hydronic system balancing.

C408.2.2.1 Air systems balancing. Each supply air outlet and *zone* terminal device shall be equipped with means for air balancing in accordance with the requirements of Chapter 6 of the *International Mechanical Code*. Discharge dampers are prohibited on constant volume fans and variable volume fans with motors 10 hp (18.6 kW) and larger. Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp (0.74 kW), fan speed shall be adjusted to meet design flow conditions.

> **Exception:** Fans with fan motors of 1 hp (0.74 kW) or less are not required to be provided with a means for air balancing.

C408.2.2.2 Hydronic systems balancing. Individual hydronic heating and cooling coils shall be equipped with means for balancing and measuring flow. Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses, then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions. Each hydronic system shall have either the capability to measure pressure across the pump, or test ports at each side of each pump.

> **Exceptions:** The following equipment are not required to be equipped with means for balancing or measuring flow:
>
> 1. Pumps with pump motors of 5 hp (3.7 kW) or less.
> 2. Where throttling results in no greater than five percent of the nameplate horsepower draw above that required if the impeller were trimmed.

C408.2.3 Functional performance testing. Functional performance testing specified in Sections C408.2.3.1 through C408.2.3.3 shall be conducted.

C408.2.3.1 Equipment. Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with approved plans and specifications such that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all modes and *sequence of operation*, including under full-load, part-load and the following emergency conditions:

1. All modes as described in the *sequence* of *operation*;
2. Redundant or *automatic* back-up mode;
3. Performance of alarms; and
4. Mode of operation upon a loss of power and restoration of power.

> **Exception:** Unitary or packaged HVAC equipment listed in Tables C403.2.3(1) through C403.2.3(3) that do not require supply air economizers.

C408.2.3.2 Controls. HVAC control systems shall be tested to document that control devices, components, equipment, and systems are calibrated, adjusted and operate in accordance with approved plans and specifications. Sequences of operation shall be functionally tested to document they operate in accordance with *approved* plans and specifications.

C408.2.3.3 Economizers. Air economizers shall undergo a functional test to determine that they operate in accordance with manufacturer's specifications.

C408.2.4 Preliminary commissioning report. A preliminary report of commissioning test procedures and results shall be completed and certified by the *registered design professional* or *approved agency* and provided to the building owner. The report shall be identified as "Preliminary Commissioning Report" and shall identify:

1. Itemization of deficiencies found during testing required by this section that have not been corrected at the time of report preparation.

2. Deferred tests that cannot be performed at the time of report preparation because of climatic conditions.
3. Climatic conditions required for performance of the deferred tests.

C408.2.4.1 Acceptance of report. *Buildings*, or portions thereof, shall not pass the final mechanical inspection until such time as the *code official* has received a letter of transmittal from the *building* owner acknowledging that the *building* owner has received the Preliminary Commissioning Report.

C408.2.4.2 Copy of report. The *code official* shall be permitted to require that a copy of the Preliminary Commissioning Report be made available for review by the *code official*.

C408.2.5 Documentation requirements. The *construction documents* shall specify that the documents described in this section be provided to the *building* owner within 90 days of the date of receipt of the *certificate of occupancy*.

C408.2.5.1 Drawings. *Construction documents* shall include the location and performance data on each piece of equipment.

C408.2.5.2 Manuals. An operating and maintenance manual shall be provided and include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined setpoints shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
5. A narrative of how each system is intended to operate, including recommended setpoints.

C408.2.5.3 System balancing report. A written report describing the activities and measurements completed in accordance with Section C408.2.2.

C408.2.5.4 Final commissioning report. A report of test procedures and results identified as "Final Commissioning Report" shall be delivered to the building owner and shall include:

1. Results of functional performance tests.
2. Disposition of deficiencies found during testing, including details of corrective measures used or proposed.
3. Functional performance test procedures used during the commissioning process including measurable criteria for test acceptance, provided herein for repeatability.

Exception: Deferred tests which cannot be performed at the time of report preparation due to climatic conditions.

C408.3 Lighting system functional testing. Controls for automatic lighting systems shall comply with Section C408.3.

C408.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. The construction documents shall state the party who will conduct the required functional testing. Where required by the code official, an approved party independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405. Where occupant sensors, time switches, programmable schedule controls, photosensors or daylighting controls are installed, the following procedures shall be performed:

1. Confirmation that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
2. Confirmation that the time switches and programmable schedule controls are programmed to turn the lights off.
3. Confirmation that the placement and sensitivity adjustments for photosensor controls reduce electric light based on the amount of usable daylight in the space as specified.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

The changes proposed are intended to accomplish consistency between IECC and IgCC commissioning provisions; to clarify the application of various exceptions, and consistency of phrasing and terminology. If the changes to the IECC are approved, a companion change will be submitted by the SEHPCAC for 2014.

Specific changes are:

- C408.2.1 – Replaces the 'as a minimum in item 4 with a new item 6 which makes it clear that the registered design professional should include other elements in the commissioning plan beyond the listed 5 where the designer sees such is appropriate.
- C408.2.2.1 – Provides a complete sentence for the exception. As the preceding paragraph has multiple requirements, it is essential that the exception clearly state the provisions which are 'excepted'.
- C408.2.2.2 – Completes the exceptions; clarifies what is being 'excepted'.
- C408.3.1 – A grammatical clean-up. The lead in text states that 'the following procedures shall be performed". The text of the 3 listed items are commands, not procedures.

Cost Impact: The code change proposal will not increase the cost of construction. The proposal is editorial in nature and will not affect the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides editorial clean up to the provisions and use of appropriate terminology.

Assembly Action: **None**

Final Hearing Results

CE351-13 **AS**

Code Change No: CE352-13

Original Proposal

Section(s): C408.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C408.2 Mechanical systems commissioning and completion requirements. Prior to ~~passing~~ the final mechanical inspection, the *registered design professional* shall provide evidence of mechanical systems *commissioning* and completion in accordance the provisions of this section.

Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

Exception: The following systems are exempt from the commissioning requirements:

1. Mechanical systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140 690 W) cooling capacity and 600,000 Btu/h (175 860 W) heating capacity.
2. Systems included in Section C403.3 that serve dwelling units and sleeping units in hotels, motels, boarding houses or similar units

Reason: The current code requires something to be done in advance of a future event. The registered design professional can only provide something either prior to an inspection or after passage of the inspection. This proposal clarifies the order in which commissioning events take place, to clarify the code to foster implementation and compliance verification.

Cost Impact: The code change proposal does not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The change provides clarity to code requirements for the timing of the commissioning.

Assembly Action: **None**

Final Hearing Results

CE352-13 **AS**

Code Change No: CE353-13

Original Proposal

Section(s): C408.2

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C408.2 Mechanical systems commissioning and completion requirements. Prior to passing the final mechanical inspection, the *registered design professional* shall provide evidence of mechanical systems *commissioning* and completion in accordance the provisions of this section.

Construction document notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request in accordance with Sections C408.2.4 and C408.2.5.

Exceptions: The following systems are exempt ~~from the commissioning requirements~~:

1. Mechanical systems in buildings where the total mechanical equipment capacity is less than 480,000 Btu/h (140 690 W) cooling capacity and 600,000 Btu/h (175 860 W) heating capacity.
2. Systems included in Section C403.3 that serve individual dwelling units and sleeping units ~~in hotels, motels, boarding houses or similar units~~

Reason: This proposal simplifies and clarifies the exceptions to required mechanical systems commissioning. The objective of this proposal is to clarify the code to foster implementation and compliance verification. It is also not necessary in an exception to re-state the topic in the parent section to which the exception applies. The term "sleeping unit" is defined in the code so the delineation of where such units may or may not occur is not needed and is confusing. The intent, regardless of the type of building in which they are located, is that the systems serving individual sleeping units need not be commissioned. The word "individual" is added so that complex central systems serving multiple sleeping units would not be exempt from commissioning.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: Clarifies that the exception applies to systems within the dwelling unit or sleeping unit.

Assembly Action: **None**

Final Hearing Results

CE353-13 **AS**

Code Change No: CE354-13

Original Proposal

Section(s): C408.2.2.1

Proponent: Amanda Hickman, InterCode Incorporated, representing AMCA International (Amanda@InterCodeinc.com)

Revise as follows:

C408.2.2.1 Air system balancing. Each supply air outlet and *zone* terminal device shall be equipped with means for air balancing in accordance with the requirements of Chapter 6 of the *International Mechanical Code*. Discharge dampers <u>used for air system balancing</u> are prohibited on constant volume fans and variable volume fans with motors 10 hp (18.6 kW) and larger. Air systems shall be balanced in a manner to first minimize throttling losses then, for fans with system power of greater than 1 hp (0.74 kW), fan speed shall be adjusted to meet design flow conditions.

Exception: Fans with fan motors of 1 hp (0.74 kW) or less.

Reason: Discharge dampers are often used to shield a building area from rain and snow when the fan is not operating. In these situations, dampers use no energy when the fan is off and a minuscule amount of energy when the fan is running.

The added language provides clarity to this section and ensures that the restriction on discharge dampers only applies to those used for air balancing purposes. Disallowing discharge dampers altogether would constitute a restriction and energy loss while the fan is running.

Cost Impact: This proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposal clarifies the application of this part of the text.

Assembly Action: **None**

Final Hearing Results

CE354-13 **AS**

Code Change No: CE355-13

Original Proposal

Section(s): C408.2.4.1

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

C408.2.4.1 Acceptance of report. *Buildings,* or portions thereof, shall not be considered acceptable for a final inspection pursuant to Section C104.3 ~~pass the final mechanical inspection~~ until ~~such time as~~ the *code official* has received a letter of transmittal from the *building* owner acknowledging that the *building* owner has received the Preliminary Commissioning Report.

Reason: This proposal revises the commissioning provision so that buildings cannot be considered for a final inspection (e.g., do not pass the mechanical inspection) until the owner indicates in writing they have the required commissioning report. This clarifies the code through the reference section for final inspections and eliminates unneeded language "such time as".

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The process should not be delayed waiting for the formality of the submitted report.

Assembly Action: **None**

Public Comment

Public Comment 1:

Ellen Eggerton, Fairfax County, representing Virginia Building Coe Officials Association; requests Approval as Submitted.

Commenter's Reason: The existing code language puts the mechanical contractor on the hook for items that could be the responsibility of an electrical contractor or the general contractor. The code change holds up the final inspection regardless of which contractor is holding up the work.

Public Comment 2:

Jeremiah Williams, U.S. Department of Energy, requests Approval as Submitted.

Commenter's Reason: The current code is clear, but not complete. It essentially says that the mechanical inspection is not passed until the code official has the required letter of transmittal. Without a letter of transmittal confirming the commissioning has been completed, the mechanical inspection would not be passed. Without passing the mechanical inspection, it is presumed any final inspection could not proceed, and any resultant occupancy permit could not be issued. At the code development hearing, there was opposition to this change based on the opinion that the revision would tend to hold up the conduct of inspections and, as a result, would hold up the issuance of the final occupancy permit. In disapproving the code change, the committee indicated that the process should not be delayed waiting for the formality of a submitted report. DOE does not believe the code change has a negative impact regarding overall project approvals and in some cases could eliminate re-inspections and speed the issuance of an occupancy permit.

The current and proposed code text only provides for the submission of a letter of transmittal related to receipt of the commissioning report by the building owner. Currently, the code says the building does not pass final mechanical inspection until the letter is received (i.e., even if all the other items covered by the mechanical inspection pass, no passage occurs until the letter is received). Proposal CE355-13 requires the receipt of the letter before the final inspection occurs. This should not delay the process, because it ensures that when the final mechanical inspection is done, the commissioning has been completed per code; as a result, the building is more likely to pass the final mechanical inspection. So the proposal does not delay the approval process for the building owner and in some cases could accelerate the process.

The code change proposal, as covered in more detail below, will not hold up the issuance of an occupancy permit and actually could speed its issuance. Under the current code, if the letter is not sent, then the mechanical inspection is not passed and subsequent inspections and issuance of an occupancy permit cannot occur.

The commissioning provisions in the code apply to mechanical systems as well as electrical power and lighting systems. It would seem then the code should also add electrical inspection passage as a criterion, but that is not currently addressed in the code, nor proposed herein. That said, the key issue is final inspection, which unlike mechanical or electrical inspections, is an item specifically covered in the code. Instead of addressing the passage of the mechanical or electrical inspections, which in turn trigger a final inspection and issuance of a certificate of occupancy, based on the receipt of a letter, it seems more appropriate to address that as a condition for a final inspection. This ensures conformance to all the system commissioning requirements, and provides a singular point of reference in the process. Either way, there is a possible hold up on issuing the occupancy permit (i.e., under the current code or proposed code language) based on receipt of the letter from the owner.

The remaining issue then is if the AHJ wants to conduct the inspection before or after receipt of the letter. It would seem more reasonable, given the intent of commissioning, that an inspector would be more likely to find fewer issues in inspecting a commissioned versus an un-commissioned building. Also, a requirement that the letter be posted prior to the final inspection provides some incentive for the building owner to ensure the commissioning is completed. Since the intent of commissioning is to ensure the building electrical, lighting and mechanical systems are properly and working, it is more appropriate to ensure commissioning is conducted prior to final inspection as opposed to logging the receipt of a letter from the owner after all the inspections have been completed. In either case, the issuance of a certificate of occupancy rests on receipt of the letter, and the inspections have to be conducted. If the above reasons are not sufficient, this requirement provides some incentive for the building owner to focus on getting this done, allowing the inspector to actually see the result in the building, which benefits both the builder and the AHJ.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

CE355-13 AS

Code Change No: CE356-13

Original Proposal

Section(s): C408.2.5.2

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C408.2.5.2 Manuals. An operating and maintenance manual shall be provided and include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.
2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.
3. Name and address of at least one service agency.
4. HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined setpoints shall be permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.
5. Submittal data indicating all selected options for each piece of lighting equipment and lighting controls.
6. Operation and maintenance manuals for each piece of lighting equipment. Required routine maintaince actions, cleaning and recommended relamping shall be clearly identified.
7. A schedule for inspecting and recalibrating all lighting controls.
8. A narrative of how each system is intended to operate, including recommended setpoints.

Reason: The current requirements for manuals seems specific to HVAC documentation. This proposal adds additional language for the documentation, maintenance, and inspection of lighting equipment and controls. These requirements are consistent with ANSI/ASHRAE/IES Standard 90.1

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved the proposal because the information on the lighting controls is just as important as those on the HVAC systems. The listing of manual items is simply information for the building owner, it requires no action. Some felt that some or all of this would be better placed in commentary. Some felt that details on each luminaire is excessive detail.

Assembly Action: **None**

Final Hearing Results

CE356-13 **AS**

Code Change No: CE357-13

Original Proposal

Section(s): C408.3.1

Proponent: Steve Ferguson, American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) (sferguson@ashrae.org)

Revise as follows:

C408.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. ~~The construction documents shall state the party who will conduct the required functional testing.~~ Where required by the code official, an approved ~~party~~ individual independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405.

Where occupant sensors, time switches, programmable schedule controls, photosensors or daylighting controls are installed, the following procedures shall be performed:

1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
    - 1.1. For projects with up to seven occupancy sensors, all occupancy sensors shall be tested
    - 1.2. For projects with more than seven the following shall be verified:
        - 1.2.1. Status indicator (as applicable) operates correctly
        - 1.2.2. The controlled lights turn off or down to the permitted level within the required time,
        - 1.2.3. For auto-on occupant sensors, the lights do turn on to the permitted level when someone enters the space,
        - 1.2.4. For manual on sensors, the lights turn on only when manually activated
        - 1.2.5. The lights are not incorrectly turned on by movement in nearby areas or by HVAC operation
2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
3. Confirm that all control devices for daylight controls have been properly located, field-calibrated, and set for design set points and threshold light levels. All daylight control devices shall only be readily accessible to authorized personnel. ~~the placement and sensitivity adjustments for photosensor controls reduce electric light based on the amount of usable daylight in the space as specified.~~

Reason: For consistency with ASHRAE/IES 90.1. These revisions add more specific requirements to the functional testing of lighting controls for the common controls required by the standard and adds some clarification to the description of entities allowed to perform the testing and verification.

Cost Impact: The code change proposal will increase the cost of construction when lighting controls are required in parking garages.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proponent requested disapproval in order to address needed revisions.

Assembly Action: **None**

Public Comments

Public Comment 1:

Steve Ferguson, ASHRAE, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

C408.3.1 Functional testing. Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. Where required by the code official, an approved individual independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405.

Where occupant sensors, time switches, programmable schedule controls, photosensors or daylighting controls are installed, the following procedures shall be performed:

1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.
   1.1 For projects with up to seven occupancy sensors, all occupancy sensors shall be tested. For projects with more than seven, at least one of each sensor type and the sensors in one of each distinct room or space type shall be tested
   1.2 For all sensors required to be tested by item 1.1, ~~projects with more than seven~~ the following shall be verified:
      1.2.1 Status indicators operate correctly
      1.2.2 The controlled lights turn off or down to the permitted level within the required time,
      1.2.3 For auto-on occupant sensors, the lights do turn on to the permitted level when someone enters the space,
      1.2.4 For manual on sensors, the lights turn on only when manually activated
      1.2.5 The lights are not incorrectly turned on by movement in nearby areas or by HVAC operation
2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.
3. Confirm that all control devices for daylight controls have been properly located, field-calibrated, and set for design set points and threshold light levels. All daylight control devices shall only be readily accessible to authorized personnel.

Commenter's Reason: The original proposal was written was not laid out correctly. The intent is for the all of the tests to be performed when required. If a project has 7 or fewer sensors, then all sensors must be tested. If a project has more than 7 sensors, then one set of sensors needs to be tested for distinct room or space types.
If you have 7 hallways and 19 offices, you would only be required to test all of the sensors in one of the hallways and one of the offices.

The current layout proposes to fix that and clarifies when the verification needs to occur.

Public Comment 2:

Eric Makela, Birtt/Makela Group, representing Northwest Energy Codes Group, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

Add to Section C202 General Definitions

REGISTERED DESIGN PROFESSIONAL. An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.

Revise as follows:

~~**C408.3.1 Functional testing.** Testing shall ensure that control hardware and software are calibrated, adjusted, programmed and in proper working condition in accordance with the construction documents and manufacturer's installation instructions. The construction documents shall state the party who will conduct the required functional testing. Where required by the code official, an approved party~~ individual ~~independent from the design or construction of the project shall be responsible for the functional testing and shall provide documentation to the code official certifying that the installed lighting controls meet the provisions of Section C405.~~

C408.3.1 Functional testing. Prior to passing final inspection, the *registered design professional* shall provide evidence that the lighting control systems have been tested to ensure that control hardware and software are calibrated, adjusted, programmed, and in proper working condition in accordance with the construction documents and manufacturer's installation instructions~~.~~ Functional testing shall comply with Section C408.3.1.1 to C408.3.1.2 for the applicable control type.

C408.3.1.1 Occupancy sensors Where *occupancy sensors* are provided, the following procedures shall be performed:

1. Certify that the occupancy sensor has been located and aimed in accordance with manufacturer recommendations
2. For projects with seven or fewer *occupancy sensors* each sensor shall be tested.

3. For projects with more than seven *occupancy sensors*, testing shall be done for each unique combination of sensor type and space geometry. Where multiples of each unique combination of sensor type and space geometry are provided no fewer than the greater of one, or 10 percent of each combination, shall be tested unless the code official or design professional require a higher percentage to be tested. Where 30 percent or more of the tested controls fail, all remaining identical combinations shall be tested.

For each occupancy sensor to be tested, verify the following:

3.1 Where occupancy sensors include status indicators, verify correct operation.
3.2 The controlled lights turn off or down to the permitted level within the required time.
3.3 For auto-on *occupancy sensors*, the lights turn on to the permitted level when an occupant enters the space.
3.4 For manual on sensors, the lights turn on only when manually activated.
3.5 The lights are not incorrectly turned on by movement in adjacent areas or by HVAC operation.

C408.3.1.2 Automatic time switches. Where automatic time switches are provided, the following procedures shall be performed:

1. Confirm that the automatic time switch control is programmed with accurate weekday, weekend, and holiday schedules.
2. Provide documentation to the owner of automatic time switch programming including weekday, weekend, holiday schedules, and set-up and preference program settings.
3. Verify the correct time and date in the time switch.
4. Verify that any battery back-up is installed and energized.
5. Verify that the override time limit is set to no more than 2 hours.
6. Simulate occupied condition. Verify and document the following:
   6.1 All lights can be turned on and off by their respective area control switch.
   6.2 The switch only operates lighting in the enclosed space in which the switch is located.
7. Simulate unoccupied condition. Verify and document the following:
   7.1 All non-exempt lighting turns off.
   7.2. Manual override switch allows only the lights in the enclosed space where the override switch is located to turn on or remain on until the next scheduled shut off occurs.
8. Additional testing as specified by the registered design professional.

C408.3.1.3 Daylight Controls Where daylighting controls are provided, the following procedures shall be performed:

1. All control devices have been properly located, field-calibrated and set for accurate set points and threshold light levels.
2. Daylight controlled lighting loads adjust to light level set points in response to available daylight.
3. The locations of calibration adjustment equipments are readily accessible only to authorized personnel.

C408.3.2 Documentation Requirements. The *construction documents* shall specify that *documents* certifying that the installed lighting controls meet documented performance criteria of Section C405 be provided to the *building* owner within 90 days from the date of receipt of the *certificate of occupancy*.

~~Where occupant sensors, time switches, programmable schedule controls, photosensors or daylighting controls are installed, the following procedures shall be performed:~~

~~1. Confirm that the placement, sensitivity and time-out adjustments for occupant sensors yield acceptable performance.~~

~~1.1. For projects with up to seven occupancy sensors, all occupancy sensors shall be tested~~
~~1.2. For projects with more than seven the following shall be verified:~~
~~1.2.1. Status indicator (as applicable) operates correctly~~
~~1.2.2. The controlled lights turn off or down to the permitted level within the required time,~~
~~1.2.3. For auto-on occupant sensors, the lights do turn on to the permitted level when someone enters the space,~~
~~1.2.4. For manual on sensors, the lights turn on only when manually activated~~
~~1.2.5. The lights are not incorrectly turned on by movement in nearby areas or by HVAC operation~~

~~2. Confirm that the time switches and programmable schedule controls are programmed to turn the lights off.~~

~~3. Confirm that all control devices for daylight controls have been properly located, field-calibrated, and set for design set points and threshold light levels. All daylight control devices shall only be readily accessible to authorized personnel. the placement and sensitivity adjustments for photosensor controls reduce electric light based on the amount of usable daylight in the space as specified.~~

Commenter's Reason: This Public Comment provides specific functional testing requirements for the specific types of lighting controls that are addressed in Section C405 of the IECC. The current language in Section C408.3 is not specific to lighting control type, providing general requirements with the intent that a system can be adequately "commissioned" if the section is followed. The Public Comment provides specific, step-by-step instructions testing occupancy sensors, daylighting controls and automatic time switches to ensure that they are operating correctly before system acceptance. The requirements will appear in the Southern Nevada Energy Code and were proposed by the lighting design industry. The functional testing requirements are consistent with the timing and format of Section C408.2. Also the modification requires that the Registered Design Professional perform to testing requirement to be consistent with the Section C408 Commissioning requirements.

Final Hearing Results

CE357-13 **AMPC1, 2**

Code Change No: CE362-13, Part I

Original Proposal

Section(s): C403.2.5 (New), R403.2 (New) (IRC N1103.2 (New))

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IECC-COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Julius Ballanco, P.E, JB Engineering and Code Consulting, P.C. representing Self (JBEngineer@aol.com)

PART I IECC-COMMERCIAL PROVISIONS

Add new text as follows:

<u>**C403.2.5 Hot water boiler outdoor temperature setback control.** Hot water boilers that supply heat to the building through one- or two-pipe heating systems shall have an outdoor setback control that lowers the boiler water temperature based on the outdoor temperature.</u>

Reason: This is one of the single most energy efficient controls for a hot water boiler. By modulating the hot water temperature in the heating system, the boiler fires less, using less energy. This is a simple control that every hot water boiler should be required to have for saving energy.

Cost Impact: This code change will not increase the cost of construction.

Public Hearing Results

Errata for this proposal is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART I – IECC - Commercial
Committee Action: **Approved as Submitted**

Committee Reason: The change will provide needed energy efficiency.

Assembly Action: **None**

Final Hearing Results

CE362-13, Part I **AS**

Code Change No: CE362-13, Part II

Original Proposal

Section(s): C403.2.5 (New), R403.2 (New) (IRC N1103.2 (New))

THIS IS A 2 PART CODE CHANGE PROPOSAL. PART I WILL BE HEARD BY THE IECC-COMMERCIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. PART II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Julius Ballanco, P.E, JB Engineering and Code Consulting, P.C. representing Self (JBEngineer@aol.com)

PART II IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R403.2 (N1103.2) Hot water boiler outdoor temperature setback. Hot water boilers that supply heat to the building through one- or two- pipe heating systems shall have an outdoor setback control that lowers the boiler water temperature based on the outdoor temperature.

Reason: This is one of the single most energy efficient controls for a hot water boiler. By modulating the hot water temperature in the heating system, the boiler fires less, using less energy. This is a simple control that every hot water boiler should be required to have for saving energy.

Cost Impact: This code change will not increase the cost of construction.

Public Hearing Results

Errata for this proposal is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

Part I of this code changes was heard by the Commercial Energy Conservation Code Development Committee and Part II was heard by the Residential Energy Conservation Code Development Committee.

PART II – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: This is a needed, simple energy saving technology.

Assembly Action: **None**

Final Hearing Results

CE362-13, Part II AS

Code Change No: CE363-13

Original Proposal

Section(s): C404.3

Proponent: Julius Ballanco, P.E./ JB Engineering and Code Consulting, P.C./Self (JBEngineer@aol.com)

Delete without substitution as follows:

~~**C404.3 Temperature controls.** Service water-heating equipment shall be provided with controls to allow a setpoint of 110°F (43°C) for equipment serving dwelling units and 90°F (32°C) for equipment serving other occupancies. The outlet temperature of lavatories in public facility rest rooms shall be limited to 110°F (43°C).~~

Reason: This is a requirement that threatens the public health of the occupants of a building. In Chapter 1, the intent of the code states, in part, "This code is not intended to abridge safety, health or environmental requirements contained in other applicable codes or ordinances." By requiring temperature of service hot water to be controlled to 90°F or 110°F, the system is set up perfectly for the accelerated growth of legionella pneumophilia bacteria. These bacteria can lead to the building occupants contracting legionnaires disease.

The plumbing engineering community is extremely concerned with the prevention of legionella pneumophilia bacteria breeding grounds. The bacteria breeds on biofilm and grows rapidly in water temperatures identified in this section. The minimal energy savings associated with this section is not worth the possible death of the building occupants.

Cost Impact: This code change will not increase the cost of construction.

Public Hearing Results

Errata for this proposal is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

Committee Action: **Approved as Submitted**

Committee Reason: The regulation of controls should be part of the International Plumbing Code. This provision sets up a conflict, or potential conflict, if not maintained appropriately.

Assembly Action: **None**

Final Hearing Results

CE363-13 **AS**

Code Change No: RE1-13

Original Proposal

Section(s): R101.4.3 (IRC N1101.3)

Proponent: Brenda A. Thompson, Clark County Development Services, Las Vegas NV, representing ICC Sustainability, Energy & High Performance Building Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

R101.4.3 (N1101.3) Additions, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.

~~6. Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,~~

~~7.~~ 6. Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.

~~8.~~ 7. Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

It is inappropriate to have item 6 in the existing building provisions of the Residential IECC. Chapter 4(RE) has no provisions requiring a vestibule or revolving door in a residential building. Even if such were provided in an existing residential building, the code shouldn't require keeping a feature not required by the code for new construction of a like building.

Cost Impact: The change will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This code change proposal appropriately removes a provision that does not apply to the IECC-Residential provisions. This cleans up some duplicity caused by the separation of the Residential and Commercial provisions into separate codes.

Assembly Action: **None**

Final Hearing Results

RE1-13 **AS**

Code Change No: RE3-13

Original Proposal

Section(s): R103.2 (IRC N1101.8)

Proponent: Craig Conner, Building Quality, representing self (craig.conner@mac.com)

Revise as follows:

R103.2 (N1101.8) Information on construction documents. Construction documents shall be drawn to scale upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *code official*. Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed, and show in sufficient detail pertinent data and features of the building, systems and equipment as herein governed. Details shall include, but are not limited to, as applicable, insulation materials and their *R*-values; fenestration *U*-factors and SHGCs; area-weighted *U*-factor and SHGC calculations; mechanical system design criteria; mechanical and service water heating system and equipment types, sizes and efficiencies; ~~economizer description;~~ equipment and systems controls; ~~fan motor horsepower (hp) and controls;~~ duct sealing, duct and pipe insulation and location; ~~lighting fixture schedule with wattage and control narrative;~~ and air sealing details.

Reason: Commercial requirements don't belong in residential.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This code change proposal appropriately removes a provision that does not apply to the IECC-Residential provisions.

Assembly Action: **None**

Final Hearing Results

RE3-13	**AS**

Code Change No: RE5-13

Original Proposal

Section(s): R202 (IRC N1101.9)

Proponent: Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, Inc. (smozingo@coloradocode.net)

Delete without substitution as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

~~**ENTRANCE DOOR.** Fenestration products used for ingress, egress and access in nonresidential buildings, including, but not limited to, exterior entrances that utilize latching hardware and automatic closers and contain over 50-percent glass specifically designed to withstand heavy use and possibly abuse.~~

Reason: Within the definition itself it clarifies that we are only talking about entrance doors in nonresidential buildings, thus this definition should not be located in the residential chapter.

When the IECC was split up and new chapters 1-3 were created for both the residential and the commercial portions of the code some things were brought over into the commercial chapters that belonged only to residential and vice versa. It becomes necessary now to clean up these very separate and distinct chapters so that those who may be new to the energy code and were not aware of the previous combined versions of chapters 1-3 will not be confused by things that were brought forward by mistake.

Cost Impact: This code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This is an appropriate clean-up of the IECC-Residential Provisions that will lessen confusion in applying the code.

Assembly Action: **None**

Final Hearing Results

RE5-13	**AS**

Code Change No: RE6-13

Original Proposal

Section(s): R202 (NEW) (IRC N1101.9 (NEW))

Proponent: Matt Dobson, representing the Vinyl Siding Institute (mdobson@vinylsiding.org)

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

INSULATED SIDING. An insulated cladding with manufacturer-installed insulating material as an integral part of the cladding product having a minimum R-value of R-2, based on testing in accordance with ASTM C1363.

Reason: This definition will help building officials and energy specialists/raters understand how to qualify insulated siding as home insulation. It includes language similar to the definition of insulated vinyl siding in ASTM D7793 and uses insulated sheathing's R-value threshold in the current energy code.

This is a general definition that can be applied to any insulated siding, regardless of the material. It will provide direction to manufacturers of these products that want to properly test their products and qualify them as home insulation.

By setting a minimum R-value threshold for qualification and stating the test method that must be used for insulation, it provides a clear path for evaluation and code acceptance when a cladding system is classified as insulation.

This testing is done using ASTMC1363 (hot box) as specified by the rules for home insulation in Federal Trade Commission regulation 16 CFR Part 460 and as referenced in the energy code under section R303.1.4. The test protocol has been reviewed and deemed to be in the spirit of the rule, 16 CRF Part 460, by the Federal Trade Commission. The test methodology for insulated siding has been accepted and published as a part of the ENERGY STAR Version 3 program for new construction.

There have been questions about how the R-value of insulated siding will be impacted by air movement or wind. As specified in ASTM D7793, insulated vinyl siding is tested under ASTM C1363 without any special sealing of joints or laps, just as it would be installed in the field. ASTM C1363 includes a wind of specified velocity as part of test. Although the primary purpose of this wind is to remove the effect of the boundary air film, it also provides an opportunity for air to circulate into or behind the siding. The R-value reported for the test thus includes the effect of this wind and any reduction in insulating performance due to entry of air.

As part of the development of test methodology for insulated vinyl siding, a variety of profile types were tested both unsealed (as installed) and with all joints and laps sealed. A comparison of the results shows that there is indeed a reduction in R-value of up to about 25% for the unsealed configuration, but that the remaining R-value is still substantial. Below is a sample of the results of this study which show products end R-value in sealed and unsealed configurations. Per ASTM D7793, the R-value reported for insulated vinyl siding must be determined through testing in an unsealed, as-installed configuration.

Product	Lock Style	Wind Config	Sealing	R-value
Single 7	Standard Lock	Perpendicular	Sealed	2.52
		Perpendicular	Unsealed	2.12
		Perpendicular	Unsealed	2.13
		Perpendicular	Unsealed	2.13
		Perpendicular	Unsealed	2.16
Quad 4.5	Standard Lock	Perpendicular	Sealed	3.27
		Perpendicular	Unsealed	2.56
		Perpendicular	Unsealed	2.57
		Perpendicular	Unsealed	2.57
		Perpendicular	Unsealed	2.63
		Perpendicular	Unsealed	2.53

Product	Lock Style	Wind Config	Sealing	R-value
		Parallel Bottom	Sealed	2.85
		Parallel Bottom	Unsealed	2.65
		Parallel-Top	Sealed	2.85
		Parallel-Top	Unsealed	2.55
Double 6	Standard Lock	Perpendicular	Sealed	2.86
		Perpendicular	Unsealed	2.34
		Perpendicular	Unsealed	2.33
		Perpendicular	100% Unsealed	2.34
		Parallel Bottom	Sealed	2.75
		Parallel Bottom	Unsealed	2.45
		Parallel-Top	Sealed	2.75
		Parallel-Top	Unsealed	2.55
A: Double 6	Stack Lock	Perpendicular	Sealed	3.74
		Perpendicular	Unsealed	2.03
		Perpendicular	Sealed	3.54
		Perpendicular	Unsealed	2.69
		Parallel Bottom	Sealed	3.35
		Parallel Bottom	Unsealed	2.65
		Parallel-Top	Sealed	3.35
		Parallel-Top	Unsealed	2.75
B: Double 6	Stack Lock	Perpendicular	Sealed	3.11
		Perpendicular	Unsealed	1.97
Double 4.5	Standard Lock	Perpendicular	Sealed	3.13
		Perpendicular	Unsealed	2.32

A complete copy of this report and be viewed here by going to http://www.vinylsiding.org/ABOUTSIDING/insulated/Summary_of_VSI_R-value_Testing.pdf.

For more information about insulated siding, go to www.insulatedsiding.info.

Cost Impact: This change have minimal cost impact as many products on the market are certified and tested using this methodology.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

INSULATED SIDING. ~~An~~ ~~insulated cladding~~ type of continuous insulation with manufacturer-installed insulating material as an integral part of the cladding product having a minimum R-value of R-2~~, based on testing in accordance with ASTM C1363.~~

Committee Reason: This proposal will add more information about a product that can be used to meet code envelope requirements. This gives builders more flexibility with more products that can be used to meet the code requirements.

Assembly Action: **None**

Final Hearing Results

RE6-13	**AM**

Code Change No: RE9-13

Original Proposal

Section(s): R202 (NEW) (IRC N1101.9 (NEW)), R304 (NEW) (IRC N1101.16 (NEW))

Proponent: Jim Meyers, Southwest Energy Efficiency Project, representing Southwest Energy Efficiency Project

Add new text as follows:

SECTION R304
SOLAR READY ZONE

R304.1 General. (N1102.16.1) New detached one- and two-family dwellings, and multiple single family dwellings having roofs oriented between 110 degrees and 270 degrees of true north shall comply with Sections R304.2 through R304.8.

R304.2 (N1102.16.2) Construction document requirements for solar ready zone. Construction documents for new detached one- and two-family dwellings, and multiple single family dwellings having roofs oriented between 110 degrees and 270 degrees of true north shall indicate a *solar ready zone*.

R304.3 (N1102.16.3) Solar ready zone area. The total *solar ready zone* area shall be no less than 300 square feet exclusive of access or set back areas as required by the *International Fire Code*. New multiple single family dwellings three stories or more in height above grade plane and with a total floor area less than or equal to 2000 square feet shall have a *solar ready zone* area of not less than 150 square feet. The *solar ready zone* shall be comprised of areas not less than five feet in width and not less than 80 square feet exclusive of access or set back areas as required by the *International Fire Code*.

Exceptions:

1. New buildings with a permanently installed on-site renewable energy system.
2. Roof areas that are in shade more than 70 percent of the time.

R304.4 (N1102.16.4) Obstructions. *Solar ready zones* shall be free from obstructions, including but not limited to vents, chimneys, and roof mounted equipment.

R304.5 (N1102.16.5) Roof load documentation. The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.

R304.6 (N1102.16.6) Interconnection pathway. Construction documents shall indicate pathways for routing of conduit or plumbing from the *solar ready zone* to the electrical service panel or service hot water system.

R304.7 (N1102.16.7) Electrical service reserved space. The main electrical service panel shall have a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled “For Future Solar Electric”. The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

R304.8 (N1102.16.8) Construction documentation certificate. A permanent certificate, indicating the *solar ready zone* and other requirements of this section, shall be posted near the electrical distribution panel, water heater or other conspicuous location by the builder or registered design professional.

Add new definition as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

<u>**SOLAR READY ZONE**. A section or sections of the roof or building overhang designated and reserved for the future installation of a solar electric or solar thermal system.</u>

Reason: This proposal is intended to support future potential improvements for detached one- and two-family dwellings, and multiple single family dwellings for solar electric and solar thermal systems. The proposed language follows similar language from code adoptions by local municipalities in Tucson, AZ, Boulder, CO, and from the 2013 California Title 24 building code.

This proposal is intended to identify the areas of a residential building roof, called the solar ready zone, for potential future installation of renewable energy systems. This proposal requires documenting necessary solar ready zone information on the plans, some of which may already be required in permit construction requirements. This proposal also requires the builder to post specific information about the home for use by the homeowner(s).

This proposal does not require the installation of conduit, pre wiring, or pre-plumbing. It does not require any specific physical orientation of the residential building. It does not require any increased load capacities for residential roofing systems. It does not require the redesign of plans.

The documentation of solar ready zones and roof load calculations (already performed during the design phase) will assist building departments as well as any future solar contractors seeking to install renewable energy systems on the roof. The builder/designer is knowledgeable on the intricacies of each model and plan and can easily identify unobstructed roof areas as well as spaces where conduit, wiring and plumbing can be routed from the roof to the respective utility areas. This will save building departments and solar designers' time and effort when installing future solar systems. If a homeowner wishes to install a solar energy system later, this documentation can save thousands of dollars in labor, installation, design and integration of the solar system into the house.

Many building departments have been mandated by local regulations to accelerate permits and inspections for solar installation. Having important information and documentation available to the building department, solar contractor and homeowner will assist in supporting the accelerated working environment many municipalities have mandated.

The U.S. Department of Energy's (DOE) SunShot Initiative has set a goal to make solar energy cost competitive with other forms of energy by the end of the decade which will reduce installed costs of solar energy systems by about 75%. This initiative, combined with increased pressures on our energy supply and demand, will encourage and drive greater adoption of renewable energy systems on residential buildings.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: The proposal does not contain enough information to decide that this is appropriate for all climate zones and for all the conditions that have been defined. This might be more appropriate as an appendix for jurisdictions to decide if this is appropriate for their community. In addition, the proposal is written in an overly complicated manner. This can be simpler.

Assembly Action: **None**

Public Comments

Public Comment 2:

Lorraine Ross, Intech Consulting Inc. representing The Dow Chemical Company requests Approval as Modified by this Public Comment.

Replace the proposal as follows:

<u>**APPENDIX (X)**</u>

<u>**SOLAR READY PROVISIONS – DETACHED ONE-AND TWO-FAMILY DWELLINGS, MULTIPLE SINGLE FAMILY DWELLINGS (TOWNHOUSES)**</u>

<u>(The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance.)</u>

<u>**SECTION XA101 SCOPE**</u>

<u>**XA101.1 General**. These provisions shall be applicable for new construction where solar ready provisions are required.</u>

SECTION XA102
GENERAL DEFINITIONS

SOLAR READY ZONE. A section or sections of the roof or building overhang designated and reserved for the future installation of a solar photovoltaic or solar thermal system.

XA103
SOLAR READY ZONE

XA103.1 General. New detached one- and two-family dwellings, and multiple single family dwellings (townhouses) with at least 600 square feet of roof area oriented between 110 degrees and 270 degrees of true north shall comply with sections XA103.2 through XA103.8.

Exceptions:

1. New residential buildings with a permanently installed on-site renewable energy system.
2. A building with a solar ready zone that is shaded for more than 70 percent of daylight hours annually.

XA103.2 Construction document requirements for solar ready zone. Construction documents shall indicate the *solar ready zone*.

XA103.3 Solar ready zone area. The total *solar ready zone* area shall be no less than 300 square feet exclusive of mandatory access or set back areas as required by the *International Fire Code*. New multiple single family dwellings (townhouses) three stories or less in height above grade plane and with a total floor area less than or equal to 2000 square feet per dwelling shall have a *solar ready zone* area of not less than 150 square feet. The *solar ready zone* shall be comprised of areas not less than five feet in width and not less than 80 square feet exclusive of access or set back areas as required by the *International Fire Code*.

XA103.4 Obstructions. *Solar ready zones* shall be free from obstructions, including but not limited to vents, chimneys, and roof mounted equipment.

XA103.5 Roof load documentation. The structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents.

XA103.6 Interconnection pathway. Construction documents shall indicate pathways for routing of conduit or plumbing from the *solar ready zone* to the electrical service panel or service hot water system.

XA103.7 Electrical service reserved space. The main electrical service panel shall have a reserved space to allow installation of a dual pole circuit breaker for future solar electric installation and shall be labeled “For Future Solar Electric”. The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

XA103.8 Construction documentation certificate. A permanent certificate, indicating the *solar ready zone* and other requirements of this section, shall be posted near the electrical distribution panel, water heater or other conspicuous location by the builder or registered design professional.

Commenter’s Reason: The original proposal (RE9-13) was narrowly disapproved by the committee on a 5 to 6 vote and was closely followed by a 33 to 35 vote with a floor action. This public comment reflects many of the comments from both the committee and a floor amendment offered by public testimony on RE9-13 and moves the proposed change from the body of the code into a new appendix in the IECC.

Many building departments have been mandated by local regulations to accelerate permits and inspections for solar installations. Having important information and documentation available to the building department, solar contractor and homeowner will assist in supporting the accelerated working environment many municipalities have mandated. It also provides uniform guidance for those jurisdictions where solar ready ordinances are under consideration.

This proposal is intended to identify the areas of a residential building roof, called the solar ready zone, for potential future installation of renewable energy systems. This proposal requires documenting necessary solar ready zone information on the plans, some of which may already be required in permit construction requirements. This proposal also requires the builder to post specific information about the home for use by the homeowner(s).

The proposed language follows similar language from code adoptions by local municipalities in Tucson, AZ, Boulder, CO, and from the 2013 California Title 24 building code. This proposal does not require the installation of conduit, pre wiring, or pre-plumbing. It does not require any specific physical orientation of the residential building. It does not require any increased load capacities for residential roofing systems. It does not require the redesign of plans.

It is also important to note that a commercial solar ready proposal (CE361-13) was Approved as Modified by Assembly Action to establish an Appendix Chapter for Solar Ready provisions in the Commercial IECC:
“The modification included in the Assembly Action is to change the proposal to be located in an Appendix chapter in the Commercial IECC without any change to the text of the proposal”.

Final Hearing Results

RE9-13 **AMPC2**

Code Change No: RE12-13

Original Proposal

Section(s): R401.2 (IRC N1101.15)

Proponent: Jeremiah Williams, representing U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

R401.2 (N1101.15) Compliance. Projects shall comply with Sections identified as "mandatory" and with either of the following: ~~sections identified as "prescriptive" or the performance approach in Section R405.~~

1. Sections identified as "prescriptive."
2. Section R405.

Reason: The proposed change provides a clarification. The current wording in the code has led to some confusion as to whether the mandatory lighting provisions of Section R404 are required when a home complies via the performance path of Section R405.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This was disapproved in favor of RE11-13.

Assembly Action: **None**

Public Comments

Public Comment:

Jeremiah Williams, U.S. Department of Energy requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R401.2 (N1101.15) Compliance. Projects shall comply with ~~Sections identified as "mandatory" and with either of the following~~:

1. Sections R401 through R404 or ~~identified as "prescriptive."~~
2. Section R405 and the provisions of Sections R401 through R404 labeled "mandatory".

Commenter's Reason: The proposed change provides a clarification. The current wording in the code has led to some confusion as to whether the mandatory lighting provisions of Section R404 are required when a home complies via the performance path of Section R405.

This public comment addresses the reason for disapproval at the Committee Action Hearings by making the language of this proposal consistent with corresponding parts of approved proposal RE11 that clarify section R401.2. RE11 contains additional provisions that go beyond clarification and consequently may not prevail in Final Action.

DOE posted its draft proposals and public comments for the IECC on its Building Energy Codes website prior to submitting to the ICC. Interested parties were provided a 30 day public review in June 2013, for which notice was published in the *Federal Register* (Docket No. EERE-2012-BT-BC-0030) and announced via the DOE Building Energy Codes news email list. In response to stakeholder input, DOE revised its proposals and public comments, as appropriate, and submitted to the ICC.

For more information on DOE proposals and public comments, including how DOE participates in the ICC code development process, please visit: http://www.energycodes.gov/development.

Final Hearing Results

RE12-13 **AMPC**

Code Change No: RE14-13

Original Proposal

Section(s): R401.3 (IRC N1101.16)

Proponent: Andrei Moldoveanu, representing National Electrical Manufacturers Association (NEMA) (and_moldoveanu@nema.org)

R401.3 (N1101.16) Certificate (Mandatory). A permanent certificate shall be completed by the builder or registered design professional and posted on ~~or in the electrical distribution panel~~ a wall in the space where the furnace is located, a utility room, or an approved location inside the building ~~by the builder or registered design professional~~. ~~The certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels.~~ The certificate shall list the predominant *R*values of insulation installed in or on ceiling/roof, walls, foundation (slab, *basement wall,* crawlspace wall and/or floor) and ducts outside conditioned spaces; *U*-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration, and the results from any required duct system and building envelope air leakage testing done on the building. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gasfired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency shall not be *listed* for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters**.**

Reason:

1. Certificates placed on or in the electrical distribution panel may become destroyed because of the location of the panel. Panels for many buildings in the Southwest portion of the United States are located outside of the building; thereby, causing certificates on or in these panels to become destroyed due to weather.
2. Safety. Additional printed material (such as the energy certificate) on electrical distribution panel makes it difficult to see the warning labels that or located on or in the panel.
3. Certificates located on or in the electrical panel are not very visible due to the location of the panels; thereby, rendering the certificate useless.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The committee agreed that posting the certificate on the electrical panel is not necessarily a good idea, and that this proposal provides a better approach.

Assembly Action: **None**

Final Hearing Results

RE14-13 **AS**

Code Change No: RE16-13

Original Proposal

Section(s): R401.3 (IRC N1101.16)

Proponent: Brenda A. Thompson, Clark County Development Services, Las Vegas NV, representing ICC Sustainability, Energy & High Performance Building Code Action Committee (bat@clarkcounty.gov)

Revise as follows:

R401.3 (N1101.16) Certificate (Mandatory). A permanent certificate shall be completed and posted ~~on or in the electrical distribution panel~~ by the builder or registered design professional at an approved location inside the building. Where located on an electrical distribution panel, the certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels. The certificate shall list the predominant *R* values of insulation installed in or on ceiling/roof, walls, foundation (slab, *basement wall,* crawlspace wall and/or floor) and ducts outside conditioned spaces; *U*-factors for fenestration and the solar heat gain coefficient (SHGC) of fenestration, and the results from any required duct system and building envelope air leakage testing done on the building. Where there is more than one value for each component, the certificate shall list the value covering the largest area. The certificate shall list the types and efficiencies of heating, cooling and service water heating equipment. Where a gasfired unvented room heater, electric furnace, or baseboard electric heater is installed in the residence, the certificate shall list "gas-fired unvented room heater," "electric furnace" or "baseboard electric heater," as appropriate. An efficiency shall not be *listed* for gas-fired unvented room heaters, electric furnaces or electric baseboard heaters**.**

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.
Reasons for this specific proposal:

1. Certificates placed on or in the electrical distribution panel may become destroyed because of the location of the panel. Panels for many buildings in the Southwest portion of the United States are located outside of the building; thereby, causing certificates on or in these panels to become destroyed due to weather.
2. Safety. Additional printed material (such as the energy certificate) on electrical distribution panel makes it difficult to see the warning labels that or located on or in the panel.
3. Certificates located on or in the electrical panel are not very visible due to the location of the panels; thereby, rendering the certificate useless.
4. Certificates should be located where they are likely to survive over time. Perhaps that location is in a garage next to a water heater or furnace. However such arrangement is not universally common in design. Short of finding a universally acceptable location, the proposal requires the local building official to approve the locations appropriate for the local jurisdiction. The location should be an interior locations so that it isn't lost to weather induced deterioration**.**

Cost Impact: The proposal is editorial in nature and will not affect the cost of construction..

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: In conjunction with RE14-13, this is a needed stipulation that allows installation on the electrical panel, and then retains language to prevent covering the circuit directory.

Assembly Action: **None**

Final Hearing Results

RE16-13	**AS**

Code Change No: RE18-13

Original Proposal

Section(s): R402.1 (IRC N1102.1), R402.1.1 (NEW) (IRC N1102.1.1 (NEW))

Proponent: Michael D. Fischer, Kellen Company, representing the Center for the Polyurethanes Industry (mfischer@kellencompany.com)

Revise as follows:

R402.1 (N1102.1) General (Prescriptive). The *building thermal envelope* shall meet the requirements of Sections R402.1.1 through ~~R402.1.4~~. R402.1.5.

R402.1.1 (N1102.1.1) Vapor retarder. Wall assemblies in the *building thermal envelope* shall comply with the vapor retarder requirements of Section R702.7 of the *International Residential Code* or Section 1405.3 of the *International Building Code* as applicable.

Reason: The IRC contains detailed vapor retarder provisions that apply specified R-Values for continuous insulation for vapor and condensation control. It is important to ensure that compliance to the envelope requirements of the energy code are coordinated with other building code requirements. While such a cross-reference is not necessary for most building requirements, the vapor retarder provisions are the only place in the IRC that a specific thermal performance provision is called out. This proposal provides the necessary coordination.

Cost Impact: The proposal will not affect the cost of construction..

Note: If this change is approved, it would be shown in Chapter 11 of the IRC without the reference to the IBC as follows:

> **N1102.1.1 Vapor retarder.** Wall assemblies in the *building thermal envelope* shall comply with the vapor retarder requirements of Section R702.7.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This pointer for requirements for vapor retarders is needed in the code, because this product is often part of to the building envelope.

Assembly Action: **None**

Final Hearing Results

RE18-13	**AS**

Code Change No: RE43-13

Original Proposal

Section(s): R402.1.2 (IRC N1102.1.2)

Proponent: John Woestman, Kellen Company, representing Extruded Polystyrene Foam Association (XPSA) (jwoestman@kellencompany.com)

Revise as follows:

R402.1.2 (N1102.1.2) *R*-value computation. Insulation material used in layers, such as framing cavity insulation ~~and insulating sheathing,~~ or continuous insulation shall be summed to compute the corresponding component *R*-value. The manufacturer's settled *R*-value shall be used for blown insulation. Computed *R*-values shall not include an *R*-value for other building materials or air films.

Reason: This proposal is intended to clarify intent. It does not alter, add or delete current code requirements or have a cost impact. The proposal makes these changes:

Revised "insulating sheathing" to "continuous insulation". This section of the code is making a distinction between insulation interrupted by framing and insulation that is not interrupted by framing. Insulated sheathing is a type of continuous insulation (insulation that is not interrupted by framing) but not the only type. Therefore this change clarifies the true intent of this section.

Inserted "corresponding". As currently written the language in this section is confusing and could be misinterpreted to mean that you can sum cavity and continuous insulation R-values together to come up with the required R-values as listed in Table R402.1.1. However, for insulation material used in layers, the intent is for the R-values of layered cavity insulation to be summed to meet the required cavity insulation R-value and the R-values of layered continuous insulation to be summed to meet the continuous insulation R-value.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This language clarifies the intent of the code and simplifies application.

Assembly Action: **None**

Final Hearing Results

RE43-13	**AS**

Code Change No: RE45-13

Original Proposal

Section(s): Table R402.1.3 (IRC N1102.1.3)

Proponent: Shirley Ellis, Energy Systems Laboratory, Texas A&M Engineering Experiment Station, Texas A&M University System (shirleyellis@tamu.edu)

Revise as follows:

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	~~0.082~~ 0.084	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	~~0.082~~ 0.084	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	0.057 0.060	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	0.057 0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	0.057	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	0.048	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	0.048	0.057	0.028	0.050	0.055

(Portions of Table not shown remain unchanged)

Reason: This code change proposal is intended to correct the assumptions behind the wood-frame wall U-factors embedded in Table R402.1.3 of the IECC. The misrepresent the true performance of homes and, as such, over-estimate the energy efficiency of a typical R13 wood wall assembly when the Total UA or Simulated Performance path is used to demonstrate compliance to the IECC.

The wood wall U-factor values in Table R402.1.3 are currently based on a wall system that assumes the use of 5/8” plywood sheathing, which is well in excess of the minimum (3/8” thick) structural wood panel wall bracing in the International Residential Code (IRC).

While 3/8” is the minimum wood structural panel wall bracing thickness allowed in the IRC, the most common structural panel thickness used in the United States is 7/16-inch. According to the 2011 Builders Survey, 68% of residential single family wall area used wood structural panel sheathing that was 7/16” thick or less. Therefore, it is reasonable to use an R-value for structural wood panels of 0.62R in the calculation for the U-value for climate zones 1 and 2. According to Table 2, that U-factor is 0.084.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Errata: The proposal only intends a change to Zones 1 and 2 in the Frame Wall U-Factor column.

Committee Action: **Approved as Submitted**

Committee Reason: This code change proposal brings transparency and accuracy to the code by using more realistic assumptions to generate Climate Zones 1 and 2 wood frame wall *U*-factors in Table R402.1.3.

Assembly Action: **None**

Final Hearing Results

RE45-13	**AS**

Code Change No: RE50-13

Original Proposal

Section(s): Table R402.1.3 (IRC Table N1102.1.3)

Proponent: Don Surrena, CBO, representing National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

TABLE R402.1.3 (N1102.1.3)
EQUIVALENT *U*-FACTORS[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR	SKYLIGHT *U*-FACTOR	CEILING *U*-FACTOR	FRAME WALL *U*-FACTOR	MASS WALL *U*-FACTOR[b]	FLOOR *U*-FACTOR	BASEMENT WALL *U*-FACTOR	CRAWL SPACE WALL *U*-FACTOR
1	0.50	0.75	0.035	~~0.082~~ 0.084	0.197	0.064	0.360	0.477
2	0.40	0.65	0.030	~~0.082~~ 0.084	0.165	0.064	0.360	0.477
3	0.35	0.55	0.030	~~0.057~~ 0.060	0.098	0.047	0.091[c]	0.136
4 except Marine	0.35	0.55	0.026	~~0.057~~ 0.060	0.098	0.047	0.059	0.065
5 and Marine 4	0.32	0.55	0.026	~~0.057~~ 0.060	0.082	0.033	0.050	0.055
6	0.32	0.55	0.026	~~0.048~~ 0.045	0.060	0.033	0.050	0.055
7 and 8	0.32	0.55	0.026	~~0.048~~ 0.045	0.057	0.028	0.050	0.055

(Portions of table not shown remain unchanged)

Reason: The intent of these changes is not to alter the stringency of the code, but rectify the conversion from R-Value to U-Factor. Currently the R-Values and equivalent U-Factors do not match when applying a consistent calculation method.

It is important that the U-Factors and R-Values do match when small alterations are being made to the wall assemblies selected in the R-Value table. For example, a builder does not want to install R-20 as suggested in the R-Value table. Instead, the builder's preferred wall is R-15+R3.8c.i. Although the R-15+R3.8c.i. wall is thermally better than the R-20 wall, it does not meet the requirements of the Equivalent U-Factor table.

Below are a series of calculations which justify the proposed changes to the Frame Wall U-Factor values:

Climate Zone 1 and 2 Wall U-Factor Calculation Spreadsheet

Wall Thermal Resistance by Component	2x4 Wall R-13 Batt R-Value Studs	2x4 Wall R-13 Batt R-Value Cavity	Assembly Value
Wall - Outside Winter Air Film[A]	0.17		
Siding - Vinyl[A]	0.62		
Continuous Insulation	0		
OSB - 7/16"[A]	0.62		
SPF Stud/Cavity Insulation	4.375	13	
1/2" Drywall [A]	0.45		
Inside Air Film[A]	0.68		
Studs at 16" o.c. [A]	25%	75%	
Total Wall R-Values	6.92	15.54	**11.85**
Total Wall U-Values	0.145	0.064	**0.084**
[A]2009 ASHRAE Handbook of Fundamentals			

Climate Zones 3-5 Wall U-Factor Calculation Spreadsheet

Wall Thermal Resistance by Component	2x4 Wall R-13+R5 R-Value Studs	2x4 Wall R-13+R5 R-Value Cavity	2x4 Wall R-13+R5 Assembly U-Factor	2x6 Wall R-20 R-Value Studs	2x6 Wall R-20 R-Value Cavity	2x6 Wall R-20 Assembly U-Factor
Wall - Outside Winter Air Film[A]	0.17			0.17		
Siding - Vinyl[A]	0.62			0.62		
Continuous Insulation	5			0		
OSB - 7/16"[A]	0.62			0.62		
SPF Stud/Cavity Insulation	4.375	13		6.875	20	
1/2" Drywall [A]	0.45			0.45		
Inside Air Film[A]	0.68			0.68		
Studs at 16" o.c. [A]	25%	75%		25%	75%	
Total Wall R-Values	11.92	20.54	**17.39**	9.42	22.54	**16.71**
Total Wall U-Factor	0.084	0.049	**0.057**	0.106	0.044	**0.060**
[A]2009 ASHRAE Handbook of Fundamentals						

Climate Zones 6-8 Wall U-Factor Calculation Spreadsheet

Wall Thermal Resistance by Component	2x4 Wall R-13+R-10 c.i. R-Value Studs	2x4 Wall R-13+R-10 c.i. R-Value Cavity	2x4 Wall R-13+R-10 c.i. Assembly Value	2x6 Wall R-20+R-5 c.i. R-Value Studs	2x6 Wall R-20+R-5 c.i. R-Value Cavity	2x6 Wall R-20+R-5 c.i. Assembly Value
Wall - Outside Winter Air Film[A]	0.17			0.17		
Siding - Vinyl[A]	0.62			0.62		
Continuous Insulation	10			5		
OSB - 7/16"[A]	0.62			0.62		
SPF Stud/Cavity Insulation	4.375	13		6.875	20	
1/2" Drywall [A]	0.45			0.45		
Inside Air Film[A]	0.68			0.68		
Studs at 16" o.c. [A]	25%	75%		25%	75%	
Total Wall R-Values	16.92	25.54	**22.65**	14.42	27.54	**22.43**
Total Wall U-Values	0.059	0.039	**0.044**	0.069	0.036	**0.045**
[A]2009 ASHRAE Handbook of Fundamentals						

Referenced Standards: None

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal provides a consistent, comprehensive code change for frame wall U-Factors for all climate zones. The values are consistent with previous actions (RE44-RE47).

Assembly Action: **None**

Final Hearing Results

RE50-13	**AS**

Code Change No: RE53-13

Original Proposal

Section(s): R402.2.1 (IRC N1102.2.1)

Proponent: Ellen Eggerton, representing Virginia Building and Code Officials Association

Revise as follows:

R402.2.1 (N1102.2.1) Ceilings with attic spaces. ~~When~~ Where Section R402.1.1 would require R38 in the ceiling, installing R30 over 100 percent of the ceiling area requiring insulation shall be deemed to satisfy the requirement for R38 whenever the full height of uncompressed R30 insulation extends over the wall top plate at the eaves. Similarly, where Section R402.1.1 would require R49 in the ceiling, installing R38 over 100 percent of the ceiling area requiring insulation shall be deemed to satisfy the requirement for R49 whenever the full height of uncompressed R38 insulation extends over the wall top plate at the eaves. This reduction shall not apply to the U-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.

Reason: Revised language clarifies how to interpret the "alternative" ceiling insulation requirement. It has come to VBCOA's attention that some code officials have interpreted R402.1.1 as permitting R38 over the wall top plate when using "raised heel" or "energy" trusses, but where R49 could be installed in the interior of the attic where height permits, R49 would in fact be required in those areas. The amendment seeks to clarify that R38 may be used throughout the entire attic, where a full R38 can be installed over the top plate. This approach is consistent with US DOE analysis of heat flow through insulated attics (ca. 1996), accounting for actual insulation thicknesses and framing members.

Cost Impact: Depending on how this particular provision had been previously enforced, impact may be to reduce overall installed insulation materials in attics and associated costs, with no appreciable difference in heat flow rate through this part of the thermal envelope.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This code change proposal provides language that clarifies the committee's understanding of the present intent of the code.

Assembly Action: **None**

Final Hearing Results

RE53-13 **AS**

Code Change No: RE58-13

Original Proposal

Section(s): R402.2.4 (IRC N1102.2.4)

Proponent: Jeff Inks, representing the Window & Door Manufacturers Association.

Revise as follows:

R402.2.4 (N1102.2.4) Access hatches and doors. Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.

> **Exception:** Vertical doors that provide access from conditioned to unconditioned spaces shall be permitted to meet the requirements of Table R402.1.1 based on the applicable climate zone specified in Chapter 3.

Reason: As currently written, this provision is being interpreted in some jurisdictions as requiring vertical doors providing access to certain unconditioned spaces such as attics to meet the thermal insulation levels of the surrounding wall they are installed in rather than the thermal requirements for doors contained in Table R402.1.1 applicable to the building thermal envelope. The thermal performance requirements for these vertical doors should be no greater than those for exterior doors installed elsewhere in the building thermal envelope.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: This exception is unnecessary. The code allows this approach, and this needs not be stated.

Assembly Action: **None**

Public Comments

Public Comment 2:

Stephen Turchen, Fairfax County, VA, representing Virginia Building and Code Officials Association requests As Modified by this Public Comment.

Modify the proposal as follows:

R402.2.4 (N1102.2.4) Access hatches and doors. Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated to a level equivalent to the insulation on the surrounding surfaces. Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened, and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.

> **Exception:** Vertical doors that provide access from conditioned to unconditioned spaces shall be permitted to meet the fenestration requirements of Table R402.1.1 based on the applicable climate zone specified in Chapter 3.

Commenter's Reason: This code change proposal should be modified to align the proposal with the proponent's intent. IECC Table R402.1.1 contains requirements for R-values of opaque assemblies and U-factors of fenestration. The proposed modification clarifies that the vertical access door to the unconditioned space shall meet the fenestration requirement of the table. Absent this requirement, it could be reasonably interpreted that the vertical access door shall meet the R-value equivalent of the surrounding wall, as currently stated in Section R402.2.4, which would not resolve the issue the proponent was trying to address.

Final Hearing Results

RE58-13	**AMPC2**

Code Change No: RE60-13

Original Proposal

Section(s): R402.2.7 (IRC N1102.2.7), Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Joseph Lstiburek, Building Science Corporation, representing self (joe@buildingscience.com)

Revise as follows:

R402.2.7 (N1102.2.7) Floors. Floor <u>framing cavity</u> insulation shall be installed to maintain permanent contact with the underside of the subfloor decking.

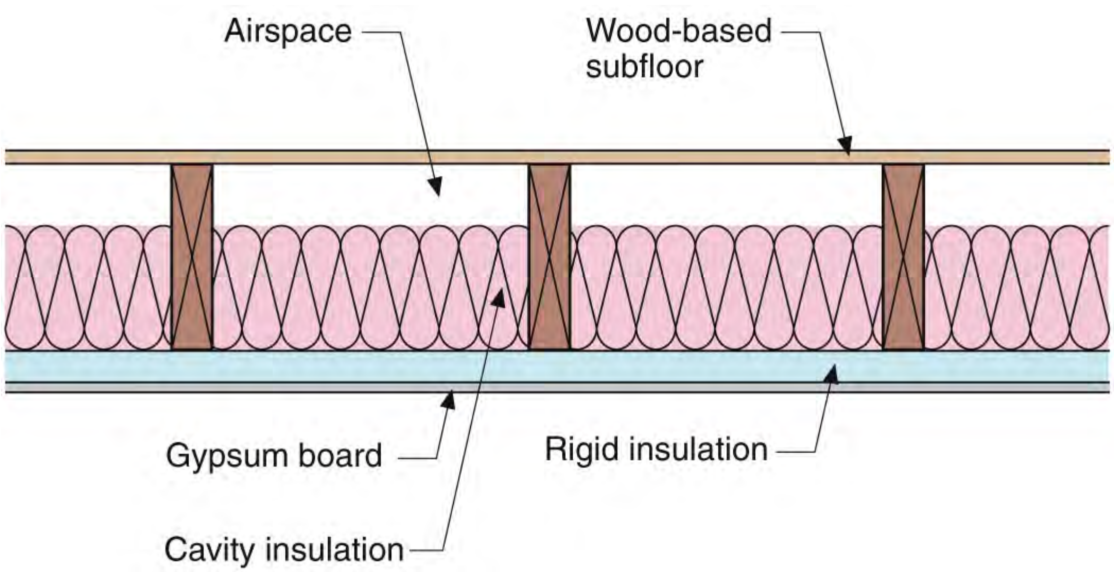
> <u>**Exception:** The floor framing cavity insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing when combined with insulation that meets or exceeds the minimum Wood Frame Wall R-value in Table 402.1.1 and extends from the bottom to the top of all perimeter floor framing members</u>.

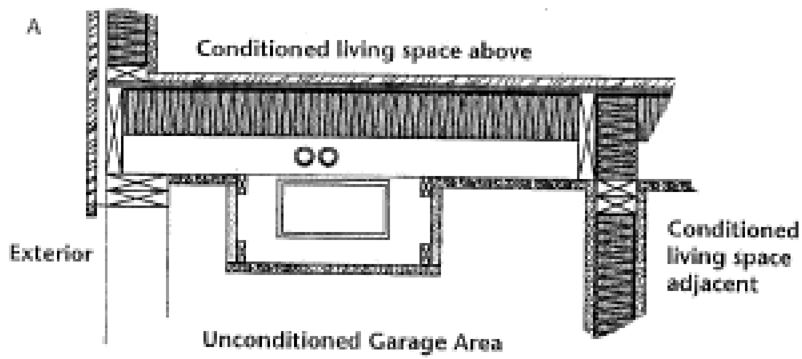
TABLE 402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

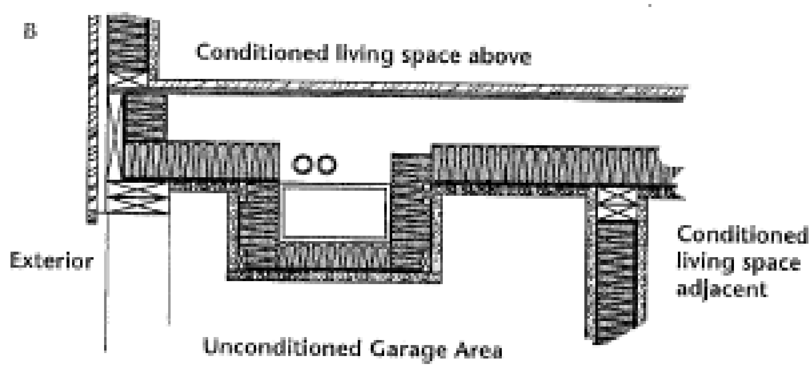
COMPONENT	CRITERIA
Floors (including above-garage and cantilevered floors)	~~Insulation~~ <u>Floor framing cavity insulation</u> shall be installed to maintain permanent contact with underside of subfloor decking or <u>floor framing cavity insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing and extends from the bottom to the top of all perimeter floor framing members</u>. The air barrier shall be installed at any exposed edge of insulation.

(Portions of Table not shown remain unchanged)

Reason: Requiring insulation in floors to be in direct contact with the underside of subfloor decking is one insulating option. Another option is to have an airspace between the floor sheathing and the top of the cavity insulation where this cavity insulation is in direct contact with the topside of sheathing or continuous insulation installed on the underside of the floor framing and is combined with perimeter insulation that meets or exceeds the R-value requirements for walls. This second option leads to fewer cold spots yet does not change the heat loss as long as the cavity insulation is in direct contact with a sheathing below it or continuous insulation below it. It also facilitates services to be enclosed within the thermal envelope. Examples of these configurations are illustrated below:







Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This code change provides a straightforward solution to a practical problem. The method has been tried and shown to work.

Assembly Action: **None**

Final Hearing Results

RE60-13	AS

Code Change No: RE63-13

Original Proposal

Section(s): Table R402.1.1 (IRC Table N1102.1.1), R402.2.13 (NNEW) (IRC N1102.2.13 (NEW))

Proponent: Jeremiah Williams, representing U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

TABLE R402.1.1 (N1102.1.1)
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT

(Portions of Table not shown remain unchanged)

h. First value is cavity insulation, second is continuous insulation or insulated siding, so "13+5" means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. ~~If structural sheathing covers 40 percent or less of the exterior, continuous insulation *R*-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.~~

<u>**R402.2.13 (N1102.2.13) Walls with partial structural sheathing.** Where Section R402.1.1 would require continuous insulation on exterior walls and structural sheathing covers 40 percent or less of the gross area of all exterior walls, the continuous insulation *R*-value shall be permitted to be reduced by an amount necessary to result in a consistent total sheathing thickness, but not more than R-3, on areas of the walls covered by structural sheathing, This reduction shall not apply to the *U*-factor alternative approach in Section R402.1.3 and the total UA alternative in Section R402.1.4.</u>

Reason: This is a clarification not intended to change the meaning of the code. Moving the relevant text out of the footnote and into a separate code section allows for a more thorough description of the sheathing reduction allowance.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal clarifies the issue of structural sheathing with continuous insulation presently contained in footnote h of Table R402.1.1. The information is appropriately placed in the body of code text.

Assembly Action: **None**

Final Hearing Results

RE63-13 **AS**

Code Change No: RE68-13

Original Proposal

Section(s): R402.3.5 (IRC N1102.3.5)

Proponent: Daniel J. Walker, P.E., Thomas Associates, Inc., representing the National Sunroom Association (dwalker@thomasamc.com)

Revise as follows:

R402.3.5 (N1102.3.5) Sunroom ~~*U*-factor~~ <u>Fenestration</u>. All *sunrooms* enclosing conditioned space shall meet the fenestration requirements of this code.

> **Exception:** For *sunrooms* with *thermal isolation* and enclosing *conditioned space*, ~~in Climate Zones 4 through 8,~~ the following exceptions to the fenestration requirements of this code shall apply:
>
> 1. <u>In Climate Zones 2 through 8</u> ~~T~~<u>t</u>he maximum fenestration *U*-factor shall be 0.45; and
> ~~2.~~ ~~T~~<u>t</u>he maximum skylight *U*-factor shall be 0.70.
> <u>2. In Climate Zones 1 through 3 the maximum SHGC shall be 0.30.</u>

New fenestration separating the *sunroom* with *thermal isolation* from *conditioned space* shall meet the *building thermal envelope* requirements of this code.

Reason: The requirements for thermally isolated sunrooms was changed in the previous code cycle to relax the requirements in recognition of the lower energy consumption of these structures due to their occasional / seasonal use. The change proposed at this time would smooth the U-factor requirements since the previous change left the requirements discontinuous by requiring a lower U-factor in Climate Zones 2 and 3 than in the higher climate zones, which does not make sense. This change would set the U-factor requirements the same for all the climate zones where requirements exist, and would correct the discontinuity in the code between the requirements in Climate Zones 2, 3 and 4.

The proposal also seeks to set relaxed SHGC requirements for thermally isolated sunrooms in Climate Zones 1 through 3 because there is no practical way for the typically larger glazing used in sunrooms to meet the lower SHGC values prescribed by Table R402.1.1 unless very dark glass is used. Consumers purchase sunrooms to create a comfortable enclosed area that provides a view of the outdoors. Extremely dark glass is contrary to the very purpose of a sunroom.

Cost Impact: The proposed change would not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

R402.3.5 (N1102.3.5) Sunroom fenestration. All *sunrooms* enclosing conditioned space shall meet the fenestration requirements of this code.

> **Exception:** For *sunrooms* with *thermal isolation* and enclosing *conditioned space*, the following exceptions to the fenestration requirements of this code shall apply:
>
> 1. In Climate Zones 2 through 8 the maximum fenestration *U*-factor shall be 0.45;
> 2. The maximum skylight *U*-factor shall be 0.70.
> ~~2. In Climate Zones 1 through 3 the maximum SHGC shall be 0.30.~~

Committee Reason: This exception to allow fenestration U-Factor in sunrooms essentially fixes an inconsistency in the code in Climate Zones 2 and 3 given that U-Factors in these two climate zones were lowered in the last code cycle, for the 2012 Code. The modification was made at the proponent's request to remove changes to SHGC values from the issue, and simply deal with U-factor.

Assembly Action: **None**

Final Hearing Results

RE68-13	**AM**

Code Change No: RE83-13

Original Proposal

Section(s): Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Ellen Eggerton, representing Virginia Building and Code Officials Association

Revise as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA[a]
Walls	Cavities within corners and headers shall be insulated by completely filling the cavity with a material having a thermal resistance of R3 per inch minimum. ~~and~~ The junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Knee walls shall be sealed.

(Portions of Table not shown remain unchanged)

Reason: The current text says, "Corners and headers shall be insulated …" All headers and corners under all circumstances? Insulated to what level? This provision is a carryover of the 2009 IECC requirement. Varying answers to these questions have already lead to varying interpretations of the code requirements, uneven enforcement, and confusion in the regulated community. This proposal intends to allay some of that confusion by specifying that headers and corners must be insulated when there is an available cavity (e.g., a two-ply 2x header in a 2x4 wall leaves no cavity to fill) and by providing a practical definition of what *insulated* means in this context. Typical insulating materials like fiberglass and rigid foam can easily achieve R3 per inch.

Cost Impact: There will be a cost impact from this proposal to the extent that this requirement was not previously enforced due to ambiguity in the requirement. Regardless, the quantities of insulation being installed are small, but there may be many of these areas to insulate, depending on the size, design, and layout of the proposed residential building.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

First sentence in "Criteria" column:

Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance of R3 per inch minimum.

Committee Reason: This a practical approach for an air barrier in corners and headers of frame walls. The modification is made to qualify where sealing is needed

Assembly Action: **None**

Final Hearing Results

RE83-13	**AM**

Code Change No: RE84-13

Original Proposal

Section(s): Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Joseph Lstiburek, Building Science Corporation, representing self (joe@buildingscience.com)

Revise as follows:

TABLE 402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	INSULATION INSTALLATION CRITERIA
Floors (including above garage and cantilevered floors)	Floor framing cavity insulation shall be installed to maintain permanent contact with underside of subfloor decking or floor framing cavity insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the bottom side of floor framing and extends from the bottom to the top of all perimeter floor framing members. The air barrier shall be installed at any exposed edge of insulation.

(Portions of Table not shown remain unchanged)

Reason: Requiring insulation in floors to be in direct contact with the underside of subfloor decking is one insulating option. Another option is to have an airspace between the floor sheathing and the top of the cavity insulation where this cavity insulation is in direct contact with the topside of sheathing or continuous insulation installed on the underside of the floor framing and is combined with perimeter insulation that meets or exceeds the R-value requirements for walls. This second option leads to fewer cold spots yet does not change the heat loss as long as the cavity insulation is in direct contact with a sheathing below it or continuous insulation below it. It also facilitates services to be enclosed within the thermal envelope.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This code change is consistent with the text approved in RE60-13.

Assembly Action: **None**

Final Hearing Results

RE84-13	**AS**

Code Change No: RE85-13

Original Proposal

Section(s): Table R402.4.1.1 (IRC Table N1102.4.1.1)

Proponent: Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, Inc.
smozingo@coloradocode.net

Delete and substitute as follows:

~~**TABLE 402.4.1.1 (N1102.4.1.1)**~~
~~**AIR BARRIER AND INSULATION INSTALLATION**~~

TABLE 402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA
General Requirements	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed.	Air-permeable insulation shall not be used as a sealing material..
Ceiling / attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.	The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.
Walls	The junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Knee walls shall be sealed.	Corners and headers shall be insulated. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.	
Rim joists	Rim joists shall include the air barrier.	Rim joists shall be insulated.
Floors (including above garage and cantilevered floors)	The air barrier shall be installed at any exposed edge of insulation.	Insulation shall be installed to maintain permanent contact with underside of subfloor decking.
Crawl space walls	Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls.
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.	

COMPONENT	AIR BARRIER CRITERIA	INSULATION INSTALLATION CRITERIA
Narrow cavities		Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.	
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be sealed to the drywall.	Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated.
Plumbing and wiring		Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower / tub on exterior wall	The air barrier installed at exterior walls adjacent to showers and tubs shall separate them from the showers and tubs.	Exterior walls adjacent to showers and tubs shall be insulated.
Electrical / phone box on exterior walls	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.	
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.	
Fireplace	An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors	

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

Reason: Reason: Table R402.4.1.1 in the 2012 IECC and 2009 IECC has contained a table that included insulation and air barrier requirements within the same criteria. This has created confusion with the trades in the construction of residential housing. This change adds an additional column to the table and separates air barrier criteria and insulation criteria. This change adds clarity for the trades.

No substantive changes were made in the narrative criteria descriptions with the exception of separating sentences which contain criteria for both insulation and air barrier into two narratives; one for insulation and one for air barrier criteria.

The “air barrier and thermal barrier” component from Table R402.4.1.1 in the 2009 and 2012 IECC was renamed as “general requirements” but the criteria from the previous “air barrier and thermal barrier” component row has not changed with the exception of separating insulation and air barrier criteria.

Cost Impact: The code change proposal will not increase the cost of construction. No additional costs.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The separation of air barrier criteria from insulation criteria is useful to the inspector and the builder, in order make the code easier to understand and apply. This proposal makes no changes to the code, it is a re-format.

Assembly Action: **None**

Final Hearing Results

RE85-13 **AS**

Code Change No: RE86-13

Original Proposal

Section(s): Table R402.4.1.1 (IRC Table N1102.4.1.1), R402.4.2 (IRC N1102.4.2)

Proponent: Thomas Stroud, Senior Manager, Codes & Standards, representing Hearth, Patio & Barbecue Association (stroud@hpba.org)

Revise as follows:

TABLE R402.4.1.1 (N1102.4.1.1)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	CRITERIA[a]
Air barrier and thermal barrier	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed. Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.
Walls	Corners and headers shall be insulated and the junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier. Knee walls shall be sealed.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.
Rim joists	Rim joists shall be insulated and include the air barrier.
Floors (including above-garage and cantilevered floors)	Insulation shall be installed to maintain permanent contact with underside of subfloor decking. The air barrier shall be installed at any exposed edge of insulation.
Crawl space walls	Where provided in lieu of floor insulation, insulation shall be permanently attached to the crawlspace walls. Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.
Shafts, penetrations	Duct shafts, utility penetrations, ~~and~~ fire place chases and flue shafts opening to exterior or unconditioned space shall be sealed.
Narrow cavities	Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be air tight, IC rated, and sealed to the drywall.
Plumbing and wiring	Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.

Shower/tub on exterior wall	Exterior walls adjacent to showers and tubs shall be insulated and the air barrier installed separating them from the showers and tubs.
Electrical/phone box on exterior walls	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor or drywall.
~~Fireplace~~	~~An air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors.~~

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

R402.4.2 (N1102.4.2) Fireplaces. New wood-burning fireplaces shall have tight fitting flue dampers <u>or doors</u>, and outdoor combustion air. <u>When using tight-fitting doors on UL 127 fireplaces, they must be tested and listed for the fireplace.</u>

Reason: In 2012 Table R402.4.1.1 Fireplace criteria states an air barrier shall be installed on fireplace walls. Fireplaces shall have gasketed doors. In Section R402.4.2 it states new wood-burning fireplaces shall have tight-fitting flue dampers or doors, and outdoor combustion air. We interpret this to mean traditional, field-fabricated, “masonry fireplaces” in accordance with 2009 IRC Section R1001, and constructed of concrete or solid clay-masonry units; NOT “factory-built,” UL 127 fireplaces in accordance with IRC Section R1004. Because of requirements in the IECC that require all fireplaces to be provided with gasketed doors, a great deal of controversy has resulted. Most factory-built fireplaces are not listed for use with sealed glass doors and installing such doors on fireplaces that are not tested for these doors could cause overheating of the fireplace resulting in a fire hazard. Without testing, the effect of the doors will be an unknown. In this regard, the intent of Section R402.4.2 is to mitigate air leakage during periods of non-use, but not where the conditions of fireplace installation are in violation of the UL 127 listing.

Regarding the requirement for an air barrier on “fireplace walls”, this is an unclear statement and is clarified by the addition in *Shafts, Penetrations* that the air sealing is to be on the chase and not on the fireplace. This will address chase sealing details that are needed and gives clarification to address framed wall construction.

Cost Impact: These code changes will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

R402.4.2 (N1102.4.2) Fireplaces. New wood-burning fireplaces shall have tight fitting flue dampers or doors, and outdoor combustion air. When using tight-fitting doors on <u>factory-built fireplaces listed and labeled in accordance with</u> UL 127 ~~fireplaces~~, ~~they must~~ <u>the doors shall</u> be tested and listed for the fireplace. <u>Where using tight-fitting doors on masonry fireplaces, the doors shall be listed and labeled in accordance with UL907.</u>

Committee Reason: Factory-built fireplaces must be specifically tested for gasketed doors. This is a safety issue that needs to be addressed in the code. The modification adds a testing standard for tight-fitting doors on masonry fireplaces, to address safety issues.

Assembly Action: **None**

Final Hearing Results

RE86-13 **AM**

Code Change No: RE91-13

Original Proposal

Section(s): R402.4.1.2 (IRC N1102.4.1.2), Chapter 5

Proponent: Theresa A. Weston, PhD., representing DuPont Building Innovations (theresa.a.weston@usa.dupont.com)

Revise as follows:

R402.4.1.2 (N1102.4.1.2) Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour in Climate Zones 1 and 2, and 3 air changes per hour in Climate Zones 3 through 8. Testing shall be conducted in accordance with ASTM E 779 or ASTM E 1827 ~~with a blower door~~ and reported at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*.

During testing:

1. Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed, beyond the intended weatherstripping or other infiltration control measures;
2. Dampers including exhaust, intake, makeup air, backdraft and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;
3. Interior doors, if installed at the time of the test, shall be open;
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;
5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and
6. Supply and return registers, if installed at the time of the test, shall be fully open.Add new reference standards:

Add new standards to Chapter 5 as follows:

E779-10 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization

E1827-11 Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door

Reason: This proposal adds appropriate standard blower door test methods to the code. The code currently does not reference a test method standard. The specification of standard test methods should improve the reliability of the data by which code compliance is determined.

Cost Impact: The code change proposal will not increase the cost of construction.

Analysis: A review of the standard proposed for inclusion in the code ASTM E1827-11 Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.
Standard ASTM E779-03 is currently referenced in the IECC-Commercial Provisions, Chapter 5. Update to the latest edition, 2010 will be considered in a code change proposal for administrative update of standards. See the hearing order for the Administrative Code Committee.

Public Hearing Results

For staff analysis of the content of ASTM E779-10 and ASTM E1827-11 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

Committee Action: **Approved as Submitted**

Committee Reason: This proposal adds appropriate standards for blower door test methods to the code.

Assembly Action: **None**

Final Hearing Results

RE91-13	**AS**

Code Change No: RE103-13

Original Proposal

Section(s): R403.1.1 (IRC N1103.1.1)

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing self (culp@birchpointconsulting.com)

Revise as follows:

R403.1.1 (N1103.1.1) Programmable thermostat. Where the primary heating system is a forced-air furnace, at least one thermostat per dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain *zone* temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed by the manufacturer with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

Reason: When this requirement was added to the 2009 IECC, the last sentence about initial programmed set points was really intended for manufacturer design, so that the thermostat would be ready to go "out of the box". However, there have been reports that this sentence adds extra compliance work for code officials who have to spend time checking and in some cases programming the thermostat set points. This proposal clarifies that this requirement is the manufacturer's responsibility, so that ultimately all thermostats on the market will come already in compliance with this section.

Cost Impact: None, or possible decrease in compliance time / costs.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The original intent of this section of the code was the thermostat being preset by the manufacturer.

Assembly Action: **None**

Final Hearing Results

RE103-13	**AS**

Code Change No: RE105-13

Original Proposal

Section(s): R403.1.1 (IRC N1103.1.1)

Proponent: Ellen Eggerton, representing Virginia Building and Code Officials Association

Revise as follows:

R403.1.1 (N1103.1.1) Programmable thermostat. ~~Where the primary heating system is a forced air furnace, at least one thermostat per~~ The thermostat controlling the primary heating or cooling system of the dwelling unit shall be capable of controlling the heating and cooling system on a daily schedule to maintain different temperature set points at different times of the day. This thermostat shall include the capability to set back or temporarily operate the system to maintain *zone* temperatures down to 55°F (13°C) or up to 85°F (29°C). The thermostat shall initially be programmed with a heating temperature set point no higher than 70°F (21°C) and a cooling temperature set point no lower than 78°F (26°C).

Reason: This suggested change recognizes that forced air heating and air conditioning systems are not the only systems that may benefit from programmable thermostats. Hydronic, radiant electric, and solar thermal systems could also be programmed for night or "unoccupied" setback periods. The proposal concurrently clarifies that the primary heating or cooling system, at minimum, is the system that should receive the programmable thermostat. This clarification is necessary for those residential dwelling units that have multiple systems; e.g., first floor / second floor forced air systems, or radiant electric systems with thermostats in each room. Which system must have a programmable thermostat? It is the "primary" system, typically the one serving the largest area of the dwelling, but subject to reasonable interpretation by the Building Official. Impact of this proposal may be to reduce installation of unnecessary programmable thermostats in multiple H/AC systems.

Cost Impact: If the non-forced air system would otherwise have a non-programmable thermostat installed, then this proposal will increase the cost of construction. However, programmable thermostats are becoming more standard in the marketplace for new residential construction, so the cost impact is effectively zero. Cost differentials when purchasing a programmable vs. non-programmable thermostat are minimal.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This appropriately places the requirement for a programmable thermostat on all types of HVAC systems. Forced air systems are not the only system that would benefit from a programmable thermostat.

Assembly Action: **None**

Final Hearing Results

RE105-13	**AS**

Code Change No: RE107-13

Original Proposal

Section(s): R403.2.1 (IRC N1103.2.1)

Proponent: Shaunna Mozingo, City of Cherry Hills Village, representing Colorado Chapter of ICC, Inc.
smozingo@coloradocode.net

Revise as follows:

R403.2.1 (N1103.2.1) Insulation (Prescriptive). Supply and return ducts in attics shall be insulated to a minimum of R-8. ~~All other ducts~~ Supply and return ducts in other portions of the building shall be insulated to a minimum of R-6.

Exception: Ducts or portions thereof located completely inside the building thermal envelope.

Reason: The requirement as written is commonly misinterpreted to say that all supply ducts in attics are insulated to R-8 and all other ducts in attics, including bathroom exhausts, returns, etc are insulated to R-6 when in fact, the intent was that the supply ducts in attics get R-8 and the supplies in other unconditioned spaces in the building, such as garages, ventilated crawl spaces, etc, get R-6. Also, the ducts should not be limited to supplies but should include return ducts as well. This intent is called out much more clearly in the commercial section of the code.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

R403.2.1 (N1103.2.1) Insulation (Prescriptive). Supply and return ducts in attics shall be insulated to a minimum of R-8 where 3 inch diameter and greater and R-6 where less than 3 inch diameter. All other ducts supply and return ducts in other portions of the building shall be insulated to a minimum of R-6 where 3 inch diameter and greater and R-4.2 where less than 3 inch diameter.

Committee Reason: This proposed change reflects the original intent of the code that "all other ducts" was meant to mean supply and return ducts, not bathroom exhausts, etc. The modification is to reflect the fact that energy losses in smaller ducts are less.

Assembly Action: **None**

Final Hearing Results

RE107-13	**AM**

Code Change No: RE109-13

Original Proposal

Section(s): R403.2 (IRC N1103.2), R403.2.2 (IRC N1103.2.2), R403.2.3 (NEW) (IRC N1103.2.3 (NEW)), R403.2.4 (NEW) (IRC N1103.2.4 (NEW))

Proponent: Craig Conner, Building Quality representing self (craig.conner@mac.com)

Revise as follows:

R403.2 (N1103.2) Ducts. Ducts and air handlers shall be in accordance with Sections R403.2.1 through ~~R403.2.3~~ R403.2.5.

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

~~Duct tightness shall be verified by either of the following:~~

1. ~~Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.~~
2. ~~Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m2) of conditioned floor area.~~

   ~~**Exception**: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.~~

R403.2.3 (N1103.2.3) Duct testing (Mandatory). Ducts shall be pressure tested to determine air leakage by one of the following methods:

1. Postconstruction test: Total leakage shall be measured with a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.

2. Rough-in test: Total leakage shall be measured with a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure if installed at the time of the test. All registers shall be taped or otherwise sealed during the test.

   Exception: A duct air leakage test shall not be required where the ducts and air handlers are located entirely within the building thermal envelope.

A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*.

R403.2.4 (N1103.2.4) Duct leakage (Prescriptive). The total leakage of the ducts, where measured in accordance with Section R403.2.3, shall be as follows:

1. Postconstruction test: The total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area.
2. Rough-in test: The total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area where the air handler is installed at the time of the test. Where the air handler is not installed at the time of the test, the total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m^2) of conditioned floor area.

~~R403.2.3~~ R403.2.5 (~~N1103.2.3~~ N1103.2.5) Building cavities (Mandatory). Building framing cavities shall not be used as ducts or plenums.

Reason: This is exactly the online draft DOE posted. DOE put it well in their reason statement as posted online with the change above:

"The proposal simply changes the duct leakage requirements from mandatory to prescriptive, while retaining the testing requirement and duct construction specifications. Changing the duct leakage rate from mandatory to prescriptive will allow builders the option of trading improvements in other building components for less stringent pressure test results or vice versa. This provides flexibility in meeting the requirements and options for recovering from an unexpected test failure. "

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: By moving the duct leakage requirements from mandatory to prescriptive the code is allowing tradeoff for improvements in other building components; thus the code is more flexible.

Assembly Action: **None**

Final Hearing Results

RE109-13 **AS**

Code Change No: RE111-13

Original Proposal

Section(s): R403.2.2 (IRC N1103.2.2)

Proponent: Vickie Lovell InterCode Inc. representing DuctMate Industries (vickie@intercodeinc.com)

Revise as follows:

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the *International Mechanical Code* or *International Residential Code*, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. ~~Continuously welded and locking-type longitudinal joints and seams in ducts operating at static pressures less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.~~ For ducts having a static pressure classification of less than 2 inches of water column (500 Pa), additional closure systems shall not be required for continuously welded joints and seams, and locking-type joints and seams of other than the snap-lock and button-lock types.

Duct tightness shall be verified by either of the following:

1. Postconstruction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.
2. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the system, including the manufacturer's air handler enclosure. All registers shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm (85 L/min) per 100 square feet (9.29 m^2) of conditioned floor area.

   Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

Reason: This proposed text is derived from a revision to the International Mechanical Code that was proposed by the PMG Code Action Committee in M151-12 and was approved by the voting membership in Portland for the 2015 IMC. That reason statement is supplied below:

"Unless sealant or a gasket is used, snap-lock and button-lock type seams will leak significantly. The current exception attempted to prevent unnecessary sealing for joints and seams that leak very little or not at all, but it went too far by including all locking type joints and seams. Some locking joints are leakproof such as mechanically folded seams used for spiral seam duct, but this cannot be said for all locking joints."

The identical proposal is being submitted to the 2015 IECC commercial requirements for consistency.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This is an important clarification regarding ducts that can be allowed and how to treat them to ensure integrity of the system.

Assembly Action: **None**

Final Hearing Results

RE111-13	**AS**

Code Change No: RE117-13

Original Proposal

Section(s): R403.2.2 (IRC N1103.2.2)

Proponent: Donald J. Vigneau, AIA, Northeast Energy Efficiency Partnerships, Inc. (NEEP) (dvigneau@neep.org)

Revise as follows:

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal seams in ducts operating at a static pressure less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Duct tightness shall be verified by either of the following options;

1.~~2.~~ Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handling enclosure, All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm per 100 square feet (9.29 m^2) of conditioned floor area.

2.~~1.~~ Post-construction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handling enclosure, All register boots shall be taped or otherwise sealed during the test.

Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

Reason: Reversing the order of the required testing options places the first option in a preferential position, to lead the user in selection of these required test options. Rough-in testing is the optimum time for the test, as it allows maximum opportunity to inspect the duct sealing, identify and rectify leaks in the sealed joints, and allow for inspections when the completeness of the ductwork assembly can be verified and before concealed spaces are closed in. The remaining openings for terminals and connections can readily be checked at building appliance and equipment installation inspections customarily accomplished shortly before a final inspection.

Reversing the order increases the probability that problems in the duct sealing not only can be more easily found, but also corrected at the best possible time for easy access and reduced costs for the corrections. No revisions to the existing options text is required; only re-numbering.

Note: This is the second code change proposal submitted on the same code section. Each submittal covers different subsections of the code section requirements and the two proposals are not related.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The proposed change removes an exception that is not related to energy conservation.

Assembly Action: **None**

Final Hearing Results

RE117-13	**AS**

Code Change No: RE118-13

Original Proposal

Section(s): R403.2.2 (IRC N1103.2.2)

Proponent: Donald J. Vigneau, AIA, Northeast Energy Efficiency Partnerships, Inc. (NEEP) (dvigneau@neep.org)

Revise as follows:

R403.2.2 (N1103.2.2) Sealing (Mandatory). Ducts, air handlers, and filter boxes shall be sealed. Joints and seams shall comply with either the International Mechanical Code or International Residential Code, as applicable.

Exceptions:

1. Air-impermeable spray foam products shall be permitted to be applied without additional joint seals.
2. Where a duct connection is made that is partially inaccessible, three screws or rivets shall be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
3. Continuously welded and locking-type longitudinal seams in ducts operating at a static pressure less than 2 inches of water column (500 Pa) pressure classification shall not require additional closure systems.

Duct tightness shall be verified by either of the following options;

1. ~~2~~. Rough-in test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handling enclosure, All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 3 cfm per 100 square feet (9.29 m^2) of conditioned floor area.
2. ~~1~~. Post-construction test: Total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 square feet (9.29 m^2) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handling enclosure, All register boots shall be taped or otherwise sealed during the test.

Exception: The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope.

Reason: Reversing the order of the required testing options places the first option in a preferential position, to lead the user in selection of these required test options. Rough-in testing is the optimum time for the test, as it allows maximum opportunity to inspect the duct sealing, identify and rectify leaks in the sealed joints, and allow for inspections when the completeness of the ductwork assembly can be verified and before concealed spaces are closed in. The remaining openings for terminals and connections can readily be checked at building appliance and equipment installation inspections customarily accomplished shortly before a final inspection.

Reversing the order increases the probability that problems in the duct sealing not only can be more easily found, but also corrected at the best possible time for easy access and reduced costs for the corrections. No revisions to the existing options text is required; only re-numbering.

Note: This is the second code change proposal submitted on the same code section. Each submittal covers different subsections of the code section requirements and the two proposals are not related.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: The reverse order of items 1 and 2 provides a more logical format that assists the contractor's understanding of the provisions.

Assembly Action: **None**

Final Hearing Results

RE118-13	**AS**

Code Change No: RE125-13, Part I

Original Proposal

Section(s): R403.4.1 (IRC N1103.4.1), R403.4.1.1 (NEW) (IRC N1103.4.1.1 (NEW)), R403.4.1.2 (NEW) (IRC N1103.4.1.2 (NEW)), Chapter 5, IPC [E] 607.2.1, [E] 607.2.1.1 (NEW), [E] 607.2.1.1.1 (NEW), [E] 607.2.1.1.2 (NEW), IPC Chapter 14, IRC P2905 (NEW), IRC P2905.1 (NEW)

Proponent: Gary Klein, Affiliated International Management, LLC Gary Klein (Gary@aim4sustainability.com)

THIS IS A 3 PART CODE CHANGE. PARTS I AND II WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I IECC-RESIDENTIAL PROVISIONS

Revise as follows:

R403.4.1 (IRC N1103.4.1) ~~Circulating hot~~ Heated water circulation and temperature maintenance systems (Mandatory)~~.~~ ~~Circulating hot water systems shall be provided with an automatic or readily *accessible* manual switch that can turn off the hot-water circulating pump when the system is not in use.~~ Heated water circulation systems shall be in accordance with Section R403.4.1.1. Heat trace temperature maintenance systems shall be in accordance with Section R403.4.1.2. Automatic controls, temperature sensors and pumps shall be *accessible*. Manual controls shall be *readily accessible*.

R403.4.1.1 (IRC N1103.4.1.1) Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).

R403.4.1.2 (IRC N1103.4.1.2) Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add new standards to Chapter 5 (IRC Chapter 44) as follows:

The Institute of Electrical and Electronic Engineers, Inc.
3 Park Avenue
New York, NY 1016-5997

IEEE

515.1-2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications

Reason: There are 2 primary reasons for this proposed change. 1) Correlate the language in the IECC, the IRC and the IPC; 2) Clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

The current code language is not the same in the IECC and the IPC. It should be. It should also be the same in the IRC since the heated water systems do not know what occupancy they are in.

The current language allows for continuously operating circulation pumps, which creates inefficiency in the hot water distribution system. It also does not address the use of heat trace in both codes and there is currently no requirement that the heat trace be suitable for the application. The consequence is that water heating energy consumption is increased.

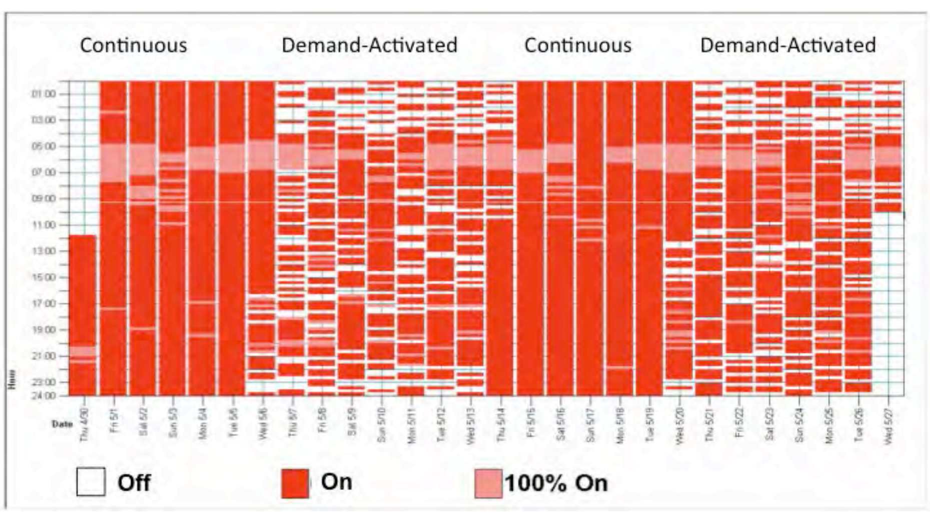
Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						Demand Activated Circulation
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

Figure 2 shows the differences in run-time at the water heater (or boiler) between a continuously pumped recirculation loop and one that has a demand activated pump control. Blank space (white) means the water heater was off. Red means some percent of run-time between zero and continuous. Pink means the water heater or boiler was running continuously. The test results come from studies done by Southern California Gas Company on a sample of more than 300 multi-family buildings with central water heaters and recirculation systems. Most systems tested were built before insulation was required on hot water recirculation loops. Savings ranged from 10-30 percent of the water heating energy use and 84 percent of the pump electricity use. The costs for installing the retrofit were paid back in just about one year. In new construction, the marginal costs would be recovered in just a few months

Figure 2 Run-time of Water Heater with Two Different Pump Controls



Why is demand-activated circulation such an efficient strategy? The 2012 IECC, IPC and IRC require that the hot water piping in automatic temperature maintenance systems in new buildings be insulated with pipe insulation. This means the water in the circulation loop will stay hot for a very long time – up to 45 minutes for ¾ inch nominal pipe up to 2 hours for 2-inch nominal pipe – even if the circulating pump is shut off. If this is the case, why run the pump when the water is still hot? Why run the pump when no one is in the building or when no one is demanding hot water? The only time it makes sense to run the pump is shortly before hot water is needed: hence the requirement that the pump be controlled on-demand.

The requirements for heat trace are partly to ensure that the systems can be operated in the most energy efficient manner consistent with providing heated water to the occupancy. The reference standards are included to ensure that installed systems are safe for the intended application. The energy consequences of using heat trace are very reasonable. Figure 3 presents the energy requirements for a heat trace system with the same hot water supply piping as the circulation systems shown in Figure 1. The energy requirements of keeping the trunk line hot – the same as keeping the supply portion of the loop hot in a circulating system – are 701 kWh per year, assuming 12 hours at high temp (115F) and 12 hours at economy temp (105F). This is equivalent to operating the loop about 3 hours per day, but with hot water available 24/7 in the supply trunk! This is a significant savings when water heating is done electrically or with a similarly expensive fuel. If the branches are also traced, we can deliver heated water even more quickly to the fixtures using only 1,682 kWh per year, which is the same energy as running the loop a little more than 6 hours a day.

Figure 3. Annual Energy Needed for Electric Heat Trace Systems

Heat Trace			
	(kWh per year)		
	Trunk	Br	T-Br
Supply Heat Losses			
High Temp	394	552	946
Economy Temp	307	429	736
Total Electricity	701	981	1,682

Cost impact: The proposal does not require either circulation or heat trace; however if either is selected, it clarifies the requirements for installation. Most recirculation systems today are installed with some form of control, usually a timer, a bandwidth thermostat (aquastat) or both. Some come with more sophisticated controls, such as programmable or are connected to an energy management system. In some cases, switching from these control strategies to demand activated controls will cost less. In other cases, the demand-activated controls will cost more.

Analysis: A review of the standards proposed for inclusion in the code, UL 515 and CSA 22.2 No 130-03 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Public Hearing Results

For staff analysis of the content of IEEE 515.1-2012 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

PART I – IECC – Residential
Committee Action: Approved as Modified

Modify the proposal as follows:

R403.4.1.1 (IRC N1103.4.1.1) Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. ~~Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).~~ Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

R403.4.1.2 (IRC N1103.4.1.2) Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1 or UL 515. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add standard to Chapter 14 as follows:

UL

515-2011 Electrical Resistance Heat Tracing for Commercial and Industrial Applications including revisions through November 30, 2011

Committee Reason: The originally proposed control technology was too specific. The modified wording allows for different types of control technology. The UL 515 standard was added because most manufacturers are certifying heat trace products to the UL standard. The overall proposal was approved because the committee generally agreed that it costs too much to operate a circulation system all the time.

Assembly Action: **None**

Final Hearing Results

RE125-13, Part I	**AM**

Code Change No: RE125-13

Original Proposal

Section(s): R403.4.1 (IRC N1103.4.1), R403.4.1.1 (NEW) (IRC N1103.4.1.1 (NEW)), R403.4.1.2 (NEW) (IRC N1103.4.1.2 (NEW)), Chapter 5, IPC [E] 607.2.1, [E] 607.2.1.1 (NEW), [E] 607.2.1.1.1 (NEW), [E] 607.2.1.1.2 (NEW), IPC Chapter 14, IRC P2905 (NEW), IRC P2905.1 (NEW)

Proponent: Gary Klein, Affiliated International Management, LLC Gary Klein (Gary@aim4sustainability.com)

THIS IS A 3 PART CODE CHANGE. PARTS I AND II WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART II-IPC

Revise as follows:

[E] 607.2.1 ~~Hot~~ Heated water circulation and temperature maintenance systems ~~controls~~. For other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, automatic circulating hot water system pumps or heat trace shall be arranged to be conveniently turned off, automatically or manually, when the hot water system is not in operation. Heated water circulation and temperature maintenance systems for Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane shall be in accordance with Section 607.2.1.1.

[E] 607.2.1.1 Group R2, R3 and R4 occupancies 3 stories or less. This section shall apply to Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Heated water circulation systems shall be in accordance with Section 607.2.1.1.1. Heat trace temperature maintenance systems shall be in accordance with Section 607.2.1.1.2. *Access* to automatic controls, temperature sensors and pumps shall be provided. *Ready access* to manual controls shall be provided.

[E] 607.2.1.1.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).

[E] 607.2.1.1.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add standards to Chapter 14 as follows:

The Institute of Electrical and Electronic Engineers, Inc.
3 Park Avenue
New York, NY 1016-5997

IEEE

515.1-2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications

Reason: There are 2 primary reasons for this proposed change. 1) Correlate the language in the IECC, the IRC and the IPC; 2) Clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

The current code language is not the same in the IECC and the IPC. It should be. It should also be the same in the IRC since the heated water systems do not know what occupancy they are in.

The current language allows for continuously operating circulation pumps, which creates inefficiency in the hot water distribution system. It also does not address the use of heat trace in both codes and there is currently no requirement that the heat trace be suitable for the application. The consequence is that water heating energy consumption is increased.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						**Demand Activated Circulation**
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
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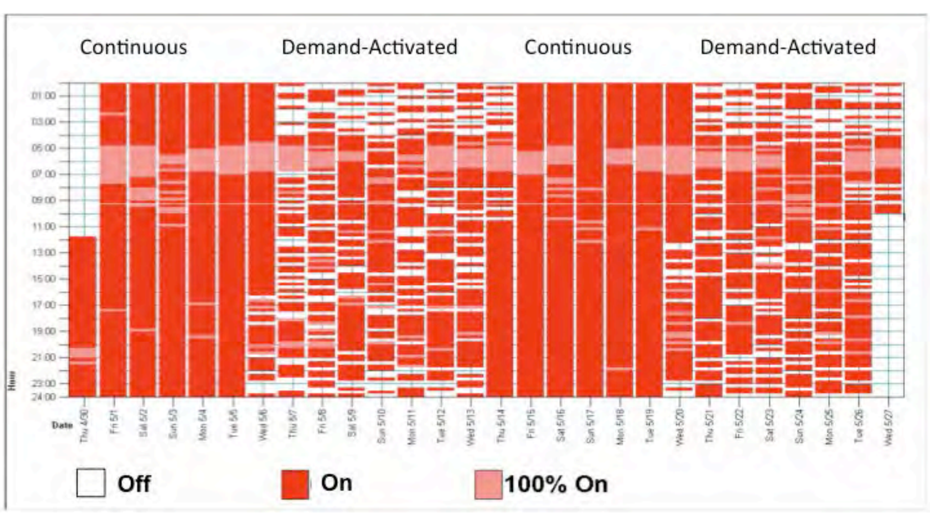
Figure 2 shows the differences in run-time at the water heater (or boiler) between a continuously pumped recirculation loop and one that has a demand activated pump control. Blank space (white) means the water heater was off. Red means some percent of run-time between zero and continuous. Pink means the water heater or boiler was running continuously. The test results come from studies done by Southern California Gas Company on a sample of more than 300 multi-family buildings with central water heaters and recirculation systems. Most systems tested were built before insulation was required on hot water recirculation loops. Savings ranged from 10-30 percent of the water heating energy use and 84 percent of the pump electricity use. The costs for installing the retrofit were paid back in just about one year. In new construction, the marginal costs would be recovered in just a few months

Figure 2 Run-time of Water Heater with Two Different Pump Controls



Why is demand-activated circulation such an efficient strategy? The 2012 IECC, IPC and IRC require that the hot water piping in automatic temperature maintenance systems in new buildings be insulated with pipe insulation. This means the water in the circulation loop will stay hot for a very long time – up to 45 minutes for ¾ inch nominal pipe up to 2 hours for 2-inch nominal pipe – even if the circulating pump is shut off. If this is the case, why run the pump when the water is still hot? Why run the pump when no one is in the building or when no one is demanding hot water? The only time it makes sense to run the pump is shortly before hot water is needed: hence the requirement that the pump be controlled on-demand.

The requirements for heat trace are partly to ensure that the systems can be operated in the most energy efficient manner consistent with providing heated water to the occupancy. The reference standards are included to ensure that installed systems are safe for the intended application. The energy consequences of using heat trace are very reasonable. Figure 3 presents the energy requirements for a heat trace system with the same hot water supply piping as the circulation systems shown in Figure 1. The energy requirements of keeping the trunk line hot – the same as keeping the supply portion of the loop hot in a circulating system – are 701 kWh per year, assuming 12 hours at high temp (115F) and 12 hours at economy temp (105F). This is equivalent to operating the loop about 3 hours per day, but with hot water available 24/7 in the supply trunk! This is a significant savings when water heating is done electrically or with a similarly expensive fuel. If the branches are also traced, we can deliver heated water even more quickly to the fixtures using only 1,682 kWh per year, which is the same energy as running the loop a little more than 6 hours a day.

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Cost impact: The proposal does not require either circulation or heat trace; however if either is selected, it clarifies the requirements for installation. Most recirculation systems today are installed with some form of control, usually a timer, a bandwidth thermostat (aquastat) or both. Some come with more sophisticated controls, such as programmable or are connected to an energy management system. In some cases, switching from these control strategies to demand activated controls will cost less. In other cases, the demand-activated controls will cost more.

Analysis: A review of the standards proposed for inclusion in the code, UL 515 and CSA 22.2 No 130-03 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Public Hearing Results

For staff analysis of the content of IEEE 515.1-2012 relative to CP#28, Section 3.6, please visit: http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

PART II – IPC
Committee Action: Approved as Modified

Modify the proposal as follows:

[E] 607.2.1.1.1 Circulation systems. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. ~~Circulation system pump controls shall be demand activated. The controls shall start the pump upon sensing the presence of a user of a fixture or appliance, receiving a signal from the action of an action of a user of a fixture or appliance or sensing the flow of heated water to a fixture or appliance. The controls shall limit the water temperature increase in the return water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the return piping and shall limit the return water temperature to 102ºF (38.9ºC).~~ Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.

[E] 607.2.1.1.2 Heat trace systems. Electric heat trace systems shall comply with IEEE 515.1 or UL 515. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.

Add standard to Chapter 14 as follows:

UL

515-2011 Electrical Resistance Heat Tracing for Commercial and Industrial Applications including revisions through November 30, 2011

Committee Reason: The originally proposed control technology was too specific. The modified wording allows for different types of control technology. The UL 515 standard was added because most manufacturers are certifying heat trace products to the UL standard. The overall proposal was approved because the committee generally agreed that it costs too much to operate a circulation system all the time.

Assembly Action: None

Public Comments

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self, requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

[E] 607.2.1 Heated water circulation and heat trace ~~temperature maintenance~~ systems. For ~~other than~~ Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, ~~automatic circulating hot water system pumps or heat trace shall be arranged to be conveniently turned off, automatically or manually, when the hot water system is not in operation.~~ heated water circulation and heat trace systems shall be installed in accordance with Section R403.4.1 of the *International Energy Conservation Code*. For other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, heated water circulation and heat trace ~~temperature maintenance~~ systems ~~for Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane~~ shall be installed in accordance with ~~Section 607.2.1.1.~~ Section C404.5 of the *International Energy Conservation Code*. ~~circulating hot water systems shall be arranged to be provided with a manual switch having ready access, or an automatic switch, that can turn off the hot water circulating pump when the system is not in use. Heated water circulation and temperature maintenance systems for other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane shall be in accordance with Section 607.2.1.1.~~

~~**[E] 607.2.1.1 For other than Group R2, R3 and R4 occupancies 3 stories or less**. This section shall apply to other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. Heated water circulation systems shall be in accordance with Section 607.2.1.1.1. Heat trace temperature maintenance systems shall be in accordance with Section 607.2.1.1.2. *Access* to automatic controls, temperature sensors and pumps shall be provided. *Ready access* to manual controls shall be provided.~~

~~**[E] 607.2.1.1.1 Circulation systems**. Heated water circulation systems shall be provided with a circulation pump. The system return pipe shall be a dedicated return pipe or a cold water supply pipe. Gravity and thermo-syphon circulation systems shall be prohibited. Controls for circulating hot water system pumps shall start the pump based on the identification of a demand for hot water within the occupancy. The controls shall automatically turn off the pump when the water in the circulation loop is at the desired temperature and when there is no demand for hot water.~~

~~**[E] 607.2.1.1.2 Heat trace systems.** Electric heat trace systems shall comply with IEEE 515.1 or UL 515. Controls for such systems shall be able to automatically adjust the energy input to the heat tracing to maintain the desired water temperature in the piping in accordance with the times when heated water is used in the occupancy.~~

~~**Add standard to Chapter 14 as follows:**~~

~~**IEEE**~~
~~515.1 2012 IEEE Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Trace Heating for Commercial Applications~~

~~**UL**~~

~~515-2011 Electrical Resistance Heat Tracing for Commercial and Industrial Applications including revisions through November 30, 2011~~

Commenter's Reason: The purpose of this proposal is to clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

The reason for this code change is to correlate the language in the IECC with that in the IPC. The floor modifications heard by the Committee were correct as far they went. However, on further review, parts of the original proposal that were not modified are complicated and undermine the intent of the modifications that were approved.

The requirements for efficient heated water circulation and electrical heat trace systems belong in the IECC. However, it is important for those implementing the IPC to know what is required of them when installing these systems. These systems affect the design and layout of the overall domestic piping supply, and need to carry a reference to avoid lapses in coordination with other requirements of the system controls.

In order to decrease the possibility of conflicting language appearing in the two documents, it makes sense to have the provisions in the IECC and the pointer in the IPC. This greatly simplifies the code language.

Supporting this modification will correlate the language in the IPC with that in the IECC.

I urge your support.

Final Hearing Results

RE125-13, Part II AMPC

Code Change No: RE-125, Part III

Original Proposal

Section(s): R403.4.1 (IRC N1103.4.1), R403.4.1.1 (NEW) (IRC N1103.4.1.1 (NEW)), R403.4.1.2 (NEW) (IRC N1103.4.1.2 (NEW)), Chapter 5, IPC [E] 607.2.1, [E] 607.2.1.1 (NEW), [E] 607.2.1.1.1 (NEW), [E] 607.2.1.1.2 (NEW), IPC Chapter 14, IRC P2905 (NEW), IRC P2905.1 (NEW)

Proponent: Gary Klein, Affiliated International Management, LLC Gary Klein (Gary@aim4sustainability.com)

THIS IS A 3 PART CODE CHANGE. PARTS I AND II WILL BE HEARD BY THE IECC RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART III-IRC

Add new text as follows:

SECTION P2905
HEATED WATER DISTRIBUTION SYSTEMS

P2905.1 Heated water systems. Heated water circulation and temperature maintenance systems shall be in accordance with Section N1103.4.1.

Reason: There are 2 primary reasons for this proposed change. 1) Correlate the language in the IECC, the IRC and the IPC; 2) Clarify the requirements for heated water circulation systems and for heat trace systems, if they are installed. The proposed changes do not require the use of circulation or heat trace.

The current code language is not the same in the IECC and the IPC. It should be. It should also be the same in the IRC since the heated water systems do not know what occupancy they are in.

The current language allows for continuously operating circulation pumps, which creates inefficiency in the hot water distribution system. It also does not address the use of heat trace in both codes and there is currently no requirement that the heat trace be suitable for the application. The consequence is that water heating energy consumption is increased.

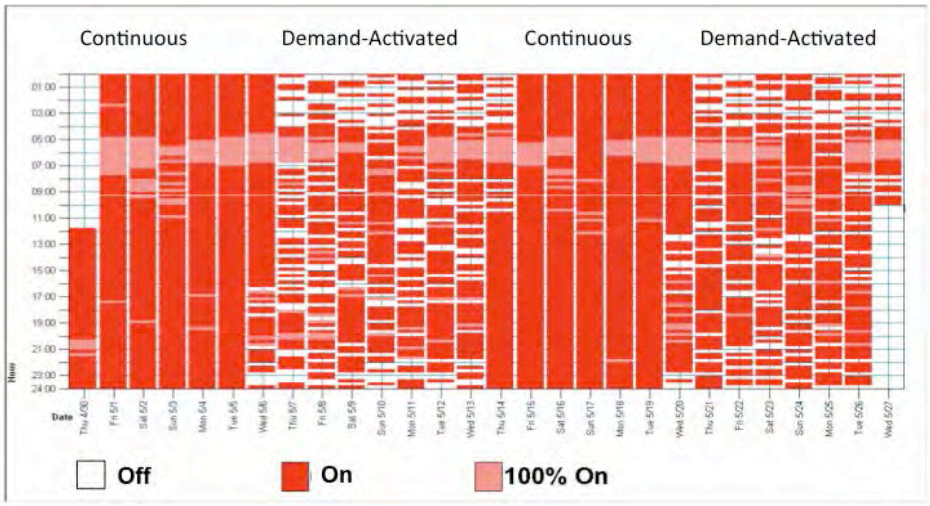
Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						**Demand Activated Circulation**
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

Figure 2 shows the differences in run-time at the water heater (or boiler) between a continuously pumped recirculation loop and one that has a demand activated pump control. Blank space (white) means the water heater was off. Red means some percent of run-time between zero and continuous. Pink means the water heater or boiler was running continuously. The test results come from studies done by Southern California Gas Company on a sample of more than 300 multi-family buildings with central water heaters and recirculation systems. Most systems tested were built before insulation was required on hot water recirculation loops. Savings ranged from 10-30 percent of the water heating energy use and 84 percent of the pump electricity use. The costs for installing the retrofit were paid back in just about one year. In new construction, the marginal costs would be recovered in just a few months

Figure 2 Run-time of Water Heater with Two Different Pump Controls



Why is demand-activated circulation such an efficient strategy? The 2012 IECC, IPC and IRC require that the hot water piping in automatic temperature maintenance systems in new buildings be insulated with pipe insulation. This means the water in the circulation loop will stay hot for a very long time – up to 45 minutes for ¾ inch nominal pipe up to 2 hours for 2-inch nominal pipe – even if the circulating pump is shut off. If this is the case, why run the pump when the water is still hot? Why run the pump when no one is in the building or when no one is demanding hot water? The only time it makes sense to run the pump is shortly before hot water is needed: hence the requirement that the pump be controlled on-demand.

The requirements for heat trace are partly to ensure that the systems can be operated in the most energy efficient manner consistent with providing heated water to the occupancy. The reference standards are included to ensure that installed systems are safe for the intended application. The energy consequences of using heat trace are very reasonable. Figure 3 presents the energy requirements for a heat trace system with the same hot water supply piping as the circulation systems shown in Figure 1. The energy requirements of keeping the trunk line hot – the same as keeping the supply portion of the loop hot in a circulating system – are 701 kWh per year, assuming 12 hours at high temp (115F) and 12 hours at economy temp (105F). This is equivalent to operating the loop about 3 hours per day, but with hot water available 24/7 in the supply trunk! This is a significant savings when water heating is done electrically or with a similarly expensive fuel. If the branches are also traced, we can deliver heated water even more quickly to the fixtures using only 1,682 kWh per year, which is the same energy as running the loop a little more than 6 hours a day.

Figure 3. Annual Energy Needed for Electric Heat Trace Systems

Heat Trace			
	(kWh per year)		
	Trunk	**Br**	**T-Br**
Supply Heat Losses			
High Temp	394	552	946
Economy Temp	307	429	736
Total Electricity	701	981	1,682

Cost impact: The proposal does not require either circulation or heat trace; however if either is selected, it clarifies the requirements for installation. Most recirculation systems today are installed with some form of control, usually a timer, a bandwidth thermostat (aquastat) or both. Some come with more sophisticated controls, such as programmable or are connected to an energy management system. In some cases, switching from these control strategies to demand activated controls will cost less. In other cases, the demand-activated controls will cost more.

Analysis: A review of the standards proposed for inclusion in the code, UL 515 and CSA 22.2 No 130-03 with regard to the ICC criteria for referenced standards (Section 3.6 of CP#28) will be posted on the ICC website on or before April 1, 2013.

Public Hearing Results

For staff analysis of the content of IEEE 515.1-2012 relative to CP#28, Section 3.6, please visit:
http://www.iccsafe.org:8888/cs/codes/Documents/2012-13cycle/Proposed-A/00a_updates.pdf

PART III – IRC-Plumbing
Committee Action: Disapproved

Committee Reason: There is no need to have a pointer in the plumbing chapters to direct the reader to another chapter of the IRC. There could be no end to the amount of pointers we could put into the IRC.

Assembly Action: None

Public Comments

Public Comment:

Gary Klein, Affiliated International Management, LLC, representing self requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

P2905.1 Heated water circulation systems and heat trace systems. ~~Heated water circulation and temperature maintenance systems shall be in accordance with Section N1103.4.1.~~ Circulation systems and heat trace systems, that are installed to bring heated water in close proximity to one or more fixtures, shall meet the requirements of Section N1103.4.1.

Commenter's Reason: The Committee disapproved the code change because they felt there was no need for a pointer to another section in the IRC.

These systems affect the design and layout of the overall water distribution in a building. Designers and installers need to realize that temperature maintenance systems have requirements that are buried in the energy code chapters of the IRC. Plumbing-oriented users of the IRC have, in the past, simply focused on the plumbing chapters for their work. They rely on many pointers in the plumbing chapters to help remind them pick up plumbing-related items outside those chapters. For example, Sections P2602.2, P2603.2, P2801.3, P2801.7, P2903.8, P3001.2, and P3101.5. Let's help these readers understand how to design and install water temperature maintenance systems correctly the first time instead of embarrassing them at final inspection. This is just a simple pointer, not a code requirement.

The language of this "pointer section" is being reworded because during testimony at the hearing, I heard that some people thought this proposal *required* circulation systems and heat trace systems. No, that was not the intent and is not the intent of this reworded section. All this section is saying is where such systems are installed, do it in accordance with that section in the energy code chapter. The 2012 IRC *does not require* these systems. Perhaps another proposal in this cycle will be approved to require some limit as to how far away a fixture can be from the hot water source, I don't know at this point.

I urge your support of this comment.

Final Hearing Results

RE125-13, Part III AMPC

Code Change No: RE129-13, Part II

Original Proposal

Section(s): R403.4.2 (IRC N1103.4.2), Table R403.4.2 (IRC Table N1103.4.2), IPC [E]607.5, IRC P2905 (NEW)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS TWO SEPARATE PROPOSALS. PART III WILL BE HEARD BY THE IRC-MP COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, (gary@aim4sustainability.com)

PART II-IPC

Revise as follows:

[E] 607.5 ~~Pipe~~ Insulation <u>of piping</u>. ~~Hot water piping in automatic temperature maintenance systems shall be insulated with not less than 1 inch (25 mm) of insulation having a conductivity not exceeding 0.27 Btu per inch/h • ft^2 • °F (1.53 W per 25 mm/m^2 • K). The first 8 feet (2438 mm) of hot water piping from a hot water-source that does not have heat traps shall be insulated with 0.5 inch (12.7 mm) of material having a conductivity not exceeding 0.27 Btu per inch/h • ft^2 • °F (1.53 W per 25 mm/m^2 • K).~~ <u>For other than Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, piping to the inlet of a water heater and piping conveying water heated by a water heater shall be insulated in accordance with Sections C404.5 of the *International Energy Conservation Code*. For Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane, piping to the inlet of a water heater and piping conveying water heated by a water heater shall be insulated in accordance with Section R403.4.2 of the *International Energy Conservation Code*.</u>

Reason: PART I-IECC The current requirements as to where pipe insulation must be installed and the run length allowance where insulation *doesn't* have to be installed, are much too complex for most installers to comprehend. Think of trying to explain the current run length allowance to the typical person that ends up performing this type of work. It also requires too much thinking on the part the inspector when the inspector is facing a plumbing system that has some hot water piping insulated and some not. The insulation requirement needs to be simple – just insulate all of the hot water piping. The minor amount of savings by not insulating some lengths of hot water piping is overshadowed by confusion/time wasted in the field and the significant potential of not getting it correct (and failing an inspection).

The phrase "water heated by a water heater" was used instead of "hot water" because the IECC does not have a definition for hot water. Code users could refer to the definition found in the IRC and the IPC for hot water which says water of a temperature 110F or greater. However, an installer *could* try to justify <u>not</u> installing insulation on any piping with the claim that they intended to set the water heater temperature at 108F. This is not the intent of the existing language and by using the phrase "water heated by a water heater", this loophole will be closed.

The description of the required insulation is expanded. Where tubular pipe insulation is used, that material does not have an R value rating. The equivalent R value must be calculated. And while some submittal specification sheets show the equivalent R-value for each wall thickness, some do not. And how often does a submittal sheet show up on a jobsite? Tubular pipe insulation is specified in wall thickness and k value. The k value in this code section covers the most commonly used insulation materials for this application. To keep it simple – Table R403.4.2 is provided to show the required wall thicknesses that closely approximates a R value of R-3 for the two most common types of pipe insulation materials. This takes the calculations out of the picture to make it simple for installers and inspectors.

The option for insulating piping with materials that are R-value rated was left in this section because it is sometimes possible to "encapsulate" piping within wall or ceiling insulation without the need for installing tubular pipe insulation. Where piping is properly "nested" into fiberglass batts in walls or is covered with spray-in foam systems, the installation of tubular pipe insulation is a waste of time and money. This option needs to remain to allow these alternate cost savings methods to be used.

The last sentence "Pipe insulation shall be continuous along all piping." is intended to prohibit a common practice of just insulating piping up to where the piping enters and exits a structural member. For example, a pipe that runs vertically through the bottom plate of a wall or through a joist needs to be insulated continuously through those members in order for the insulated piping system to be effective in reducing energy loss.

The exceptions are added to this section to clarify where “piping insulation” is not required. Most items are common sense. Valves and pumps are difficult to insulate and the benefit of such effort is minimal. Let’s keep is simple and easy.

PART II– IPC

The text that is struck out in IPC 607.5 is replaced with text that points the appropriate sections on the IECC that cover insulation.

Normally, the IPC only covers plumbing in commercial buildings. However, because the residential chapters in the IECC covers R2, R3 and R4 occupancy buildings that are 3 stories or less above grade plane in height *and* these occupancies are not covered by the plumbing chapter in the IRC, there needs to be a ‘pointer section’ in the IPC to alert the plumbing installer that there are piping insulation requirements in the residential provisions of the IECC that apply. Of primary concern are for allowing sufficient space around the piping (such as in wall cavities) and properly sizing holes through structural members to accommodate the insulation.

PART III – IRC

A new section is added in Chapter 29 of the IRC to alert the plumbing installer that the heated water piping installation must allow for insulating of the piping system. Of primary concern are for allowing sufficient space around the piping (such as in wall cavities) and properly sizing holes through structural members to accommodate the insulation.

Cost Impact: None.

Public Hearing Results

PART II – IPC

Committee Action: **Approved as Submitted**

Committee Reason: The plumbing code needs updated to provide an appropriate pointer to the energy code requirements.

Assembly Action: **None**

Final Hearing Results

RE129-13, Part II **AS**

Code Change No: RE132-13

Original Proposal

Section(s): R403.4.2 (IRC N1103.4.2), Table R403.4.2 (IRC Table N1103.4.2)

Proponent: Don Surrena, CBO, National Association of Home Builders (NAHB) (dsurrena@nahb.org)

Revise as follows:

R403.4.2 (N1103.4.2) Hot water pipe insulation (Prescriptive). Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

1. Piping larger than 3/4 inch nominal diameter.
2. Piping serving more than one dwelling unit.
~~3. Piping from the water heater to kitchen outlets.~~
~~4~~3. Piping located outside the conditioned space.
~~5~~4. Piping from the water heater to a distribution manifold.
~~6~~5. Piping located under a floor slab.
~~7~~6. Buried piping.
~~8~~7. Supply and return piping in recirculation systems other than demand recirculation systems.
~~9. Piping with run lengths greater than the maximum run lengths for the nominal pipe diameter given in Table R403.4.2.~~

~~All remaining piping shall be insulated to at least R-3 or meet the run length requirements of Table R403.4.2.~~

~~**TABLE R403.4.2 (N1103.4.2)**~~
~~**MAXIMUM RUN LENGTH (feet)**[a]~~

~~Nominal Pipe Diameter of Largest Diameter Pipe in the Run (inch)~~	~~3/8~~	~~1/2~~	~~3/4~~	~~> 3/4~~
~~Maximum Run Length~~	~~30~~	~~20~~	~~10~~	~~5~~

Reason: Research has been performed by a two different sources that indicate insulating hot water piping in a residential home is not cost effective. The NAHB Research Center performed a study in 2010 that concluded, based on a low cost estimate that the simple payback for insulating hot water piping was in the 60 to 100 year range based on the piping material. Additionally, a 2009 study presented by the National Renewable Energy Lab at the ASME 3rd International Conference of Energy Sustainability estimated paybacks between 72 and 183 years for various insulation configurations.

First cost, as determined in the NAHB Research Center report varied between $500 and $1,200. The NREL report had a slightly smaller house with an estimated installation cost of $366.

The simulations demonstrate that the benefit of insulation is greatest when all of the hot water uses are spaced apart from 10 to 30 minutes; however, this is not typically how hot water is consumed in a home. The benefit of insulation is diminished with shorter and longer time between uses.

It was shown in the study that pipes located in colder locations such as an unconditioned crawl space, benefit more from pipe insulation than pipes located in more conditioned spaces. This is why the insulation requirement was not changed for hot water pipes outside conditioned space.

Plastic pipe was shown to have less loss than copper pipe and commensurately insulation is more beneficial on metal pipe than on plastic pipe. However, copper pipe is losing market share and currently is only being installed in 14% of new homes.

Sources:

NAHB Research Center (2010), *Domestic Hot Water System Piping Insulation: Analysis of Benefits and Cost*
Hendron, R. Burch, J. Hoeschele, M. Rainer, L. (2009), *Potential for Energy Savings Through Residential Hot Water Distribution System Improvements*, Proceedings of the 3rd International Conference on Energy Sustainability

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Proponent requested disapproval based upon action on RE129-13.

Assembly Action: **None**

Public Comments

Public Comment:

Craig Conner, Building Quality representing himself requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

R403.4.2 (N1103.4.2) Hot water pipe insulation (Prescriptive). Insulation for hot water pipe with a minimum thermal resistance (*R*-value) of R-3 shall be applied to the following:

1. Piping ~~larger than~~ 3/4 inch and larger in nominal diameter.
2. Piping serving more than one dwelling unit.
3. Piping located outside the conditioned space.
4. Piping from the water heater to a distribution manifold.
5. Piping located under a floor slab.
6. Buried piping.
7. Supply and return piping in recirculation systems other than demand recirculation systems.

Commenter's Reason: This would not require pipe insulation on most pipes where the use of hot water is only occasional, but would retain the pipe insulation on the main lines (3/4 inch and larger) where the insulation is of more value because the flow of hot water is much more frequent. At least some portion of the pipe run to kitchens and bathrooms is likely to be 3/4 and larger and this is the piping that is most likely to have the highest number of uses because it is being shared by more plumbing fixtures. Specifying a requirement based on pipe size, rather than where the pipe leads to, is clearer and easier to inspect. This comment retains RE132's simplicity by eliminating the table based on pipe length.

Final Hearing Results

RE132-13	**AMPC**

Code Change No: RE136-13, Part I

Original Proposal

Section(s): R403.4.2 (NEW) (IRC N1103.4.2 (NEW)), IPC 202, IPC [E]607.2.1.1 (NEW), IRC P2905 (NEW), IRC P2905.1 (NEW)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, gary@aim4sustainability.com

PART I – IECC-RESIDENTIAL PROVISIONS

Add new text as follows:

R403.4.2 (IRC N1101.4.2) Demand recirculation systems. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a *demand recirculation water system.* Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the temperature entering the cold water piping to 102ºF (38.9 ºC).

Reason: The purpose of this code change proposal is to clarify the requirements for installing circulation pumps in applications that use a cold water supply pipe to circulate the water back to the water heater. Demand recirculation water systems are significantly more energy efficient than other recirculation systems and are inherently safer when the cold water supply is used as the return.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						**Demand Activated Circulation**
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
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Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

The inherently better safety comes from the fact that the controls specified for demand recirculation water systems limit the flow of water from the hot water supply into the cold water supply to only minutes a day and because they limit the temperature of the water that is allowed to go into the cold water supply. There are five other control strategies for heated water recirculation systems (thermosyphon (gravity), continuous pumping, timer controlled, bandwidth temperature sensor (aquastat) controlled and a combination of timer and bandwidth temperature sensor (aquastat) controlled and none of them has the ability to meet these stringent requirements.

The requirements of this section should be identical in both the IECC and the IPC, since the language for the controls does not depend on occupancy

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: This proposal will not increase the cost of construction, as it does not require the use of demand recirculation water systems. In addition, the ability to use cold-water supply piping as a return pipe may reduce the cost of installing a circulation loop.

Public Hearing Results

PART I – IECC – Residential
Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides clarity on how demand recirculation systems that return water though a cold water pipe back to the source should operate.

Assembly Action: **None**

Public Comments

Public Comment 2:

Greg Towsley, Grundfos representing self, requests As Modified by this Public Comment.

Modify the proposal as follows:

R403.4.2 (IRC N1101.4.2) Demand recirculation systems. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a demand recirculation water system. Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture, or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the ~~water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the~~ temperature of the water entering the cold water piping ~~102ºF (38.9 ºC)~~ 104°F (40°C).

Commenter's Reason: The addition of the comma after fixture clarifies that there are three (3) options on how the pump will start. Eliminating the requirement of a temperature rise allows for innovation and reduces restriction of technology from only one design. Most thermostats available in the market are designed for 104°F, not 102°F.

Final Hearing Results

RE136-13, Part I	AMPC2

Code Change No: RE136-13, Part II

Original Proposal

Section(s): R403.4.2 (NEW) (IRC N1103.4.2 (NEW)), IPC 202, IPC [E]607.2.1.1 (NEW), IRC P2905 (NEW), IRC P2905.1 (NEW)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, gary@aim4sustainability.com

PART II – IPC

Add new definition as follows:

<u>**DEMAND RECIRCULATION WATER SYSTEM.** A water distribution system where one more pumps prime the service hot water piping with heated water upon demand for hot water.</u>

Add new text as follows:

<u>**[E] 607.2.1.1 Demand recirculation controls.** This section shall apply only to Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a *demand recirculation water system.* Pumps shall have controls that comply with both of the following:</u>

1. <u>The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture or sensing the flow of hot or tempered water to a fixture fitting or appliance.</u>
2. <u>The control shall limit the water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the temperature entering the cold water piping to 102ºF (38.9 ºC)</u>.

Reason: The purpose of this code change proposal is to clarify the requirements for installing circulation pumps in applications that use a cold water supply pipe to circulate the water back to the water heater. Demand recirculation water systems are significantly more energy efficient than other recirculation systems and are inherently safer when the cold water supply is used as the return.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The <u>annual</u> energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						Demand Activated Circulation
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

The inherently better safety comes from the fact that the controls specified for demand recirculation water systems limit the flow of water from the hot water supply into the cold water supply to only minutes a day and because they limit the temperature of the water that is allowed to go into the cold water supply. There are five other control strategies for heated water recirculation systems (thermosyphon (gravity), continuous pumping, timer controlled, bandwidth temperature sensor (aquastat) controlled and a combination of timer and bandwidth temperature sensor (aquastat) controlled and none of them has the ability to meet these stringent requirements.

The requirements of this section should be identical in both the IECC and the IPC, since the language for the controls does not depend on occupancy

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: This proposal will not increase the cost of construction, as it does not require the use of demand recirculation water systems. In addition, the ability to use cold-water supply piping as a return pipe may reduce the cost of installing a circulation loop.

Public Hearing Results

PART II – IPC
Committee Action: Approved as Submitted

Committee Reason: The proposal provides clarity on how demand recirculation systems that return water though a cold water pipe back to the source should operate.

Assembly Action: None

Public Comments

Public Comment 2:

Greg Towsley, Grundfos representing self, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

[E] 607.2.1.1 Demand recirculation controls. This section shall apply only to Group R2, R3 and R4 occupancies that are 3 stories or less in height above grade plane. A water distribution system having one or more recirculation pumps that pump water from a heated water supply pipe back to the heated water source through a cold water supply pipe shall be a demand recirculation water system. Pumps shall have controls that comply with both of the following:

1. The control shall start the pump upon receiving a signal from the action of a user of a fixture or appliance, sensing the presence of a user of a fixture, or sensing the flow of hot or tempered water to a fixture fitting or appliance.
2. The control shall limit the ~~water temperature increase in the cold water piping to not more than 10ºF (5.6 ºC) greater than the initial temperature of the water in the piping and limits the~~ temperature of the water entering the cold water piping to ~~102ºF (38.9 ºC)~~ 104°F (40°C).

Commenter's Reason: The addition of the comma after fixture clarifies that there are three (3) options on how the pump will start. Eliminating the requirement of a temperature rise allows for innovation and reduces restriction of technology from only one design. Most thermostats available in the market are designed for 104°F, not 102°F.

Final Hearing Results

RE136-13, Part II **AMPC2**

Code Change No: RE136-13, Part III

Original Proposal

Section(s): R403.4.2 (IRC N1103.4.2), Table R403.4.2 (IRC Table N1103.4.2), IPC [E]607.5, IRC P2905 (NEW)

THIS IS A 3 PART CODE CHANGE PROPOSAL. PARTS I AND II WILL BE HEARD BY THE IECC-RESIDENTIAL ENERGY CONSERVATION CODE DEVELOPMENT COMMITTEE AS 2 SEPARATE CODE CHANGES. PART III WILL BE HEARD BY THE IRC-PM COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

Proponent: Gary Klein, Affiliated International Management, LLC, representing self, gary@aim4sustainability.com

PART III – IRC-P

Add new text as follows:

SECTION P2905
HEATED WATER DISTRIBUTION SYSTEMS

P2905.1 Demand recirculation systems. *Demand recirculation water systems* shall be in accordance with Section N1103.4.2.

Reason: The purpose of this code change proposal is to clarify the requirements for installing circulation pumps in applications that use a cold water supply pipe to circulate the water back to the water heater. Demand recirculation water systems are significantly more energy efficient than other recirculation systems and are inherently safer when the cold water supply is used as the return.

Figure 1 shows that demand activated circulation is significantly more energy efficient than any other type of heated water circulation system. The annual energy needed to keep the loop hot with water heated electrically or with natural gas are shown separately from the energy needed for the pump. The majority of the energy is lost in keeping the water in the loop at the desired temperature (all of it if there is a gravity loop). A small loop, 100 feet including the supply and the return was analyzed. The savings ranges from 87.5 percent when compared to a recirculation system that runs only 2-hours per day to 99 percent when compared to a recirculation system that runs only 24-hours per day. The operating costs and savings remain proportional as the length of the circulation loop and the flow rate of the pump increase.

Figure 1 Annual Energy Requirements for Demand Activated Circulation and Standard Recirculation

	Standard Recirculation						Demand Activated Circulation
	Daily Hours of Operation						
	24	12	8	6	4	2	0.25
Loop Heat Losses							
Natural Gas (therms)	292	146	97	73	49	24	3
Electric (kWh)	6,388	3,194	2,129	1,597	1,065	532	67
Pump Energy (kWh)	438	219	146	110	73	37	8

The inherently better safety comes from the fact that the controls specified for demand recirculation water systems limit the flow of water from the hot water supply into the cold water supply to only minutes a day and because they limit the temperature of the water that is allowed to go into the cold water supply. There are five other control strategies for heated water recirculation systems (thermosyphon (gravity), continuous pumping, timer controlled, bandwidth temperature sensor (aquastat) controlled and a combination of timer and bandwidth temperature sensor (aquastat) controlled and none of them has the ability to meet these stringent requirements.

The requirements of this section should be identical in both the IECC and the IPC, since the language for the controls does not depend on occupancy

For more information and background on issues related to hot water distribution and for a more detailed analysis in support of this proposal please go to http://www.aim4sustainability.com Follow the link on the home page to Codes.

Cost impact: This proposal will not increase the cost of construction, as it does not require the use of demand recirculation water systems. In addition, the ability to use cold-water supply piping as a return pipe may reduce the cost of installing a circulation loop.

Public Hearing Results

PART III – IRC – Plumbing
Committee Action: Disapproved

Committee Reason: There is no need to have a pointer in the plumbing chapters to direct the reader to another chapter of the IRC. There could be no end to the amount of pointers we could put into the IRC.

Assembly Action: None

Final Hearing Results

RE136-13, Part III AS

Code Change No: RE142-13

Original Proposal

Section(s): R403.6 (IRC N1103.6)

Proponent: Brian Dean, Energy Efficient Codes Coalition; Garrett Stone, Brickfield Burchette Ritts & Stone, PC; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy; and Bill Prindle, Energy Efficient Codes Coalition.

Revise as follows:

R403.6 (N1103.6) Equipment sizing <u>and efficiency rating</u> (Mandatory). Heating and cooling equipment shall be sized in accordance with ACCA Manual S based on building loads calculated in accordance with ACCA Manual J or other *approved* heating and cooling calculation methodologies. <u>New or replacement heating and cooling equipment shall have an efficiency rating equal to or greater than the minimum required by federal law for the geographic location where the equipment is installed</u>

Reason: The purpose of this code change is to codify the requirement that HVAC equipment must satisfy federal minimum requirements for the location. This proposal does not establish new requirements since it simply requires that equipment meet the federal standard, but it allows the code official to enforce the requirements. This proposal improves the effectiveness of the code by reinforcing a practice that should already be taking place in plan review and inspection -- verification of the efficiency rating of heating and cooling equipment. Although federal rules set the minimum efficiency levels for manufacturers, only code officials can determine whether equipment actually installed in buildings meets or exceeds the federal minimums. The EECC has offered a similar proposal for service hot water equipment under section R403.4.

This proposal is more important now than in the past because federal minimums are expected to shift away from single nationwide efficiency levels to regionally-based efficiency levels that will vary from state to state. It is possible, whether by accident or bad intent, to see equipment that would meet federal requirements in one jurisdiction used in other states or regions in which it does not meet the regional requirement. Although this verification may already be taking place, the proposal above is intended to make it a specific requirement in all buildings. This is an important opportunity for federal, state and local governments to work together to ensure that equipment installed meets federal minimums for the location.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This provision would ensure that minimum efficiency equipment be installed in the code.

Assembly Action: **None**

Final Hearing Results

RE142-13	**AS**

Code Change No: RE163-13

Original Proposal

Section(s): R405.4.2 (IRC N1105.4.2), R405.4.2.1 (NEW) (IRC N1105.4.2.1 (NEW)), R405.2.2 (NEW) (IRC N1105.4.2.2 (NEW))

Proponent: Robby Schwarz EnergyLogic Inc., representing EnergyLogic, Inc. (robby@nrglogic.com)

Revise as follows:

R405.4.2 (N1105.4.2) Compliance report. Compliance software tools shall generate a report that documents that the *proposed design* complies with Section R405.3. A compliance report on the *proposed design* shall be submitted with the application for the building permit. Upon completion of the building, a compliance report based upon the as-built condition of the building, shall be submitted to the *code official* before a certificate of occupancy is issued by the *code official*. Batch sampling of buildings to determine energy code compliance for all buildings in the batch shall be prohibited.

Compliance reports shall include information in accordance with Sections R405.4.2.1 and R405.4.2.2. ~~The compliance documentation shall include the following information:~~ Where the *proposed design* of a building could be built on different sites where the cardinal orientation of the building on each site is different, compliance of the *proposed design* for the purposes of the application for the building permit, shall be based upon the worst case orientation, worst case configuration, worst case building air leakage and worse case duct leakage. Such worse case parameters shall be used as inputs to the compliance software for energy analysis.

1. ~~Address or other identification of the residence;~~
2. ~~An inspection checklist documenting the building component characteristics of the *proposed design* as listed in Table R405.5.2(1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design,* and shall document all inputs entered by the user necessary to reproduce the results;~~
3. ~~Name of individual completing the compliance report; and~~
4. ~~Name and version of the compliance software tool.~~

R405.4.2.1 (N1105.4.2.1) Compliance report for permit application. A compliance report submitted with the application for building permit shall include all of the following:

1. Building street address, or other building site identification.
2. A statement indicating that the *proposed design* complies with Section R405.3.
3. An inspection checklist documenting the building component characteristics of the *proposed design* as indicated in Table R405.5.2(1). The inspection checklist shall show results for both the *standard reference design* and the *proposed design* with all user inputs to the compliance software to generate the results.
4. A site-specific energy analysis report that is in compliance with Section R405.3
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

R405.4.2.2 (N1105.4.2.2) Compliance report for certificate of occupancy. A compliance report submitted for obtaining the certificate of occupancy shall include all of the following:

1. Building street address, or other building site identification

2. A statement indicating that the as-built building complies with Section R405.3.
3. A certificate indicating that the building passes the performance matrix for code compliance and the energy saving features of the buildings.
4. A site-specific energy analysis report that is in compliance with Section R405.3.
5. Name of the individual performing the analysis and generating the report.
6. Name and version of the compliance software tool.

~~**Exception:** Multiple orientations. When an otherwise identical building model is offered in multiple orientations, compliance for any orientation shall be permitted by documenting that the building meets the performance requirements~~

Reason: Jurisdictions, Builders, third party inspection companies and others are not clear of the process for completing and utilizing the simulated performance path. With all pathways through the energy code one must in essence declare how they will meet the intent of the code. For the prescriptive path they simply say they are going prescriptive, for the UA trade off path they submit a document such as a RESCheck report, and for the simulated performance path they must currently submit a document demonstrating that the annual energy cost of the proposed design are less than or equal to the same home if it were built with the reference design specification. It becomes unclear how one demonstrates that they have carried out their proposed design. The revisions proposed for this section clearly outlines a process by which the proposed design is submitted, inspections take place, and additional analysis is preformed to ensure that the proposed design was achieved or bettered for the purposes of compliance.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal provides clarity for interested parties to understand what the process is for utilizing the performance path.

Assembly Action: **None**

Final Hearing Results

RE163-13 **AS**

Code Change No: RE167-13

Original Proposal

Section(s): Table R405.5.2(1) (IRC Table B1105.5.2(1))

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Thermal distribution systems	~~None~~ Duct insulation: From Section R403.2.1. A thermal distribution system efficiency (DSE) of 0.88 shall be applied to both the heating and cooling system efficiencies for all systems other than tested duct systems. For tested duct systems, the leakage rate shall be 4 cfm (113.3 L/min) per 100 ft^2 (9.29 m^2) of *conditioned floor area* at a pressure differential of 0.1 inches w.g. (25 Pa).	Thermal distribution system efficiency shall be as tested or as specified in Table R405.5.2(2) if not tested. Duct insulation shall be as proposed.

(Portions of table not shown remain unchanged)

Reason: The specification for the STANDARD REFERENCE DESIGN was inadvertently deleted from DOE's EC13 change proposal in the last code cycle. EC13 was approved, leaving the table with no specifications for thermal distribution systems in the standard reference design. This proposal restores the missing cell with text from EC13-09/10.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

Under the "Proposed Design Column, revise the text as follows:

~~Thermal distribution system efficiency shall be~~ as tested or as specified in Table R405.5.2(2) if not tested. Duct insulation shall be as proposed.

Committee Reason: This proposal restores text from a cell inadvertently deleted by EC13-09/10. The modification simply makes the format of the text consistent with the remainder of the table.

Assembly Action: **None**

Final Hearing Results

RE167-13 **AM**

Code Change No: RE173-13

Original Proposal

Section(s): Table R405.5.2(1) (IRC Table N1105.5.2(1))

Proponent: Dr. Thomas D. Culp, Birch Point Consulting LLC, representing the Glazing Industry Code Committee (culp@birchpointconsulting.com)

Revise as follows:

TABLE R405.5.2(1) (N1105.5.2(1))
SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

BUILDING COMPONENT
Opaque Doors
~~Glazing[a]~~ Vertical Fenestration other than Opaque Doors
Skylights

(Portions of table not shown remain unchanged)

~~a. Glazing shall be defined as sunlight-transmitting fenestration, including the area of sash, curbing or other framing elements, that enclose conditioned space. Glazing includes the area of sunlight-transmitting fenestration assemblies in walls bounding conditioned basements. For doors where the sunlight-transmitting opening is less than 50 percent of the door area, the glazing area is the sunlight transmitting opening area. For all other doors, the glazing area is the rough frame opening area for the door including the door and the frame.~~

Reason: This corrects the terminology in the performance path table to be consistent with the rest of the chapter. "Doors" can include both glazed and opaque doors, but the intent was clearly meant to be opaque doors, since it is referring to only the U-factor in Table R402.1.3. It is then unclear where to put glazed doors. This proposal clarifies the three fenestration rows as "opaque doors", "vertical fenestration other than opaque doors", and "skylights".

Cost Impact: This proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This corrects the terminology in the performance path table to be consistent with the rest of the chapter and code. Using appropriate terminology only serves to improve the clarity of the code.

Assembly Action: **None**

Final Hearing Results

RE173-13 **AS**

Code Change No: RE184-13

Original Proposal

Section(s): R101.4.3, R202, R406 (NEW), (IRC N1101. 3, N1101.9, N1106(NEW))

Proponent: Eric Makela, Britt Makela Group, Inc., representing Institute for Market Transformation (eric@brittmakela.com), Ryan Meres, Institute for Market Transformation

Delete and substitute as follows:

~~**R101.4.3 (N1101.3) Additions, alterations, renovations or repairs.** Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.~~

~~**Exception:** The following need not comply provided the energy use of the building is not increased:~~

1. ~~Storm windows installed over existing fenestration.~~
2. ~~Glass only replacements in an existing sash and frame.~~
3. ~~Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.~~
4. ~~Construction where the existing roof, wall or floor cavity is not exposed.~~
5. ~~Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.~~
6. ~~Replacement of existing doors that separate *conditioned space* from the exterior shall not require the installation of a vestibule or revolving door, provided, however, that an existing vestibule that separates a *conditioned space* from the exterior shall not be removed,~~
7. ~~Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.~~
8. ~~Alterations that replace only the bulb and ballast within the existing luminaires in a space provided that the *alteration* does not increase the installed interior lighting power.~~

R101.4.3 (N1101.3) Additions, alterations, or repairs. Additions, alterations, or repairs to an existing building, building system or portion thereof shall comply with Section R406.

Revise definition as follows:

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

Add new text as follows:

SECTION R406 (IRC N1106)
ADDITIONS, ALTERATIONS, OR REPAIRS

R406.1 (IRC N1106.1) Scope. The provisions of this section shall control the *alteration*, *repair* and *addition* of existing buildings and structures for compliance with this code.

R406.2 (IRC N1106.2) Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, *alteration* or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

R406.4 (IRC N1106.4) Additions, alterations, or repairs. Additions, alterations, or repairs to an existing building, building system or portion thereof shall comply with Sections R406.4.1, R406.4.2 or R406.4.3. Unaltered portions of the existing building or building supply system shall not be required to comply with this code. Additions, alterations, or repairs shall not create an unsafe or hazardous condition or overload existing building systems.

R406.4.1 (IRC N1106.4.1) Additions. An addition shall be deemed to comply with this code if the addition alone complies, if the existing building and addition comply as a single building, or if the building with the addition uses no more energy than the existing building. Additions shall be in accordance with Section 406.4.1.1 or Section 406.4.1.2.

406.4.1.1 (IRC N1106.4.1.1) Prescriptive compliance. Additions shall comply with Sections 406.4.1.1.1 through 406.4.1.1.4.

406.4.1.1.1 (IRC N1106.4.1.1.1) Building envelope. New building envelope assemblies that are part of the addition shall comply with Sections R402.1, R402.2, R402.3.1 through R402.3.5, and R402.4.

> **Exception.** Where nonconditioned space to is changed to conditioned space the building envelope of the addition shall comply where the UA, as determined in Section 402.1.4, of the existing building and the addition, and any alterations that are part of the project, is less than or equal to UA generated for the existing building.

R406.4.1.1.2 (IRC N1106.4.1.1.2) Heating and cooling systems. New heating, cooling and duct systems that are part of the addition shall comply with Sections R403.1, R403.2, R403.3, R403.5 and R403.6.

> **Exception:** Where ducts from an existing heating and cooling system are extended to an addition, duct systems with less than 40 linear feet in unconditioned spaces shall not be required to be tested in accordance with Section R403.2.2.

R406.4.1.1.3 (IRC N1106.4.1.1.3) Service hot water systems. New service hot water systems that are part of the addition shall comply with Section R403.4.

R406.4.1.1.4 (IRC N1106.4.1.1.4) Lighting. New lighting systems that are part of the addition shall comply with Section 404.1.

R406.4.1.2 (IRC N1106.4.1.2) Existing plus addition compliance (Simulated Performance Alternative). Where nonconditioned space is changed to conditioned space the addition shall comply where the annual energy cost or energy use of the addition and the existing building, and any alterations that are part of the project, is less than or equal to the annual energy cost of the existing building when modeled in accordance with Section R405. The addition and any alterations that are part of the project shall comply with Section R405 in its entirety.

406.4.2 (IRC N1106.4.2) Alterations. Alterations to existing buildings shall comply with Section R406.4.2.1 through R406.4.2.4. *Alterations* shall be such that the existing building or structure uses no more energy than the existing building or structure prior to the *alteration*.

406.4.2.1 (IRC N1106.4.2.1) Building envelope. Building envelope assemblies that are part of the alteration shall comply with Sections R402.1.1 or R402.1.3, R402.2.1 through R402.2.11, R402.3.1, R402.3.2, R402.3.6, R402.4.3 and R402.4.4.

Exceptions: The following building envelope alterations are exempt from Section 406.1.2.1.

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.
5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.

R406.4.2.2 (IRC N1106.4.2.2) Heating and cooling systems. New heating, cooling and duct systems that are part of the alteration shall comply with Sections R403.1, R403.2, R403.3 and R403.6.

Exception: Where ducts from an existing heating and cooling system are extended, duct systems with less than 40 linear feet in unconditioned spaces shall not be required to be tested in accordance with Section R403.2.2.

R406.4.2.3 (IRC N1106.4.2.3) Service hot water systems. New service hot water systems that are part of the alteration shall comply with Section R403.4.

R406.4.2.4 (IRC N1106.4.2.4) Lighting. New lighting systems that are part of the alteration shall comply with Section 404.1.

R406.4.3 Repairs. (IRC N1106.4.3) Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this section. Routine maintenance, ordinary repairs exempt from *permit*, and abatement of wear due to normal service conditions shall not be subject to the requirements for *alterations.*

Reason: The residential provisions of the 2012 IECC require that additions, alterations renovations or repairs comply with the provisions of the energy code without providing a clear "roadmap" on the specific requirements that apply to these projects. The goal of this code change proposal is to provide clear direction to the code user on what provisions must be complied with based on the type of project. Increasing the clarity of the code will increase the compliance rate and result in increased energy savings for these projects.

This proposal places all of the requirements for additions, alterations, renovations and repairs into a new section in the residential provisions of the IECC and builds off the work conducted by the ICC SEHPCAC in the development of their existing building proposal. The additions portion of the proposal provides an energy neutral method for demonstrating compliance for difficult to comply projects by basically saying that the building with the addition uses no more energy than the existing building. This will allow projects to take advantage of energy efficient alterations on the existing building to offset difficult to comply with features on the addition. For example, garage conversations in Climate Zone 5, where the walls are framed with 2 X 4's, will be forced to increase the insulation levels of the wall system to levels that are difficult to meet without significant cost. Allowing this type of trade-off will increase the overall efficiency of the entire building at a lower potential first cost than insulating the wall system.

An allowance is also included for adding a short duct run in unconditioned space by exempting up to 40 feet of new duct work. Currently the code would require this duct to be tested even though the entire system is very leaky. This allowance is from the Washington State Residential Energy Code.

Exceptions currently included in Section C101.4.3 of the 2012 IECC have been moved into this new section and linked to the applicable references to the building envelope, systems or lighting section. Repairs have been clearly identified and essentially exempted from the requirements of the IECC if they fall within certain defined parameters.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

~~**REPAIR.** The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.~~

Committee Reason: This code change proposal provides clearer direction to the code user regarding the requirements for additions, alterations, and repairs. The modification was simply to remove the changes to definition of repair. The proposed revision to definition of repair provides a narrow definition that would serve to confuse the issue.

Assembly Action: **None**

Final Hearing Results

RE184-13	**AM**

Code Change No: RE188-13

Original Proposal

Section(s): R202 (NEW) (IRC N1101.9 (NEW)), R401.2 (IRC N1101.15), R406 (NEW) (IRC N1106 NEW)

Proponent: Eric Makela, Britt Makela Group, Inc., David Goldstein, National Resource Defense Council (Eric@BrittMakela.com)

Revise as follows:

R401.2 (N1101.15) Compliance. Projects shall comply with Sections identified as “mandatory” and with either sections identified as “prescriptive”, ~~or~~ the performance approach in Section R405~~.~~ or an Energy Rating Index (ERI) approach in Section R406.

SECTION R406 (N1106)
ENERGY RATING INDEX COMPLIANCE ALTERNATIVE

R406.1 (N1106.1) Scope. This section establishes criteria for compliance using an Energy Rating Index analysis.

R406.2 (N1106.2) Mandatory requirements. Compliance with this section requires that the mandatory provisions identified in Section R401.2 and R403.4.2 be met. The building thermal envelope shall be greater than or equal to levels of efficiency and Solar Heat Gain Coefficient in Table 402.1.1 or 402.1.3 of the 2009 *International Energy Conservation Code.*

> **Exception:** Supply and return ducts not completely inside the building thermal envelope shall be insulated to a minimum of R-6.

R406.3 (N1106.3) Energy rating index. The energy rating index (ERI) shall be a numerical integer value that is based on a linear scale constructed such that the *ERI reference design* has an Index value of 100 and a residential building that uses no net purchased energy has an Index value of 0. Each integer value on the scale shall represent a one percent (1%) change in the total energy use of the *rated design* relative to the total energy use of the *ERI reference design*. The ERI shall consider all energy used in the residential building.

R406.3.1 (N1106.3.1) ERI reference design. The *ERI reference design* shall be configured such that is it meets the minimum requirements of the 2006 *International Energy Conservation Code* prescriptive requirements

The proposed residential building shall be shown to have an annual total normalized Modified Loads that are less than or equal to the annual total Loads of the *ERI reference design.*

R406.4 (N1106.4) ERI based compliance. Compliance based on an ERI analysis requires that the *rated design* be shown to have an ERI less than or equal to the appropriate value listed in Table R406.3, when compared to the *ERI reference design*.

TABLE R406.4 (N1106.4)
MAXIMUM ENERGY RATING INDEX

Climate Zone	Energy Rating Index
1	52
2	52
3	51
4	54
5	55
6	54
7	53
8	53

R406.5 (N1106.5) Verification by approved agency. Verification of compliance with Section R406 shall be completed by an *approved* third party.

R406.6 (N1106.6) Documentation. Documentation of the software used to determine the energy rating index and the parameters for the residential building shall be in accordance with Sections R406.6.1 through R406.6.3.

R406.6.1 (N1106.6.1) Compliance software tools. Documentation verifying that the methods and accuracy of the compliance software tools conform to the provisions of this section shall be provided to the *code official.*

R406.6.2 (N1106.6.2) Compliance report. Compliance software tools shall generate a report that documents that the energy rating index of the *rated design* complies with Sections R406.3 and R406.4. The compliance documentation shall include the following information:

1. Address or other identification of the residential building;
2. An inspection checklist documenting the building component characteristics of the *rated design*. The inspection checklist shall show results for both the *ERI reference design* and the *rated design,* and shall document all inputs entered by the user necessary to reproduce the results;
3. Name of individual completing the compliance report; and
4. Name and version of the compliance software tool.

Exception: Multiple orientations. When an otherwise identical building model is offered in multiple orientations, compliance for any orientation shall be permitted by documenting that the building meets the performance requirements in each of the four cardinal (north, east, south and west) orientations.

R406.6.3 (N1106.6.3) Additional documentation. The *code official* shall be permitted to require the following documents:

1. Documentation of the building component characteristics of the *ERI reference design.*
2. A certification signed by the builder providing the building component characteristics of the *rated design.*
3. Documentation of the actual values used in the software calculations for the *rated design.*

R406.7 (N1106.7) Calculation software tools. Calculation software, where used, shall be in accordance with Sections R406.7.1through R406.7.3.

R406.7.1 (N1106.7.1)Minimum capabilities. Calculation procedures used to comply with this section shall be software tools capable of calculating the energy rating index as described in Section R406.3, and shall include the following capabilities:

1. Computer generation of the *ERI reference design* using only the input for the *rated design.* The calculation procedure shall not allow the user to directly modify the building component characteristics of the *ERI reference design.*
2. Calculation of whole-building, as a single *zone,* sizing for the heating and cooling equipment in the *ERI reference design* residence in accordance with Section R403.6.
3. Calculations that account for the effects of indoor and outdoor temperatures and part-load ratios on the performance of heating, ventilating and air-conditioning equipment based on climate and equipment sizing.
4. Printed *code official* inspection checklist listing each of the *rated design* component characteristics determined by the analysis to provide compliance, along with their respective performance ratings.

R406.7.2 (N1106.7.2) Specific approval. Performance analysis tools meeting the applicable sections of Section R406 shall be *approved.* Tools are permitted to be *approved* based on meeting a specified threshold for a jurisdiction. The *code official* shall approve tools for a specified application or limited scope.

R406.7.3 (N1106.7.3) Input values. When calculations require input values not specified by Sections R402, R403, R404 and R405, those input values shall be taken from an *approved* source.

Add new definitions as follows:

RATED DESIGN. A description of the proposed building used to determine the energy rating index.

ERI REFERENCE DESIGN. A version of the *rated design* that meets the minimum requirements of the 2006 *International Energy Conservation Code.*

Reason: The residential provisions of the IECC allows for varying methods for demonstrating compliance with the code. This includes both a prescriptive and simulated performance option in addition to allowing efficiency programs that are designed to go above the minimum code levels as “deemed to comply” programs. These above code programs must be approved by the code official to be used in the jurisdiction. Alternative programs that depend on an Energy Rating Index (ERI) have been approved as an alternative code or above code program in at least 6 states and in over 130 jurisdictions. These types of programs typically take the form of a Home Energy Rating System (HERS) program. Under the current code there is no guidance on setting Energy Rating Index scores, which will lead to inconsistent application of these types of programs based on climate zones.

The goal of this proposal is to introduce an Energy Rating Index with established rating numbers into the code that will allow alternative programs to be designed to meet these criteria. The proposal provides guidelines for the development of the index, documentation provided to ensure compliance and a requirement that an approved 3rd party verify that the building complies with the applicable Energy Rating Index. The reference house is based on a home built to the 2006 IECC which is consistent with ERI based programs.

The 2009 IECC residential envelope requirements have been set as the least efficient level of efficiency for potential trade-offs to ensure that minimum levels of efficiency that have proven to be cost effective are installed in all buildings and that some flexibility is allowed in the approach to alternative designs. This proposal also requires complying with the applicable mandatory requirements to be consistent with the Above Code section in the IECC. And because energy losses in the domestic hot water distribution system fall outside the scope of the energy rating index as it can be calculated with 2013 methodology, current code provisions relating to hot water pipe insulation are mandatory as well. We anticipate that these requirements can be folded into the energy rating index for the 2018 IECC and thus removed from the mandatory sections then.

This proposal is intended to produce substantial additional energy savings compared to the current or proposed levels of prescriptive requirements in the 2015 IECC while allowing considerably greater flexibility to builders using a method with which a large segment of the market is already familiar. This flexibility is likely to result in lower construction costs for any given level of energy efficiency. Builders who do not make use of this proposed method are still able to comply with the Code can still use any of the existing compliance pathways.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

Committee Action: **Approved as Submitted**

Committee Reason: This proposal, while providing 20% more stringency, provides a system that has considerably more flexibilitty for achieving energy efficiency. Rating systems are becoming a more common approach, with straightforward options that are being more widely used in the construction marketplace.

Assembly Action: **None**

Final Hearing Results

RE188-13	**AS**

Code Change No: RE193-13

Original Proposal

Section(s): R202 (IRC N1101.9), 403.10 (New) (IRC N1103.10 (New))

Proponent: Darren Meyers, P.E., International Energy Conservation Consultants, LLC, consultant to Illinois Energy Office – Department of Commerce & Economic Opportunity (dmeyers@ieccode.com)

Revise as follows:

SECTION R202 (N1101.9)
GENERAL DEFINITIONS

COMBUSTION APPLIANCE ZONE (CAZ). A contiguous air volume within a building that contains a containing a Category I or II atmospherically-vented appliance or a Category III or IV direct vent or integral vent appliance drawing combustion air from inside of the building or dwelling unit. The CAZ includes but is not limited to, a mechanical closet, mechanical room, or the main body of a house or dwelling unit.

DRAFT. The pressure difference existing between the *appliance* or any component part and the atmosphere, that causes a continuous flow of air and products of *combustion* through the gas passages of the *appliance* to the atmosphere.

Mechanical or induced draft. The pressure difference created by the action of a fan, blower or ejector that is located between the *appliance* and the *chimney* or vent termination.

Natural draft. The pressure difference created by a vent or *chimney* because of its height, and the temperature difference between the *flue gases* and the atmosphere.

SPILLAGE. Combustion gases emerging from an appliance or venting system into the combustion appliance zone during burner operation.

Add new text as follows:

R403.10 (N1103.10) Worst-case testing of atmospheric venting systems. Buildings or dwelling units containing a Category I or II atmospherically-vented appliance; or a Category III or IV direct vent or integral vent appliance drawing combustion air from inside of the building or dwelling unit, shall have the Combustion Appliance Zone (CAZ) tested for spillage, acceptable draft and carbon monoxide (CO) in accordance with this Section. Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope* and prior to final inspection.

> **Exception:** Buildings or dwelling units containing only Category III or IV direct vent or integral vent appliances that do not draw combustion air from inside of the building or dwelling unit.

The enumerated test procedure below shall be followed during test

1. Set all combustion appliances to the pilot setting or turn off the service disconnects for all combustion appliances. Close all exterior doors and windows and the fireplace damper. With the building or dwelling unit in this configuration, measure and record the baseline ambient pressure

inside the building or dwelling unit CAZ. Compare the baseline ambient pressure of the CAZ to that of the outside ambient pressure, and record the difference (Pa).

2. Establish worst case by turning on the *clothes dryer* and all exhaust fans. Close all interior doors that make the CAZ pressure more negative. Turn on the air handler, where present, and leave on if as a result, the pressure in the CAZ becomes more negative. Check interior door positions again, closing only the interior doors that make the CAZ pressure more negative. Measure net change in pressure from the CAZ to outdoor ambient pressure, correcting for the base ambient pressure inside the home. Record "worst case depressurization" pressure and compare to Table R403.10(1).

   Where CAZ depressurization limits are exceeded under worst-case conditions according to Table R403.10(1), additional combustion air must be provided or other modifications to building air-leakage performance or exhaust appliances such that depressurization is brought within the limits prescribed in Table R403.10(1).

3. Measure worst case spillage, acceptable draft, and carbon monoxide (CO) by firing the fuel-fired appliance with the smallest Btu capacity first.

   a. Test for spillage at the draft diverter with a mirror or smoke puffer. An appliance that continues to spill flue gases for more than 60 seconds fails the spillage test.
   b. Test for CO measuring undiluted flue gases, in the throat or flue of the appliance using a digital gauge in parts per million (ppm) at the 10 minute mark. Record CO ppm readings to be compared with Table R403.10(3) upon completion of Step 4. Where the spillage test fails under worst case, go to Step 4.
   c. Where spillage ends within 60 seconds, test for acceptable draft in the connector no less than one foot, but no more than two feet downstream of the draft diverter. Record draft pressure and compare to Table R403.10(2).
   d. Fire all other connected appliances simultaneously and test again at the draft diverter of each appliance for spillage, CO and acceptable draft using procedures 3a through 3c.

4. Measure spillage, acceptable draft, and carbon monoxide (CO) under natural conditions—without *clothes dryer* and exhaust fans on—according to the procedure outlined in Step 3, measuring the net change in pressure from worst case condition in Step 3 to natural in the CAZ to confirm the worst case depressurization taken in Step 2. Repeat the process for each appliance, allowing each vent system to cool between tests.
5. Monitor indoor ambient CO in the breathing zone continuously during testing, and abort the test where indoor ambient CO exceeds 35 ppm by turning off the appliance, ventilating the space, and evacuating the building. The CO problem must be corrected prior to completing combustion safety diagnostics.
6. Make recommendations based on test results and the retrofit action prescribed in Table R40310.3).

TABLE R403.10(1) (N1103.10(1))
CAZ DEPRESSURIZATION LIMITS

VENTING CONDITION	**LIMIT (Pa)**
Category I, atmospherically-vented water heater	-2.0
Category I or II atmospherically-vented boiler or furnace common-vented with a Category I atmospherically-vented water heater	-3.0
Category I or II atmospherically-vented boiler or furnace, equipped with a flue damper, and common-vented with a Category I atmospherically-vented water heater	-5.0

Category I or II atmospherically-vented boiler or furnace alone	
Category I or II atmospherically-vented, fan-assisted boiler or furnace common-vented with a Category I atmospherically-vented water heater	
Decorative vented, gas appliance	
Power vented or induced-draft boiler or furnace alone, or fan assisted water heater alone	-15.0
Category IV direct vented appliances and sealed combustion appliances	-50.0

For SI: 6894.76 Pa = 1.0 psi.

TABLE R403.10(2) (N1103.10(2))
ACCEPTABLE DRAFT TEST CORRECTION

OUTSIDE TEMPERATURE (°F)	**MINIMUM DRAFT PRESSURE REQUIRED (Pa)**
< 10	-2.5
10 – 90	(Outside Temperature ÷ 40) – 2.75
> 90	-0.5

For SI: 6894.76 Pa = 1.0 psi.

TABLE R403.10(3) (N1103.10(3))
ACCEPTABLE DRAFT TEST CORRECTION

CARBON DIOXIDE LEVEL (ppm)	**AND OR**	**SPILLAGE AND ACCEPTABLE DRAFT TEST RESULTS**	**RETROFIT ACTION**
0 – 25	and	Passes	Proceed with work
25 < x ≤ 100	and	Passes	Recommend that CO problem be resolved
25 < x ≤ 100	and	Fails in worst case only	Recommend an appliance service call and repairs to resolve the problem
100 < x ≤ 400	or	Fails under natural conditions	**Stop!** Work shall not proceed until appliance is serviced and problem resolved
> 400	and	Passes	**Stop!** Work shall not proceed until appliance is serviced and problem resolved
> 400	and	Fails under any condition	**Emergency!** Shut off fuel to appliance and call for service immediately

Reason: Energy efficiency improvements often have a direct impact on the building pressure boundary affecting the safe operation of combustion equipment. Routinely sealing up buildings without looking at the combustion equipment risk sooner or later will result in harming someone with back-drafted flue gas conditions.

This proposal is intended to provide clear guidance to builders, code officials and home performance contractors for worst-case testing of atmospheric venting systems where air-sealing techniques and air-leakage performance testing requirements of the 2015 IECC are employed. Worst case testing is used by home performance contractors to identify problems that weaken draft and restrict combustion air. Worst case vent testing uses the home's exhaust fans, air handling appliances and chimneys to create worst case depressurization in the combustion appliance zone (CAZ).

Language that is proposed for R403.10 is basically a distilled version of predominant combustion safety test procedures for atmospherically vented appliances found in readily available home performance programs across the country, such as EPA's Healthy Indoor Environments Protocols, EPA's Home Performance with Energy Star, DOE's Workforce Guidelines for Home Energy Upgrades, HUD's Community Development Block Grants and Weatherization Assistance Programs, BPI's Technical Standards for the Building Analyst Professional, and RESNET's Interim Guidelines for Combustion Appliance Testing and Writing Work Scopes. The proposed language is intended to take the combustion safety test procedures that are used most commonly by these home performance, weatherization, and beyond code programs, and reduce them to their simplest and most straightforward form for the purpose of combustion safety in IECC compliance and field assessment through the use of building diagnostic tools.

For Illinois, our required 9-month review process of the 2012 IECC resulted in the Illinois Energy Code Advisory Council (ECAC) concluding that reductions in building envelope air-leakage from 7 ACH50 (2009 IECC) to 5 ACH50 was a more conservative approach to take for the construction industry in our state than the more "aggressive" 7 ACH50 (2009 IECC) to 3 ACH50, as is the case with the 2012 IECC for Climate Zones 4 and 5.

While part of ECAC's consideration was the decision to insert the 2012 IRC's whole-house ventilation provisions based on ASHRAE 62.2 directly into the Illinois Energy Conservation Code, this proposal recognizes that under certain conditions, perhaps even those of forthcoming 2015 IECC, reduced natural air-leakage coupled with the installation of atmospheric combustion appliances will reduce air exchange to the outside with the potential to contribute to poor indoor air quality and possible health problems due to spillage, inadequate draft, or carbon monoxide concerns.

We suspect other states and municipalities considering 2015 IECC adoptions will seek similar building diagnostic-based solutions to combustion safety.

Cost Impact: The code change proposal will increase the cost of construction.

Public Hearing Results

Committee Action: **Disapproved**

Committee Reason: Addressment of the issue of combustion air issues is a mechanical code issue, rather than an energy code issue. The IECC committee is not qualified to deal with this issue.

Assembly Action: **None**

Public Comments

Public Comment 1:

Darren Meyers, P.E., International Energy Conservation Consultants, LLC, consultant to Illinois Energy Office – Department of Commerce & Economic Opportunity requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

IECC-R: Renumber definitions and sections of proposed text as a new "informative" Appendix A. The text of the new Appendix A would read as follows:

APPENDIX A
RECOMMENDED PROCEDURE FOR WORST-CASE TESTING OF ATMOSPHERIC VENTING SYSTEMS UNDER R402.4 OR R405 CONDITIONS ≤ 5ACH$_{50}$
(This appendix is informative and is not part of the code.)

SECTION A101
SCOPE

A101.1 General. This appendix is intended to provide guidelines for worst-case testing of atmospheric venting systems. Worst case testing is recommended to identify problems that weaken draft and restrict combustion air.

SECTION A202
GENERAL DEFINITIONS

COMBUSTION APPLIANCE ZONE (CAZ). A contiguous air volume within a building that contains a containing a Category I or II atmospherically-vented appliance or a Category III or IV direct vent or integral vent appliance drawing combustion air from inside of the building or dwelling unit. The CAZ includes but is not limited to, a mechanical closet, mechanical room, or the main body of a house or dwelling unit.

DRAFT. The pressure difference existing between the *appliance* or any component part and the atmosphere, that causes a continuous flow of air and products of *combustion* through the gas passages of the *appliance* to the atmosphere.

Mechanical or induced draft. The pressure difference created by the action of a fan, blower or ejector that is located between the *appliance* and the *chimney* or vent termination.

Natural draft. The pressure difference created by a vent or *chimney* because of its height, and the temperature difference between the *flue gases* and the atmosphere.

SPILLAGE. Combustion gases emerging from an appliance or venting system into the combustion appliance zone during burner operation.

A301.1 ~~R403.10~~ Worst-case testing of atmospheric venting systems. Buildings or dwelling units containing a Category I or II atmospherically-vented appliance; or a Category III or IV direct vent or integral vent appliance drawing combustion air from inside of the building or dwelling unit, shall have the Combustion Appliance Zone (CAZ) tested for spillage, acceptable draft and carbon monoxide (CO) in accordance with this Section. Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*. Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope* and prior to final inspection.

> **Exception:** Buildings or dwelling units containing only Category III or IV direct vent or integral vent appliances that do not draw combustion air from inside of the building or dwelling unit.

The enumerated test procedure below shall be followed during test

1. Set all combustion appliances to the pilot setting or turn off the service disconnects for all combustion appliances. Close all exterior doors and windows and the fireplace damper. With the building or dwelling unit in this configuration, measure and record the baseline ambient pressure inside the building or dwelling unit CAZ. Compare the baseline ambient pressure of the CAZ to that of the outside ambient pressure, and record the difference (Pa).
2. Establish worst case by turning on the *clothes dryer* and all exhaust fans. Close all interior doors that make the CAZ pressure more negative. Turn on the air handler, where present, and leave on if as a result, the pressure in the CAZ becomes more negative. Check interior door positions again, closing only the interior doors that make the CAZ pressure more negative. Measure net change in pressure from the CAZ to outdoor ambient pressure, correcting for the base ambient pressure inside the home. Record "worst case depressurization" pressure and compare to Table A301.1(1) ~~R403.10(1)~~.

   Where CAZ depressurization limits are exceeded under worst-case conditions according to Table A301.1(1) ~~R403.10(1)~~, additional combustion air must be provided or other modifications to building air-leakage performance or exhaust appliances such that depressurization is brought within the limits prescribed in Table A301.1(1) ~~R403.10(1)~~.

3. Measure worst case spillage, acceptable draft, and carbon monoxide (CO) by firing the fuel-fired appliance with the smallest Btu capacity first.

   a. Test for spillage at the draft diverter with a mirror or smoke puffer. An appliance that continues to spill flue gases for more than 60 seconds fails the spillage test.
   b. Test for CO measuring undiluted flue gases, in the throat or flue of the appliance using a digital gauge in parts per million (ppm) at the 10 minute mark. Record CO ppm readings to be compared with Table A301.1(3) ~~R403.10(3)~~ upon completion of Step 4. Where the spillage test fails under worst case, go to Step 4.
   c. Where spillage ends within 60 seconds, test for acceptable draft in the connector no less than one foot, but no more than two feet downstream of the draft diverter. Record draft pressure and compare to Table A301.1(2) ~~R403.10(2).~~
   d. Fire all other connected appliances simultaneously and test again at the draft diverter of each appliance for spillage, CO and acceptable draft using procedures 3a through 3c.

4. Measure spillage, acceptable draft, and carbon monoxide (CO) under natural conditions—without *clothes dryer* and exhaust fans on—according to the procedure outlined in Step 3, measuring the net change in pressure from worst case condition in Step 3 to natural in the CAZ to confirm the worst case depressurization taken in Step 2. Repeat the process for each appliance, allowing each vent system to cool between tests.
5. Monitor indoor ambient CO in the breathing zone continuously during testing, and abort the test where indoor ambient CO exceeds 35 ppm by turning off the appliance, ventilating the space, and evacuating the building. The CO problem must be corrected prior to completing combustion safety diagnostics.
6. Make recommendations based on test results and the retrofit action prescribed in Table A301.1(3) ~~R403.10(3).~~

TABLE <u>A301.1(1)</u> ~~R403.10(1)~~
CAZ DEPRESSURIZATION LIMITS

VENTING CONDITION	LIMIT (Pa)
Category I, atmospherically-vented water heater	-2.0
Category I or II atmospherically-vented boiler or furnace common-vented with a Category I atmospherically-vented water heater	-3.0
Category I or II atmospherically-vented boiler or furnace, equipped with a flue damper, and common-vented with a Category I atmospherically-vented water heater	-5.0
Category I or II atmospherically-vented boiler or furnace alone	
Category I or II atmospherically-vented, fan-assisted boiler or furnace common-vented with a Category I atmospherically-vented water heater	
Decorative vented, gas appliance	
Power vented or induced-draft boiler or furnace alone, or fan assisted water heater alone	-15.0
Category IV direct vented appliances and sealed combustion appliances	-50.0

For SI: 6894.76 Pa = 1.0 psi.

TABLE <u>A301.1(2)</u> ~~R403.10(2)~~
ACCEPTABLE DRAFT TEST CORRECTION

OUTSIDE TEMPERATURE (°F)	MINIMUM DRAFT PRESSURE REQUIRED (Pa)
< 10	-2.5
10 – 90	(Outside Temperature ÷ 40) – 2.75
> 90	-0.5

For SI: 6894.76 Pa = 1.0 psi.

TABLE <u>A301.1(3)</u> ~~R403.10(3)~~
ACCEPTABLE DRAFT TEST CORRECTION

CARBON DIOXIDE LEVEL (ppm)	AND OR	SPILLAGE AND ACCEPTABLE DRAFT TEST RESULTS	RETROFIT ACTION
0 – 25	and	Passes	Proceed with work
25 < x ≤ 100	and	Passes	Recommend that CO problem be resolved
25 < x ≤ 100	and	Fails in worst case only	Recommend an appliance service call and repairs to resolve the problem
100 < x ≤ 400	or	Fails under natural conditions	**Stop!** Work shall not proceed until appliance is serviced and problem resolved
> 400	and	Passes	**Stop!** Work shall not proceed until appliance is serviced and problem resolved
> 400	and	Fails under any condition	**Emergency!** Shut off fuel to appliance and call for service immediately

Final Hearing Results

RE193-13 AMPC1

Code Change No: RE195-13

Original Proposal

Section(s): Table R402.1.2 (IRC N1102.1.2)

Proponent: Matt Dobson, Representing Vinyl Siding Institute

Revise as follows:

R402.1.2 (N1102.1.2) R-value computation. Insulation material used in layers, such as framing cavity insulation, insulating sheathing and insulated siding shall be summed to compute the component R-value. The manufacturer's settled R-value shall be used for blown insulation. Computed R-values shall not include an R-value for other building materials or air films. For the purpose of complying with Table R402.1.1, the manufacturer's labeled R-value shall be reduced by R-0.6 for insulated siding.

Reason: This simple addition to the paragraph allows insulated siding to be used as part of the calculation. This is important, as prior to the advent of insulated siding, the prescriptive approach prohibits including the siding's R-value. This change will help to create more innovative ways to meet the energy code requirements and improve energy efficiency.

Because the R-value for siding is already credited as part of the prescriptive compliance method used with Table R402.1.1, that amount, R-0.6, must be deducted from the manufacturer labeled R-value of the insulated siding. This would mean that if the insulated siding's tested R-value (based on an ASTM C1363 test) were R-3.6, that only R-3.0 could be used to help comply through the prescriptive method of Table R402.1.1. Additionally, it should be understood that air films (both on the front and back of the insulated siding) are not taken into account during the R-value testing for insulated siding, so credits for those air films in the prescriptive section should remain in place.

For more information about insulated siding, go to www.insulatedsiding.info.

Cost Impact: The code change proposal will not increase the cost of construction and could potentially reduce costs by offering an additional option for compliance with the prescriptive path.

Public Hearing Results

Committee Action: **Approved as Modified**

Modify the proposal as follows:

R402.1.2 (N1102.1.2) R-value computation. Insulation material used in layers, such as framing cavity insulation, ~~insulating sheathing and insulated siding~~ or continuous insulation shall be summed to compute the component R-value. The manufacturer's settled R-value shall be used for blown insulation. Computed R-values shall not include an R-value for other building materials or air films. ~~For the purpose of complying with Table R402.1.1, the manufacturer's labeled R-value shall be reduced by R-0.6 for insulated siding.~~ Where insulated siding is used for the purpose of complying with the continuous insulation requirements of Table R402.1.1, the manufacturer's labeled R-Value for insulated siding shall be reduced by R-0.6.

Committee Reason: Committee Reason: This proposal will add more information about a product that can be used to meet code envelope requirements. This gives builders more flexibility with more products that can be used to meet the code requirements. The modification is a rewrite to clarify proponent's intent.

Assembly Action: **None**

Final Hearing Results

RE195-13 **AM**

Code Change No: SP19-13

Original Proposal

Section(s): 303.1; IECC C404.7; IECC R403.9

Proponent: Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals (jhatfield@apsp.org)

THIS IS A 3 PART CODE CHANGE. PART I WILL BE HEARD BY THE ISPSC COMMITTEE, Part II WILL BE HEARD BY THE IECC-CE COMMITTEE, PART III WILL BE HEARD BY THE IECC-RE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.

PART I - ISPSC

Revise as follows:

303.1 ~~General~~ Pool and spa energy consumption. The energy consumption of ~~requirements for~~ pools and ~~inground permanently~~ ~~installed~~ *permanent residential spas* shall be controlled by the requirements ~~as specified~~ in Sections 303.~~2~~ 1.1 through 303.1.4. ~~and APSP 15. The energy requirements for residential portable electric spas shall be in accordance with APSP 14.~~

303.1.1 Residential pools and permanent residential spas. *Residential swimming pools* and *permanent residential spas* shall be in accordance with APSP-15.

303.1.2 Heaters. The electric power to heaters shall be ~~equipped~~ ~~with~~ controlled by a~~n~~ readily accessible ~~external~~ on-off switch that is mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. ~~to allow the heater to be shutoff without adjusting the thermostat setting.~~ ~~Such switch shall be provided with ready access~~. Gas-fired heaters shall not be equipped with ~~continuous pilot burners~~ continuously-burning ignition pilots.

> ~~**Exception:** Portable residential spas and portable residential exercise spas.~~

303.1.3 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump~~s~~ motors according to a preset schedule shall be installed ~~with~~ for ~~on~~ ~~all~~ heaters and pump motors. Heaters and~~,~~ pump~~s and~~ motors that have built-in timer~~s~~ switches shall be ~~deemed~~ in compliance with this section ~~requirement~~.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- or waste-heat recovery pool heating systems.
3. ~~Portable residential spas and portable residential exercise spas.~~

303.1.4 Covers. Outdoor heated pools and outdoor ~~inground permanently-installed~~ *permanent residential spas* shall be provided with a vapor retardant cover, a liquid cover or other *approved* vapor retardant means in accordance with 104.11.

> **Exception:** Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.

303.2 Portable residential spas. The energy consumption of electric-powered *portable residential spas* shall be controlled by the requirements of APSP 14.

PART II - IECC-COMMERCIAL PROVISIONS

Revise as follows:

C404.7 Pools and spa energy consumption ~~inground permanently installed spas.~~ (Mandatory). ~~Pools and inground permanently installed spas shall comply with Sections C404.7.1 through C404.7.3.~~ The energy consumption of pools and ~~inground~~ permanent residential spas shall be controlled by the requirements in Sections C404.7.1 through C404.7.4.

C404.7.1 Heaters. The electric power to ~~all~~ heaters shall be ~~equipped~~ ~~with~~ controlled by a~~n~~ readily accessible ~~external~~ on-off switch that is mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. ~~to allow the heater to be shutoff without adjusting the thermostat setting.~~ ~~Such switch shall be provided with ready access~~. Gas-fired heaters shall not be equipped with ~~continuous pilot burners~~ continuously-burning ignition pilots..

> ~~**Exception:** Portable residential spas and portable residential exercise spas.~~

C404.7.2 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed ~~with~~ for ~~on~~ ~~all~~ heaters and pump motors. Heaters and~~,~~ pump~~s and~~ motors that have built-in time~~rs~~ switches shall be ~~deemed~~ in compliance with this section ~~requirement~~.

> **Exceptions:**
>
> 1. Where public health standards require 24-hour pump operation.
> 2. ~~Where~~ Pumps that ~~are required to~~ operate solar- and waste-heat-recovery pool heating systems.

C404.7.3 Covers. Outdoor heated pools and outdoor ~~inground permanently-installed~~ permanent residential spas shall be provided with a vapor retardant cover, a liquid cover or other *approved* vapor retardant means.

> **Exception:** ~~A vapor-retardant cover is not required for pools deriving over 70 percent of the energy for heating from site-recovered energy, such as a heat pump or solar energy source computed over an operating season.~~ Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.

C404.8 Portable residential spas. The energy consumption of electric-powered portable residential spas shall be controlled by the requirements of APSP 14.

Part III - IECC-Residential Provisions

Revise as follows:

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R403.9 Pools and spa energy consumption ~~inground permanently installed spas.~~ (Mandatory). ~~Pools and inground permanently installed spas shall comply with Sections R403.9.1 through R403.9.3.~~ The energy consumption of pools and ~~inground~~ permanent residential spas shall be controlled by the requirements in Sections R403.9.1 through R403.9.4.

R403.9.1 Heaters. The electric power to heaters shall be ~~equipped~~ ~~with~~ controlled by ~~an~~ readily accessible ~~external~~ on-off switch that is mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. ~~to allow the heater to be shutoff without adjusting the thermostat setting.~~ ~~Such switch shall be provided with ready access~~. Gas-fired heaters shall not be equipped with ~~continuous pilot burners~~ continuously-burning ignition pilots.

R403.9.2 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed ~~with~~ for ~~on~~ ~~all~~ heaters and pump motors. Heaters and~~,~~ pump~~s and~~ motors that have built-in tim~~ers~~ switches shall be ~~deemed~~ in compliance with this section ~~requirement~~.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. ~~Where~~ Pumps that ~~are required to~~ operate solar- and waste-heat-recovery pool heating systems.

R403.9.3 Covers. Outdoor heated pools and outdoor ~~inground permanently-installed~~ permanent residential spas shall be provided with a vapor retardant cover, a liquid cover or other *approved* vapor retardant means.

Exception: ~~A vapor-retardant cover is not required for pools deriving over 70 percent of the energy for heating from site-recovered energy, such as a heat pump or solar energy source computed over an operating season.~~ Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.

R403.10 Portable residential spas. The energy consumption of electric-powered portable residential spas shall be controlled by the requirements of APSP 14.

Reason:
PART I: This code change provides for the following:

1. All parts work to provide consistent language with pool and spa energy provisions found in the ISPSC and IECC. Some portions have been added here that were already included in the ISPSC and vice versa on part II and III of this proposal below.
2. Clarifies APSP-15 only applies to residential pools and inground spas.
3. Changes wording to use defined terms, as found in Chapter 2 of the ISPSC.
4. Clarifications regarding on-off switches for heaters.
6. Consistent verbiage within the time switch requirements.
7. Provides for clarity that the cover requirements are only for outdoor pools.
8. Provides for options when it comes to pool and spa covers to ensure one can comply with more intricately designed pools and spas (shape, size/infinity pools/etc.). Otherwise if only one type of method can be used then the code is limiting the design of any pool or spa. The "typical" rectangle pool is no longer the norm.

PART II Reason: This code change provides for the following:

1. All parts work to provide consistent language with pool and spa energy provisions found in the ISPSC and IECC. Some portions have been added here that were already included in the ISPSC and vice versa on part II and III of this proposal below.
2. Changes wording to use defined terms, as found in Chapter 2 of the ISPSC.
3. Clarifications regarding on-off switches for heaters.
4. Consistent verbiage within the time switch requirements.
5. Provides for clarity that the cover requirements are only for outdoor pools.
6. Provides for options when it comes to pool and spa covers to ensure one can comply with more intricately designed pools and spas (shape, size/infinity pools/etc.). Otherwise if only one type of method can be used then the code is limiting the design of any pool or spa. The "typical" rectangle pool is no longer the norm.
7. Provides for a new subsection to address portable residential spas in the rare case they would be used for more than a four story building and therefore fall under the commercial code.

PART III Reason: This code change provides for the following:

1. All parts work to provide consistent language with pool and spa energy provisions found in the ISPSC and IECC. Some portions have been added here that were already included in the ISPSC and vice versa on part II and III of this proposal below.
2. Clarifies APSP-15 only applies to residential pools and inground spas.
3. Changes wording to use defined terms, as found in Chapter 2 of the ISPSC.
4. Clarifications regarding on-off switches for heaters.
5. Consistent verbiage within the time switch requirements.
6. Provides for clarity that the cover requirements are only for outdoor pools.
7. Provides for options when it comes to pool and spa covers to ensure one can comply with more intricately designed pools and spas (shape, size/infinity pools/etc.). Otherwise if only one type of method can be used then the code is limiting the design of any pool or spa. The "typical" rectangle pool is no longer the norm.
8. Provides for a new subsection to address portable residential spas, requiring their compliance with the APSP-14 energy standard, consistent with the ISPSC.

Cost impact: These code change proposals will not increase the cost of construction.

Public Hearing Results

The code change is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information.

PART I – ISPSC

Heard by the ISPSC Committee

Committee Action: Disapproved

Committee Reason: The proposal was disapproved because it does not give credit to heaters that have on-off switches integral to the product. Shutting off power to some controls might cause the control to revert back to factory settings. Covers are only required for outdoor pools and spas. Indoor pools and spas should also have covers. Liquid covers are relatively new but there are no standards for this type of product. A standard for this product should be available before it is required by the code.

Assembly Action: None

PART II – IECC - Commercial

Heard by the IECC-Commercial Provisions Committee

Committee Action: Approved as Modified

Modify the proposal as follows:

C404.7 Pools and permanent spa energy consumption (Mandatory). The energy consumption of pools and permanent ~~residential~~ spas shall be controlled by the requirements in Sections C404.7.1 through C404.7.4.

C404.7.1 Heaters. The electric power to heaters shall be controlled by a readily accessible on-off switch that is an integral part of the heater, mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Gas-fired heaters shall not be equipped with continuously-burning ignition pilots.

C404.7.2 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed for heaters and pump motors. Heaters and pump motors that have built-in time switches shall be in compliance with this section.

Exceptions:
1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- and waste-heat-recovery pool heating systems.

C404.7.3 Covers. Outdoor heated pools and outdoor permanent ~~residential~~ spas shall be provided with a vapor retardant cover~~, a liquid cover~~ or other *approved* vapor retardant means.

Exception: Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered

energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.
C404.8 Portable ~~residential~~ spas (Mandatory). The energy consumption of electric-powered portable ~~residential~~ spas shall be controlled by the requirements of APSP 14.

Committee Reason: The reason for making the modification is that this limits the energy requirements to permanent spas only. The reason for approving the overall proposal is that the proposal coordinates the energy requirements between the IECC and the ISPSC.

Assembly Action: None

PART III – IECC – Residential

Heard by the IECC-Residential Provisions Committee

Committee Action: Approved as Modified

Modify the proposal as follows:

R403.9 (N1104.9) Pools and <u>permanent</u> spa energy consumption (Mandatory). The energy consumption of pools and permanent residential spas shall be controlled by the requirements in Sections R403.9.1 through R403.~~9.4~~ <u>9.3</u>.

> **Exception: ~~R403.9.1 Residential pools and permanent residential spas.~~** <u>Heaters and time switches</u> for swimming pools and permanent spas that are accessory to detached one- and two- family dwellings and townhouses 3 stories or less in height above ground plane and that are available only to the household and its guests shall be in accordance with APSP-15.

R403.9.~~2~~ <u>1</u> (N1104.9.~~2~~ <u>1</u>) Heaters. The electric power to heaters shall be controlled by a readily accessible on-off switch that is <u>an integral part of the heater,</u> mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Gas-fired heaters shall not be equipped with continuously-burning ignition pilots.

R403.9.~~3~~ <u>2</u> (N1104.9.~~3~~ <u>2</u>) Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed for ~~on all~~ heaters and pump motors. Heaters and~~,~~ pump~~s and~~ motors that have built-in time switches shall be in compliance with this section.

> **Exceptions:**
>
> 1. Where public health standards require 24-hour pump operation.
> 2. Pumps that operate solar- and waste-heat-recovery pool heating systems.

R403.~~9.4~~ <u>9.3</u> (N1104.~~9.4~~ <u>9.3</u>) Covers. Outdoor heated pools and outdoor ~~permanent~~ residential spas shall be provided with a vapor retardant cover~~, a liquid cover~~ or other *approved* vapor retardant means.

> **Exception:** Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required

Committee Reason: For the modification, the committee agreed with the testimony from the proponent of floor modification that heaters and time switches for pools and spas accessory to IRC-type buildings do not need to comply with the same, more stringent, requirements for commercial applications. For the overall proposal, the committee agreed with the proponent's reason statement.

Assembly Action: None

Public Comments

PART I

Public Comment:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

303.1 Energy consumption of pool<u>s</u> and <u>permanent</u> spas. The energy consumption of pools and *permanent ~~residential~~ spas* shall be controlled by the requirements in Sections 303.1.1 through 303.1.~~4~~3.

~~**303.1.1 Residential pools and permanent residential spas.** *Residential swimming pools* and *permanent residential spas* shall be in accordance with APSP-15.~~

303.1.~~2~~1 Heaters. The electric power to heaters shall be controlled by a readily accessible on-off switch that is an integral part of the heater, mounted on the exterior of the heater or external to and within 3 feet (914 mm) of the heater. Operation of such switch shall not change the setting of the heater thermostat. Such switches shall be in addition to a circuit breaker for the power to the heater. Gas-fired heaters shall not be equipped with continuously-burning ignition pilots.

303.1.~~3~~2 Time switches. Time switches or other control methods that can automatically turn off and on heaters and pump motors according to a preset schedule shall be installed for heaters and pump motors. Heaters and pump motors that have built-in timer switches shall be deemed in compliance with this section.

Exceptions:

1. Where public health standards require 24-hour pump operation.
2. Pumps that operate solar- or waste-heat recovery pool heating systems.

303.1.~~4~~3 Covers. Outdoor heated pools and outdoor *permanent ~~residential~~ spas* shall be provided with a vapor retardant cover~~, a liquid cover~~ or other *approved* vapor retardant means in accordance with Section 104.11.

Exception: Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.

303.2 Portable ~~residential~~ spas. The energy consumption of electric-powered *portable ~~residential~~ spas* shall be controlled by the requirements of APSP 14.

303.3 Residential pools and permanent residential spas. The energy consumption of *residential swimming pools* and *permanent residential spas* shall be controlled in accordance with the requirements of APSP 15.

Commenter's Reason: As it stands now there are inconsistent energy efficiency requirements between the IECC and ISPSC, which is why this three part public comment is essential to ensure that these codes are consistent with ANSI approved APSP Standards. Otherwise code officials, owners, manufacturers and installers will be faced with conflicting and possibly incompatible language. The public comment addresses the ISPSC committee's concerns, some of which was addressed in the IECC parts of the proposal in Dallas by floor modification after the input received by the ISPSC committee under Part I. This public comment implements those IECC changes to the ISPSC (Part I) portion of the proposal, but makes further clarifications to all parts to ensure the two I-codes have consistent energy efficient requirements for pools and spas.

Specifically in regards to Part I of the proposal, the public comment addresses the ISPSC committees reason for disapproval by a) adding in the integral on and off switches for heaters (already done in the IECC), b) removing the specific reference to a liquid cover, and allowing the AHJ to determine what other "approved vapor retardant means" can be used consistent with Chapter 1 (already done in the IECC), and 3) clarifying which provisions apply to public as opposed to residential *pools or permanent spas or portable spas.* This last aspect is critical to ensure it is only residential pools and spas that must meet the APSP Standard, as intended by the Standard, and the remaining portions are for both public and residential.

Part II of the proposal simply modifies the committee action by correcting a section reference. Part III of the proposal clarifies what provisions apply to public versus residential *pools as opposed to permanent spas or portable spas* – ensuring consistency between the respective Codes and the APSP Standard, following the proposed modifications under Part I.

PART II

Public Comment 1:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

C404.7 Energy consumption of pools and permanent spas (Mandatory). The energy consumption of pools and permanent spas shall be controlled by the requirements in Sections C404.7.1 through C404.7.~~4~~3.

Commenter's Reason: This public comment simply modifies the committee action by fixing a section reference. There is not a Section C404.7.4.

Public Comment 2:

Edward R. Osann, Natural Resources Defense Council on behalf of self (eosann@nrdc.org) requests Approval as Modified by this Public Comment

Further modify the proposal as follows:

C404.7.3 Covers. ~~Outdoor~~ Heated pools and outdoor permanent spas shall be provided with a vapor retardant cover or other *approved* vapor retardant means.

> **Exception:** Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required.

Commenter's Reason: Without explanation or justification, the proposal as submitted would weaken current code language by removing the requirement that a pool cover be provided for all heated pools, whether located indoors or out. There is important value provided by a cover for an indoor pool, including humidity management, which has important energy implications. The modification in this comment would restore the current requirement that new heated indoor pools be provided with a vapor retardant cover.

PART III

Public Comment 1:

Jennifer Hatfield, J. Hatfield & Associates, PL, representing the Association of Pool & Spa Professionals requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R403.9 (N1104.9)) Pools and permanent spa energy consumption (Mandatory). The energy consumption of pools and permanent ~~residential~~ spas shall be controlled by the requirements in Sections R403.9.1 through R403.9.3.

> ~~**Exception:** Heaters and time switches for swimming pools and permanent spas that are accessory to detached one- and two-family dwellings and townhouses 3 stories or less in height above ground plane and that are available only to the household and its guests shall be in accordance with APSP-15.~~

R403.9.3 (N1104.9.3) Covers. Outdoor heated pools and outdoor <u>permanent</u> ~~residential~~ spas shall be provided with a vapor retardant cover or other *approved* vapor retardant means.

> **Exception:** Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required

R403.10 (N110~~3~~<u>4</u>.10) Portable ~~residential~~ spas (Mandatory). The energy consumption of electric-powered portable ~~residential~~ spas shall be controlled by the requirements of APSP 14.

<u>**R403.11 (N1104.11) Residential pools and permanent residential spas.** Residential swimming pools and permanent residential spas that are accessory to detached one- and two- family dwellings and townhouses 3 stories or less in height above grade plane and that are available only to the household and its guests shall be in accordance with APSP-15.</u>

Commenter's Reason: This public comment simply clarifies what provisions apply to public versus residential pools as opposed to permanent spas or portable spas, also ensuring consistency between the respective codes.

Public Comment 2:

Edward R. Osann, Natural Resources Defense Council on behalf of self (eosann@nrdc.org) requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

R403.9.3 (N1104.9.3) Covers. ~~Outdoor~~ Heated pools and outdoor residential spas shall be provided with a vapor retardant cover or other *approved* vapor retardant means.

> **Exception:** Where more than 70 percent of the energy for heating, computed over an operating season, is from site-recovered energy such as from a heat pump or solar energy source, covers or other vapor retardant means shall not be required

Commenter's Reason: Without explanation or justification, the proposal as submitted would weaken current code language by removing the requirement that a pool cover be provided for all heated pools, whether located indoors or out. There is important value provided by a cover for an indoor pool, including humidity management, which has important energy implications. The modification in this comment would restore the current requirement that new heated indoor pools be provided with a vapor retardant cover.

Final Hearing Results

SP19-13 Part I	**AMPC**
SP19-13 Part II	**AMPC1**
SP19-13 Part III	**AMPC1**

Code Change No: ADM22-13

Original Proposal

Section: PART I – IBC: [A] 104.10, [A] 105.1, [A] 106.1, [A] 107.3.4, [A] 110.1, [A] 115.2, 202, 901.5, 1004.3, 1703.4.1, 1703.6, 1703.6.1, 1704.2, 1704.2.4, 1707.1, 1803.6, 3306.8, 3401.2, G104.1, J106.1, K102.3;
ICCPC: [A] 103.3.1, [A] 103.3.1.1, [A] 103.3.1.2, [A] 103.3.1.3, [A] 103.3.1.4, [A] 103.3.1.5, [A] 103.3.1.6, [A] 103.3.1.7, [A] 103.3.1.8, [A] 103.3.1.9, [A] 103.3.4.1.4, [A] 103.3.1.4.6, [A] 103.3.4.2.3, [A] 103.3.8.3, [A] 103.3.9.1.4, [A] 103.3.9.2.3, [A] 103.3.10.1;
IEBC: [A] 104.6, [A] 104.10, [A] 105.1, [A] 106.6, [A] 110.2, [A] 111.3, [A] 114.2, [A] 115.3, [A] 115.4, [A] 116.5, [A] 117.1, [A] 117.3;
IFC: [A] 104.3, [A] 104.3.1, [A] 104.7.2, [A] 105.1.1, [A] 109.2, [A] 109.3.1, [A] 109.3.2, [A] 110.4, [A] 111.2, [A] 112.1;
IFGC: [A] 102.3, [A] 104.4, [A] 105.1, [A] 106.1, [A] 106.3, [A] 108.5, [A] 108.7.2;
IMC: [A] 102.3, [A] 104.4, [A] 105.1, [A] 106.1, [A] 106.3, [A] 108.5, [A] 108.7.2;
IPC: [A] 102.3, [A] 104.4, [A] 105.1, [A] 106.1, [A] 106.3, [A] 108.5, [A] 108.7.2;
IPSDC: [A] 102.5, [A] 104.4, [A] 105.1, [A] 108.5, [A] 108.7.2;
IPMC: [A] 101.2, [A] 102.2, [A] 104.3, [A] 105.1, [A] 107.2, [A] 107.6, [A] 108.2, [A] 108.2.1, [A] 108.3, [A] 108.4, [A] 108.5, [A] 108.6, [A] 109.5, [A] 110.1, [A] 110.3, [A] 112.2;
IWUIC: [A] 101.6, [A] 105.1, [A] 105.2, [A] 109.2.2, [A] 109.3, [A] 109.4.1, [A] 109.4.5.2, [A] 109.4.5.2.1, [A] 109.4.5.3, [A] 109.4.5.4, [A] 113.2, [A] 114.2;
IZC: [A] 103.3, [A] 107.7.3, [A] 109.1
PART II – IECC: C108.2;
PART III – IECC: R108.2;
PART IV – IRC: R104.6, R105.1, R110.3, R111.3, R114.1;
PART V – ISPSC 102.3, 104.6, 104.8, 105.1, 105.2, 107.5, 107.7.2;

THIS IS A 5 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART V WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMMITTEES.

Proponent: Philip Brazil, P.E., S.E., Reid Middleton, Inc., representing Washington Association of Building Officials, Technical Code Development Committee (pbrazil@reidmiddleton.com)

PART I – IBC; ICCPC; IEBC; IFC; IFCG; IMC; IPC; IPSDC; IPMC; IWUIC; IZC

Revise the International Building Code as follows:

IBC SECTION 202
DEFINITIONS

IBC [A] REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE. A *registered design professional* engaged by the owner <u>or the owner's authorized agent</u> to review and coordinate certain aspects of the project, as determined by the *building official*, for compatibility with the design of the building or structure, including submittal documents prepared by others, deferred submittal documents and phased submittal documents.

Revise the International Building Code as follows:

IBC [A] 104.10 Modifications. Wherever there are practical difficulties involved in carrying out the provisions of this code, the *building official* shall have the authority to grant modifications for individual cases, upon application of the owner or the owner's ~~representative~~ authorized agent, provided the *building official* shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, accessibility, life and fire safety, or structural requirements. The details of action granting modifications shall be recorded and entered in the files of the department of building safety.

IBC [A] 105.1 Required. Any owner or owner's authorized agent who intends to construct, enlarge, alter, repair, move, demolish, or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the *building official* and obtain the required *permit*.

IBC [A] 106.1 Live loads posted. Where the live loads for which each floor or portion thereof of a commercial or industrial building is or has been designed to exceed 50 psf (2.40 kN/m^2), such design live loads shall be conspicuously posted by the owner or the owner's authorized agent in that part of each story in which they apply, using durable signs. It shall be unlawful to remove or deface such notices.

IBC [A] 107.3.4 Design professional in responsible charge. When it is required that documents be prepared by a *registered design professional*, the *building official* shall be authorized to require the owner or the owner's authorized agent to engage and designate on the building *permit* application a *registered design professional* who shall act as the *registered design professional in responsible charge*. If the circumstances require, the owner or the owner's authorized agent shall designate a substitute registered design professional in responsible charge who shall perform the duties required of the original *registered design professional in responsible charge*. The building official shall be notified in writing by the owner or the owner's authorized agent if the *registered design professional in responsible charge* is changed or is unable to continue to perform the duties.
The *registered design professional in responsible charge* shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building.

IBC [A] 110.1 General. Construction or work for which a permit is required shall be subject to inspection by the *building official* and such construction or work shall remain accessible and exposed for inspection purposes until *approved*. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid. It shall be the duty of the ~~*permit* applicant~~ owner or the owner's authorized agent to cause the work to remain accessible and exposed for inspection purposes. Neither the *building official* nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.

IBC [A] 115.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property involved, ~~or to~~ the owner's authorized agent, or ~~to~~ the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work will be permitted to resume.

Revise the International Building Code as follows:

IBC 901.5 Acceptance tests. Fire protection systems shall be tested in accordance with the requirements of this code and the *International Fire Code*. When required, the tests shall be conducted in the presence of the building official. Tests required by this code, the *International Fire Code* and the standards listed in this code shall be conducted at the expense of the owner or the owner's ~~representative~~ authorized agent. It shall be unlawful to occupy portions of a structure until the required fire protection systems within that portion of the structure have been tested and approved.

Revise the International Building Code as follows:

IBC 1004.3 (IFC [B] 1004.3) Posting of occupant load. Every room or space that is an assembly occupancy shall have the occupant load of the room or space posted in a conspicuous place, near the main exit or exit access doorway from the room or space. Posted signs shall be of an approved legible permanent design and shall be maintained by the owner or the owner's authorized agent.

Revise the International Building Code as follows:

IBC 1703.4.1 Research and investigation. Sufficient technical data shall be submitted to the *building official* to substantiate the proposed use of any material or assembly. If it is determined that the evidence submitted is satisfactory proof of performance for the use intended, the *building official* shall approve the use of the material or assembly subject to the requirements of this code. The costs, reports and investigations required under these provisions shall be paid by the ~~applicant~~ owner or the owner's authorized agent.

IBC 1703.6 Evaluation and follow-up inspection services. Where structural components or other items regulated by this code are not visible for *inspection* after completion of a prefabricated assembly, the ~~applicant~~ owner or the owner's authorized agent shall submit a report of each prefabricated assembly. The report shall indicate the complete details of the assembly, including a description of the assembly and its components, the basis upon which the assembly is being evaluated, test results and similar information and other data as necessary for the *building official* to determine conformance to this code. Such a report shall be *approved* by the *building official*.

IBC 1703.6.1 Follow-up inspection. The ~~applicant~~ owner or the owner's authorized agent shall provide for *special inspections* of fabricated items in accordance with Section 1704.2.5.

IBC 1704.2 Special Inspections. Where application is made for construction as described in this section, the owner or the *registered design professional in responsible charge* acting as the owner's authorized agent shall employ one or more *approved agencies* to perform inspections during construction on the types of work listed under Section 1705. These inspections are in addition to the inspections specified in Section 110.

Exceptions:

1. *Special inspections* are not required for construction of a minor nature or as warranted by conditions in the jurisdiction as *approved* by the *building official*.
2. Unless otherwise required by the *building official*, *special inspections* are not required for Group U occupancies that are accessory to a residential occupancy including, but not limited to, those listed in Section 312.1.
3. Special inspections are not required for portions of structures designed and constructed in accordance with the cold-formed steel light-frame construction provisions of Section 2211.7 or the conventional light-frame construction provisions of Section 2308.

IBC 1704.2.4 Report requirement. Special inspectors shall keep records of inspections. The special inspector shall furnish inspection reports to the *building official*, and to the *registered design professional in responsible charge*. Reports shall indicate that work inspected was or was not completed in conformance to *approved construction documents*. Discrepancies shall be brought to the immediate attention of the contractor for correction. If they are not corrected, the discrepancies shall be brought to the attention of the *building official* and to the *registered design professional in responsible charge* prior to the completion of that phase of the work. A final report documenting required *special inspections* and correction of any discrepancies noted in the inspections shall be submitted at a point in time agreed upon prior to the start of work by the ~~applicant and~~ owner or the owner's authorized agent to the *building official*.

IBC 1707.1 General. In the absence of *approved* rules or other *approved* standards, the *building official* shall make, or cause to be made, the necessary tests and investigations; or the *building official* shall accept duly authenticated reports from *approved agencies* in respect to the quality and manner of use of new materials or assemblies as provided for in Section 104.11. The cost of all tests and other investigations required under the provisions of this code shall be borne by the ~~applicant~~ owner or the owner's authorized agent.

Revise the International Building Code as follows:

IBC 1803.6 Reporting. Where geotechnical investigations are required, a written report of the investigations shall be submitted to the *building official* by the owner or owner's authorized agent at the time of *permit* application. This geotechnical report shall include, but need not be limited to, the following information:

1. A plot showing the location of the soil investigations.
2. A complete record of the soil boring and penetration test logs and soil samples.
3. A record of the soil profile.
4. Elevation of the water table, if encountered.
5. Recommendations for foundation type and design criteria, including but not limited to: bearing capacity of natural or compacted soil; provisions to mitigate the effects of expansive soils; mitigation of the effects of liquefaction, differential settlement and varying soil strength; and the effects of adjacent loads.
6. Expected total and differential settlement.
7. Deep foundation information in accordance with Section 1803.5.5.
8. Special design and construction provisions for foundations of structures founded on expansive soils, as necessary.
9. Compacted fill material properties and testing in accordance with Section 1803.5.8.
10. Controlled low-strength material properties and testing in accordance with Section 1803.5.9.

Revise the International Building Code as follows:

IBC 3306.8 Repair, maintenance and removal. Pedestrian protection required by this chapter shall be maintained in place and kept in good order for the entire length of time pedestrians are subject to being endangered. The *owner* or the *owner's* authorized agent, upon the completion of the construction activity, shall immediately remove walkways, debris and other obstructions and leave such public property in as good a condition as it was before such work was commenced.

Revise the International Building Code as follows:

IBC 3401.2 Maintenance. Buildings and structures, and parts thereof, shall be maintained in a safe and sanitary condition. Devices or safeguards which are required by this code shall be maintained in conformance with the code edition under which installed. The owner or the owner's ~~designated~~ authorized agent shall be responsible for the maintenance of buildings and structures. To determine compliance with this subsection, the building official shall have the authority to require a building or structure to be reinspected. The requirements of this chapter shall not provide the basis for removal or abrogation of fire protection and safety systems and devices in existing structures.

Revise the International Building Code as follows:

IBC G104.1 Required. Any person, owner or owner's authorized agent who intends to conduct any development in a flood hazard area shall first make application to the *building official* and shall obtain the required *permit*.

Revise the International Building Code as follows:

IBC J106.1 Maximum slope. The slope of cut surfaces shall be no steeper than is safe for the intended use, and shall be no steeper than two units horizontal to one unit vertical (50-percent slope) unless the owner or the owner's authorized agent furnishes a geotechnical report justifying a steeper slope.

Exceptions:

1. A cut surface shall be permitted to be at a slope of 1.5 units horizontal to one unit vertical (67-percent slope) provided that all of the following are met:
1.1. It is not intended to support structures or surcharges.
1.2. It is adequately protected against erosion.
1.3. It is no more than 8 feet (2438 mm) in height.
1.4. It is approved by the building code official.
1.5. Ground water is not encountered.
2. A cut surface in bedrock shall be permitted to be at a slope of one unit horizontal to one unit vertical (100-percent slope).

Revise the International Building Code as follows:

IBC K102.3 Maintenance. Electrical systems, equipment, materials and appurtenances, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe, hazard-free condition. Devices or safeguards that are required by this code shall be maintained in compliance with the code edition under which installed. The owner or the owner's ~~designated~~ authorized agent shall be responsible for the maintenance of the electrical systems and equipment. To determine compliance with this provision, the *building official* shall have the authority to require that the electrical systems and equipment be reinspected.

Revise the International Code Council Performance Code as follows:

ICCPC [A] 103.3.1 Building owner's or the owner's authorized agent responsibility.

ICCPC [A] 103.3.1.1 Design professional. The owner or the owner's authorized agent shall have the responsibility of retaining and furnishing the services of a design professional, who shall be in responsible charge of preparing and coordinating a complete and comprehensive set of design documents and other services required to prepare reports and other documents in accordance with this code. If the services required by this section are not provided, the use of this code is prohibited.

ICCPC [A] 103.3.1.2 Principal design professional. When the project requires the services of multiple design professionals, a principal design professional shall be retained and furnished, who shall have the contractual responsibility and authority over all required design professional disciplines to prepare and coordinate a complete and comprehensive set of design documents for the project.

ICCPC [A] 103.3.1.3 Peer review. The owner or the owner's authorized agent shall be responsible for retaining and furnishing the services of a design professional or recognized expert, who will perform as a peer reviewer, when required and approved by the code official. See Section 103.3.6.3 of this code.

ICCPC [A] 103.3.1.4 Costs. The costs of all special services, including contract review, when required by the code official, shall be borne by the owner or the owner's authorized agent.

ICCPC [A] 103.3.1.5 Document retention. The owner or the owner's authorized agent shall retain on the premises all documents and reports required by this code and make them available to the code official upon request.

ICCPC [A] 103.3.1.6 Maintenance. The owner or the owner's authorized agent is responsible to operate and maintain a building, structure or facility designed and built under this code in accordance with the bounding conditions and the operations and maintenance manual.

ICCPC [A] 103.3.1.7 Changes. The owner <u>or the owner's authorized agent</u> shall be responsible to ensure that any change to the facility, process or system does not increase the hazard level beyond that originally designed without approval and that all changes shall be documented in accordance with this code.

ICCPC [A] 103.3.1.8 Special expert. Where the scope of work is limited or focused in an area that does not require the services of a design professional or the special knowledge and skills associated with the practice of architecture or engineering, a special expert may be employed by the owner <u>or the owner's authorized agent</u> as the person in responsible charge of the limited or focused activity. It is the intent of this code that the individual shall possess the qualification characteristics required in Appendix D.

ICCPC [A] 103.3.1.9 Occupant requirements. The owner <u>or the owner's authorized agent</u> is responsible and accountable to ensure that all occupants and employees who are required to take certain actions or perform certain functions in accordance with a performance-based design possess the required knowledge and skills and are empowered to perform those actions.

ICCPC [A] 103.3.4.1.4 Deed restriction. Design features with bounding conditions that require continued maintenance or supervision by the owner <u>or the owner's authorized agent</u> throughout the life of the building, facility or process as conditions of compliance with the objectives of this code, shall be recorded as a deed restriction until released by the code official. When required by the code official, the deed restriction shall be modified to reflect specific changes.

ICCPC [A] 103.3.4.1.6 Emergency response capabilities. Design documentation shall clearly describe the level of response expected by emergency responders under the direct control of the owner <u>or the owner's authorized agent</u>. Emergency response capabilities, staffing levels, training requirements and equipment availability shall be documented as a bounding condition.

ICCPC [A] 103.3.4.2.3 Operations and maintenance manual. The operations and maintenance manual shall identify system and component commissioning requirements and the required interactions between these systems. The manual shall identify for the facility owner <u>or the owner's authorized agent</u> and the facility operator those actions that need to be performed on a regular basis to ensure that the components of the performance-based design are in place and operating properly. Furthermore, the operations and maintenance manual shall identify the restrictions or limitations placed upon the use and operation of the facility in order to stay within the bounding conditions of the performance-based design. The operations and maintenance manual shall be submitted at the time of the design documents submittal, unless the code official approves another time based upon the type of project and data needed for a composite review. The operations and maintenance manual shall address but not be limited to the following:

1. Description of critical systems.
2. Description of required system interactions.
3. Occupant responsibilities.
4. Occupant and staff training requirements.
5. Periodic operational requirements.
6. Periodic maintenance requirements.
7. Periodic testing requirements.
8. Limitations on facility operations (due to bounding conditions).
9. Report format for recording maintenance and operation data.
10. System and component commissioning requirements.

ICCPC [A] 103.3.8.3 Deed restrictions. Design features with bounding conditions determined by the design professional to require continued operation and maintenance by the owner <u>or the owner's authorized agent</u> throughout the life of the building as conditions of compliance with the objectives of this code shall be recorded as a deed restriction as required by the code official until released by the code official.

ICCPC [A] 103.3.9.1.4 Revocation and renewal. Failure of the building owner or the owner's authorized agent to demonstrate to the code official that the building is being operated and maintained in compliance with Sections 103.3.1.6 and 103.3.9.1 is cause to revoke or not renew a certificate of occupancy.

ICCPC [A] 103.3.9.2.3 Revocation and renewal. Failure of the owner or the owner's authorized agent to demonstrate compliance with this section is cause to revoke or not renew the certificate of compliance.

ICCPC [A] 103.3.10 Maintenance.

ICCPC [A] 103.3.10.1 Owner~~'s~~ or the owner's authorized agent responsibility. The owner or the owner's authorized agent is responsible for maintaining the building or facility in accordance with the approved documents.

Revise the International Existing Building Code as follows:

IEBC [A] 104.6 Right of entry. Where it is necessary to make an inspection to enforce the provisions of this code, or where the *code official* has reasonable cause to believe that there exists in a structure or upon a premises a condition which is contrary to or in violation of this code which makes the structure or premises unsafe, *dangerous*, or hazardous, the *code official* is authorized to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises be unoccupied, the *code official* shall first make a reasonable effort to locate the owner, the owner's authorized agent or other person having charge or control of the structure or premises and request entry. If entry is refused, the *code official* shall have recourse to the remedies provided by law to secure entry.

IEBC [A] 104.10 Modifications. Wherever there are practical difficulties involved in carrying out the provisions of this code, the *code official* shall have the authority to grant modifications for individual cases upon application of the owner or owner's authorized representative, provided the *code official* shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code, and that such modification does not lessen health, accessibility, life and fire safety, or structural requirements. The details of action granting modifications shall be recorded and entered in the files of the Department of Building Safety.

IEBC [A] 105.1 Required. Any owner or owner's authorized agent who intends to *repair*, add to, alter, relocate, demolish, or change the occupancy of a building or to *repair*, install, add, alter, remove, convert, or replace any electrical, gas, mechanical, or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the *code official* and obtain the required permit.

IEBC [A] 106.6 Design professional in responsible charge. When it is required that documents be prepared by a registered design professional, the *code official* shall be authorized to require the owner or the owner's authorized agent to engage and designate on the building permit application a registered design professional who shall act as the *registered design professional in responsible charge*. If the circumstances require, the owner or the owner's authorized agent shall designate a substitute *registered design professional in responsible charge* who shall perform the duties required of the original *registered design professional in responsible charge*. The *code official* shall be notified in writing by the owner or the owner's authorized agent if the *registered design professional in responsible charge* is changed or is unable to continue to perform the duties. The *registered design professional in responsible charge* shall be responsible for reviewing and coordinating submittal documents prepared by others, including phased and deferred submittal items, for compatibility with the design of the building. Where structural observation is required, the inspection program shall name the individual or firms who are to perform structural observation and describe the stages of construction at which structural observation is to occur.

IEBC [A] 110.2 Certificate issued. After the *code official* inspects the building and finds no violations of the provisions of this code or other laws that are enforced by the Department of Building Safety, the *code official* shall issue a certificate of occupancy that shall contain the following:.

1. The building permit number.
2. The address of the structure.
3. The name and address of the owner<u> or the owner's authorized agent</u>.
4. A description of that portion of the structure for which the certificate is issued.
5. A statement that the described portion of the structure has been inspected for compliance with the requirements of this code for the occupancy and division of occupancy and the use for which the proposed occupancy is classified.
6. The name of the *code official*.
7. The edition of the code under which the permit was issued.
8. The use and occupancy in accordance with the provisions of the *International Building Code*.
9. The type of construction as defined in the *International Building Code*.
10. The design occupant load and any impact the *alteration* has on the design occupant load of the area not within the scope of the work.
11. If fire protection systems are provided, whether the fire protection systems are required.
12. Any special stipulations and conditions of the building permit.

IEBC [A] 111.3 Authority to disconnect service utilities. The *code official* shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards in case of emergency where necessary to eliminate an immediate hazard to life or property or when such utility connection has been made without the approval required by Section 111.1 or 111.2. The *code official* shall notify the serving utility and, wherever possible, the owner <u>or</u> <u>the owner's authorized agent</u> and occupant of the building, structure or service system of the decision to disconnect prior to taking such action. If not notified prior to disconnecting, the owner or occupant of the building, structure or service system shall be notified in writing, as soon as practical thereafter.

IEBC [A] 114.2 Issuance. The stop work order shall be in writing and shall be given to the owner <u>or the owner's authorized agent</u> of the property involved ~~or to the owner's agent~~, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order and the conditions under which the cited work will be permitted to resume.

IEBC [A] 115.3 Notice. If an *unsafe* condition is found, the *code official* shall serve on the owner, <u>the owner's authorized</u> agent, or person in control of the structure a written notice that describes the condition deemed *unsafe* and specifies the required *repairs* or improvements to be made to abate the *unsafe* condition, or that requires the *unsafe* building to be demolished within a stipulated time. Such notice shall require the person thus notified to declare immediately to the *code official* acceptance or rejection of the terms of the order.

IEBC [A] 115.4 Method of service. Such notice shall be deemed properly served if a copy thereof is delivered to the owner <u>or the owner's authorized agent</u> personally; sent by certified or registered mail addressed to the owner<u> or the owner's authorized agent</u> at the last known address with the return receipt requested; or delivered in any other manner as prescribed by local law. If the certified or registered letter is returned showing that the letter was not delivered, a copy thereof shall be posted in a conspicuous place in or about the structure affected by such notice. Service of such notice in the foregoing manner upon the owner's <u>authorized </u>agent or upon the person responsible for the structure shall constitute service of notice upon the owner.

IEBC [A] 116.5 Costs of emergency repairs. Costs incurred in the performance of emergency work shall be paid by the jurisdiction. The legal counsel of the jurisdiction shall institute appropriate action against the owner of the premises <u>or the owner's authorized agent</u> where the unsafe structure is or was located for the recovery of such costs.

IEBC [A] 117.1 General. The *code official* shall order the owner of any premises or the owner's authorized agent upon which is located any structure that in the *code official's* judgment is so old, dilapidated, or has become so out of *repair* as to be *dangerous*, unsafe, insanitary, or otherwise unfit for human habitation or occupancy, and such that it is unreasonable to *repair* the structure, to demolish and remove such structure; or if such structure is capable of being made safe by *repairs*, to *repair* and make safe and sanitary or to demolish and remove at the owner's or the owner's authorized agent's option; or where there has been a cessation of normal construction of any structure for a period of more than two years, to demolish and remove such structure.

IEBC [A] 117.3 Failure to comply. If the owner or the owner's authorized agent of a premises fails to comply with a demolition order within the time prescribed, the *code official* shall cause the structure to be demolished and removed, either through an available public agency or by contract or arrangement with private persons, and the cost of such demolition and removal shall be charged against the real estate upon which the structure is located and shall be a lien upon such real estate.

Revise the International Fire Code as follows:

IFC [A] 104.3 Right of entry. Whenever it is necessary to make an inspection to enforce the provisions of this code, or whenever the *fire code official* has reasonable cause to believe that there exists in a building or upon any premises any conditions or violations of this code which make the building or premises unsafe, dangerous or hazardous, the *fire code official* shall have the authority to enter the building or premises at all reasonable times to inspect or to perform the duties imposed upon the *fire code official* by this code. If such building or premises is occupied, the *fire code official* shall present credentials to the occupant and request entry. If such building or premises is unoccupied, the *fire code official* shall first make a reasonable effort to locate the *owner*, the owner's authorized agent or other person having charge or control of the building or premises and request entry. If entry is refused, the *fire code official* has recourse to every remedy provided by law to secure entry.

IFC [A] 104.3.1 Warrant. When the *fire code official* has first obtained a proper inspection warrant or other remedy provided by law to secure entry, an *owner*, the owner's authorized agent or occupant or person having charge, care or control of the building or premises shall not fail or neglect, after proper request is made as herein provided, to permit entry therein by the *fire code official* for the purpose of inspection and examination pursuant to this code.

IFC [A] 104.7.2 Technical assistance. To determine the acceptability of technologies, processes, products, facilities, materials and uses attending the design, operation or use of a building or premises subject to inspection by the *fire code official*, the *fire code official* is authorized to require the *owner* or owner's authorized agent to provide, without charge to the jurisdiction, a technical opinion and report. The opinion and report shall be prepared by a qualified engineer, specialist, laboratory or fire safety specialty organization acceptable to the *fire code official* and shall analyze the fire safety properties of the design, operation or use of the building or premises and the facilities and appurtenances situated thereon, to recommend necessary changes. The *fire code official* is authorized to require design submittals to be prepared by, and bear the stamp of, a registered design professional.

IFC [A] 105.1.1 Permits required. Any property owner or owner's authorized agent who intends to conduct an operation or business, or install or modify systems and equipment which is regulated by this code, or to cause any such work to be done, shall first make application to the *fire code official* and obtain the required permit.

IFC [A] 109.2 Owner/occupant responsibility. Correction and abatement of violations of this code shall be the responsibility of the *owner* or the owner's authorized agent. If an occupant creates, or allows to be created, hazardous conditions in violation of this code, the occupant shall be held responsible for the abatement of such hazardous conditions.

IFC [A] 109.3.1 Service. A notice of violation issued pursuant to this code shall be served upon the *owner*, the owner's authorized agent, operator, occupant or other person responsible for the condition or violation, either by personal service, mail or by delivering the same to, and leaving it with, some person of responsibility upon the premises. For unattended or abandoned locations, a copy of such notice of violation shall be posted on the premises in a conspicuous place at or near the entrance to such premises and the notice of violation shall be mailed by certified mail with return receipt requested or a certificate of mailing, to the last known address of the *owner*, the owner's authorized agent, or occupant ~~or both~~.

IFC [A] 109.3.2 Compliance with orders and notices. A notice of violation issued or served as provided by this code shall be complied with by the *owner*, the owner's authorized agent, operator, occupant or other person responsible for the condition or violation to which the notice of violation pertains.

IFC [A] 110.4 Abatement. The *owner*, the owner's authorized agent, operator or occupant of a building or premises deemed unsafe by the *fire code official* shall abate or cause to be abated or corrected such unsafe conditions either by repair, rehabilitation, demolition or other *approved* corrective action.

IFC [A] 111.2 Issuance. A stop work order shall be in writing and shall be given to the *owner* of the property, or to the *owner's* authorized agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work is authorized to resume.

IFC [A] 112.1 Authority to disconnect service utilities. The *fire code official* shall have the authority to authorize disconnection of utility service to the building, structure or system in order to safely execute emergency operations or to eliminate an immediate hazard. The *fire code official* shall notify the serving utility and, whenever possible, the *owner* or the owner's authorized agent and occupant of the building, structure or service system of the decision to disconnect prior to taking such action if not notified prior to disconnection. The *owner*, the owner's authorized agent or occupant of the building, structure or service system shall be notified in writing as soon as practical thereafter.

Revise the International Fuel Gas Code as follows:

IFGC [A] 102.3 Maintenance. Installations, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe condition. Devices or safeguards which are required by this code shall be maintained in compliance with the code edition under which they were installed. The owner or the owner's authorized ~~designated~~ agent shall be responsible for maintenance of installations. To determine compliance with this provision, the code official shall have the authority to require an installation to be reinspected.

IFGC [A] 104.4 Right of entry. Whenever it is necessary to make an inspection to enforce the provisions of this code, or whenever the code official has reasonable cause to believe that there exists in a building or upon any premises any conditions or violations of this code that make the building or premises unsafe, dangerous or hazardous, the code official shall have the authority to enter the building or premises at all reasonable times to inspect or to perform the duties imposed upon the code official by this code. If such building or premises is occupied, the code official shall present credentials to the occupant and request entry. If such building or premises is unoccupied, the code official shall first make a reasonable effort to locate the owner, the owner's authorized agent or other person having charge or control of the building or premises and request entry. If entry is refused, the code official has recourse to every remedy provided by law to secure entry.

When the code official has first obtained a proper inspection warrant or other remedy provided by law to secure entry, an owner, the owner's authorized agent, ~~or~~ occupant or person having charge, care or control of the building or premises shall not fail or neglect, after proper request is made as herein provided, to promptly permit entry therein by the code official for the purpose of inspection and examination pursuant to this code.

IFGC [A] 105.1 Modifications. Whenever there are practical difficulties involved in carrying out the provisions of this code, the code official shall have the authority to grant modifications for individual cases, upon application of the owner or owner's authorized agent ~~representative~~, provided that the code official shall first find that special individual reason makes the strict letter of this code impractical and that such modification is in compliance with the intent and purpose of this code and does not lessen health, life and fire safety requirements. The details of action granting modifications shall be recorded and entered in the files of the Department of Inspection.

IFGC [A] 106.1 Where required. An owner, owner's authorized agent or contractor who desires to erect, install, enlarge, alter, repair, remove, convert or replace an installation regulated by this code, or to cause such work to be done, shall first make application to the code official and obtain the required permit for the work.
Exception: Where *appliance* and *equipment* replacements and repairs are required to be performed in an emergency situation, the permit application shall be submitted within the next working business day of the Department of Inspection.

IFGC [A] 106.3 Application for permit. Each application for a permit, with the required fee, shall be filed with the code official on a form furnished for that purpose and shall contain a general description of the proposed work and its location. The application shall be signed by the owner or an owner's authorized agent. The permit application shall indicate the proposed *occupancy* of all parts of the building and of that portion of the site or lot, if any, not covered by the building or structure and shall contain such other information required by the code official.

IFGC [A] 108.5 Stop work orders. Upon notice from the code official that work is being done contrary to the provisions of this code or in a dangerous or unsafe manner, such work shall immediately cease. Such notice shall be in writing and shall be given to the owner of the property, the owner's authorized agent, or the person doing the work. The notice shall state the conditions under which work is authorized to resume. Where an emergency exists, the code official shall not be required to give a written notice prior to stopping the work. Any person who shall continue any work on the system after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable for a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars.

IFGC [A] 108.7.2 Authority to disconnect service utilities. The code official shall have the authority to require disconnection of utility service to the building, structure or system regulated by the technical codes in case of emergency where necessary to eliminate an immediate hazard to life or property. The code official shall notify the serving utility, and wherever possible, the owner or the owner's authorized agent and occupant of the building, structure or service system of the decision to disconnect prior to taking such action. If not notified prior to disconnection, the owner or occupant of the building, structure or service system shall be notified in writing, as soon as practicable thereafter.

Revise the International Mechanical Code as follows:

IMC [A] 102.3 Maintenance. Mechanical systems, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and sanitary condition. Devices or safeguards which are required by this code shall be maintained in compliance with the code edition under which they were installed. The owner or the owner's authorized ~~designated~~ agent shall be responsible for maintenance of mechanical systems. To determine compliance with this provision, the code official shall have the authority to require a mechanical system to be reinspected.

The inspection for maintenance of HVAC systems shall be done in accordance with ASHRAE/ACCA/ANSI Standard 180.

IMC [A] 104.4 Right of entry. Whenever it is necessary to make an inspection to enforce the provisions of this code, or whenever the code official has reasonable cause to believe that there exists in a building or upon any premises any conditions or violations of this code which make the building or premises unsafe, insanitary, dangerous or hazardous, the code official shall have the authority to enter the building or premises at all reasonable times to inspect or to perform the duties imposed upon the code official by this code. If such building or premises is occupied, the code official shall present credentials to the occupant and request entry. If such building or premises is unoccupied, the code official shall first make a reasonable effort to locate the owner, the owner's authorized agent or other person having charge or control of the building or premises and request entry. If entry is refused, the code official has recourse to every remedy provided by law to secure entry.

When the code official has first obtained a proper inspection warrant or other remedy provided by law to secure entry, an owner, the owner's authorized agent or occupant or person having charge, care or control of the building or premises shall not fail or neglect, after proper request is made as herein provided, to promptly permit entry therein by the code official for the purpose of inspection and examination pursuant to this code.

IMC [A] 105.1 Modifications. Whenever there are practical difficulties involved in carrying out the provisions of this code, the code official shall have the authority to grant modifications for individual cases upon application of the owner or owner's authorized agent ~~representative~~, provided that the code official shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and does not lessen health, life and fire safety requirements. The details of action granting modifications shall be recorded and entered in the files of the mechanical inspection department.

IMC [A] 106.1 When required. An owner, owner's authorized agent or contractor who desires to erect, install, enlarge, alter, repair, remove, convert or replace a mechanical system, the installation of which is regulated by this code, or to cause such work to be done, shall first make application to the code official and obtain the required permit for the work.

Exception: Where *equipment* and *appliance* replacements or repairs must be performed in an emergency situation, the permit application shall be submitted within the next working business day of the department of mechanical inspection.

IMC [A] 106.3 Application for permit. Each application for a permit, with the required fee, shall be filed with the code official on a form furnished for that purpose and shall contain a general description of the proposed work and its location. The application shall be signed by the owner or ~~an~~ the owner's authorized agent. The permit application shall indicate the proposed *occupancy* of all parts of the building and of that portion of the site or lot, if any, not covered by the building or structure and shall contain such other information required by the code official.

IMC [A] 108.5 Stop work orders. Upon notice from the code official that mechanical work is being done contrary to the provisions of this code or in a dangerous or unsafe manner, such work shall immediately cease. Such notice shall be in writing and shall be given to the owner of the property, or to the owner's authorized agent, or to the person doing the work. The notice shall state the conditions under which work is authorized to resume. Where an emergency exists, the code official shall not be required to give a written notice prior to stopping the work. Any person who shall continue any work on the system after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable for a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars.

IMC [A] 108.7.2 Authority to order disconnection of energy sources. The code official shall have the authority to order disconnection of energy sources supplied to a building, structure or mechanical system regulated by this code, when it is determined that the mechanical system or any portion thereof has become hazardous or unsafe. Written notice of such order to disconnect service and the causes therefor shall be given within 24 hours to the owner, the owner's authorized agent and occupant of such building, structure or premises, provided, however, that in cases of immediate danger to life or property, such disconnection shall be made immediately without such notice. Where energy sources are provided by a public utility, the code official shall immediately notify the serving utility in writing of the issuance of such order to disconnect.

Revise the International Plumbing Code as follows:

IPC [A] 102.3 Maintenance. All plumbing systems, materials and appurtenances, both existing and new, and all parts thereof, shall be maintained in proper operating condition in accordance with the original design in a safe and sanitary condition. All devices or safeguards required by this code shall be maintained in compliance with the code edition under which they were installed.
The owner or the owner's authorized ~~designated~~ agent shall be responsible for maintenance of plumbing systems. To determine compliance with this provision, the code official shall have the authority to require any plumbing system to be reinspected.

IPC [A] 104.4 Right of entry. Whenever it is necessary to make an inspection to enforce the provisions of this code, or whenever the code official has reasonable cause to believe that there exists in any building or upon any premises any conditions or violations of this code that make the building or premises unsafe, insanitary, dangerous or hazardous, the code official shall have the authority to enter the building or premises at all reasonable times to inspect or to perform the duties imposed upon the code official by this code. If such building or premises is occupied, the code official shall present credentials to the occupant and request entry. If such building or premises is unoccupied, the code official shall first make a reasonable effort to locate the owner, the owner's authorized agent or other person having charge or control of the building or premises and request entry. If entry is refused, the code official shall have recourse to every remedy provided by law to secure entry.
When the code official shall have first obtained a proper inspection warrant or other remedy provided by law to secure entry, no owner, owner's authorized agent, ~~or~~ occupant or person having charge, care or control of any building or premises shall fail or neglect, after proper request is made as herein provided, to promptly permit entry therein by the code official for the purpose of inspection and examination pursuant to this code.

IPC [A] 105.1 Modifications. Whenever there are practical difficulties involved in carrying out the provisions of this code, the code official shall have the authority to grant modifications for individual cases, upon application of the owner or owner's ~~representative~~ authorized agent, provided the code official shall first find that special individual reason makes the strict letter of this code impractical and the modification conforms to the intent and purpose of this code and that such modification does not lessen health, life and fire safety requirements. The details of action granting modifications shall be recorded and entered in the files of the plumbing inspection department.

IPC [A] 106.1 When required. Any owner, owner's authorized agent or contractor who desires to construct, enlarge, alter, repair, move, demolish or change the *occupancy* of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the code official and obtain the required permit for the work.

IPC [A] 106.3 Application for permit. Each application for a permit, with the required fee, shall be filed with the code official on a form furnished for that purpose and shall contain a general description of the proposed work and its location. The application shall be signed by the owner or an owner's authorized agent. The permit application shall indicate the proposed *occupancy* of all parts of the building and of that portion of the site or lot, if any, not covered by the building or structure and shall contain such other information required by the code official.

IPC [A] 108.5 Stop work orders. Upon notice from the code official, work on any plumbing system that is being done contrary to the provisions of this code or in a dangerous or unsafe manner shall immediately cease. Such notice shall be in writing and shall be given to the owner of the property, or to the owner's authorized agent, or to the person doing the work. The notice shall state the conditions under which work is authorized to resume. Where an emergency exists, the code official shall not be required to give a written notice prior to stopping the work. Any person who shall continue any work in or about the structure after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars.

IPC [A] 108.7.2 Authority to disconnect service utilities. The code official shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by the technical codes in case of an emergency, where necessary, to eliminate an immediate danger to life or property. Where possible, the owner or an owner's authorized agent and occupant of the building, structure or service system shall be notified of the decision to disconnect utility service prior to taking such action. If not notified prior to disconnecting, the owner, an owner's authorized agent or occupant of the building, structure or service systems shall be notified in writing, as soon as practical thereafter.

Revise the International Private Sewage Disposal Code as follows:

IPSDC [A] 102.5 Maintenance. *Private sewage disposal systems*, materials and appurtenances, both existing and new, and all parts thereof shall be maintained in proper operating condition in accordance with the original design in a safe and sanitary condition. Devices or safeguards that are required by this code shall be maintained in compliance with the code edition under which they were installed. The owner or the owner's authorized ~~designated~~ agent shall be responsible for maintenance of *private sewage disposal systems*. To determine compliance with this provision, the code official shall have the authority to require reinspection of any *private sewage disposal system*.

IPSDC [A] 104.4 Right of entry. Whenever it is necessary to make an inspection to enforce the provisions of this code, or whenever the code official has reasonable cause to believe that there exists in any building or upon any premises any conditions or violations of this code that make the building or premises unsafe, insanitary, dangerous or hazardous, the code official shall have the authority to enter the building or premises at all reasonable times to inspect or to perform the duties imposed on the code official by this code. If such building or premises is occupied, the code official shall present credentials to the occupant and request entry. If such building or premises is unoccupied, the code official shall first make a reasonable effort to locate the owner, the owner's authorized agent or other person having charge or control of the building or premises and request entry. If entry is refused, the code official has recourse to every remedy provided by law to secure entry.

When the code official shall have first obtained a proper inspection warrant or other remedy provided by law to secure entry, no owner, owner's authorized agent or occupant or person having charge, care or control of any building or premises shall fail or neglect, after proper request is made as herein provided, to promptly permit entry therein by the code official for the purpose of inspection and examination pursuant to this code.

IPSDC [A] 105.1 Modifications. Whenever there are practical difficulties involved in carrying out the provisions of this code, the code official shall have the authority to grant modifications for individual cases, upon application of the owner or owner's ~~representative~~ authorized agent provided that the code official shall first find that special individual reason makes the strict letter of this code impractical, the modification is in conformity with the intent and purpose of this code and such modification does not lessen health and fire- and life-safety requirements. The details of action granting modifications shall be recorded and entered in the files of the Private Sewage Disposal Inspection Department.

IPSDC [A] 108.5 Stop work orders. Upon notice from the code official, work on any *private sewage disposal system* that is being done contrary to the provisions of this code or in a dangerous or unsafe manner shall immediately cease. Such notice shall be in writing and shall be given to the owner of the property, to the owner's authorized agent or to the person doing the work. The notice shall state the conditions under which work is authorized to resume. Where an emergency exists, the code official shall not be required to give a written notice prior to stopping the work. Any person who shall continue any work on the system after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars.

IPSDC [A] 108.7.2 Authority to disconnect service utilities. The code official shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by the technical codes in case of emergency, where necessary, to eliminate an immediate danger to life or property.

Where possible, the owner, the owner's authorized agent and occupant of the building, structure or service system shall be notified of the decision to disconnect utility service prior to taking such action. If not notified prior to disconnecting, the owner or occupant of the building, structure or service systems shall be notified in writing as soon as is practical thereafter.

Revise the International Property Maintenance Code as follows:

IPMC [A] 101.2 Scope. The provisions of this code shall apply to all existing residential and nonresidential structures and all existing *premises* and constitute minimum requirements and standards for *premises*, structures, equipment and facilities for light, *ventilation*, space, heating, sanitation, protection from the elements, life safety, safety from fire and other hazards, and for safe and sanitary maintenance; the responsibility of *owners*, an owner's authorized agent, *operator*s and *occupants*; the *occupancy* of existing structures and *premises*, and for administration, enforcement and penalties.

IPMC [A] 102.2 Maintenance. Equipment, systems, devices and safeguards required by this code or a previous regulation or code under which the structure or *premises* was constructed, altered or repaired shall be maintained in good working order. No *owner*, owner's authorized agent, *operator* or *occupant* shall cause any service, facility, equipment or utility which is required under this section to be removed from or shut off from or discontinued for any occupied dwelling, except for such temporary interruption as necessary while repairs or alterations are in progress. The requirements of this code are not intended to provide the basis for removal or abrogation of fire protection and safety systems and devices in existing structures. Except as otherwise specified herein, the *owner* or the *owner's* authorized ~~designated~~ agent shall be responsible for the maintenance of buildings, structures and *premises*.

IPMC [A] 104.3 Right of entry. Where it is necessary to make an inspection to enforce the provisions of this code, or whenever the *code official* has reasonable cause to believe that there exists in a *structure* or upon a *premises* a condition in violation of this code, the *code official* is authorized to enter the structure or *premises* at reasonable times to inspect or perform the duties imposed by this code, provided that if such *structure* or *premises* is occupied the *code official* shall present credentials to the *occupant* and request entry. If such structure or *premises* is unoccupied, the *code official* shall first make a reasonable effort to locate the *owner*, the owner's authorized agent or other person having charge or control of the *structure* or *premises* and request entry. If entry is refused, the *code official* shall have recourse to the remedies provided by law to secure entry.

IPMC [A] 105.1 Modifications. Whenever there are practical difficulties involved in carrying out the provisions of this code, the *code official* shall have the authority to grant modifications for individual cases upon application of the *owner* or *owner'*s authorized agent ~~representative~~, provided the *code official* shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, life and fire safety requirements. The details of action granting modifications shall be recorded and entered in the department files.

IPMC [A] 107.2 Form. Such notice prescribed in Section 107.1 shall be in accordance with all of the following:

1. Be in writing.
2. Include a description of the real estate sufficient for identification.
3. Include a statement of the violation or violations and why the notice is being issued.
4. Include a correction order allowing a reasonable time to make the repairs and improvements required to bring the *dwelling unit* or structure into compliance with the provisions of this code.
5. Inform the property *owner* or the owner's authorized agent of the right to appeal.
6. Include a statement of the right to file a lien in accordance with Section 106.3.

IPMC [A] 107.6 Transfer of ownership. It shall be unlawful for the *owner* of any *dwelling unit* or structure who has received a compliance order or upon whom a notice of violation has been served to sell, transfer, mortgage, lease or otherwise dispose of such *dwelling unit* or structure to another until the provisions of the compliance order or notice of violation have been complied with, or until such *owner* or the owner's authorized agent shall first furnish the grantee, transferee, mortgagee or lessee a true copy of any compliance order or notice of violation issued by the *code official* and shall furnish to the *code official* a signed and notarized statement from the grantee, transferee, mortgagee or lessee, acknowledging the receipt of such compliance order or notice of violation and fully accepting the responsibility without condition for making the corrections or repairs required by such compliance order or notice of violation.

IPMC [A] 108.2 Closing of vacant structures. If the structure is vacant and unfit for human habitation and *occupancy*, and is not in danger of structural collapse, the *code official* is authorized to post a placard of condemnation on the *premises* and order the structure closed up so as not to be an attractive nuisance. Upon failure of the *owner* or the owner's authorized agent to close up the *premises* within the time specified in the order, the *code official* shall cause the *premises* to be closed and secured through any available public agency or by contract or arrangement by private persons and the cost thereof shall be charged against the real estate upon which the structure is located and shall be a lien upon such real estate and may be collected by any other legal resource.

IPMC [A] 108.2.1 Authority to disconnect service utilities. The *code official* shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards set forth in Section 102.7 in case of emergency where necessary to eliminate an immediate hazard to life or property or when such utility connection has been made without approval. The *code official* shall notify the serving utility and, whenever possible, the *owner* or the owner's authorized agent and *occupant* of the building, structure or service system of the decision to disconnect prior to taking such action. If not notified prior to disconnection the *owner*, the owner's authorized agent or *occupant* of the building structure or service system shall be notified in writing as soon as practical thereafter.

IPMC [A] 108.3 Notice. Whenever the *code official* has *condemned* a structure or equipment under the provisions of this section, notice shall be posted in a conspicuous place in or about the structure affected by such notice and served on the *owner*, the owner's authorized agent or the person or persons responsible for the structure or equipment in accordance with Section 107.3. If the notice pertains to equipment, it shall also be placed on the *condemned* equipment. The notice shall be in the form prescribed in Section 107.2.

IPMC [A] 108.4 Placarding. Upon failure of the *owner* or the owner's authorized agent or person responsible to comply with the notice provisions within the time given, the *code official* shall post on the *premises* or on defective equipment a placard bearing the word "Condemned" and a statement of the penalties provided for occupying the *premises*, operating the equipment or removing the placard.

IPMC [A] 108.5 Prohibited occupancy. Any occupied structure *condemned* and placarded by the *code official* shall be vacated as ordered by the *code official*. Any person who shall occupy a placarded *premises* or shall operate placarded equipment, and any *owner*, the owner's authorized agent or any person responsible for the *premises* who shall let anyone occupy a placarded *premises* or operate placarded equipment shall be liable for the penalties provided by this code.

IPMC [A] 108.6 Abatement methods. The *owner*, the owner's authorized agent, *operator* or *occupant* of a building, *premises* or equipment deemed unsafe by the *code official* shall abate or cause to be abated or corrected such unsafe conditions either by repair, rehabilitation, demolition or other *approved* corrective action.

IPMC [A] 109.5 Costs of emergency repairs. Costs incurred in the performance of emergency work shall be paid by the jurisdiction. The legal counsel of the jurisdiction shall institute appropriate action against the *owner* of the *premises* or the owner's authorized agent where the unsafe structure is or was located for the recovery of such costs.

IPMC [A] 110.1 General. The *code official* shall order the *owner* of any *premises* or the owner's authorized agent, upon which is located any structure, which in the *code official* judgment after review is so deteriorated or dilapidated or has become so out of repair as to be dangerous, unsafe, insanitary or otherwise unfit for human habitation or occupancy, and such that it is unreasonable to repair the structure, to demolish and remove such structure; or if such structure is capable of being made safe by repairs, to repair and make safe and sanitary, or to board up and hold for future repair or to demolish and remove at the *owner's* option; or where there has been a cessation of normal construction of any structure for a period of more than two years, the *code official* shall order the *owner* or the owner's authorized agent to demolish and remove such structure, or board up until future repair. Boarding the building up for future repair shall not extend beyond one year, unless *approved* by the building official.

IPMC [A] 110.3 Failure to comply. If the *owner* of a *premises* or the owner's authorized agent, fails to comply with a demolition order within the time prescribed, the *code official* shall cause the structure to be demolished and removed, either through an available public agency or by contract or arrangement with private persons, and the cost of such demolition and removal shall be charged against the real estate upon which the structure is located and shall be a lien upon such real estate.

IPMC [A] 112.2 Issuance. A stop work order shall be in writing and shall be given to the *owner* of the property, to the *owner's* authorized agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order and the conditions under which the cited work is authorized to resume.

Revise the International Wildland-Urban Interface Code as follows:

IWUIC [A] 101.6 Maintenance. All buildings, structures, landscape materials, vegetation, *defensible space* or other devices or safeguards required by this code shall be maintained in conformance to the code edition under which installed. The owner or the owner's authorized ~~designated~~ agent shall be responsible for the maintenance of buildings, structures, landscape materials and vegetation.

IWUIC [A] 105.1 Practical difficulties. When there are practical difficulties involved in carrying out the provisions of this code, the code official is authorized to grant modifications for individual cases on application in writing by the owner or a ~~duly~~ owner's authorized ~~representative~~ agent. The code official shall first find that a special individual reason makes enforcement of the strict letter of this code impractical, the modification is in conformance to the intent and purpose of this code, and the modification does not lessen any fire protection requirements or any degree of structural integrity. The details of any action granting modifications shall be recorded and entered into the files of the code enforcement agency.

IWUIC [A] 105.2 Technical assistance. To determine the acceptability of technologies, processes, products, facilities, materials and uses attending the design, operation or use of a building or premises subject to the inspection of the code official, the code official is authorized to require the owner, the owner's authorized agent, or the person in possession or control of the building or premises to provide, without charge to the jurisdiction, a technical opinion and report. The opinion and report shall be prepared by a qualified engineer, specialist, laboratory or fire safety specialty organization acceptable to the code official and the or the owner's authorized agent and shall analyze the fire safety of the design, operation or use of the building or premises, the facilities and appurtenances situated thereon and fuel management for purposes of establishing fire hazard severity to recommend necessary changes.

IWUIC [A] 109.2.2 Service of orders and notices. Orders and notices authorized or required by this code shall be given or served on the owner, the owner's authorized agent, operator, occupant or other person responsible for the condition or violation either by verbal notification, personal service, or delivering the same to, and leaving it with, a person of suitable age and discretion on the premises; or, if no such person is found on the premises, by affixing a copy thereof in a conspicuous place on the door to the entrance of said premises and by mailing a copy thereof to such person by registered or certified mail to the person's last known address.

Orders or notices that are given verbally shall be confirmed by service in writing as herein provided.

IWUIC [A] 109.3 Right of entry. Whenever necessary to make an inspection to enforce any of the provisions of this code, or whenever the code official has reasonable cause to believe that there exists in any building or on any premises any condition that makes such building or premises unsafe, the code official is authorized to enter such building or premises at all reasonable times to inspect the same or to perform any duty authorized by this code, provided that if such building or premises is occupied, the code official shall first present proper credentials and request entry; and if such building or premises is unoccupied, the code official shall first make a reasonable effort to locate the owner, the owner's authorized agent, or other persons having charge or control of the building or premises and request entry. If such entry is refused, the code official shall have recourse to every remedy provided by law to secure entry. Owners, the owner's authorized agent, occupants or any other persons having charge, care or control of any building or premises, shall, after proper request is made as herein provided, promptly permit entry therein by the code official for the purpose of inspection and examination pursuant to this code.

IWUIC [A] 109.4.1 General compliance. Orders and notices issued or served as provided by this code shall be complied with by the owner, the owner's authorized agent, operator, occupant or other person responsible for the condition or violation to which the corrective order or notice pertains.

If the building or premises is not occupied, such corrective orders or notices shall be complied with by the owner or the owner's authorized agent.

IWUIC [A] 109.4.5.2 Notice. Where an unsafe condition is found, the code official shall serve on the owner, owner's authorized agent or person in control of the building, structure or premises, a written notice that describes the condition deemed unsafe and specifies the required repairs or improvements to be made to abate the unsafe condition, or that requires the unsafe structure to be demolished within a stipulated time. Such notice shall require the person thus notified, or their designee, to declare within a stipulated time to the code official acceptance or rejection of the terms of the order.

IWUIC [A] 109.4.5.2.1 Method of service. Such notice shall be deemed properly served if a copy thereof is (a) delivered to the owner or the owner's authorized agent personally; (b) sent by certified or registered mail addressed to the owner or the owner's authorized agent at the last known address with the return receipt requested; or (c) delivered in any other manner as prescribed by local law. If the certified or registered letter is returned showing that the letter was not delivered, a copy thereof shall be posted in a conspicuous place in or about the structure affected by such notice. Service of such notice in the foregoing manner upon the owner's authorized agent or upon the person responsible for the structure shall constitute service of notice upon the owner.

IWUIC [A] 109.4.5.3 Placarding. Upon failure of the owner, the owner's authorized agent, or person responsible to comply with the notice provisions within the time given, the code official shall post on the premises or on defective equipment a placard bearing the word "UNSAFE" and a statement of the penalties provided for occupying the premises, operating the equipment or removing the placard.

IWUIC [A] 109.4.5.4 Abatement. The owner, the owner's authorized agent, operator or occupant of a building, structure or premises deemed unsafe by the code official shall abate or correct or cause to be abated or corrected such unsafe conditions either by repair, rehabilitation, demolition or other *approved* corrective action.

IWUIC [A] 113.2 Authority to disconnect service utilities. The code official shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards set forth in Section 102.4 in case of emergency where necessary to eliminate an immediate hazard to life or property or when such utility connection has been made without the release required by Section 113.1. The code official shall notify the serving utility and whenever possible the owner or the owner's authorized agent and occupant of the building, structure or service system of the decision to disconnect prior to taking such action if not notified prior to disconnection. The owner, the owner's authorized agent or occupant of the building, structure or service system shall be notified in writing as soon as practical thereafter.

IWUIC [A] 114.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property involved, to the owner's authorized agent or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order and the conditions under which the cited work will be permitted to resume.

Revise the International Zoning Code as follows:

IZC [A] 103.3 Maintenance. All buildings or uses, both existing and new, and all parts thereof, shall be maintained. The owner or owner's authorized ~~designated~~ agent shall be responsible for the maintenance of buildings and parcels of land. To determine compliance with this section, the code official shall be permitted to cause any structure or use to be inspected.

IZC [A] 107.7.3 Variance review criteria. The board of adjustment shall be permitted to approve, approve with conditions or deny a request for a variance. Each request for a variance shall be consistent with the following criteria:

1. Limitations on the use of the property due to physical, topographical and geologic features.
2. The grant of the variance will not grant any special privilege to the property owner or the owner's authorized agent.
3. The applicant can demonstrate that without a variance there can be no reasonable use of the property.
4. The grant of the variance is not based solely on economic reasons.
5. The necessity for the variance was not created by the property owner or the owner's authorized agent.
6. The variance requested is the minimum variance necessary to allow reasonable use of the property.
7. The grant of the variance will not be injurious to the public health, safety or welfare.
8. The property subject to the variance request possesses one or more unique characteristics generally not applicable to similarly situated properties.

IZC [A] 109.1 Hearings. Upon receipt of an application in proper form, the code official shall arrange to advertise the time and place of public hearing. Such advertisement shall be given by at least one publication in a newspaper of general circulation within the jurisdiction. Such notice shall state the nature of the request, the location of the property, and the time and place of hearing. Reasonable effort shall also be made to give notice by regular mail of the time and place of hearing to each surrounding property owner or the owner's authorized agent; the extent of the area to be notified shall be set by the code official. A notice of such hearing shall be posted in a conspicuous manner on the subject property.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC C108.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's authorized agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work will be permitted to resume.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC R108.2 Issuance. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's authorized agent, or to the person doing the work. Upon issuance of a stop work order, the cited work shall immediately cease. The stop work order shall state the reason for the order, and the conditions under which the cited work will be permitted to resume.

PART IV – IRC

Revise the International Residential Code as follows:

IRC R104.6 Right of entry. Where it is necessary to make an inspection to enforce the provisions of this code, or where the *building official* has reasonable cause to believe that there exists in a structure or upon a premises a condition which is contrary to or in violation of this code which makes the structure or premises unsafe, dangerous or hazardous, the *building official* or designee is authorized to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises be unoccupied, the *building official* shall first make a reasonable effort to locate the owner, the owner's authorized agent, or other person having charge or control of the structure or premises and request entry. If entry is refused, the *building official* shall have recourse to the remedies provided by law to secure entry.

IRC R105.1 Required. Any owner or owner's authorized agent who intends to construct, enlarge, alter, repair, move, demolish or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the *building official* and obtain the required *permit*.

IRC R110.3 Certificate issued. After the *building official* inspects the building or structure and finds no violations of the provisions of this code or other laws that are enforced by the department of building safety, the *building official* shall issue a certificate of occupancy which shall contain the following:

1. The building *permit* number.
2. The address of the structure.
3. The name and address of the owner or the owner's authorized agent.
4. A description of that portion of the structure for which the certificate is issued.
5. A statement that the described portion of the structure has been inspected for compliance with the requirements of this code.
6. The name of the *building official*.
7. The edition of the code under which the *permit* was issued.
8. If an automatic sprinkler system is provided and whether the sprinkler system is required.
9. Any special stipulations and conditions of the building *permit*.

IRC R111.3 Authority to disconnect service utilities. The *building official* shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards set forth in Section R102.4 in case of emergency where necessary to eliminate an immediate hazard to life or property or when such utility connection has been made without the approval required by Section R111.1 or R111.2. The *building official* shall notify the serving utility and whenever possible the owner or the owner's authorized agent and occupant of the building, structure or service system of the decision to disconnect prior to taking such action if not notified prior to disconnection. The owner, the owner's authorized agent, or occupant of the building, structure or service system shall be notified in writing as soon as practical thereafter.

IRC R114.1 Notice to owner or the owner's authorized agent. Upon notice from the *building official* that work on any building or structure is being prosecuted contrary to the provisions of this code or in an unsafe and dangerous manner, such work shall be immediately stopped. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's authorized agent or to the person doing the work and shall state the conditions under which work will be permitted to resume.

PART V – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC 102.3 Maintenance. All *aquatic vessel* and related mechanical, electrical and plumbing systems, both existing and new, and all parts thereof, shall be maintained in proper operating condition in accordance with the original design in a safe and sanitary condition. All devices or safeguards required by this code shall be maintained in compliance with the code edition under which they were installed.

The *owner* or the *owner's* authorized ~~designated~~ agent shall be responsible for maintenance of all systems. To determine compliance with this provision, the *code official* shall have the authority to require any system to be reinspected.

ISPSC 104.6 Right of entry. Where it is necessary to make an inspection to enforce the provisions of this code, or where the *code official* has reasonable cause to believe that there exists in a structure or upon a premises a condition which is contrary to or in violation of this code which makes the structure or premises unsafe, dangerous or hazardous, the *code official* is authorized to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises is unoccupied, the *code official* shall first make a reasonable effort to locate the owner, the owner's authorized agent or other person having charge or control of the structure or premises and request entry. If entry is refused, the *code official* shall have recourse to the remedies provided by law to secure entry.

ISPSC 104.8 Modifications. Wherever there are practical difficulties involved in carrying out the provisions of this code, the *code official* shall have the authority to grant modifications for individual cases, upon application of the owner or owner's authorized agent ~~representative~~, provided the *code official* shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen sustainability, health, accessibility, life safety and structural requirements. The details of action granting modifications shall be recorded and entered in the files of the department of building safety.

ISPSC 105.1 When required. Any *owner*, or owner's authorized agent who desires to construct, enlarge, alter, *repair*, move, or demolish an *aquatic vessel* or to erect, install, enlarge, alter, repair, remove, convert or replace any system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the *code official* and obtain the required *permit* for the work.

ISPSC 105.2 Application for permit. Each application for a permit, with the required fee, shall be filed with the *code official* on a form furnished for that purpose and shall contain a general description of the proposed work and its location. The application shall be signed by the owner or ~~an~~ the owner's authorized agent. The permit application shall contain such other information required by the *code official*.

ISPSC 107.5 Stop work orders. Upon notice from the *code official*, work on any system that is being done contrary to the provisions of this code or in a dangerous or unsafe manner shall immediately cease. Such notice shall be in writing and shall be given to the owner of the property, or to the owner's authorized agent, or to the person doing the work. The notice shall state the conditions under which work is authorized to resume. Where an emergency exists, the *code official* shall not be required to give a written notice prior to stopping the work. Any person who shall continue any work in or about the structure after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be liable to a fine of not less than [AMOUNT] dollars or more than [AMOUNT] dollars.

ISPSC 107.7.2 Authority to disconnect service utilities. The *code official* shall have the authority to authorize disconnection of utility service to the *aquatic vessel* regulated by the technical codes in case of an emergency, where necessary, to eliminate an immediate danger to life or property. Where possible, the owner or the owner's authorized agent and occupant of the building where the aquatic vessel is located shall be notified of the decision to disconnect utility service prior to taking such action. If not notified prior to disconnecting, the owner or the owner's authorized agent or occupant of the building shall be notified in writing, as soon as practical thereafter.

Reason: The purpose for the proposal is to update the references to “applicant” and “owner” throughout the building code by changing them to the “owner or the owner’s authorized agent” where it is warranted. In Section 110.1, “the permit applicant” is changed to “the owner or the owner’s authorized agent” because the latter should be responsible to keep the work accessible and exposed for inspection. In Sections 1703.4.1 and 1707.1, “the applicant” is changed to “the owner or the owner’s authorized agent” because the latter should be responsible for the costs of required tests, reports and investigations. In Sections 1703.6 and 1704.2.4, “the applicant” is changed to “the owner or the owner’s authorized agent” because the latter should be responsible for submitting required reports to the building official. In Section 1703.6.1, the applicant” is changed to “the owner or the owner’s authorized agent” for consistency with Section 1704.2 that requires the latter to employ the approved agencies. In Section 1803.6, the “owner or authorized agent” is changed to the “permit applicant” because it should be permissible for the latter to submit the geotechnical report with the other submittal documents at the time of permit application.
The 2012 IBC contains additional references to “owner” but, based on the context in which they are used, it is not considered appropriate or useful to revise the language in conjunction with this proposal (e.g., from “the owner” to “the owner or the owner’s authorized agent”). See Sections 101.4.4, 104.6, 111.2, 112.3, 116.3, 116.4, 402.3, 913.4, 1107.4-Exc. 1, 1607.7.4, 3108.2, 3307.1, 3412.4, 3412.4.1, G101.2, G105.6-Item 3, K103.1 and L101.3.
The 2012 IBC contains additional references to “applicant” but, based on the context in which they are used, it is also not considered appropriate or useful to revise the language in conjunction with this proposal (e.g., from “the applicant” to “the owner or the owner’s authorized agent”). See Sections 104.10.1-Item 5, 105.1.1, 105.3, 107.3.1, 109.3, 109.5, 1612.3.1, 1612.3.2, 1704.2.3, 1704.3, G103.3, G103.4, G103.5.1, G103.6, G104.2, G105.7-Item 5 and J104.1.
All instances in the 2012 IBC of “applicant” and “owner,” other than listed above, are included in this proposal.

Cost Impact: The code change proposal will not increase the cost of construction.

Staff analysis: This proposal for IBC indicate a correlative change throughout the code for the changes in Chapter 1. If this proposal is approved, similar revisions will be completed in the other chapters of the codes where the terms similar to “owner and owner’s authorized agent”.

Public Hearing Results

PART I - IADMIN
Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides a consistent and proper designation of “owner and owner’s authorized agent” throughout the codes. The proposal will eliminate the confusion called by so many different terms being used in the codes to mean the same person.

Assembly Action: **None**

PART II – IECC – Commercial
HEARD BY IECC COMMERCIAL COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: Provides consistency in use of terminology within the code and with the use of the terms in the other International Codes.

Assembly Action: **None**

PART III – IECC – Residential
HEARD BY IECC RESIDENTIAL COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: This proposed language would clarify the intent of the code.

Assembly Action: **None**

PART IV - IRC
HEARD BY IRC COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this proposed code change because they felt that it clarifies who is referenced and distinguishes authorized as a legal status.

Assembly Action: **None**

PART V - ISPSC
HEARD BY THE ISPSC COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: The committee agreed with the proponent's reason statement.

Assembly Action: **None**

Final Hearing Results

ADM22-13, Part I	**AS**
ADM22-13, Part II	**AS**
ADM22-13, Part III	**AS**
ADM22-13, Part IV	**AS**
ADM22-13, Part V	**AS**

Code Change No: ADM30-13

Original Proposal

**Section: PART I - IFC: [A] 105.4.5; IWUIC: [A] 108.10;
PART II - IECC: C103.4;
PART III - IECC: R103.4**

THIS IS A 3 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERICAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMMITTEES.

Proponent: Anthony C. Apfelbeck, CBO, CFPS, City of Altamonte Springs Building/Fire Safety Division, representing self. (ACApfelbeck@Altamonte.org)

PART I –IFC; IWUIC

Revise the International Fire Code as follows:

IFC [A] 105.4.5 ~~Corrected documents~~ <u>Amended construction documents</u>. ~~Where field conditions necessitate any substantial change from the approved construction documents, the fire code official shall have the authority to require the corrected construction documents to be submitted for approval.~~ <u>Work shall be installed in accordance with the approved construction documents, and any changes made during construction that are not in compliance with the approved construction documents shall be resubmitted for approval as an amended set of construction documents.</u>

Revise the International Wildland-Urban Interface Code as follows:

IWUIC [A] 108.10 Amended <u>construction</u> documents. <u>Work shall be installed in accordance with the approved construction documents, and any</u> changes made during construction that are not in compliance with the *approved* documents shall be resubmitted for approval as an amended set of construction documents.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC C103.4 Amended construction documents. <u>Work shall be installed in accordance with the approved construction documents, and any</u> changes made during construction that are not in compliance with the *approved* construction documents shall be resubmitted for approval as an amended set of construction documents.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC R103.4 Amended construction documents. <u>Work shall be installed in accordance with the approved construction documents, and any</u> changes made during construction that are not in compliance with the *approved* construction documents shall be resubmitted for approval as an amended set of construction documents.

Reason: The proposed language is from 107.4 in the IBC which better describes the intent of the section. This proposal correlates the IFC requirement with the IBC so users, contractors and designers are subject to the same code provision in both codes. There is no justification for differing language in the IFC as opposed to the IBC on this topic. The current language in IFC 105.4.5, to submit corrected documents, is too specific based on the <u>sole</u> fact of "when field conditions necessitate. . ." Clearly, this not the only reason that revised construction documents would be needed. As an example, the owner may choose to make a revision, a design professional may value engineer a design or a contractor may change materials from the original approved construction documents. All of these items are reasons that necessitate an amended construction document submittal under the IBC but currently do not under the IFC. This proposal will match the IBC and IFC language is broad enough to addresses any condition that may cause the installation to not be in compliance with the approved construction documents.

Cost Impact: This proposal will not increase the cost of construction. The IBC already requires amended construction documents per this language.

Staff analysis: The proposed language is found in IBC Section 107.4, IEBC Section 106.4 and IRC Section R106.4.

Public Hearing Results

PART I - IADMIN
Committee Action: **Approved as Submitted**

Committee Reason: The proposed language will coordinate the IBC, IFC and IWUIC. The added language will improve consistency in document preparation. There was a suggestion that perhaps the amended construction documents should be for "substantial" rather than "any" changes. This might be interpreted to require revised drawings for minor corrections dealing with construction issues.

Assembly Action: **None**

PART II – IECC – Commercial
HEARD BY IECC COMMERCIAL COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The proposal doesn't bring clarity to the code.

Assembly Action: **None**

PART III – IECC – Residential
HEARD BY IECC RESIDENTIAL COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: This proposed language better states the intent of this section.

Assembly Action: **None**

Public Comment(s)

Part II - Public Comment:

Donald Vigneau, representing Northeast Energy Efficiency Partnerships Inc., requests Approval as Submitted.

Commenter's Reason: The approvals of ADM 30-13 Parts I & III for IBC, IWUIC and IRC will not be consistent with IECC CE unless this vote is overturned. There is no legitimate reason the provisions in the other codes should not coordinate in the energy code.

Final Hearing Results

ADM30-13, Part I	**AS**
ADM30-13, Part II	**D**
ADM30-13, Part III	**AS**

Code Change No: ADM40-13

Original Proposal

Section: PART I - IBC: [A] 107.1, IEBC: [A] 106.1, IWUIC: [A] 108.1;
PART II - IECC: C103.1;
PART III - IECC: R103.1;
PART IV - IRC: R106.1

THIS IS A 4 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMMITTEES.

Proponent: Todd Letterman, Riverside County Fire Department, and Elley Klausbruckner representing self

PART I – IBC; IEBC; IWUIC

Revise the International Building Code as follows:

IBC [A] 107.1 General. Submittal documents consisting of *construction documents*, statement of *special inspections*, geotechnical report, technical reports and other data shall be submitted in two or more sets with each *permit* application. The *construction documents* and technical reports shall be prepared by a *registered design professional* where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *building official* is authorized to require additional *construction documents* to be prepared by a *registered design professional*.

> **Exception:** The *building official* is authorized to waive the submission of *construction documents* and other data not required to be prepared by a *registered design professional* if it is found that the nature of the work applied for is such that review of *construction documents* is not necessary to obtain compliance with this code.

Revise the International Existing Building Code as follows:

IEBC [A] 106.1 General. Submittal documents consisting of construction documents, special inspection and structural observation programs, investigation and evaluation reports, technical reports and other data shall be submitted in two or more sets with each application for a permit. The construction documents and technical reports shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require additional construction documents to be prepared by a registered design professional.

> **Exception:** The *code official* is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that reviewing of construction documents is not necessary to obtain compliance with this code.

Revise the International Wildland-Urban Interface Code as follows:

IWUIC [A] 108.1 General. Plans, engineering calculations, diagrams, technical reports and other data shall be submitted in at least two sets with each application for a permit. The construction documents and technical reports shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the code official is authorized to require additional documents to be prepared by a registered design professional.

> **Exception:** The *code official* is authorized to waive the requirements for submission of plans, calculations, construction inspection requirements and other data, if it is found that the nature of the work applied for is such that reviewing of plans is not necessary to obtain compliance with this code.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC C103.1 General. Construction documents, technical reports and other supporting data shall be submitted in one or more sets with each application for a permit. The construction documents and technical reports shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional.

> **Exception:** The *code official* is authorized to waive the requirements for construction documents or other supporting data if the *code official* determines they are not necessary to confirm compliance with this code.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC R103.1 General. Construction documents, technical reports and other supporting data shall be submitted in one or more sets with each application for a permit. The construction documents and technical reports shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed. Where special conditions exist, the *code official* is authorized to require necessary construction documents to be prepared by a registered design professional.

> **Exception:** The *code official* is authorized to waive the requirements for construction documents or other supporting data if the *code official* determines they are not necessary to confirm compliance with this code.

PART IV – IRC

Revise the International Residential Code as follows:

IRC R106.1 Submittal documents. Submittal documents consisting of *construction documents*, technical reports and other data shall be submitted in two or more sets with each application for a *permit.* The *construction documents* and technical reports shall be prepared by a registered *design professional* where required by the statutes of the *jurisdiction* in which the project is to be constructed. Where special conditions exist, the *building official* is authorized to require additional *construction documents* to be prepared by a registered *design professional*.

> **Exception:** The *building official* is authorized to waive the submission of *construction documents* and other data not required to be prepared by a registered *design professional* if it is found that the nature of the work applied for is such that reviewing of *construction documents* is not necessary to obtain compliance with this code.

Reason: Building construction and systems such as mechanical, etc. have to be designed by a professional engineer. The report addressing the requirements for some of these systems is the basis of their design. It is illogical to require the design to be prepared by a registered design professional but not require the report addressing the basis of the design be prepared by a registered design professional. Additionally if there are intentional acts of omission [or misleading information] in the report prepared by a registered design professional, the authority having jurisdiction can submit a complaint to the state board and the registered design professional can face disciplinary action [from fines, loss of reputation, etc. to having their license revoked]. There are no major repercussions to the preparer of these reports if they are not registered design professionals or if the Jurisdiction or state does not require educational or licencing requirements from the preparer. The added language will lend added support to the jurisdiction when a technical report is required if chosen to adopt this section as a local or state amendment.

> *NOTE: CBC Definition of Registered Design Professional - An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or jurisdiction in which the project is to be constructed.*

Additional Verbal Reason: The cities and jurisdictions that prefer a registered design professional prepare these technical reports are facing opposition for political reasons since the language is not specific. This will also help reduce liability from the cities and jurisdictions since registered design professionals typically carry liability insurance.

Cost Impact: None

Public Hearing Results

PART I - IADMIN
Committee Action: Disapproved

Committee Reason: Technical reports are already handled by the definition of construction documents. Third party reports, such as IES reports, are not prepared by the architect, so this proposal could be interpreted as not allowing these reports. The added language is redundant.

Assembly Action: None

PART II – IECC – Commercial
HEARD BY IECC COMMERCIAL COMMITTEE

Committee Action: Disapproved

Committee Reason: The added text doesn't improve the code. Technical reports, when appropriate, are covered by the general concept of construction documents. The code official can require information in various forms where needed to assure that a design complies with the code.

Assembly Action: None

PART III – IECC – Residential
HEARD BY IECC RESIDENTIAL COMMITTEE

Committee Action: Approved as Submitted

Committee Reason: The proposed language would clarify what constitutes necessary documentation for permit application.

Assembly Action: None

PART IV - IRC
HEARD BY IRC COMMITTEE

Committee Action: Disapproved

Committee Reason: The committee disapproved this code change proposal because a) " technical report" is not defined b) the provision is not needed because the design professional is responsible for what they sign, seal and date and c) the proposal is not workable if you consider the number of reports that are sourced by design professionals for any given project.

Assembly Action: None

Final Hearing Results

ADM40-13, Part I	**D**
ADM40-13, Part II	**D**
ADM40-13, Part III	**AS**
ADM40-13, Part IV	**D**

Code Change No: ADM51-13

Original Proposal

Section: **PART I - IBC: 202, IEBC: 202, IFC: 202, IFGC: 202, IMC: 202, IZC: 202**
PART II - IECC: C202;
PART III - IECC: R202 (IRC N1101.9);
PART IV - IRC: R202;
PART V – ISPSC: 202.

THIS IS A 5 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART V WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMMITTEES.

Proponent: Jeremiah Williams, U.S. Department of Energy (jeremiah.williams@ee.doe.gov)

PART I – IBC; IEBC; IFC; IFCG; IMC; IZC

Revise the International Building Code as follows:

IBC SECTION 202
DEFINITIONS

[A] ALTERATION. Any construction, retrofit or renovation to an *existing structure* other than *repair* or *addition* that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

Revise the International Existing Building Code as follows:

IEBC SECTION 202
DEFINITIONS

[A] ALTERATION. Any construction, retrofit or renovation to an existing structure other than a *repair* or *addition* that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit. Alterations are classified as Level 1, Level 2 or Level 3.

Revise the International Fire Code as follows:

IFC SECTION 202
DEFINITIONS

[A] ALTERATION. Any construction, retrofit or renovation to an *existing structure* other than *repair* or *addition* that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

Revise the International Fuel Gas Code as follows:

IFGC SECTION 202
GENERAL DEFINITIONS

[A] ALTERATION. A change in a system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

Revise the International Mechanical Code as follows:

IMC SECTION 202
GENERAL DEFINITIONS

[A] ALTERATION. A change in a ~~mechanical~~ system that involves ~~an~~ a retrofit, extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

Revise the International Zoning Code as follows:

IZC SECTION 202
GENERAL DEFINITIONS

[A] ALTERATION. Any retrofit, change, addition or modification in construction, occupancy or use.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC SECTION C202
GENERAL DEFINITIONS

ALTERATION. Any construction, retrofit or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

ALTERATION. Any construction, retrofit or renovation to an existing structure other than repair or addition that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a permit.

PART IV – IRC

Revise the International Residential Code as follows:

IRC SECTION R202
DEFINITIONS

ALTERATION. Any construction, retrofit or renovation to an existing structure other than repair or addition that requires a *permit*. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a *permit*.

PART V – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC SECTION 202
DEFINITIONS

ALTERATION. Any construction, retrofit or renovation to an *existing aquatic vessel* other than repair or addition that requires a permit. Also, a change in a building, electrical, gas, mechanical or plumbing system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a *permit*.

Reason:
PART I - This proposal expands definition of "alteration" to include retrofits and changes to energy systems for consistency with the 2012 International Energy Conservation Code (IECC). While the terms "construction" and "renovation" are not defined in the International Existing Buildings Code (IEBC) or other International Code Council (ICC) codes, they logically include mechanical, water heating, and lighting systems. Since this is not clearly spelled out, given some interpretations of the code these energy using systems might be excluded from IECC compliance when they should not be excluded. The suggested new sentence is intended to clarify the scope of the IECC with respect to alterations of such systems or their component parts and is consistent with the definition of "alteration" in the 2012 IECC. Because the term "retrofit" is used regularly to generally describe work done in existing buildings, its inclusion in the definition along with construction and renovation is intended to provide more clarity when trying to determine what is and is not covered by the IEBC with respect to work being done in and to existing buildings.

PART II, PART III, PART IV, and PART V –
A change in a mechanical system as currently described in the code is an appropriate target for compliance and alterations to such systems should meet the applicable provisions of the energy code. Plumbing, electrical (lighting), and other building systems also use energy and, if altered as defined in the code, they should be equally addressed as mechanical systems are in the current code. As an example, the extension of a potable hot water system to serve additional lavatories could involve additional hot water piping that should be insulated. Another example involves updating a lighting system arrangement with new fixtures and wiring. Such situations do not involve repairs or additions and are currently not subject to the provisions of the code when they should be. This proposal clarifies "alterations" to include changes to HVAC, service heating water, or lighting systems involving extension, addition, or change to arrangement, type, or purpose. This ensures that alterations, no matter what systems are involved, comply with the code. Approval of this change also ensures consistency between the IEBC as applied to alterations and the IECC. All three chapters in the IEBC applicable to alterations (7, 8 and 9) refer to the IECC and contain provisions applicable to other than mechanical systems. This change ensures consistency in scope between the IEBC and the IECC with respect to alterations.

There is a cost impact associated with this proposed change to the degree that the subject systems are not clearly covered in the current code and as a result alterations that should be subject to the energy code are not required to meet the energy code.

Cost Impact: The code change proposal will not increase the cost of construction.

Public Hearing Results

PART I - IADMIN
Committee Action: **Disapproved**

Committee Reason: The term 'retrofit' is undefined. The term 'needs a permit' is redundant.

Assembly Action: **None**

PART II – IECC – Commercial
HEARD BY IECC COMMERCIAL COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: The changes improve the definition of alteration to clarify that it includes changes to the building systems as well as the building, and that it includes retrofitting existing building elements.

Assembly Action: **None**

PART III – IECC – Residential
HEARD BY IECC RESIDENTIAL COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: This is a needed change to clarify what constitutes an alteration.

Assembly Action: **None**

PART IV - IRC
HEARD BY IRC COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The committee disapproved this code change proposal because there is no definition in the code for "retrofit."

Assembly Action: **None**

PART V - ISPSC
HEARD BY THE ISPSC COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The proposal appears to bring too much scope of coverage into this code that is only for coverage of pools and spas.

Assembly Action: **None**

Final Hearing Results

ADM51-13, Part I	**D**
ADM51-13, Part II	**AS**
ADM51-13, Part III	**AS**
ADM51-13, Part IV	**D**
ADM51-13, Part V	**D**

Code Change No: ADM57-13

Original Proposal

Section: **PART I - IFGC: 202, IMC: 202, IPC: 202**
PART II - IECC: C202 (New);
PART III - IECC: R202 (IRC N1101.9)(New)

THIS IS A 3 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMMITTEES.

Proponent: Brenda A. Thompson, Clark County Development Services, Clark County, Nevada, representing Sustainable/Energy/High Performance Code Action Committee (bat@clarkcounty.gov)

PART I – IBC; IFCG; IMC; IPC

Revise the International Building Code as follows:

IBC SECTION 202
DEFINITIONS

[A] APPROVED AGENCY. An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been *approved* by the building official.

Revise the International Fuel Gas Code as follows:

IFGC SECTION 202
GENERAL DEFINITIONS

[A] APPROVED AGENCY. An established and recognized agency ~~that is *approved* by the code official and~~ regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the code official.

Revise the International Mechanical Code as follows:

IMC SECTION 202
GENERAL DEFINITIONS

[A] APPROVED AGENCY. An established and recognized agency ~~that is *approved* by the code official and~~ regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the code official.

Revise the International Plumbing Code as follows:

IPC SECTION 202
GENERAL DEFINITIONS

[A] APPROVED AGENCY. An established and recognized agency ~~that is *approved* by the code official and~~ regularly engaged in conducting tests or furnishing inspection services<u>, when such agency has been approved by the code official</u>.

PART II – IECC-COMMERCIAL

Add a new definition to the International Energy Conservation Code-Commercial as follows:

IECC SECTION C202
GENERAL DEFINITIONS

<u>**APPROVED AGENCY.** An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the code official.</u>

PART III – IECC-RESIDENTIAL

Add a new definition to the International Energy Conservation Code-Residential as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

<u>**APPROVED AGENCY.** An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the code official.</u>

Reason: This proposal was submitted by the ICC Sustainability Energy and High Performance Code Action Committee (SEHPCAC). The SEHPCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes or portion thereof. This includes both the technical aspects of the codes as well as the code content in terms of scope and application of referenced standards. Since its inception in July, 2011, the SEHPCAC has held 3 open meetings and over 30 workgroup calls which included members of the SEHPCAC as well as any interested party to discuss and debate proposed changes and public comments. Related documentation and reports are posted on the SEHPCAC website at: http://www.iccsafe.org/cs/SEHPCAC/Pages/default.aspx.

Reasons for this specific proposal:

Part I – These revisions are for consistency across codes with the defined term.

Part II and III - The term 'approved agency' is used in the IECC, but not defined. While the term is defined in the *International Building Code*, and therefore available for application to the IECC, the SEHPCAC believes that the definition should be included in the IECC so that it is readily available for code users and the term is consistently applied.

Cost Impact: This code change proposal will not increase the cost of construction.

Staff analysis: The term "Approved Agency" is currently defined in the IBC, IFGC, IMC, IPC, IRC, ISPSC and IgCC. In the IBC, IPC, IMC and IPC, this definition is scoped to Administration. The term proposed for the IECC is the same as defined in the IRC and the ISPSC.

Public Hearing Results

PART I - IADMIN
Committee Action: **Approved as Submitted**

Committee Reason: The term 'approved agency' should be consistent throughout the codes.

Assembly Action: **None**

PART II – IECC – Commercial
HEARD BY IECC COMMERCIAL COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: Adding the definition for 'approved agency' provides a definition to a term already used in this code. This would also be consistent with the other International Codes.

Assembly Action: **None**

PART III – IECC – Residential
HEARD BY IECC RESIDENTIAL COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: The proposal provides a consistent definition of ‘approved agency’ throughout all of the I-Codes.

Assembly Action: **None**

Final Hearing Results

ADM57-13, Part I	**AS**
ADM57-13, Part II	**AS**
ADM57-13, Part III	**AS**

Code Change No: ADM60-13

Original Proposal

Section: **PART I - IBC: 202; IEBC: 202;**
PART II - IECC: C202;
PART III - IECC: R202 (IRC N1101.9);
PART IV - IRC: R202;
PART V - ISPSC: 202

THIS IS A 5 PART CODE CHANGE. PARTS I WILL BE HEARD BY THE ADMINISTRATIVE PROVISIONS COMMITTEE AS ONE CODE CHANGE. PART II WILL BE HEARD BY THE ENERGY CONSERVATION CODE-COMMERCIAL COMMITTEE. PART III WILL BE HEARD BY THE ENERGY CONSERVATION CODE-RESIDENTIAL COMMITTEE. PART IV WILL BE HEARD BY THE RESIDENTIAL CODE COMMITTEE. PART V WILL BE HEARD BY THE SWIMMING POOL AND SPA CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDER FOR THESE COMMMITTEES.

Proponent: Maureen Traxler, City of Seattle, representing Seattle Department of Planning and Development (maureen.traxler@seattle.gov)

PART I – IBC; IEBC

Revise the International Building Code as follows:

IBC SECTION 202
DEFINITIONS

[A] REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

Revise the International Existing Building Code as follows:

IEBC SECTION 202
DEFINITIONS

[A] REPAIR. The ~~restoration to good or sound condition~~ reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

PART II – IECC-COMMERCIAL

Revise the International Energy Conservation Code-Commercial as follows:

IECC SECTION C202
GENERAL DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

PART III – IECC-RESIDENTIAL

Revise the International Energy Conservation Code-Residential as follows:

IECC SECTION R202 (IRC N1101.9)
GENERAL DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage.

PART IV – IRC

Revise the International Residential Code as follows:

IRC SECTION R202
DEFINITIONS

REPAIR. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage. For definitions applicable in Chapter 11, see Section N1101.9.

PART V – ISPSC

Revise the International Swimming Pool and Spa Code as follows:

ISPSC SECTION 202
DEFINITIONS

REPAIR. The ~~restoration to good or sound condition~~ reconstruction or renewal of any part of an existing *aquatic vessel* for the purpose of its maintenance or to correct damage.

Reason: We are proposing the definition be modified in each of the codes in which it appears. The identical definition appears in the IBC, IEBC, IRC and ISPSC--4 of the 6 ICC codes in which it appears. The IECC definition is "The reconstruction or renewal of any part of an existing building." Note that the term is not defined in the IFC, IMC, IFGC, IPC or IPSDC. The definition of 'repair' in the IGCC definition is identical except that it includes building sites as well as buildings, and can be addressed in Group C.

Limiting repairs to maintenance is not consistent with the use of the term in the codes. IBC Section 3405.1 and IEBC Section 404.1, Repairs, specifically state that repair includes correction of damage. "Work on nondamaged components that is necessary for the required *repair* of damaged components shall be considered part of the *repair* and shall not be subject to the requirements for *alterations* in this chapter." IEBC Section 606.2 deals with repairs to damaged buildings—explicitly including correction of damage, which in many cases would be more than "maintenance".

Another possible solution to this inconsistency would be to delete the phrase "for the purpose of its maintenance" as the term is defined in the IECC. However, adding damage to the existing definition more clearly distinguishes repairs from alterations.

Cost Impact: None.

Public Hearing Results

PART I - IADMIN

Committee Action: **Approved as Submitted**

Committee Reason: The revision to the term 'repair' cleans up the difference between the terms repair and alteration. This proposal will also provide consistency throughout the code.

Assembly Action: **None**

PART II – IECC – Commercial
HEARD BY IECC COMMERCIAL COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: The proposal results in the identical definition of repair in multiple International Codes.

Assembly Action: **None**

PART III – IECC – Residential
HEARD BY IECC RESIDENTIAL COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: This proposed change would provide consistency with other I-Codes.

Assembly Action: **None**

PART IV - IRC
HEARD BY IRC COMMITTEE

Committee Action: **Approved as Submitted**

Committee Reason: The committee approved this proposed code change because they felt that it clarifies what the code is commonly interpreted to intend. This action is consistent with prior committee action on ADM60 Part I.

Assembly Action: **None**

PART V - ISPSC
HEARD BY THE ISPSC COMMITTEE

Committee Action: **Disapproved**

Committee Reason: The phrase “to correct damage” is too specific and unnecessary.

Assembly Action: **None**

Public Comment(s)

Part V - Public Comment:

Maureen Traxler, City of Seattle Dept of Planning & Development, representing Washington Association of Building Officials Technical Code Development Committee, requests Approval as Submitted.

Commenter’s Reason: This is a five-part proposal; four parts were approved. The proposal makes the definition of “repair” consistent in all the codes where it is used. The proposal also makes the definition consistent with the common use of the term to refer to correction of damage as repair.

Final Hearing Results

ADM60-13, Part I	**AS**
ADM60-13, Part II	**AS**
ADM60-13, Part III	**AS**
ADM60-13, Part IV	**AS**
ADM60-13, Part V	**AS**

Code Change No: ADM62-13

Original Proposal

ADM62-13

IBC, IECC, IEBC, IFC, IFGC, IgCC, IMC, IPC, IPMC, IRC, and the ISPSC

The following table provides a comprehensive list of all standards that the respective standards promulgators have indicated have been, or will be, updated from the listing in the 2012 Editions of the International Codes. According to Section 4.5.1 of ICC Council Policy #CP 28, Code Development Policy, the updating of standards referenced by the Codes shall be accomplished administratively by the Administrative code development committee. Therefore, referenced standards that are to be updated for the 2015 edition of any of the I-Codes are listed in this single code change proposal. Note that the table below indicates the change to the standard, and the code or codes in which each standard appears. The list includes standards that the promulgators have already updated or will have updated by December 1, 2014.

> ***4.5.1 Standards referenced in the I-Codes:** The updating of standards referenced by the Codes shall be accomplished administratively by the Administrative code development committee in accordance with these full procedures except that the deadline for availability of the updated standard and receipt by the Secretariat shall be December 1 of the third year of each code cycle. The published version of the new edition of the Code which references the standard will refer to the updated edition of the standard. If the standard is not available by the deadline, the edition of the standard as referenced by the newly published Code shall revert back to the reference contained in the previous edition and an errata to the Code issued. Multiple standards to be updated may be included in a single proposal.*

AA	**Aluminum Association**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
ADM 1-~~2010~~ 2015	Aluminum Design Manual: Part I Specification for Aluminum Structures	IBC						
AAMA	**American Architectural Manufacturers Association**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
450-~~09~~ 10	Voluntary Performance Rating Method for Mulled Fenestration Assemblies	IRC						
506-~~08~~ 11	Voluntary Specifications for Hurricane Impact and Cycle Testing of Fenestration Products	IRC						
711-~~07~~ 13	Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration Products	IRC						
1402-~~86~~ 09	Standard Specification for Aluminum Siding, Soffit and Fascia	IBC						

ACCA — Air Conditioning Contractors of America

Standard Reference Number	Title	Referenced in Code(s):							
Manual D-~~09~~ 2011	Residential Duct Systems	IMC	IRC						
Manual J-2011	Residential Load Calculation - Eighth Edition	IRC	IECC-R						
Manual S-~~10~~ 13	Residential Equipment Selection	IRC	IECC-R						
180-~~2008~~ 2012	Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems	IMC	IRC						
183-2007 (reaffirmed 2011)	Peak Cooling and Heating Load Calculations in Buildings Except Low-Rise Residential Buildings	IMC	IECC						

ACI — American Concrete Institute

Standard Reference Number	Title	Referenced in Code(s):							
216.1-~~07~~ 14	~~Standard Method~~ Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies	IBC							
304.2R-~~04~~ 96	Placing Concrete by Pumping Methods (Reapproved 2008)	ISPSC							
305.1-~~06~~ 14	Specification for Hot Weather Concreting	ISPSC							
308.1-~~98~~ 11	~~Standard~~ Specification for Curing Concrete	ISPSC							
318-~~11~~ 14	Building Code Requirements for Structural Concrete	IBC	IRC	ISPSC					
332-~~10~~ 14	Residential Code Requirements for Structural Concrete Construction	IRC							
506.2-~~95~~ 13	Specification for Shotcrete	ISPSC							
530-~~11~~ 13	Building Code Requirements for Masonry Structures	IBC	IRC						
530.1-~~11~~ 13	Specifications for Masonry Structures	IBC	IRC						

~~AF&PA~~ AWC — ~~American Forest & Paper Association~~ American Wood Council

Standard Reference Number	Title	Referenced in Code(s):							
~~AF&PA~~ AWC STJR~~—2012~~ 2015	Span Tables for Joists and Rafters	IBC	IRC						
~~ANSI/AF&PA~~ AWC WFCM~~—2012~~ 2015	Wood Frame Construction Manual for One- and Two-Family Dwellings	IBC	IRC						
ANSI/AWC NDS-~~2012~~ 2015	National Design Specification (NDS) for Wood Construction - with 2012 Supplement	IBC	IRC						
~~ANSI/AF&PA~~ AWC SDPWS~~—2008~~ 2015	Special Design Provisions for Wind and Seismic	IBC							
~~AF&PA~~ AWC WCD No. 4-2003	Wood Construction Data-Plank and Beam Framing for Residential Buildings	IBC							

ANSI/~~AF&PA~~ AWC PWF~~—2007~~ 2015	Permanent Wood Foundation Design Specification	IBC	IRC					
AHRI	**Air Conditioning, Heating and Refrigeration Institute**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
210/240-2008 with Addenda 1 and 2	Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment	IECC-C						
310/380-2004 (CSA - C744-04)	Standard for Packaged Terminal Air-Conditioners and Heat Pumps	IECC-C						
340/360-2007 with Addendum 2	Performance Rating of Commercial and Industrial Unitary Air-Conditioning and Heat Pump Equipment	IECC-C						
365 (I-P)-2009	Commercial and Industrial Unitary Air-Conditioning Condensing Units	IECC-C						
366 (SI)-2009	Commercial and Industrial Unitary Air-Conditioning Condensing Units	IECC-C						
400-2001 with Addenda 1 and 2	Liquid to Liquid Heat Exchangers ~~with Addendum 2~~	IECC-C						
440-2008	Performance Rating of Room Fan-Coils	IECC-C						
460-2005	Performance Rating of Remote Mechanical-Draft Air-Cooled Refrigerant Condensers	IECC-C						
550/590-~~03~~ 2011 with Addendum 1	Performance Rating of Water-Chilling ~~Packages~~ and Heat Pump Water-Heating Packages Using the Vapor Compression Cycle ~~with Addenda~~	IECC-C						
700- ~~2006~~ 2011 with Addendum 1	~~Purity~~ Specifications for Fluorocarbon ~~and Other~~ Refrigerants	IECC-C						
870-20~~09~~ 05	Performance Rating of Direct Geoexchange Heat Pumps	IECC-C						
1160-~~08~~ (I-P) 09	Performance Rating of Heat Pump z21.56	IECC-C	ISPSC					
116~~0~~1 (SI)- ~~08~~ -2011	Performance Rating of Heat Pump Pool Heaters	IECC-C	ISPSC					
13256-1~~(2005)~~ (2011)	~~Water-Source Heat Pumps –~~ Water-to-Air and Brine-to-Air Heat Pumps – Testing and Rating for Performance: ~~Part 1 -~~	IECC-C						
13256-2~~(1998)~~ (2011)	~~Water-source Heat Pumps~~ Water-to-Water and Brine-to-water Heat Pumps - Testing and Rating For Performance: ~~Part 2:~~	IECC-C						

AISI	**American Iron and Steel Institute**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
AISI S100-07/S2-~~10~~ 12	North American Specification for the Design of Cold Formed Steel Structural Members ~~with Supplement 2, dated~~ ~~2010~~ 2012	IBC	IRC					
AISI S110-07/S1-09 (2012)	Standard for Seismic Design of Cold-Formed Steel Structural Systems-Special Moment Frames, 2007 with Supplement 1, dated 2009, (2012)	IBC						
AISI S200-~~07~~ 2012	North American Standard for Cold-Formed Steel Framing - General Provisions	IBC						
AISI S210-~~07~~ 2012	North American Standard for Cold-formed Steel Framing-Floor and Roof System Design, 2007, (2012)	IBC						
AISI S211-07/S1-12 (2012)	North American Standard for Cold-Formed Steel Framing-Wall Stud Design, 2007, including Supplement 1, dated 2012, (2012)	IBC						
AISI S212-~~07~~ (2012)	North American Standard for Cold-Formed Steel Framing-Header Design, 2007, (2012)	IBC						
AISI S213-07/S1-~~09~~ (2012)	North American Standard for Cold-Formed Steel Framing-Lateral Design, with Supplement 1, dated 2009, (2012)	IBC						
AISI S214-~~07~~ 12	North American Standard for Cold-Formed Steel Framing - Truss Design with Supplement 2, dated ~~2008~~, 2012	IBC						
AISI S230-07-~~07/S2-08~~ /S3-12 (2012)	Standard for Cold-formed Steel Framing-Prescriptive Method for One- and Two-family Dwellings, 2007, with Supplement ~~2~~ 3, dated ~~2008~~ dated 2012, (2012)	IRC	IBC					
~~AITC~~	**~~American Institute of Timber Construction~~** (***Please note that the AITC is no longer promulgating ICC standards. Standards previously promulgated by AITC are now being handled by APA and WCLIB.)***							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
ALI	**Automotive Lift Institute**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						

ALI/ALCTV-~~2006~~ 2011	Standard for Automotive Lifts - Safety Requirements for Construction, Testing, and Validation ~~(ANSI)~~	IBC						
AMCA	**Air Movement and Control Association International**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
205-~~10~~ 12	Energy Efficiency Classification for Fans	IgCC						
220-~~05~~ 08	Laboratory Methods of Testing Air Curtain Units for Aerodynamic Performance Rating	IgCC						
500D-~~10~~ 12	Laboratory Methods for Testing Dampers for Rating	IECC-C						
ANSI	**American National Standards Institute**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
Z97.1- ~~09~~ 2014	Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test	IBC	IRC					
ANSI A137.1-~~88~~ 2012	American National Standard Specifications for Ceramic Tile	IBC	IRC					
Z21.50/CSA 2.22-~~2007~~ 2012	Vented Gas Fireplaces	IRC	IFGC	IgCC				
Z21.88/CSA 2.33-~~09~~ 2015	Vented Gas Fireplace Heaters	IRC	IFGC	IgCC				
LC 1/CSA 6.26-~~2005~~ 2013	Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing (CSST)	IFGC						
LC 4/CSA 6.32-~~2007~~ 2012	Press-Connect Metallic Fittings for Use in Fuel Gas Distribution Systems	IFGC	IRC					
Z21.1-~~2005~~ 2010	Household Gas Cooking Appliances	IFGC	IRC					
Z21.5.1/CSA 7.1-~~2006~~ 2014	Gas Clothes Dryers - Volume I - Type 1 Clothes Dryer	IFGC	IRC					
Z21.5.2/CSA 7.2-~~2005~~ 2014	Gas Clothes Dryers - Volume II - Type 2 Clothes Dryer	IFGC						
Z21.10.1/CSA 4.1-~~2009~~ 2012	Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less	IFGC	IRC					
Z21.10.3/CSA 4.3-~~2004~~ 2011	Gas Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating or Instantaneous	IFGC	IRC					
Z21.11.2-~~2007~~ 2011	Gas-Fired Room Heaters - Volume II - Unvented Room Heaters	IFGC	IRC					
Z21.13/CSA 4.9-~~2010~~ 2011	Gas-Fired Low Pressure Steam and Hot Water Boilers	IFGC	IRC					
A21.40.1/CSA 2.91-96 (R~~2002~~ 2011)	Gas-Fired Heat Activated Air Conditioning and Heat Pump Appliances	IFGC	IRC					
Z21.40.2/CSA 2.92-96 (R~~2002~~ 2011)	Air-Conditioning and Heat Pump Appliances (Thermal Combustion)	IFGC	IRC					
Z21.42-~~1993 (R2002)~~ 2014	Gas-Fired Illuminating Appliances	IFGC	IRC					

Z21.47/CSA 2.3-~~2007~~ 2012	Gas-Fired Central Furnaces	IFGC	IRC					
Z21.50/CSA 2.22-~~2006~~ 2012	Vented Gas Fireplaces	IFGC	IRC					
Z21.56/CSA 4.7-~~2007~~ 2013	Gas-Fired Pool Heaters	IFGC	ISPSC	IRC				
Z21.58/CSA 1.6-~~2003~~ 2013	Outdoor Cooking Gas Appliances	IFGC	IRC					
Z21.60/CSA 2.26-~~2003~~ 2012	Decorative Gas Appliances for Installation in Solid-fuel Burning Fireplaces	IFGC	IRC					
Z21.80/CSA 6.22-~~2003 (R2008)~~ 2011	Line Pressure Regulators	IFGC	IRC					
Z21.84-~~2002~~ 2012	Manually-lighted, Natural Gas Decorative Gas Appliances for Installation in Solid Fuel Burning Fireplaces	IFGC	IRC					
Z21.88/CSA 2.33-~~2009~~ 2015	Vented Gas Fireplace Heaters	IFGC	IRC					
Z21.97-~~2009~~ 2012	Outdoor Decorative Appliances	IFGC	IRC					
Z83.4/CSA 3.7-~~2003~~ 2012	Non-Recirculating Direct Gas-fired Industrial Air Heaters	IFGC						
~~Z83.6-90 (R1998)~~ withdrawn replaced with Z83.19 & Z83.20	Gas-fired Infrared Heaters	IFGC	IRC					
Z83.11/CSA 1.8-~~2006~~ 2013	Gas Food Service Equipment	IFGC						
Z83.18-~~2004~~ 2012	Recirculating Direct Gas-fired Industrial Air Heaters	IFGC						
Z83.19-2001 (R~~2005~~ 2009)	Gas-fired High Intensity Infrared Heaters	IFGC	IRC					
~~Z124.1-95~~ replaced with CSA B45.5-11/ IAPMO Z124-11	Plastic ~~Bathtub Units~~ Plumbing Fixtures	IPC	IRC					
~~Z124.1.2-2005~~ replaced with CSA B45.5-11/ IAPMO Z124-11	Plastic ~~Bathtub and Shower Units~~ Plumbing Fixtures	IPC	IRC					
~~Z124.2-95~~ replaced with CSA B45.5-11/ IAPMO Z124-11	Plastic ~~Shower Receptors and Shower Stalls~~ Plumbing Fixtures	IPC	IRC					
~~Z124.3-95~~ replaced with CSA B45.5-11/ IAPMO Z124-11	Plastic ~~Lavatories~~ Plumbing Fixtures	IPC	IRC					
~~Z124.4-96~~ replaced with CSA B45.5-11/ IAPMO Z124-11	Plastic ~~Water Closet Bowls and Tanks~~ Plumbing Fixtures	IPC	IRC					
~~Z124.6-97~~ replaced with CSA B45.5-11/ IAPMO Z124-11	Plastic ~~Sinks~~ Plumbing Fixtures	IPC	IRC					
~~Z124.7-97~~ replaced with IAPMO Z124.7-2012	Prefabricated Plastic Spa Shells	ISPSC						
~~Z124.9-94~~ replaced with CSA B45.5-11/ IAPMO Z124-11	Plastic ~~Urinal Fixtures~~ Plumbing Fixtures	IPC	IRC					
APA	**APA -The Engineered Wood Association**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
ANSI~~/AITC~~ A 190.1 – ~~07~~ 12	Structural Glued-Laminated Timber	IBC	IRC	IgCC				
APA E30-~~03~~ 11	Engineered Wood Construction Guide	IRC						
APA PDS ~~04~~ 12	Panel Design Specification	IBC						
APA PDS Supplement 5-~~08~~ 12	Design and Fabrication of All-Plywood Beams (revised ~~2008~~ 2013)	IBC						

APA PDS Supplement 1-~~90~~ 12	Design and Fabrication of Plywood Curved Panels (revised ~~1995~~ 2013)	IBC
APA PDS Supplement 4-~~90~~ 12	Design and Fabrication of Plywood Sandwich Panels (revised ~~1993~~ 2013)	IBC
APA PDS Supplement 3-~~90~~ 12	Design and Fabrication of Plywood Stressed-skin Panels (revised ~~1996~~ 2013)	IBC
APA PDS Supplement 2-~~92~~ 12	Design and Fabrication of Glued Plywood-lumber Beams (revised ~~1998~~ 2013)	IBC
EWS R540-~~02~~ 12	Builders Tips: Proper Storage and Handling of Glulam Beams	IBC
EWS S475-~~01~~ 07	Glued Laminated Beam Design Tables	IBC
EWS S560-~~03~~ 10	Field Notching and Drilling of Glued Laminated Timber Beams	IBC
EWS T300-~~05~~ 07	Glulam Connection Details	IBC
EWS X440-~~03~~ 08	Product Guide - Glulam	IBC

API

API –American Petroleum Institute

Standard Reference Number	Title	Referenced in Code(s):
Publ 2009 7th Edition (2002, R2012)	Safe Welding and Cutting Practices in Refineries, Gas Plants and Petrochemical Plants	IFC
Publ 2023 3rd Edition (R2001, R2006)	Guide for Safe Storage and Handling of Heated Petroleum-Derived Asphalt Products and Crude Oil Residue	IFC
Publ 2028 3rd Edition (2002, R2012)	Flame Arrestors in Piping Systems	IFC
Publ 2201 5th Edition (2003, 2010)	Procedures for Welding or Hot Tapping on Equipment in Service	IFC
RP 651 ~~(1997)~~ 3rd Edition (2007)	Cathodic Protection of Aboveground Petroleum Storage Tanks	IFC
RP 752 ~~(2003)~~ 3rd Edition (2009)	Management of Hazards Associated with Location of Process Plant Buildings, CMA Manager's Guide	IFC
RP 1604 (1996) 3rd Edition, R2010)	Closure of Underground Petroleum Storage Tanks	IFC
RP 1615 ~~(1996)~~ 6th Edition (2011)	Installation of Underground Petroleum Storage Systems	IFC
RP 2001 ~~(2005)~~ 9th Edition (2012)	Fire Protection in Refineries	IFC
RP 2350 ~~(2005)~~ 4th Edition (2012)	Overfill Protection for Storage Tanks in Petroleum Facilities, 3rd Edition	IFC
RP 2003 ~~(1998)~~ 7th Edition (2008)	Protection Against Ignitions Arising out of Static, Lightening, and Stray Currents	IFC
Spec 12P 3rd Edition ~~(1995)~~ (Reaffirmed ~~2000~~)	Specification for Fiberglass Reinforced Plastic Tanks	IFC
Std 653 ~~(2001)~~ 4th Edition (~~2000~~) (2009)	Tank Inspection, Repair, Alteration and Reconstruction	IFC
Std 2015 6th Edition (2001, R2006)	Safe Entry and Cleaning of Petroleum Storage Tanks	IFC

Standard Reference Number	Title	Referenced in Code(s):						
Std 2000 6th Edition ~~(1998~~) 2009	Venting Atmosphere and Low-pressure Storage Tanks: Nonrefrigerated and Refrigerated	IFC						
APHA	**American Public Health Association**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
~~2005~~ 2012	Standard Methods for Examination of Water and Waste water 2~~1~~ 2nd Edition	IgCC						
APSP	**The Association of Pool & Spa Professionals**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
ANSI/~~NSPI~~ APSP/ICC 3-~~99~~ 2013	Standard for Permanently Installed Residential Spas	IRC						
ANSI/~~NSPI~~ APSP/ICC 4-~~2007~~ 2012	Standard for Above-ground/On-ground residential swimming pools	IRC						
ANSI/~~NSPI~~ APSP/ICC 5-~~2003~~ 2011	Standard for Residential In-Ground Swimming Pools	IRC						
ANSI/~~NSPI~~ APSP/ICC 6-~~2009~~ 2013	Standard for Residential Portable Spas	IRC						
ANSI/APSP/ICC 7-~~06~~ 2013	Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs, and Catch Basins	IBC	IRC	ISPSC				
ANSI/APSP/ICC 14-11	Portable Spa Energy Efficiency Standard	IPSPC						
ANSI/APSP/ICC 15-11	Standard for Energy Efficiency for Residential Inground Swimming Pools and Spas with Addenda A Approved 2013)	ISPSC						
ANSI/APSP/ICC16-11	Standard for Suction Fittings for Use in Swimming Pools, Wading Pools, Spas and Hot Tubs	ISPSC						
ASABE	**American Society of Agricultural & Biological Engineers**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
EP 559.1 ~~1997~~ W/Corr. 1 ~~DEC 1996 (R2008~~) AUG2010	Design Requirements and Bending Properties for Mechanically Laminated Wood ~~Columns~~ Assemblies	IBC						
EP 486.~~1~~ 2 ~~DEC 1999 (R2005)~~ OCT2012	Shallow Post and Pier Foundation Design	IBC						
EP542~~-~~FEB1999 ~~99~~(R2009)	Procedures for Using and Reporting Data Obtained with the Soil Cone Penetrometer	IgCC						

S313.3~~-99~~ FEB1999 (R2009)	Soil Cone Penetrometer	IgCC						

ASCE/SEI

American Society of Civil Engineers/Structural Engineers Institute

Standard Reference Number	Title	Referenced in Code(s):						
5~~—11~~ 13	Building Code Requirements for Masonry Structures	IBC	IRC					
6—11 13	Specification for Masonry Structures	IBC	IRC					
7—10	Minimum Design Loads for Buildings and Other Structures with Supplement No. 1	IBC	IEBC	IRC				
8~~—02~~ 14	Standard Specification for the Design of Cold-formed Stainless Steel Structural Members	IBC						
24-~~05~~ 13	Flood Resistant Design and Construction	IBC	ISPSC	IRC				
29-~~05~~ 14	Standard Calculation Methods for Structural Fire Protection	IBC						
~~31-03~~ 41-13 Note: will be incorporated into ASCE 41-13	Seismic Evaluation and Retrofit ~~Rehabilitation~~ of Existing Buildings	IEBC						
32-01	Design and Construction of Frost Protected Shallow Foundations	IBC	IRC					
41-~~06~~ 13	Seismic Evaluation and Retrofit ~~Rehabilitation~~ of Existing Buildings	IEBC						

ASHRAE

American Society of Heating, Refrigerating and Air Conditioning Engineers

Standard Reference Number	Title	Referenced in Code(s):						
15-~~2010~~ 2013	Safety Standard for Refrigeration Systems	IMC						
34-~~2010~~ 2013	Designation and Safety Classification of Refrigerants	IRC	IMC					
52.2-~~2007~~ 2012	Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size	IgCC						
55-~~2004~~ 2010	Thermal Environmental Conditions on Human Occupancy	IgCC						
62.1-~~2010~~ 2013	Ventilation for Acceptable Indoor Air Quality	IMC	IECC	IEBC	IgCC			
90.1-~~2010~~ 2013	Energy Standard for Buildings Except Low-Rise Residential Buildings including Addendum G (ANSI/ASHRAE/IESNA 90.1-2007)	IECC	IgCC					

140-20~~10~~ 11	Standard Method of Test for the Evaluation of Building Energy Analysis Computer Programs	IECC						
146-~~2006~~ 2011	Testing for Rating Pool Heaters	IECC						
180-~~08~~ 2012	Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems	IMC						
ANSI/ASHRAE/ACCA 183-2007 (RA2011)	Peak Cooling and Heating Load Calculations in Buildings, Except Low-rise Residential Buildings	IECC						
ASHRAE-~~2004~~ 2012	HVAC Systems and Equipment Handbook - 2004	IMC	IECC					
ASHRAE-~~2009~~ 2013	ASHRAE Handbook of Fundamentals	IRC	IECC-R	IMC				
13256-1~~(2005)~~ 1998 (RA 2012)	Water-source Heat Pumps - Testing and Rating for Performance - Part 1: Water-to-Air and Brine-to-Air Heat Pumps (ANSI/ASHRAE/IESNA 90.1-2004)	IECC						

ASME American Society of Mechanical Engineers

Standard Reference Number	Title	Referenced in Code(s):						
ASME A17.1/CSA B44~~—2007~~2013	Safety Code for Elevators and Escalators	IBC	IFC	IEBC	IRC	IPMC		
A112.1.3-2000(R~~eaffirmed~~ 20~~05~~ 11)	Air Gap Fittings for Use with Plumbing Fixtures, Appliances, and Appurtenances	IPC	IRC					
A112.3.4-2000 (R~~eaffirmed~~ 2004) replaced with ASME A112.3.4-2013/CSA B45.9-13	Macerating Toilet Systems and Related Components	IPC	IRC					
A112.4.1-~~1993 (Reaffirmed 2002)~~ 2009	Water Heater Relief Valve Drain Tubes	IPC	IRC					
A112.4.2-~~2003 (R2008~~) 2009	Water Closet Personal Hygiene Devices	IPC						
A112.4.3-1999 (R~~eaffirmed~~ 20~~04~~ 10)	Plastic Fittings for Connecting Water Closets to the Sanitary Drainage System	IPC	IRC					
A112.6.1M-1997 (R~~eaffirmed~~ 20~~02~~ 08)	Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use	IPC	IRC					
A112.6.2-2000 (R~~eaffirmed~~ 20~~04~~ 10)	Framing-Affixed Supports for Off-the-Floor Water Closets with Concealed Tanks	IPC	IRC					
A112.6.3-2001(R~~eaffirmed~~ 2007)	Floor and Trench Drains	IPC	IRC					
A112.6.7-~~2001(Reaffirmed 2007)~~ 2010	Enameled and Epoxy Coated Cast Iron and PVC Plastic Sanitary Floor Sinks	IPC						
A112.6.9-2005 (R2010)	Siphonic Roof Drains	IPC						
ASME A112.18.1-~~2005~~ 2012/ CSA B125.1-~~2005~~ 2012	Plumbing Supply Fittings	IPC	IRC					
ASME A112.18.2-~~2005~~ 2011/ CSA B125.2-~~2005~~ 2011	Plumbing Waste Fittings	IPC	IRC					
ASME A112.19.1-2013/ CSA B45.2-~~08~~ 13	Enameled Cast-Iron and Enameled Steel Plumbing Fixtures	IPC	IRC					

ASME A112.19.2-~~2008~~ 2013/ CSA B45.1-~~08~~ 13	Ceramic Plumbing Fixtures	IPC	IRC					
ASME A112.19.3-2008/ CSA B45.4-08(R2013)	Stainless-Steel Plumbing Fixtures	IPC	IRC					
ASME A112.19.5-2011/ CSA/B45.15-~~09~~ 11	Flush Valves and Spuds ~~Trim~~ for Water Closets, Urinals ~~Bowls~~ and Tanks	IPC	IRC					
ASME A112.19.7-2012/ CSA B45.10-~~09~~ 2012	Hydromassage Bathtubs ~~Appliances~~ Systems	IPC	IRC					
B16.1-~~2005~~ 2010	~~Cast~~ Gray Iron Pipe Flanges and Flanged Fittings~~, Classes 25, 125 and 250~~	IFGC						
B16.3-~~2006~~ 2011	Malleable Iron Threaded Fittings Classes 150 and 300	IPC	IRC	IMC				
B16.4~~—2006~~ 2011	Gray Iron Threaded Fittings ~~Class 125 and 250~~	IPC	IRC					
B16.5-~~2003~~ 2009	Pipe Flanges and Flanged Fittings NPS 1/2 Through NPS 24	IMC						
B16.11-~~2005~~ 2011	Forged Fittings, Socket-Welding and Threaded	IPC	IRC	IMC				
B16.12-~~1998 (Reaffirmed 2006)~~ 2009	Cast Iron Threaded Drainage Fittings	IPC	IRC					
B16.15-~~2006~~ 2011	Cast Bronze Threaded Fittings	IRC	IMC	IPC	IPSPC			
B16.18-~~2001 (Reaffirmed 2005)~~ 2012	Cast Copper Alloy Solder Joint Pressure Fittings	IPC	IBC	IRC	IMC	IFC		
B16.20-~~1998(Reaffirmed~~ 2007~~)~~	Metallic Gaskets for Pipe Flanges: Ring-Joint, Spiral-Wound, and Jacketed	IFGC						
B16.22-2001~~(Reaffirmed 2005)~~ (R2010)	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings	IPC	IBC	IRC	IFC	IMC		
B16.23-~~2002 (Reaffirmed 2006)~~ 2011	Cast Copper Alloy Solder Joint Drainage Fittings: DWV	IPC	IRC	IMC				
B16.24-~~2006~~ 2011	Cast Copper Alloy Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and 2500	IMC						
B16.26-~~2006~~ 2011	Cast Copper Alloy Fittings for Flared Copper Tubes	IPC	IRC	IMC				
B16.29-~~2007~~ 2012	Wrought Copper and Wrought-Copper-Alloy Solder Joint Drainage Fittings - (DWV)	IPC	IRC	IMC				
B16.33-~~2002(Reaffirmed 2007)~~ 2012	Manually Operated Metallic Gas Valves for Use in Gas Piping Systems up to 125 psig (Sizes 1/2 through 2)	IFGC	IRC					
B31.1-~~2007~~ 2012	Power Piping	IFC						
B31.3-~~2004~~ 2012	Process Piping	IBC	IFC					
B31.4-~~2006~~ 2012	Pipeline Transportation Systems for Liquid Hydrocarbons and other Liquids	IFC						
B31.9~~—08~~ 2011	Building Services Piping	IFC	IMC					
ASSE 1016/ASME A112.1016/CSA B125.16-2011 is a replacement for ASSE 1016-2010	Performance Requirements for Automatic Compensating, Valves for Individual Showers and Tub/Shower Combinations	IPC	IRC	IgCC				
BPVC-~~2007~~ 2010/2011 addenda	Boiler & Pressure Vessel Code	IFC	IMC	IFGC	IRC			
CSD-1-~~2009~~ 2011	Controls and Safety Devices for Automatically Fired Boilers	IMC						

ASPE	**American Society of Plumbing Engineers**			
Standard Reference Number	**Title**	**Referenced in Code(s):**		
45-~~2007~~ 2013	Siphonic Roof Drainage Systems	IPC		

ASSE	**American Society of Sanitary Engineering**			
Standard Reference Number	**Title**	**Referenced in Code(s):**		
~~1016-2010~~ ASSE 1016/ASME A112.1016/CSA B125.16-2011	Performance Requirements for Automatic Compensating, Valves for Individual Showers and Tub/Shower Combinations	IPC	IRC	IgCC

ASTM	**ASTM International**				
Standard Reference Number	**Title**	**Referenced in Code(s):**			
A53/A 53M-~~07~~ 12	Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless	IPC	IMC	IRC	IFGC
A74-~~09~~ 12	Specification for Cast Iron Soil Pipe and Fittings	IPC	IRC	IPSDC	
A82/A 2M-~~05a~~ 07	Specification for Steel Wire, Plain, for Concrete Reinforcement	IRC			
A106/A 106M-~~08~~ 11	Specification for Seamless Carbon Steel Pipe for High-Temperature Service	IMC	IRC	IFGC	
A123/A 123M-~~02~~ 12	Specification of Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products	IBC			
A126-~~04~~(2009)	Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings	IMC	IRC		
A153/A153M-~~05~~ 09	Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware	IBC	IRC		
A182-~~10a~~ 12A	Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings and Valves and Parts for High-Temperature Service	ISPSC			
A185/A 185M-~~06E01~~ 07	Specification for Steel Welded Wire Reinforcement, Plain for Concrete	IBC			
A240/A 240M-~~09~~ 12	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications	IBC	IRC	IPSPC	
A252-~~98(2007)~~ 10	Specification for Welded and Seamless Steel Pipe Piles	IBC			
A283/A 283M-~~03(2007)~~ 12	Specification for Low and Intermediate Tensile Strength Carbon Steel Plates	IBC			
A307-~~07b~~ 10	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength	IBC	IRC		
A312/A 312M-~~08a~~ 12A	Specification for Seamless, and Welded, and Heavily Cold Worked Austenitic Stainless Steel	IPC	IRC	ISPSC	

	Pipes								
A377-~~03~~ 2003(2008)e1*	Index of Specification for Ductile-Iron Pressure Pipe	IRC							
A403-~~10a~~ 12	Standard Specification for Wrought Austenitic Stainless Steel Pipe Fittings	ISPSC							
A416/A 416M-~~06~~ 12A	Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete	IBC							
A420/A 420M-~~07~~ 10A	Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service	IMC							
A421/A 421M- ~~05~~ 10	Specification for Uncoated Stress-Relieved Steel Wire for Prestressed Concrete	IBC							
A435/A 435M-90 ~~(2007)~~ 2012	Specification for Straight-Beam Ultrasonic Examination of Steel Plates	IBC							
A463M/A 463M-~~06~~ 10	Specification for Steel Sheet, Aluminum-Coated, by the Hot Dip Process	IBC	IRC						
A480/A480M-~~06b~~ 12	Specification for General Requirements for Flat-Rolled Stainless and Heat-/Resisting Steel Plate, Sheet and Strip	IBC							
A496-~~05~~ 07	Specification for Steel Wire, Deformed for Concrete Reinforcement	IBC							
A497 A497M-~~06e01~~ 07	Specification for Steel Welded Reinforcement Deformed for Concrete	IBC							
A510-~~08~~ 11	Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, Alloy Steel	IBC	IRC						
A572/A 572M-~~07~~ 12	Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel	IBC							
A588/A 588M-05 ~~10~~	Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 Mpa) Minimum Yield Point, with Atmospheric Corrosion Resistance	IBC							
A615/A 615M-~~09~~ 12	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement	IBC	IRC						
A653/A 653M-~~08~~ 11	Specification for Steel Sheet, Zinc-Coated Galvanized or Zinc-Iron Alloy-Coated Galvannealed by the Hot-Dip Process	IBC	IRC						
A690/690M-07(2012)	Standard Specification for High Strength Low-Alloy Nickel, Copper Phosphorus Steel H-Piles and Sheet Piling with Atmospheric Corrosion Resistance for Use in Marine Environments	IBC							
A706/A 706M-09B	Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement	IBC	IRC						
A722/A 722M-~~07~~ 12	Specification for Uncoated High-Strength Steel Bar for Prestressing Concrete	IBC							

A733-2003(2009)e1*	Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples	IPC						
A755/A 755M-~~03(2008)~~ 2011	Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process and Prepainted by the Coil-coating Process for Exterior Exposed Building Products	IBC	IRC					
A767/A 767M-~~05~~ 09	Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement	IBC						
A775/A 775M-07b	Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process and Prepainted by the Coil-coating Process for Exterior Exposed Building Products	IBC						
A778-01(2009)e1	Specification for Welded Unannealed Austenitic Stainless Steel Tubular Products	IPC	IRC					
A792/A 792M-~~08~~ 10	Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process	IBC	IRC					
A875/A 875M-~~06~~ 10	Standard Specification for Steel Sheet Zinc-5%, Aluminum Alloy-Coated by the Hot-Dip Process	IBC	IRC					
A888-~~09~~ 11	Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Application	IPC	IPSDC	IRC				
A913/A 913M-~~07~~ 11	Specification for High-Strength Low-Alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process (QST)	IBC						
A924/A 924M-~~08a~~ 2010a	Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot Dip Process	IBC	IRC					
A951/A951M-~~06~~ 11	Specification for Steel Wire Masonry Joint Reinforcement	IRC						
A992/A 992M-~~06a~~ 11	Standard Specification for Structural Shapes	IBC						
A996/A 996M-20**09**b	Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement	IRC						
A1003/A 1003M-~~08~~ 12	Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-formed Framing Members	IRC						
A1008/A1008M-~~07~~ 12	Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable	IBC						
B42-~~02e01~~ 10	Specification for Seamless Copper Pipe, Standard Sizes	IPC	IBC	IRC	IFC			
B43-~~98(2004~~) 09	Specification for Seamless Red Brass Pipe, Standard Sizes	IPC	IBC	IRC	IFC	IMC		
B68-~~02~~ 11	Specification for Seamless Copper Tube, Bright Annealed	IBC	IFC	IMC				
B75-~~02~~ 11	Specification for Seamless Copper Tube	IPC	IPSDC	IRC	IMC			

B88-~~03~~ 09	Specification for Seamless Copper Water Tube	IPC	IBC	IPSDC	IRC	IMC	IF C	IPSPC
B101-~~07~~ 12	Specification for Lead-Coated Copper Sheet and Strip for Building Construction	IBC	IRC					
B135-~~08a~~ 10	Specification for Seamless Brass Tube	IRC	IMC					
B152/B 152M-~~06a~~ 09	Specification for Copper Sheet, Strip Plate and Rolled Bar	IPC						
B209-~~07~~ 10	Specification for Aluminum and Aluminum-Alloy Steel and Plate	IBC	IRC					
B210-~~04~~ 12	Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes	IFGC						
B227-~~04~~ 10	Specification for Hard-Drawn Copper-Clad Steel Wire	IRC						
B241/B 241M-~~02~~ 10	Specification for Aluminum and Aluminum-Alloy, Seamless Pipe and Seamless Extruded Tube	IFGC						
B251-~~02e01~~ 10	Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube	IPC	IPSDC	IBC	IFC	IRC	IM C	
B302-~~07~~ 12	Specification for Threadless Copper Pipe, Standard Sizes	IPC	IRC	IMC				
B370-~~09~~ 12	Specification for ~~Cold Rolled~~ Copper Sheet and Strip for Building Construction	IBC	IRC					
B447-~~07~~ 12a	Specification for Welded Copper Tube	IPC	IRC					
B633-~~07~~ 11	Specification for Electodeposited Coatings of Zinc on Iron and Steel	IRC						
B687-99~~(2005)e01~~ (2011)	Specification for Brass, Copper, and Chromium-Plated Pipe Nipples	IPC						
B695-04(2009)	Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel	IBC	IRC					
B813-~~00(2009)~~ 10	Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube	IPC	IPSDC	IRC	IMC			
B828-02(2010)	Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings	IPC	IPSDC	IRC				
C4-04~~e01~~ (2009)	Specification for Clay Drain Tile and Perforated Clay Drain Tile	IPC	IPSDC	IRC				
C5-~~03~~ 10	Specification for Quicklime for Structural Purposes	IBC	IRC					
C14-~~07~~ 11	Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe	IPC	IPSDC	IRC				
C22/C 22M-00~~(2005)e01~~ (2010)	Specification for Gypsum	IBC	IRC					
C27-98(2008)	Specification for ~~Standard~~ Classification of Fireclay and High-Alumina Refractory Brick	IBC	IRC					
C28/C 28M-~~00(2005~~**)** 10	Specification for Gypsum Plasters	IBC	IRC					
C31/C 31M-~~08b~~ 12	Practice for Making and Curing Concrete Test Specimens in the Field	IBC						
C33/C33M-~~08~~ 11a	Specification for Concrete Aggregates	IBC	IRC					

C34~~-03~~ 10	Specification for Structural Clay Load-Bearing Wall Tile	IBC	IRC					
C35-~~01(2005)~~/C35M-1995(2009)	Specification for Inorganic Aggregates for Use in Gypsum Plaster	IBC	IRC					
~~C36/C 36M-03~~ Withdrawn Replaced	Specification for Gypsum Wallboard	IBC						
~~C37/C 37M-01~~ Withdrawn Replaced	Specification for Gypsum Lath	IBC						
C42/C 42M-~~04~~ 12	Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete	IBC						
C55-~~06e01~~ 2011	Specification for Concrete Building Brick	IBC	IRC					
C56-~~05~~ 2010	Specification for Structural Clay Non-Load-Bearing Tile	IBC						
C59/C 59M-**00(2006)**	Specification for Gypsum Casting Plaster and Molding Plaster	IBC	IRC					
C61/C 61M-00(2006) (2011)	Specification for Gypsum Keene's Cement	~~IBC~~	IRC					
C62-~~08~~ 12	Specification for Building Brick (Solid Masonry Units Made From Clay or Shale)	IBC	IRC					
C67-~~08~~ 12	Test Methods of Sampling and Testing Brick and Structural Clay Tile	IBC						
C73-~~05~~ 10	Specification for Calcium Silicate ~~Face~~ Brick (Sand-Lime Brick)	IBC	IRC					
C76-~~08a~~ 12a	Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe	IPC	IPSDC	IRC				
C90-~~08~~ 12	Specification for Loadbearing Concrete Masonry Units	IBC	IRC	IECC				
C91-~~05~~ 12	Specification for Masonry Cement	IBC	IRC					
C94/C 94M-~~09~~ 12	Specification for Ready-Mixed Concrete	IBC	IRC					
C109/C 109M-~~05~~ 2001b	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)	IBC						
C126-~~99(2005)~~ 12	Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units	IBC						
C129-~~06~~ 11	Specification for Nonload-bearing Concrete Masonry Units	IBC	IRC					
C140-~~08a~~ 2012a	Test Method Sampling and Testing Concrete Masonry Units and Related Units	IBC	IRC					
C143/C 143M-~~08~~ 2010a	Test Method for Slump of Hydraulic Cement Concrete	IRC						
~~C145-85~~ *Withdrawn Combined*	Specification for Solid-Load Bearing Concrete Masonry Units	IRC						
C150-~~07~~ 12	Specification for Portland Cement	IBC	IRC					
C172/C172M-~~08~~ 10	Practice for Sampling Freshly Mixed Concrete	IBC						

C199-84 ~~(2005)~~ (2011)	Test Method for Pier Test for Refractory Mortars	IBC	IRC					
C203-~~5a~~ (2012)	Standard Test Methods for Breaking Load and Flexural Properties of Block-type Thermal Insulation	IRC						
C206-03(2009)	Specification for Finishing Hydrated Lime	IBC						
C207-~~06~~ 2011	Specification for Hydrated Lime for Masonry Purposes	IBC	IRC					
C208-~~2008a~~ 12	Specification for Cellulosic Fiber Insulating Board	IBC	IRC					
C212-~~00(2006)~~10	Specification for Structural Clay Facing Tile	IBC						
C216-~~07a~~ 12	Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale)	IBC	IRC					
C270-~~08a~~ 12a	Specification for Mortar for Unit Masonry	IBC	IRC					
C272-~~01(2007)~~/C272M-12	Standard Test Method for Water Absorption of Core Materials for ~~Structural~~ Sandwich Constructions	IRC						
C273/C273M-~~07a~~ 11	Standard Test Method for Shear Properties of Sandwich Core Materials	IRC						
C296-~~00(2004)~~ /C296M-00(2009)e1	Specification for Asbestos-Cement Pressure Pipe	IPC	IRC					
C315-07(2011)	Specification for Clay Flue Liners and Chimney Pots	IBC	IRC	IMC	IFGC			
C317/C 317M-00~~(2005)~~ 2010	Specification for Gypsum Concrete	IBC						
C330-~~05~~**/C330-2009**	Specification for Lightweight Aggregates for Structural Concrete	IBC						
C331-~~05~~ /C331M-2010	Specification for Lightweight Aggregates for Concrete Masonry Units	IBC						
C406-~~06e01~~ /C406M-2010	Specification for Roofing Slate	IBC	IRC					
C411-~~05~~ 11	Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation	IRC	IMC					
C425-04(2009)	Specification for Compression Joints for Vitrified Clay Pipe and Fittings	IPC	IPSDC	IRC				
C428/C428M-05(20~~06~~11)e1	Specification for Asbestos-Cement Nonpressure Sewer Pipe	IPC	IPSDC	IRC				
C443-~~05a~~ 12	Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets	IPC	IPSDC	IRC				
C472-99~~(2004)~~ (2009)	Specification for Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete	IBC						
C473-~~07~~ 12	Test Methods for Physical Testing of Gypsum Panel Products	IBC						
C474-~~05~~ 12	Test Methods for Joint Treatment Materials for Gypsum Board Construction	IBC						
C475/C 475M-~~02(2007)~~ 12	Specification for Joint Compound and Joint Tape for Finishing	IBC	IRC					

	Gypsum ~~Wall~~ Board							
C476-~~08~~ 10	Specification for Grout for Masonry	IRC						
C496/C496M-~~96~~ 11	Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens	IEBC						
C503-~~08a~~ 10	Specification for Marble Dimension Stone (Exterior)	IBC						
C508/C508M-00~~(2004)~~ (2009)e1	Specification for Asbestos-Cement Underdrain Pipe	IPC	IRC					
C514-04(2009)e1	Specification for Nails for the Application of Gypsum Board	IBC	IRC					
C516-08~~a~~	Specification for Vermiculite Loose Fill Thermal Insulation	IBC						
C518-~~04~~ 10	Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus	IBC	IECC					
C547-~~07e1~~ 12	Specification for Mineral Fiber Pipe Insulation	IBC						
C549-06(2012)	Specification for Perlite Loose Fill Insulation	IBC						
C552-~~07~~ 12b	Standard Specification for Cellular Glass Thermal Insulation	IBC	IRC					
C557-03(2009)e~~0~~1	Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing	IBC	IRC					
C564-~~08~~ 12	Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings	IPC	IPSDC	IRC				
C568-~~08a~~ 10	Specification for Limestone Dimension Stone	IBC						
C578~~—08b~~12a	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation	IBC	IRC					
C587-04~~(2009)~~	Specification for Gypsum Veneer Plaster	IBC	IRC					
C595/C95M-~~08a~~ 2012e1	Specification for Blended Hydraulic Cements	IBC	IRC					
C615/C615M-~~03~~ 2011	Specification for Granite Dimension Stone	IBC						
C616/C616M-~~08a~~ 2010	Specification for Quartz Dimension Stone	IBC						
C629-~~08~~ 2010	Specification for Slate Dimension Stone	IBC						
~~C630/C 630M-03~~ *Withdrawn replaced by C1396/C1396M-11*	Specification for Water-Resistant Gypsum Backing Board	IBC	IRC					
C635/C635M-~~07~~ 12	Specification for the Manufacturer, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings	IBC						
C645-~~08a~~ 11A	Specification for Nonstructural Steel Framing Members	IBC	IRC					
C652-~~09~~ 12	Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)	IBC	IRC					
C685/C 685M-~~07~~ 11	Specification for Concrete Made by Volumetric Batching and	IRC						

	Continuous Mixing							
C700-~~07a~~ 11	Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated	IPC	IPSDC	IRC				
C726-~~05e1~~ 12	Standard Specification for Mineral Wool Roof Insulation Board	IBC						
C728-05(2010)	Standard Specification for Perlite Thermal Insulation Board	IBC	IRC					
C744-~~08~~ 11	Specification for Prefaced Concrete and Calcium Silicate Masonry Units	IBC						
C754-~~08~~ 11	Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products	IBC						
C836/C836M-~~06~~ 12	Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course	IBC	IRC					
C840-~~08~~ 11	Specification for Application and Finishing of Gypsum Board	IBC						
C841-03(2008)E1	Specification for Installation of Interior Lathing and Furring	IBC						
C842-~~05~~(2010)E1	Specification for Application of Interior Gypsum Plaster	IBC						
C843-99~~(2006)~~ (2012)	Specification for Application of Gypsum Veneer Plaster	IBC	IRC					
C844-04(2010)	Specification for Application of Gypsum Base to Receive Gypsum Veneer Plaster	IBC	IRC					
C847-~~09~~ 12	Specification for Metal Lath	IBC	IRC					
C887-05(2010)	Specification for Packaged, Dry, Combined Materials for Surface Bonding Mortar	IBC	IRC					
C897-05(2009)	Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters	IBC	IRC					
C920-~~08~~ 11	Standard Specification for Elastomeric Joint Sealants	IBC	IRC	IgCC				
C926-~~06~~ 12A	Specification for Application of Portland Cement-Based Plaster	IBC	IRC					
C931/C 931M-04 *Withdrawn Replaced by C1396/C1396M-11*	Specification for Exterior Gypsum Soffit Board	IBC						
C932-06	Specification for Surface-Applied Bonding Compounds ~~Agents~~ for Exterior Plastering	IBC						
C933-~~07b~~ 11	Specification for Welded Wire Lath	IBC						

C946-~~91 (2001)~~ 10	Specification for ~~Practice for~~ Construction of Dry-stacked, Surface-Bonded Walls	IBC						
C954-~~07~~ 11	Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 inch (0.84 mm) to 0.112 inch (2.84 mm) in Thickness	IBC	IRC					
C955-~~09~~ 11C	Standard Specification for Load-bearing Transverse and Axial Steel Studs, Runners Tracks, and Bracing or Bridging, for Screw Application of Gypsum Panel Products and Metal Plaster Bases	IBC	IRC					
C956-04(2010)	Specification for Installation of Cast-in-Place Reinforced Gypsum Concrete	IBC						
C957-~~06~~ 10	Specification for High-Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane with Integral Wearing Surface	IBC	IRC					
C989/C989M-~~06~~ 12A	Specification for ~~Ground Granulated Blast-Furnace~~ Slag Cement for Use in Concrete and Mortars	IBC						
C1007-~~08a~~ 11a	Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories	IBC						
C1019-~~09~~ 11	Test Method for Sampling and Testing Grout	IBC						
C1029-~~08~~ 10	Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation	IBC	IRC					
C1032-06(2011)	Specification for Woven Wire Plaster Base	IBC	IRC					
C1047-~~09~~ 10A	Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base	IBC	IRC					
C1053-00~~(2005)~~ (2010)	Specification for Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications	IPC						
C1063-~~08~~ 12C	Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster	IBC	IRC					
C1088-09	Specification for Thin Veneer Brick Units Made From Clay or Shale	IBC						
C1072-~~06~~ 11	Standard Text Method for Measurement of Masonry Flexural Bond Strength	IBC						
C1107/C1107-~~08~~ 11	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)	IRC						

C1116/C1116M-~~08a~~ 10	Standard Specification for Fiber - Reinforced Concrete and Shotcrete	IRC						
C1157-~~08a~~ 11	Standard Performance Specification for Hydraulic Cement	IBC						
C1167-~~03~~ 11	Specification for Clay Roof Tiles	IBC	IRC					
C1173-~~08~~ 10	Specification for Flexible Transition Couplings for Underground Piping Systems	IPC	IPSDC	IRC				
C1178/C 1178M-~~06~~ 11	Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel	IBC	IRC					
C1186-08	Specification for Flat ~~Nonasbestos~~ Fiber Cement Sheets	IBC	IRC					
C1218/C1218M-99(2008)	Test Method for Water-Soluble Chloride in Mortar and Concrete	IBC						
C1240-~~05~~ 12	Specification for Silica Fume Used in Cementitious Mixtures	IBC						
C1261-~~07~~ 10	Specification for Firebox Brick for Residential Fireplaces	IBC	IRC					
C1277-~~08~~ 11	Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings	IPC	IPSDC	IRC				
C1278/C1278M-07a(2011)	Specification for Fiber-Reinforced Gypsum Panels	IBC	IRC					
C1280-~~09~~ 12A	Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing	IBC						
C1283-~~07a~~ 11	Practice for Installing Clay Flue Lining	IBC	IRC					
C1288-99~~(2004)e1~~ 2010	Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets	IBC	IRC					
C1289~~—08~~ 12a	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board	IBC	IRC					
C1314-~~07~~ 11A	Test Method for Compressive Strength of Masonry Prisms	IBC						
C1325-08b	Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement ~~Interior Substrate Sheets~~ Backer Units	IBC	IRC					
C1328/C1328M-~~05~~ 12	Specification for Plastic (Stucco Cement)	IBC	IRC					

C1364-~~07~~ 10B	Standard Specification for Architectural Cast Stone	IBC						
C1371-04A(2010)E1	Standard Test Method For Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers	IECC	IgCC					
C1373/C1373--~~03~~ 11	Standard Practice for Determination of Thermal Resistance of Attic Insulation Systems Under Simulated Winter Conditions	IECC						
C1396/1396M-~~06a~~ 11	Specification for Gypsum Ceiling Board	IBC	IRC					
C1405-~~08~~ 12	Standard Specification for Glazed Brick (Single Fired, Solid Brick Units)	IBC						
C1492-03(2009)	Standard Specification for Concrete Roof Tile	IBC	IRC					
C1513-~~04~~ 12	Standard Specification for Concrete Roof Tile	IRC						
C1540-~~08~~ 11	Specification for Heavy Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings	IPC						
C1611/C 1611M-~~05~~ 09BE1	Standard Test Method for Slump Flow of Self-Consolidating Concrete	IBC						
C1629/C1692M—06(2011)	Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels	IBC						
C1658/C1658-~~06~~ 12	Standard Specification for Glass Mat Gypsum Panels	IBC	IRC					
C1563-08	Standard Test Method for Gaskets for Use in Connection with Hub and Spigot Cast Iron Soil Pipe and Fittings for Sanitary Drain, Waste, Vent and Storm Piping Applications	IPC						
D25-~~99(2005)~~12	Specification for Round Timber Piles	IBC						
D56-05(2010)	Test Method for Flash Point by Tag Closed Tester	IBC						
D86-~~09~~ 2011b	Test Method for Distillation of Petroleum Products at Atmospheric Pressure	IBC	IFC					
D92-~~05a~~ 12	Test Method for Flash and Fire Points by Cleveland Open Cup Tester	IFC						
D93-~~08~~ 11	Test Method for Flash Point by Pensky-Martens Closed Cup Tester	IBC	IFC	IMC				

D226/D226M-~~06~~ 09	Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing	IBC	IRC					
D227/D227M-03(2011)E1	Specification for Coal-Tar-Saturated Organic Felt Used in Roofing and Waterproofing	IBC	IRC					
D635-~~06~~ 10	Test Method for Rate of Burning and/or Extent and Time of Burning of ~~Self-Supporting~~ Plastics in a Horizontal Position	IBC						
D1003-~~07~~ 11e1	Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics	IECC						
D1248-~~05~~ 12	Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable	IRC						
D1557-~~07~~ 12	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft3(2,700kN-m/m3))	IBC						
D1593-09	Non-rigid vinyl chloride plastic film and sheeting	ISPSC						
D1621-~~04a~~ 10	Standard Test Method for Compressive Properties Of Rigid Cellular Plastics	IRC						
D1623-~~03~~ 09	Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics	IRC						
D1693-~~08~~ 12	Test Method for Environmental Stress-Cracking of Ethylene Plastics	IRC	IMC					
D1784-~~08~~ 11	Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Choloride) (CPVC) Compounds	IRC						
D1785-~~06~~ 12	Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120	IPC	IMC	IRC	ISPSC			
D1863/D1863M-05(2011)E1	Specification for Mineral Aggregate Used on Built-Up Roofs	IBC	IRC					
D1869-95 ~~(2005)e1~~ (2010)	Specification for Rubber Rings for Asbestos-Cement Pipe	IPC	IPSDC	IRC				
D1929-~~96(2001)e01~~ 12	Test Method for Determining Ignition ~~Properties~~ Temperature of Plastics	IBC						
D1970/D1970M-~~09~~ 11	Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roof Underlayment for Ice Dam Protection	IBC	IRC					
D2126-~~04~~ 09	Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging	IRC						
D2216-~~05~~ 10	Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass	IBC						
D2235-04 (2011)	Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings	IPC	IPSDC	IMC	IRC			

D2239-~~03~~ 12	Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter	IPC	IRC					
D2241-~~05~~ 09	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series)	IPC	IRC	IMC	ISPSC			
D2412-~~02(2008)~~ 11	Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading	IRC	IMC					
D2487-~~06e1~~ 2011	Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)	IBC						
D2513-~~08b~~ 12	Specification for ~~Thermoplastic~~ Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings	IRC	IMC	IFGC				
D2559-~~04~~ 12A	Standard Specification for Adhesives for ~~Structural Laminated~~ Bonded Structural Wood Products for Use under Exterior (West Use) Exposure Conditions	IRC						
D2564-~~04e01~~ 12	Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems	IPC	IPSDC	IRC	IMC			
D2626/D2626M-04(2012)E1	Specification for Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing	IBC	IRC					
D2661-~~08~~ 11	Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings	IPC	IPSDC	IRC				
D2665-~~09~~ 12	Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings	IPC	IPSDC	IRC				
D2672-96a~~(2003)~~ (2009)	Specification for Joints for IPS PVC Pipe Using Solvent Cement	IPC	IRC	ISPSC				
D2683-~~04~~ 10	Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing	IPC	IRC	IMC				
D2729-~~03~~ 11	Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings	IRC	IPC	IPSDC				
D2737-~~03~~ 12E1	Specification for Polyethylene (PE) Plastic Tubing	IPC	IRC					
D2822/D2822M-05(2011)E1	Specification for Asphalt Roof Cement, Asbestos Containing	IBC	IRC					
D2823/D2823M-05 (2011)E1	Specification for Asphalt Roof Coatings, Asbestos Containing	IBC	IRC					
D2824-06(2012)E1	Specification for Aluminum-Pigmented Asphalt Roof Coatings, Non-fibered, Asbestos Fibered, and Fibered without Asbestos	IRC	IBC					
D2837-~~08~~ 11	Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products	IRC	IMC					
D2843-~~99(2004)e01~~ 10	Test for Density of Smoke from the Burning or Decomposition of Plastics	IBC						
D2846/D 2846M-09BE1	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic	IPC	IRC	IMC	ISPSC			

	Hot- and Cold-Water Distribution Systems							
D2855-96~~(2002)~~ (2010)	Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings	IPC	IPSDC	IRC				
D2859-06 (2011)	Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials	IBC	IFC					
D2898-~~(04)~~ 10	Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing	IBC	IRC	IWUIC				
D2949-~~01a(2008)~~ 10	Specification for 3.25-in. Outside Diameter Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings	IPC	IPSDC	IRC				
D2974-07~~a~~ A	Standard Test Methods for Moisture, Ash and Organic Matter of Peat and other Organic Soils	IgCC						
D3035-~~08~~ 12	Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter	IPC	IRC	IMC				
D3139-98~~(2005)~~ 2011	Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals	IPC						
D3161/D3161M-~~09~~ 12	Test Method for a Wind Resistance of Asphalt Shingles (Fan Induced Method)	IBC	IRC					
D3200-74~~(2005)~~ 2012	Standard Specification and Test Method for Establishing Recommended Design Stresses for Round Timber Construction Poles	IBC						
D3201-08AE1	Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Based Products	IBC	IRC	IWUIC				
D3261-~~03~~ 12	Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings Plastic Pipe and Tubings	IMC	IPC					
D3278-1996~~(2004)e1~~ (2011)	Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus	IBC	IFC	IMC				
D3311-~~08~~ 11	Specification for Drain, Waste and Vent (DWV) Plastic Fittings Patterns	IPC	IRC					
D3350-~~08~~ 12	Specification for Polyethylene Plastics Pipe and Fittings Materials	IRC	IMC					
D3462/3462M-~~09~~ 10A	Specification for Asphalt Shingles Made From Glass Felt and Surfaced with Mineral Granules	IBC	IRC					
D3679-~~09~~ 11	Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding	IBC	IRC					
D3689-07	Test Methods for Deep Foundations ~~Piles~~ Under Static Axial Tensile Load	IBC						
D3737-~~08~~ 09E1	Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam)	IBC	IRC					
D3805/D3805M-97~~(2003)e1~~ (2009)	Standard Guide for Application of Aluminum-Pigmented Asphalt Roof Coatings	IBC						
D3909/D3909M-97b~~(2004)~~ 2012e1	Specification for Asphalt Roll Roofing (Glass Felt) Surfaced with Mineral Granules	IBC	IRC	IWUIC				
D3957-~~06~~ 09	Standard Practices for Establishing Stress Grades for Structural Members Used In Log	IBC	IRC					

	Buildings							
D4022/D4022M-2007(2012)E1	Specification for Coal Tar Roof Cement, Asbestos Containing	IBC	IRC					
D4068-~~01~~ 09	Specification for Chlorinated Polyethylene (CPE) Sheeting for Concealed Water-Containment Membrane	IPC	IRC					
D4272-~~08a~~ 09	Test Method for Total Energy Impact of Plastic Films by Dart Drop	IBC						
D4318-~~05~~ 10	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils	IBC	IRC					
D4434/D4434M-~~09~~ 12	Specification for Poly (Vinyl Chloride) Sheet Roofing	IBC	IRC					
D4479/D4479M-07(2012)E1	Specification for Asphalt Roof Coatings - Asbestos-Free	IBC	IRC					
D4551-~~96 (2008)e1~~ 12	Specification for Poly (Vinyl Chloride) (PVC) Plastic Flexible Concealed Water-Containment Membrane	IPC	IRC					
D4586/D4586M-07(2012)E1	Specification for Asphalt Roof Cement, Asbestos-Free	IBC	IRC					
D4601/D4601M-~~08~~ 042012E1	Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing	IBC	IRC					
D4637/D4637M-~~08~~ 12	Specification for EPDM Sheet Used in Single-Ply Roof Membrane	IBC	IRC					
D4829-~~08a~~ 11	Test Method for Expansion Index of Soils	IBC	IRC					
D4869/D4869M-05(2011)e01	Specification for Asphalt-Saturated (Organic Felt) Underlayment Used in Steep Slope Roofing	IBC	IRC					
D4897/D4897M-01(2009)	Specification for Asphalt-Coated Glass-Fiber Venting Base Sheet Used in Roofing	IBC	IRC					
D4945-~~08~~ 12	Test Methods for High-Strain Dynamic Testing of Deep Foundations	IBC						
~~D5019-07a~~ Withdrawn/no replacement	Specification for Reinforced CSM Polymeric Sheet Used in Roofing Membrane	IBC	IRC					
D5055-~~10~~ 12	Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists	IBC	IRC	IgCC				
D5197-09E1	Test Method for Determination of Formaldehyde and Other Carbonyl Compounds in Air (Active Sampler Methodology)	IgCC						
D5456-~~10~~ 12	Standard Specification for Evaluation of Structural Composite Lumber Products	IBC	IRC	IgCC				
D5516-~~03~~ 09	Test Method of Evaluating the Flexural Properties of Fire-Retardant Treated Softwood Plywood Exposed to the Elevated Temperatures	IBC	IRC					
D5643/D5643M-06 (2012)E1	Specification for Coal Tar Roof Cement, Asbestos-Free	IBC	IRC					
D5664-~~08~~ 10	Test Methods for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength	IBC	IRC					

	Properties of Fire-Retardant Treated Lumber							
D6162-2000a(2008)	Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements	IBC	IRC					
D6164/D6164M-~~05e1~~ 11	Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Polyester Reinforcements	IBC	IRC					
D6222/D6222M-~~08~~ 11	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcements	IBC	IRC					
D6223D6223M-02(2009)E1	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements	IBC	IRC					
D6662-09	Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards	IWUIC						
D6694-08	Standard Specification for Liquid-applied Silicone Coating Used In Spray Polyurethane Foam Roofing Systems	IBC	IRC					
D6698-~~07~~ 12	Standard Test Method for On-Line Measurement of Turbidity Below 5 NTU in Water	IgCC						
D6754/D6745M-~~02~~ 10	Standard Specification for Ketone Ethylene Ester Based Sheet Roofing	IBC	IRC					
D6757-07	Standard Specification for ~~Inorganic~~ Underlayment Felt Containing Inorganic Fibers used in Steep-Slope Roofing ~~Products~~	IBC	IRC					
D6878-~~08e1~~/D6878-11A	Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing	IBC	IRC					
D6886-~~11~~ 12	Standard Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis	IgCC						
D7032-~~08~~ 10a	Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite Deck Boards and Guardrail Systems (Guards or Handrails)	IRC	IWUIC					
D7158-08~~d~~ /D7158M 2011	Standard Test Method for Wind Resistance of Sealed Asphalt Shingles (Uplift Force/Uplift Resistance Method)	IBC	IRC					
E84-~~09~~ 2012c	Test Method for Surface Burning Characteristics of Building Materials	IBC	IFC	IRC	IMC			
E96/E96M-~~05~~ 10	Test Method for Water Vapor Transmission of Materials	IBC	IRC					
E108-~~07a~~ 2011	Test Methods for Fire Tests of Roof Coverings	IBC	IRC					
E119-~~2008a~~ 2012a	Standard Test Methods for Fire Tests of Building Construction and Materials	IBC	IRC	IMC	IWUIC			

E136-~~09~~ 2012	Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C	IBC	IRC	IMC	IWUIC			
E519-~~00e1~~ /E519M 2010	Standard Test Method for Diagonal Tension (Shear) in Masonry Assemblages	IEBC						
E605-93(~~2006~~) (2011)	Test Method for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members	IBC						
E681-~~04~~ 2009	Test Method for Concentration Limits of Flammability of Chemicals (Vapors and Gases)	IBC	IFC					
E736-00~~(2006)~~ (2011)	Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members	IBC						
E779~~—03~~ 10	Standard Test Method for Determining Air Leakage Rate by Fan Pressurization	IECC	IgCC					
E814-~~08b~~ 2011a	Test Method of Fire Tests of Through-Penetration Firestops	IBC	IRC	IMC				
E970-~~08a~~ 2010	Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source	IBC	IRC					
E1300-~~07e01~~ 12AE1	Practice for Determining Load Resistance of Glass in Buildings	IBC						
E1332-90(2003)	Standard Classification for the Determination of Outdoor-Indoor Transmission Class	IgCC						
E1354-~~09~~ 2011b	Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter	IBC	IFC					
E1465-08A	Standard Practice for Radon Control Options for the Design and Construction of New Low-Rise Residential Buildings	IRC						
E1509-~~04~~ 12	Standard Specification for Room Heaters, Pellet Fuel-Burning Type	IRC	IMC	IgCC				
E1529-~~06~~ 10	Test Method for Determining Effects of Large Hydrocarbon Pool Fires on Structural Members and Assemblies	IFC						
E1537-~~07~~ 12	Test Method for Fire Testing of Upholstered Furniture	IFC						
E1590-~~07~~ 12	Test Method for Fire Testing of Mattresses	IFC						
E1592-05(2012)	Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference	IBC						
E1602-~~03~~ 02(2010)E1	Guide for Construction of Solid Fuel-Burning Masonry Heaters	IBC	IRC					
E1643-~~10~~ 11	Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders used in Contact with Earth or Granular Fill Under Concrete Slabs	IgCC						

E1677-~~05~~ 11	Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls	IECC						
E1966-07A(2011)	Test Method for Fire resistant Joint Systems	IBC	IFC					
E1980-~~01~~ 11	Standard Practice for Calculating Solar Refluctance Index of Horizontal and Low-sloped Opaque Surfaces	IECC	IgCC					
E1996-~~09~~ 12	Specification for Performance of Exterior Windows, ~~Glazed~~ Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes	IBC	IRC	IFC				
E2072-~~04~~ 10	Standard Specification for Photolumiscent (Phosphorescent) Safety Markings	IBC	IFC					
E2174-~~09~~ 10AE1	Standard Practice for On-Site Inspection of Installed Fire Stops	IBC	IEBC					
E2178 ~~-03~~ 11	Standard Test Method for Air Permeance of Building Materials	IRC	IECC					
E2231-~~04~~ 09	Standard Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess to Surface Burning Characteristics	IRC	IMC					
E2273-03(2011)	Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies	IBC	IRC					
E2307 -~~04~~ 12	Standard Test Method for Determining Fire Resistance of a Perimeter ~~Fire Barriers~~ Joint System Between an Exterior Wall Assembly and a Floor Assembly Using the Intermediate-Scale, Multi-story Test Apparatus[1].	IBC						
E2336-04(2009)	Standard Test Methods Fire Resistive Grease Duct Enclosure Systems	IMC						
E2357-~~05~~ 11	Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies	IECC						
E2393-~~09~~ 10A	Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barrier	IBC	IEBC					
E2404 ~~—08~~ 12	Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Vinyl Wall or Ceiling Coverings to Assess Surface Burning Characteristics	IBC	IFC					
E2568—09e1	Standard Specification of PB Exterior Insulation and Finish Systems ~~(EIFS)~~	IBC	IRC					
E2573 ~~—07a~~ 12	Standard Practice for Specimen Preparation and Mounting of Site-fabricated Stretch Systems to Assess Surface Burning Characteristics	IBC	IFC					
E2599-~~09~~ 11	Standard Practice for Specimen Preparation and Mounting of Reflective Insulation Materials and Vinyl Stretch Ceiling Materials ~~Radiant Barrier~~ for Building Applications to Assess	IBC						

	Surface Burning Characteristics							
E2634-~~08~~ 11	Standard Specification for Flat Wall Insulating Concrete Form (ICF) Systems	IBC	IRC					
F409-~~02(2008)~~ 12	Specification for Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings	IPC	IRC					
F437-~~06~~ 09	Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80	IPC	IRC	IMC	ISPSC			
F438-~~04~~ 09	Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40	IPC	IRC	IMC	ISPSC			
F439-~~06~~ 12	Specification for ~~Socket-Type~~ Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80	IPC	IRC	IMC	ISPSC			
F441/F 441M-~~02(2008)~~ 12	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80	IPC	IRC	IMC				
F442/F 442M-~~99(2005)e1~~ 12	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)	IPC	IRC	IMC				
F477-~~08~~ 10	Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe	IPC	IPSDC	IRC				
F493-~~04~~ 10	Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings	IPC	IRC	IMC				
F547-~~06~~ (2012)	Terminology of Nails for Use with Wood and Wood-based Materials	IBC						
F656-~~08~~ 10	Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings	IPC	IPSDC	IRC				
F714-~~08~~ 12E1	Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter	IPC	IRC	IMC				
F876-~~08b~~ 10E1	Specification for Crosslinked Polyethylene (PEX) Tubing	IPC	IRC	IMC				
F877-~~07~~ 11	Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems	IPC	IRC	IMC				
F891-~~07~~ 10	Specification for Coextruded Poly (Vinyl Chloride) (PVC) Plastic Pipe with a Cellular Core	IPC	IPSDC	IRC				
F1055-~~98(2006)~~ 11	Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene Pipe and Tubing	IPC	IRC	IMC				
F1281-~~07~~ 11	Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX)	IPC	IRC	IMC				

	Pressure Pipe							
F1282-~~06~~ 10	Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe	IPC	IMC	IRC				
F1346-91 ~~(2003)~~ (2010	Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs	IBC	IRC	IPMC	IgCC	ISPSC		
F1484-~~05~~ 12	Standard Test Methods for Performance of Steam Cookers	IgCC						
F1488-~~03~~ 09E1	Specification for Coextruded Composite Pipe	IPC	IPSDC	IRC	IgCC			
F1496-~~99(2005)e1~~ 12	Standard Test Method for Performance of Convection Ovens	IgCC						
F1499-~~01(2008)~~ 12	Specification for Coextruded Composite Drain, Waste, and Vent Pipe (DWV)	IPSDC						
F1667-05 11A E1	Specification for Driven Fasteners: Nails, Spikes, and Staples	IBC	IRC					
F1673-~~04(2005)~~ 10	Standard Specification for Polyvinylidene Fluoride (PVDF) Corrosive Waste Drainage Systems	IPC						
F1807-~~08~~ 12	Specifications for Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing	IPC	IRC	IMC				
F1924-~~05~~ 12	Standard Specification for Plastic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing	IMC						
F1960-~~09~~ 12	Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing	IPC	IRC	IMC				
F1974-~~08~~ 09	Specification for Metal Insert Fittings for Polyethylene/Aluminum/Polyethylene and Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene Composite Pressure Pipe	IPC	IRC	IMC				
F1986-01~~(2006)~~ (2011)	Specification for Multilayer Pipe, Type 2, Compression Fittings and Compression Joints for Hot and Cold Drinking Water Systems	IPC	IRC					
F2080-~~08~~ 09	Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Cross-linked Polyethylene (PEX) Pipe	IPC	IRC					

F2098-08	Standard Specification for Stainless Steel Clamps for Securing SDR9 Cross-Linked Polyethylene (PEX) Tubing to Metal Insert and Plastic Insert Fittings	IPC	IRC					
F2159-~~05~~ 11	Specification for Plastic Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing	IPC						
F2200—~~05~~ 11B	Standard Specification for Automated Vehicular Gate Construction	IRC	IFC					
F2262-~~05~~ 09	Standard Specification for Cross-linked Polyethylene/Aluminum/Cross-linked Polyethylene Tubing OD Controlled SDR9	IPC	IRC					
F2306/F 2306M-~~08~~ 11	Specification for 12" to 60" 300 to 1500 mm annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications	IPC						
F2387-04(2012)	Standard Specification for Manufactured Safety Vacuum Release Systems, Swimming (SVRS) for Pools, Spas and Hot Tubs	IBC						
F2389-~~07e1~~ 10	Specification for Pressure-Rated Polypropylene (PP) Piping Systems	IPC	IRC	IMC				
F2434-~~08~~ 09	Standard Specification for Metal Insert Fittings Utilizing a Copper Crimp ring for SDR9 Cross-Linked Polyethylene (PEX) Tubing and SDR9 Cross-Linked Polyethylene/Aluminum/Cross-Linked Polyethylene (PEX-AL-PEX) Tubing	IPC	IRC	IMC				
F2735-09	Standard Specification for Plastic Insert Fittings for SDR9 Cross-linked Polyethylene (PEX) and Polyethylene of Raised Temperature (PE-RT) Tubing	IMC	IPC	IRC				
F2769-~~09~~ 10	Polyethylene of Raised Temperature (PE-RT) Plastic Hot and Cold-Water Tubing and Distribution Systems	IMC	IPC	IRC				
AWCI	**The Association of the Wall & Ceiling Industries International**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
12-B-~~98~~ 04	~~Technical Manual 12-B~~ Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-Resistive Materials; an Annotated Guide, ~~First~~ Second Edition	IBC						
AWPA	**American Wood Protection Association**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						

M4~~—08~~ 11	Standard for the Care of Preservative-Treated Wood Products	IBC	IRC					
U1~~—11~~ 14	USE CATEGORY SYSTEM: User Specification for Treated Wood except Section 6, Commodity Specification H	IBC	IRC					
AWS	**American Welding Society**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
A5.8-~~04~~M/A5.8:2011	Specifications for Filler Metals for Brazing and Braze Welding	IRC	IMC	IPC				
D1.3-~~98~~/D1.3M:2008	Structural Welding Code-Sheet Steel	IBC						
D1.4-~~1998~~ /D1.4M:2011	Structural Welding Code - Reinforcing Steel Including Metal Inserts and Connections in Reinforced Concrete Construction	IBC						
AWWA	**American Water Works Association**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
C104-~~98~~/A21.4-08	~~Standard for~~ Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water	IRC	IPC					
C110/A21.10-~~03~~ 12	~~Standard for~~ Ductile-Iron and Gray-Iron Fittings~~, 3 in through 48 Inches for Water~~	IRC	IPC	IMC				
C111-~~00~~/A21.11-12	~~Standard for~~ Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings	IPC	IFGC					
C115-A21.15-~~99~~ 11	~~Standard for~~ Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges	IRC	IPC	IMC				
C151/A21.51-~~02~~ 09	~~Standard for~~ Ductile-Iron Pipe, Centrifugally Cast for Water	IRC	IPC	IMC				
C153/A21.53-~~00~~ 11	~~Standard for~~ Ductile-Iron Compact Fittings for Water Service	IRC	IPC	IMC				
C510-~~00~~ 07	Double Check Valve Backflow Prevention Assembly	IRC	IPC					
C511-~~00~~ 07	Reduced-Pressure Principle Backflow Prevention Assembly	IRC	IPC					
C651-~~99~~ 05	Disinfecting Water Mains	IPC						
C652-~~02~~ 11	Disinfection of Water-Storage Facilities	IPC						
BHMA	**Builders Hardware Manufacturers' Association**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						

Standard Reference Number	Title	Referenced in Code(s):						
A 156.19-~~2007~~ 2013	Power Assist and Low Energy Power Operated Doors	IBC	IFC					
CDPH	**California Department of Public Health**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
CDPH Section 01350	~~EHLB~~ Standard Method for the Testing and Evaluation of ~~VOC~~ Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1(2010)	IgCC						
CGA	**Compressed Gas Association**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
C-7 (~~2004~~) (2011)	Guide to Preparation of Precautionary Labeling and Marking of Compressed Gas Containers	IFC						
ANSI/CGA P-18-2006	Standard for Bulk Inert Gas Systems ~~at Consumer Sites (an American National Standard)~~	IFC						
P-20 (~~2003~~) (2009)	Standard for Classification of Toxic Mixtures	IFC						
P-23 (~~2003~~) (2008)	Standard for Categorizing Gas Mixtures Containing Flammable and Nonflammable Components	IFC						
S-1.1 (~~2005~~) (2011)	Pressure Relief Device Standards - Part 1 - Cylinders for Compressed Gases	IFC	IFGC					
S-1.3 (~~2005~~) (2008)	Pressure Relief Device Standards - Part 3 - Stationary Storage Containers for Compressed Gases	IFC	IFGC					
CPA	**Composite Panel Association**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
A135.4-~~2004~~ 2012	Basic Hardboard	IBC	IRC					
A135.5-~~2004~~ 2012	Prefinished Hardboard Paneling	IBC	IRC					
A135.6-~~2006~~ 2012	~~Hardboard~~ Engineered Wood Siding	IBC	IRC					
A208.1-~~99~~ 2009	Particleboard	IBC	IRC					
CRRC	**Cool Roof Rating Council**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
CRRC-1-20~~10~~ 12	Cool Roof Rating Council Standard	IgCC						
CSA	**~~Canadian Standards Association~~ CSA Group**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						

ASME A17.1/CSA B44—2013	Safety Code for Elevators and Escalators	IBC	IFC	IEBC	IRC	IPMC			
ASME A112.18.1-~~2005~~ 2012/ CSA B125.1-~~2005~~ 2012	Plumbing Supply Fittings	IPC	IRC						
ASME A112.18.2-~~2005~~ 2011/ CSA B125.2-~~2005~~ 2011	Plumbing Waste Fittings	IRC	IPC						
ASME A112.19.1 2013/ CSA B45.2-~~08~~ 13	Enameled Cast-Iron and Enameled Steel Plumbing Fixtures	IRC	IPC						
A112.19.2-~~2008~~ 2013/ CSA B45.1-~~08~~ 13	Ceramic Plumbing Fixtures	IPC	IRC						
ASME A112.19.3-2008/ CSA B45.4-08(R2013)	Stainless-Steel Plumbing Fixtures	IRC	IPC						
ASME A112.19.5-2011/ CSA/B45.15-~~09~~ 11	Flush Valves and Spuds ~~Trim~~ for Water Closets, Urinals ~~Bowls~~ and Tanks	IPC	IRC						
ASME A112.19.7-2012/ CSA B45.10-~~09~~ 2012	Hydromassage Bathtubs ~~Appliances~~ Systems	IPC	IRC						
ASME A112.3.4-2013/CSA B45.9-99~~(R2008)~~ 13	Macerating Systems and Related Components	IRC	IPC						
ASSE 1016/ASME A112.1016/CSA B125.16-2011 is a replacement for ASSE 1016-2010	Performance Requirements for Automatic Compensating, Valves for Individual Showers and Tub/Shower Combinations	IPC	IRC	IgCC					
CSA B45.5-~~02 (R2008)~~ 11/ IAPMO Z124-2011	Plastic Plumbing Fixtures	IRC	IPC						
B64.1.1-~~01~~ 11	Vacuum Breakers, Atmospheric Type (AVB)	IRC	IPC						
B64.1.2-~~07~~ 11	Pressure Vacuum Breakers (PVB)	IRC	IPC						
B64.1.3-~~07~~ 11	Spill Resistant Pressure Vacuum Breakers (SRPVB)	IPC	IRC						
B64.2-~~01~~ 11	Vacuum Breakers, Hose Connection Type (HCVP)	IRC	IPC						
B64.2.1-~~07~~ 11	Vacuum Breakers, Hose Connection (HCVB) with Manual Draining Feature	IRC	IPC						
B64.2.1.1-~~07~~ 11	Hose Connection Dual Check Vacuum Breakers (HCDVB)	IRC	IPC						
B64.2.2-~~01~~ 11	Vacuum Breakers, Hose Connection Type (HCVP) with Automatic Draining Feature	IRC	IPC						
B64.3-~~07~~ 11	Dual Check Valve Backflow Preventers Atmospheric Port (DCAP)	IRC	IPC						
B64.4-~~07~~ 11	Reduced Pressure Principle Backflow Preventers (RP)	IRC	IPC						
B64.4.1-~~07~~ 11	Reduced Pressure Principle for Fire Systems (RPF)	IRC	IPC						
B64.5-~~07~~ 11	Double Check Backflow Preventers (DCVA)	IRC	IPC						
B64.5.1-~~07~~ 11	Double Check Valve Backflow Preventers for Fire Systems (DCVAF)	IRC	IPC						
B64.6-~~07~~ 11	Dual Backflow Preventers Check Valve (DuC)	IPC	IRC						
B64.7-~~07~~ 11	Laboratory Faucet Vacuum Breakers (LFVB)	IRC	IPC						
B64.10.1-~~07~~ 11	~~Manual for the Selection, Installation,~~ Maintenance and Field Testing of Backflow Preventers ~~ion~~	IPC							

	~~Devices~~								
B79-08 (R2013)	Commercial and Residential Drains, and Cleanouts	IPC							
CSA B125.3-~~2005~~ 12	Plumbing Fittings	IRC	IPC						
B137.1-~~05~~ 13	Polyethylene (PE) Pipe , Tubing and Fittings for Cold Water Pressure Services	IRC	IPC						
B137.2-~~05~~ 13	Polyvinylchloride PVC Injection-Moulded Gasketed Fittings for Pressure Applications	IRC	IPC	ISPSC					
B137.3-~~05~~ 13	Rigid Poly (Vinyl Chloride) (PVC) Pipe for Pressure Applications	IRC	IPC	IPSDC					
B137.5-~~05~~ 13	Cross-Linked Polyethylene (PEX) Tubing Systems for Pressure Applications	IRC	IPC						
B137.6-~~05~~ 13	Chlorinated Polyvinylchloride CPVC Pipe, Tubing and Fittings for Hot and Cold Water Distribution Systems	IRC	IPC	ISPSC					
B137.9-~~02~~ 13	Polyethylene/Aluminum/Polyethyle ne (PE-AL-PE) Composite Pressure-Pipe Systems	IRC	IPC	IMC					
B137.10M-~~05~~ 13	Crosslinked Polyethylene/Aluminum/Crosslinke d Polyethylene (PEX-AL-PEX) Composite Pressure-Pipe Systems	IRC	IPC	IMC					
B137.11-~~05~~ 13	Polypropylene (PP-R) Pipe and Fittings for Pressure Applications	IRC	IPC						
B181.1-~~06~~ 11	Acrylonitrile-butadiene-stryrene (ABS) Drain, Waste, and Vent Pipe and Pipe Fittings	IRC	IPC	IPSDC					
B181.2-~~06~~ 11	Polyvinylchloride PVC Drain, and chlorinated polyvinylchloride (CPVC) Drain, Waste, and Vent Pipe and Pipe Fittings	IRC	IPC	IPSDC					
B181.3-~~06~~ 11	Polyolefin and polyvinylidene fluoride (PVDF) Laboratory Drainage Systems	IRC	IPC						
B182.1- ~~06~~ 11	Plastic drain and sewer pipe and pipe fittings	IPC	IPSDC						
B182.2-~~06~~ 11	PSM type polyvinylchloride (PVC) sewer pipe and fittings	IRC	IPC	IPSDC					
B182.4-~~06~~ 11	Profile polyvinylchloride PVC Sewer Pipe and Fittings	IRC	IPC	IPSDC					
B182.6-~~06~~ 11	Profile Polyethylene (PE) Sewer Pipe and Fittings for leak proof sewer applications	IRC	IPC						
B182.8-~~06~~ 11	Profile Polyethylene (PE) Storm Sewer and Drainage Pipe and Fittings	IRC	IPC						
B356-~~00(2005)~~ 10	Water Pressure Reducing Valves for Domestic Water Supply Systems	IPC	IRC						
B481.1-~~07~~ 12	Testing and Rating of Grease Interceptors Using Lard	IPC							
B602-~~05~~ 10	Mechanical Couplings for Drain, Waste, and Vent Pipe and Sewer Pipe	IRC	IPC	IPSDC					
CAN/CSA A257.1M-~~92~~ 2009	Circular Concrete Culvert, Storm Drain, Sewer Pipe and Fittings	IRC	IPC	IPSDC					

CAN/CSA A257.2M-~~92~~ 2009	Reinforced Circular Concrete Culvert, Storm Drain, Sewer Pipe and Fittings	IRC	IPC	IPSDC					
CAN/CSA A257.3M-~~92~~ 2009	Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections, and Fittings Using Rubber Gaskets	IRC	IPC	IPSDC					
B137.11-~~05~~ 13	Polypropylene (PP-R) Pipe and Fittings for Pressure Applications	IRC	IPC						
B45.3-02 (R2008)	Porcelain Enameled Steel Plumbing Fixtures	IRC	IPC						
0437-Series-93 (R2006)	Standards on OSB and Waferboard (Reaffirmed 2001)	IRC							
ANSI ~~CSA America~~ FC 1-~~2003~~ 2012 to be relocated under ANSI	Stationary Fuel Cell Power Systems	IFGC	IMC	IRC					
CAN/CSA B366.1-~~2009~~ 2011	Solid-Fuel-Fired Central Heating Appliances	IgCC							
B483.1-~~07~~ 14	Drinking Water Treatment Systems	IRC	IPC						
CSA C22.2 No. 218.1-M89(R~~2006~~ 2011)	Spas, Hot Tubs and Associated Equipment	ISPSC							
C22.2 No. 236 ~~05~~ -11 ~~(R2009) M89(R2006)~~	~~Heating and~~ Cooling Equipment (binational standard with UL 1995)	ISPSC							
C22.2 No. 108-01 (R2010)	Liquid Pump	ISPSC							

CTI

Cooling Technology Institute

Standard Reference Number	Title	Referenced in Code(s):								
STD-201 (~~2009~~ 11)	Standard for Certification of Water Cooling Tower Thermal Performance	IECC								

DASMA

Door and Access Systems Manufacturers

Standard Reference Number	Title	Referenced in Code(s):								
105-92~~(R2004)~~ -13	Test Method for Thermal Transmitance and Air Infiltration of Garage Doors	IECC								
107-97 (R~~2004~~ 2012)	Room Fire Test Standard for Garage Doors Using Foam Plastic Insulation	IBC								
108-~~05~~ 12	Standard Method for Testing Sectional Garage Doors and Rolling Doors: Determination of Structural Performance Under Uniform Static Air Pressure Difference	IBC	IRC							
115-~~05~~ 12	Standard Method for Testing Sectional Garage Doors and Rolling Doors: Determination of Structural Performance Under Missile Impact and Cyclic Wind	IBC	IRC							

	Pressure								
FEMA	**Federal Emergency Management Agency**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
FEMA P646~~-08~~ 12	Guidelines for Design of Structures for Vertical Evacuation from Tsunamis	IBC							
FEMA~~-~~ ~~-FA/~~ TB-2-08	Flood-D ~~d~~amage Resistant Materials Requirements	IRC							
~~FIA-TB-11 – 01~~ FEMA-TB 11—01	Crawlspace Construction for Buildings Located in Special Flood Hazard Area	IBC	IRC						
FM	**FM Global**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
FM 4470 ~~2009~~ 2013	Approval Standard for Single-Ply Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction ~~Covers~~.	IBC							
4474~~-04~~ 11	American National Standard for Evaluating ~~the Simulated~~ Wind ~~Uplift Resistance of~~ Roof/Ceiling Assemblies, -Plastic Interior Finish Materials, Plastic Exterior Building Panels, Wall/Ceiling Coating Systems, Interior or Exterior Finish Systems ~~Using Static Positive and/or Negative Differential Pressures~~	IBC							
4880 ~~(2005)~~ 2010	Approval Standard for Class 1 Rating of ~~Evaluating~~ Insulated Wall or Wall and Roof/Ceiling Panels, ~~Assemblies, Plastic~~ Interior Finish Materials, ~~Plastic Exterior Building, Wall/Ceiling~~ or Coatings ~~Systems, Interior or~~ and Exterior Finish Systems	IBC	IRC						
GA	**Gypsum Association**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
GA 216~~-07~~ 13	Application and Finishing of Gypsum Panel Products	IBC							

GA-253-~~07~~ 12	~~Recommended Standard Specification for the~~ Application of Gypsum Sheathing	IRC							
GA-600-~~09~~ 12	Fire~~-~~ Resistance Design Manual, ~~18th~~ 20th Edition	IBC							
HPVA	**Hardwood Plywood and Veneer Association**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
HP-1-~~2009~~ 2013	Standard for Hardwood and Decorative Plywood	IBC	IRC	IgCC					
IAPMO	**International Association of Plumbing and Mechanical Officials**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
CSA B45.5-11/ IAPMO Z124-2011 replaces ANSI Z124.1, 1.2, 2, 3, 4, 6, 9	Plastic Plumbing Fixtures	IRC	IPC						
IAPMO Z124.7-2012 replaces ANSI Z124.7-97	Prefabricated Plastic Spa Shells	ISPSC							
ICC	**International Code Council**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
ICC A117.1-09 14	Accessible and Usable Buildings and Facilities	IBC	IFC	IZC	IEBC	IRC			
IBC-~~12~~ 15	International Building Code	IRC	IFC	IMC	IPC	IPSDC	IFGC	IECC	IEBC IWUIC
IECC-~~12~~ 15	International Energy Conservation Code	IBC	IRC	IMC	IPC	IFGC	IgCC	ISPSC	
IEBC-~~12~~ 15	International Existing Building Code	IBC	IMC	IPMC	IgCC				
IFC-~~12~~ 15	International Fire Code	IBC	IRC	IMC	IPC	IFGC	IECC	IEBC	IPMC
IFGC-~~12~~ 15	International Fuel Gas Code	IBC	IRC	IFC	IMC	IPC	IECC	IEBC	IPMC
IMC-~~12~~ 15	International Mechanical Code	IBC	IRC	IFC	IPC	IFGC	IECC	IEBC	IPMC
ICCPC-~~12~~ 15	International Performance Code	IgCC							
IPC-~~12~~ 15	International Plumbing Code	IBC	IRC	IFC	IMC	IPSDC	IFGC	IEBC	IPMC
IPSDC-~~12~~ 15	International Private Sewage Disposal Code	IBC	IPC	IRC					
IPMC-~~12~~ 15	International Property Maintenance Code	IBC	IRC	IFC	IEBC				
IRC-~~12~~ 15	International Residential Code	IBC	IFC	IMC	IFGC	IEBC	IPC	IPMC	IgCC
IWUIC-~~12~~ 15	International Wildland-Urban Interface Code	IBC	IFC						
IZC-~~12~~ 15	International Zoning Code	IBC	IMC						
ICC 500-~~08~~ 14	ICC/NSSA Standard on the Design and Construction of Storm Shelters	IBC	IRC						

ICC 600-~~08~~ 14	Standard for Residential Construction In High Wind Regions	IBC	IRC						
ICC 700-~~2008~~ 12	National Green Building Standard	IgCC							
IgCC-~~12~~ 15	International Green Construction Code	IBC	ICCPC	IEBC	IECC	IFC	IFGC	IMC	IPC
IES	**Illuminating Engineering Society**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
TM-15-~~07~~ 11	Luminaire Classification System for Outdoor Luminaires	IgCC							
IIAR	**International Institute of Ammonia Refrigeration**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
2-~~99~~ 2014 ~~(Addendum A-2005)~~	~~Addendum A to~~ Equipment, Design, and Installation of Ammonia Mechanical Refrigerating Systems	IMC							
ISEA	**International Safety Equipment Association**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
ANSI/ISEA Z358.1-~~98~~ 2009	Emergency Eyewash and Shower Equipment	IPC							
MSS	**Manufacturers Standardization Society of the Valve and Fittings Industry**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
MSS SP-6-~~01~~ 2012	Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings	IFGC							
ANSI MSS SP-58 ~~1993~~ 2009	Pipe Hangers and Supports –Materials, Design, Manufacture, Selection, Application, and Installation	IRC	IFGC						
~~SP-69-2002~~ ANSI/MSS SP-58-2009	Pipe Hangers and Supports – Materials, Design, Manufacture, Selection ~~and~~ , Application , and Installation *(SP69 will be withdrawn in 2014 and ANSI MSS SP-58-2009 replaces it)*	IMC							
NFPA	**National Fire Protection Association**								
Standard Reference Number	Title	Referenced in Code(s):							

10-~~10~~ 13	Standard for Portable Fire Extinguishers	IFC	IBC						
13-~~10~~ 13	Standard for the Installation of Sprinkler Systems	IFC	IBC						
13D-~~10~~ 13	Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes	IFC	IRC	IBC					
13R- ~~10~~ 13	Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies ~~Up to and Including Four Stories in Height~~	IFC	IBC	IEBC					
14-~~10~~ 13	Standard for the Installation of Standpipe, ~~Private Hydrants~~ and Hose Systems	IFC	IBC						
15-12	Standard for the Water Spray Fixed Systems for Fire Protection	IFC							
16-11	Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems	IFC	IBC						
17-~~09~~ 13	Standard for Dry Chemical Extinguishing Systems	IFC	IBC						
17A-~~09~~ 13	Standard for Wet Chemical Extinguishing Systems	IFC	IBC						
20- ~~10~~ 13	Standard for the Installation of Stationary Pumps for Fire Protection	IFC	IBC						
22-~~08~~ 13	Standard for the Water Tanks for Private Fire Protection	IFC							
24- ~~10~~ 13	Standard for the Installation of Private Fire Service Mains and Their Appurtenances	IFC							
25-~~11~~ 13	Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems	IFC	IPMC						
30A-~~12~~ 15	Code for Motor Fuel Dispensing Facilities and Repair Garages	IFC	IMC	IFGC					
30B-~~12~~ 15	Code for the Manufacture and Storage of Aerosol Products	IFC							
31-~~11~~ 15	Standard for the Installation of Oil-Burning Equipment	IFC	IRC	IMC	IBC				

32-~~11~~ 15	Drycleaning Plants	IFC	IBC						
33-~~11~~ 15	Standard for Spray Application Using Flammable or Combustible Materials	IFC							
34-~~11~~ 15	Standard for Dipping and Coating Processes Using Flammable or Combustible Liquids	IFC							
35-~~11~~ 15	Standard for Manufacture of Organic Coatings	IFC							
37-~~10~~ 14	Installation and Use of Stationary Combustion Engines and Gas Turbines	IMC	IFGC						
40-~~11~~ 15	Standard for the Storage and Handling of Cellulose Nitrate Film	IFC	IBC						
45-~~11~~ 15	Standard on Fire Protection for Laboratories Using Chemicals	IMC							
~~50-01~~ replaced with 55-13 that incorporates NFPA 50	~~Bulk Oxygen Systems at Consumer Sites~~ Compressed Gases and Cryogenic Fluids Code	IPC							
51- ~~07~~13	Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes	IFC	IPC	IFGC					
51A-12	Standard for Acetylene Cylinder Charging Plants	IFC							
52-~~10~~ 13	Vehicular Fuel Gaseous System Code	IFC							
55~~-10-~~13	~~Standard for the Storage, Use and Handling of~~ Compressed Gases and Cryogenic Fluids Code ~~in Portable and Stationery Containers Cylinders and Tanks~~	IFC							
58-~~11~~ 13	Liquefied Petroleum Gas Code	IFC	IBC	IRC	IMC	IFGC			
59A ~~10~~ 13	Standard for the Production, Storage and Handling of Liquefied Natural Gas (LNG)	IFC							
61- ~~08~~ 13	Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities	IFC	IBC						

69-~~08~~ 14	Standard on Explosion Prevention Systems	IFC	IMC					
72- ~~10~~ 13	National Fire Alarm and Signaling Code	IFC	IBC	IRC	IMC	IEBC	IgCC	IWUIC
80- ~~10~~ 13	Standard for Fire Doors and Other Opening Protectives	IFC	IBC					
82-~~09~~ 14	Standard on Incinerators, Waste and Linen Handling Systems and Equipment~~, 2009 Edition~~	IMC	IFGC	IBC	IRC			
85-11	Boiler and ~~Construction~~ Combustion Systems Hazards Code	IFC	IBC	IRC	IFGC			
86-~~11~~ 15	Standard for Ovens and Furnaces	IFC						
88A-~~11~~ 15	Standard for Parking Structures	IFGC						
91-~~10~~ 15	Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids	IMC						
92~~B—09~~ 12	Smoke Control ~~Management~~ Systems ~~in Malls, Atria, and Large Spaces~~	IFC	IBC	IMC				
96-~~11~~ 13	Standard for Ventilation Control and Fire Protection of Commercial Cooking Operation	IMC						
99-~~12~~ 15	Health Care Facilities Code	IBC	IFC	IEBC	IBC			
101-~~12~~ 15	Life Safety Code	IBC	IFC	IEBC				
105-~~10~~ 15	~~Installation~~ Standard ~~of~~ for Smoke Door Assemblies and Other Opening Protectives	IBC	IFC					
110-~~10~~ 15	Standard for Emergency and Standby Power Systems	IFC	IBC	IECC				
111-~~10~~ 15	Standard on Stored Electrical Energy Emergency and Standby Power Systems	IFC	IECC	IBC				
120-~~10~~ 15	Standard for Fire Prevention and Control in Coal Mines	IFC	IBC					
160-~~11~~ 15	Standard for the Use of Flame Effects Before an Audience	IFC						
170-~~09~~ 15	Standard for Fire Safety and Emergency Symbols	IFC	IBC					

204-~~07~~ <u>15</u>	Standard for Smoke and Heat Venting	IFC							
211-~~10~~ <u>13</u>	<u>Standard for</u> Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances	IFC	IBC	IRC	IMC	IFGC			
221-~~09~~ <u>15</u>	Standard for High Challenge Fire Walls, Fire Walls and Fire Barrier Walls~~, 2009 Edition~~	IBC							
241-~~09~~ <u>13</u>	<u>Standard for</u> Safeguarding Construction, Alteration, and Demolition Operations	IFC							
253-~~11~~ <u>15</u>	Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source	IBC	IFC						
259-~~08~~ <u>13</u>	Standard Test Method for Potential Heat of Building Materials	IBC	IRC						
260-~~09~~ <u>13</u>	Standard Methods of Tests and Classification System for Cigarette Ignition Resistance of Components of Upholstered Furniture	IFC							
261-~~09~~ <u>13</u>	<u>Standard</u> Method of Test for Determining Resistance of Mock-Up Upholstered Furniture Material Assemblies to Ignition by Smoldering Cigarettes	IFC							
262-~~11~~ <u>15</u>	Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces	IMC							
274-~~09~~ <u>13</u>	Standard Test Method to Evaluate Fire Performance Characteristics of Pipe Insulation	IMC							
275-~~10~~ <u>13</u>	Standard Method of Fire Tests for the Evaluation of Thermal Barriers ~~Used Over Foam Plastic Insulation~~	IBC	IRC						
285-11	<u>Standard</u> <u>Fire</u> Test Method ~~of~~ for the Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible	IBC							

	Components								
286-~~11~~ 15	Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth	IFC	IBC	IRC					
288-12	Standard Methods of Fire Tests of ~~Floor~~ Horizontal Fire Door Assemblies Installed in Horizontal~~ly~~ Fire-Resistance-Rated Floor Systems	IBC							
289-~~09~~ 13	Standard Method of Fire Test for Individual Fuel Packages	IFC	IBC						
318-~~09~~ 15	Standard for the Protection of Semiconductor Fabrication Facilities	IFC							
385- ~~07~~ 12	Standard for Tank Vehicles for Flammable and Combustible Liquids	IFC							
407-12	Standard for Aircraft Fuel Servicing	IFC							
409-~~11~~ 15	Aircraft Hangers	IFC	IBC	IFGC					
~~430-04~~ 400-13	~~Storage of Liquid and Solid Oxidizers~~ Hazardous Material Code	IFC							
484-~~12~~ 15	Standard for Combustible Metals	IFC	IBC						
~~490-10~~ 400-13	Storage of Ammonium Nitrate Hazardous Material Code	IFC							
495-~~10~~ 13	Explosive Materials Code	IFC							
498-~~10~~ 13	Standard for Safe Havens and Interchange Lots for Vehicles Transporting Explosives	IFC							
501-~~10~~ 13	Standard on Manufactured Housing	IRC							
505-~~11~~ 13	Fire Safety Standard Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations	IFC							
654-~~06~~ 13	Standard for Prevention of Fire & Dust Explosions from the Manufacturing, Processing, and	IBC	IFC						

	Handling of Combustible Particulate Solids								
655-12	Standard for the Prevention of Sulfur Fires and Explosions	IBC	IFC						
664-12	Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities	IBC	IFC						
701-10	Standard Method~~s~~ of Fire Tests for Flame-Propagation of Textiles and Films	IFC	IBC						
703-~~12~~ 15	Standard for Fire Retardant Treated Wood and Fire Retardant Coatings for Building Materials	IFC							
704-12	Standard System for the Identification of the Hazards of Materials for Emergency Response	IFC	IMC	IBC					
720-~~09~~ 15	Standard for the Installation of Carbon Monoxide (CO) Warning Equipment Dwelling Units	IFC	IBC	IRC					
750-~~10~~ 13	Standard on Water Mist Fire Protection Systems	IFC	IMC	IFGC					
853-~~10~~ 15	Installation of Stationary Fuel Cell Power Systems	IRC							
1122- ~~08~~ 13	Code for Model Rocketry	IFC							
1123-~~10~~ 13	Code for Fireworks Display	IFC							
1124- ~~08~~ 13	Code for the Manufactur~~e~~ing, Transportation, Storage and Retail Sales of Fireworks and Pyrotechnic Articles	IFC	IBC						
1125-12	Code for the Manufacture of Model Rocket and High Power Rocket Motors	IFC							
1126-~~11~~ 15	Standard for the Use of Pyrotechnics Before a Proximate Audience	IFC							
1127- ~~08~~ 13	Code for High Power Rocketry	IFC							
1142-12	Standard on Water Supply for Suburban and Rural Fire Fighting	IFC							
2001-12	Standard on Clean Agent Fire Extinguishing	IFC	IBC						

	Systems								
NSF	**NSF International**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
3~~-2008~~ 2010	Commercial Warewashing Equipment	IPC	IgCC						
14-~~2008e~~ 2011	Plastics Piping System Components and Related Materials	IRC	IPC	ISPSC					
18-~~2007~~ 2012	Manual Food and Beverage Dispensing Equipment	IPC							
40-~~2000~~ 2012	Residential Wastewater Treatment Systems	IPSDC							
41-~~1999~~ 2011	Nonliquid Saturated Treatment Systems ~~(Composing Toilets)~~	IPSDC							
42-~~2007ae~~ 2011	Drinking Water Treatment Units - Aesthetic Effects	IRC	IPC						
44-~~2007~~ 2012	Residential Cation Exchange Water Softeners	IRC	IPC	IgCC					
50-~~2009~~ 2012	Equipment for Swimming Pools, Spas, Hot Tubs, and other Recreational Water Facilities	IgCC	ISPSC						
53-~~2007a~~ 2011a	Drinking Water Treatment Units - Health Effects	IRC	IPC						
58-~~2007~~ 2012	Reverse Osmosis Drinking Water Treatment Systems	IRC	IPC	IgCC					
61-~~2008~~ 2012	Drinking Water System Components - Health Effects	IRC	IPC	IgCC					
62-~~2007~~ 2012	Drinking Water Distillation Systems	IPC							
350-2011	Onsite Residential and Commercial Water Reuse Treatment Systems	IgCC							
PCA	**Portland Cement Association**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
100-~~07~~ 12	Prescriptive Design of Exterior Concrete Walls for One and Two-Family Dwellings (Pub. No. EB241)	IRC							
PCI	**Prestressed Concrete Institute**								

Standard Reference Number	Title	Referenced in Code(s):
MNL 124-~~89~~ 11	Design for Fire Resistance of Precast Prestressed Concrete	IBC
PDI	**Plumbing and Draining Institute**	
Standard Reference Number	**Title**	**Referenced in Code(s):**
PDI G101 ~~(2003)~~ 2012	Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing and Installation Data	IPC
PTI	**Post-Tensioning Institute**	
Standard Reference Number	**Title**	**Referenced in Code(s):**
PTI DC ~~-2007~~ 10.5-12	Standard Requirements for Design and Analysis of Shallow Post-tensioned Concrete Foundation on Expansive Soils~~,~~ ~~Second Edition~~	IBC
~~PTI DC 2007 10.5-12~~	~~Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils, Third Edition~~	~~IBC~~
RMI	**Rack Manufacturers Institute**	
Standard Reference Number	**Title**	**Referenced in Code(s):**
ANSI/MH16.1~~—08~~ 12	Specification for Design, Testing and Utilization of Industrial Steel Storage Racks	IBC
SBCA	**Structural Building Components Association**	
Standard Reference Number	**Title**	**Referenced in Code(s):**
BCSI ~~2008~~ 2013	Building Component Safety Information Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected	IRC

	Wood Trusses								
CFS-BCSI-2008	Cold Formed Steel Building Component Safety Information (CFSBCSI) Guide to Good Practice for Handling, Installing & Bracing of Cold-formed Steel Trusses	IRC							
SMACNA	**Sheet Metal & Air Conditioning Contractors National Assoc. Inc.**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
SMACNA~~-85~~ 2012	HVAC Air Duct Leakage Test Manual 2nd Edition	IECC-C	IgCC						
SMACNA~~ /ANSI 2005~~ 2015	HVAC Duct Construction Standards - Metal and Flexible 4th Edition (ANSI)	IMC							
SPRI	**Single-Ply Roofing Institute**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
ANSI/SPRI RP-4-~~08~~ 13	Wind Design Guide for Ballasted Single-ply Roofing Systems	IBC							
ANSI/SPRI/FM4435-ES-1-~~03~~ 11	Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems	IBC							
TIA	**Telecommunications Industry Association**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
222-G-2005	Structural Standards for Antenna Supporting Structures and Antennas, including - Addendum 1, 222-G-1 dated 2007, ~~and~~ Addendum 2, 222-G-2 Dated 2009, Addendum 3, 222-3 dated 2013, and Addendum 4, 222-G-4 dated 2014	IBC							
TMS	**The Masonry Society**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
216-~~97~~ 2013	Standard Method for Determining Fire Resistance of	IBC							

	Concrete and Masonry Construction Assemblies								
302-~~07~~ 2012	Standard Method for Determining the Sound Transmission ~~Class~~ Rating for Masonry Walls	IBC	IRC	IgCC					
402-~~11~~ 2013	Building Code for Masonry Structures	IBC	IRC						
403-~~10~~ 2013	Direct Design Handbook for Masonry Structures	IBC	IRC						
602-~~11~~ 2013	Specification for Masonry Structures	IBC	IRC						
TPI	**Truss Plate Institute**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
TPI 1-2007 2012	National Design Standards for Metal Plate Connected Wood Truss Construction	IBC	IRC						
UL	**Underwriters Laboratories**								
Standard Reference Number	**Title**	**Referenced in Code(s):**							
9-2009	Fire Tests of Window Assemblies~~, with Revisions through April 2005~~	IBC							
14B-2008	Sliding Hardware for Standard Horizontally Mounted Tin Clad Fire Doors ~~– with Revisions through July 2000~~	IBC							
14C-2006	Swinging Hardware for Standard Tin Clad Fire Doors Mounted Singly and in Pairs, with revisions through December 2008	IBC							
17-2008	Vent or Chimney Connector Dampers for Oil-Fired Appliances, with Revisions through January 2010	IRC	IMC						
80-2007	Steel Tanks for Oil-Burner Fuels and Other Combustible Liquids with Revisions through August 2009	IRC	IFC						

103-~~2001~~ 2010	Factory-Built Chimneys, for Residential Type and Building Heating Appliances with Revisions through July 2012	IBC	IMC	IFGC	IRC				
127-~~08~~ 2011	Factory-Built Fireplaces ~~- with Revisions through January 2010~~	IBC	IRC	IMC					
142-06	Steel Aboveground Tanks for Flammable and Combustible Liquids with Revisions through February 2010	IFC							
174-04	Household Electric Storage Tank Water Heaters - with Revisions through ~~May 2006~~ September 2012	IRC	IMC						
180-~~03~~ 2012	Liquid-level Indicating Guarges for Oil Burner Fuels~~- with revision through March 2007~~ and Other Combustible Liquids	IRC	IMC						
197-~~2003~~ 2010	Commercial Electric Cooking Appliances - with revisions through ~~March 2006~~ June 2011	IMC							
217–2006	Single and Multiple Stations Smoke Alarms - with revisions through April ~~2010~~ 2012	IBC	IRC	IFC					
263-~~03~~ 2011	Standard for Fire Test of Building Construction and Materials ~~with revisions through October 2007~~	IBC	IRC	IWUIC	IMC				
294-1999	Access Control Systems Units with Revisions through September 2010	IBC	IFC						
300-2005 (R2010)	Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Equipment with Revisions through July 16, 2010	IBC	IFC						
305-~~97~~ 2012	Panic Hardware	IBC	IFC						
325-2002	Door, Drapery, Gate, Louver and Window Operators and Systems - with Revisions through	IBC	IFC	IRC					

	~~February 2010~~ January 2012							
372-2007	Automatic Electrical Controls for Household and Similar Use - Part 2: Particular Requirements for Burner Ignition Systems and Components with revisions through July ~~25, 2011~~ 2012	ISPSC						
378-06	Draft Equipment, with Revisions through January 2010	IRC	IMC					
391-~~2006~~ 2010	Solid-Fuel and Combination-Fuel Central and Supplementary Furnaces	IMC						
412-~~2004~~ 2011	Refrigeration Unit Coolers - with Revisions through ~~January 2009~~ August 2012	IMC						
499-05	Electric Heating Appliances-with revisions through ~~January 2009~~ April 2012	IMC						
555–2006	Fire Dampers-with revisions through May ~~2010~~ 2012	IBC	IMC					
555S–1999	Smoke Dampers - with Revisions through May ~~2010~~ 2012	IBC	IMC					
641–~~1995~~ 2010	Type L Low-Temperature Venting Systems ~~- with Revisions through July 2009~~	IBC	IRC	IMC	IFGC			
651–~~05~~ 2011	Schedule 40 and Schedule 80 Rigid PVC Conduit and Fittings with revisions through March ~~2010~~ 2012	IFGC	IRC					
705-2004 Revision 5	Standard for Power Ventilators ~~with revisions through March 2012~~	IMC						
710B-~~2004~~ 2011	Recirculating Systems ~~with Revisions through December 2009~~	IBC	IFC	IMC				
723—08	Standard for Test for Surface Burning Characteristics of Building Materials with Revisions through September 2010	IBC	IFC	IWUIC	IRC			

726-1995	Oil-Fired Boiler Assemblies - with Revisions through April ~~2010~~ 2011	IRC	IMC	IECC				
729-03	Oil-Fired Floor Furnaces with revisions through ~~April 2010~~ August 2012	IRC	IMC					
730-03	Oil-Fired Wall Furnaces ~~with revisions through April 2010~~ August 2012	IRC	IMC					
731-1995	Oil-Fired Unit Heaters with Revisions through ~~April 2010~~ August 2012	IMC	IECC-C					
737-~~07~~ 2011	Fireplaces Stoves~~- with Revisions through January 2010~~	IRC	IMC					
793-08	Automatically Operated Roof Vents For Smoke and Heat with Revisions through September 2011	IBC	IFC					
795-~~2006~~ 2011	Commercial-Industrial Gas Heating Equipment with revisions through ~~April 2010~~ September 2012	IRC	IFGC					
842-07	Valves for Flammable Fluids, with Revisions through April 2011	IRC	IMC					
858-05	Household Electric Ranges - with Revisions through ~~May 2010~~ April 2012	IMC	IRC					
864-03	Standard for Control Units and Accessories for Fire Alarm Systems-with Revisions through ~~February 2010~~ August 2012	IBC	IFC					
867-~~00~~ 2011	Electrostatic Air Cleaners~~-with Revisions through February 2010~~	IMC						
873-2007	Temperature-Indicating and -Regulating Equipment, with revisions through July ~~25, 2011~~ 2012	ISPSC						
875-09	Electric Day Bath Heaters with revisions through ~~October 2009~~ November 2011	IMC	IRC					
896-1993	Oil-Burning Stoves - with Revisions	IRC	IMC					

	through May 2010 August 2012							
900-04	Air Filter Units- with revisions through ~~November 2009~~ February 2012	IFC	IMC					
907-~~94~~ 2010	Fireplace Accessories - with revisions through ~~July 2006~~ April 2010	IMC						
924-06	Emergency Lighting and Power Equipment with revisions through ~~January 2009~~ February 2011	IBC	IFC					
959-~~2001~~ 2010	Medium Heat Appliance Factory-Built Chimneys - ~~with Revisions through June 2010~~	IRC	IMC	IFGC				
1004-1-~~08~~ 2012	Standard for Rotating Electrical Machines General Requirements with revisions through June 23, 2011	ISPSC						
1026-~~07~~ 2012	Electric Household Cooking and Food Services Appliances	IRC						
1037-99	Antitheft Alarms and Devices with Revisions through December 2009	IFC						
1040-1996	Fire Test of Insulated Wall Construction - with Revisions through September 2007 October 2012	IBC	IRC					
1042-~~94~~ 2009	Electric Baseboard Heating Equipment-with revisions through ~~February 2008~~ June 2010	IRC						
1046-~~00~~ 2010	Grease Filters for Exhaust Ducts with revisions through January 2012	IMC						
1081-2008	Standard for Swimming Pool Pumps, Filters and Chlorinators, with revisions through ~~March 31, 2010~~ November 2011	ISPSC						
1240-2005	Electric Commercial Clothes-Drying Equipment - with Revisions through ~~October 2009~~ February 2011	IMC						
1261-2001	Electric Water Heaters for Pools and Tubs - with Revisions through	IRC	IMC	ISPSC				

	~~June 16, 2010~~ July 2012							
1275-2005	Flammable Liquid Storage Cabinets with Revisions through ~~May 2006~~ February 2010	IFC						
1315-95	Standard for Safety for Metal Waste Paper containers- with Revisions through ~~August 2007~~ September 2012	IFC						
1363-2007	Relocatable Power Taps - with revisions through ~~October 2009~~ September 2012	IFC						
1453-04	Electric Booster and Commercial Storage Tank Water Heaters - with Revisions through December 2009 July 2011	IRC	IMC					
1482-~~10~~ 2011	Solid-Fuel Type Room Heaters	IBC	IRC	IMC	IgCC			
1563-2009	Standard for Electric Hot Tubs, Spas and Association Equipment with revisions through ~~March 31, 2010~~ July 2012	ISPSC						
1673-~~96~~ 2010	Electric Space Heating Cables-with revision through ~~July 2003~~ October 2011	IRC						
1693-~~02~~ 2010	Electric Radiant Heating Panels and Heating Panel Sets, with Revisions through October 2011	IRC						
1703-02	Flat-plate Photovoltaic Modules and Panels - with revisions through ~~April 2008~~ May 2012	IBC						
1738-~~06~~ 2010	Venting Systems for Gas-Burning Appliances, Categories II, III and IV, with Revisions though May 2011	IRC	IFGC					
1741-~~99~~ 2010	Inverters, Converters, Controllers and Interconnection System Equipment with Distributed	IRC						

	Energy Resources~~-with revisions through November 2005~~							
1815-~~09~~ 2012	Standard for Nonducted Heat Recovery Ventilators	IMC						
1897-~~2004~~ 2012	Uplift Tests for Roof Covering Systems ~~with revisions through May 2008~~	IBC						
1978-~~05~~ 2010	Grease Ducts	IMC						
1994-04	Luminous Egress Path Marking Systems with Revisions through ~~April 2010~~ November 2010	IBC	IFC					
1995-~~2005~~ 2011	Heating and Cooling Equipment~~, with revisions through July 2009~~	IRC	IMC	ISPSC				
1996-~~04~~ 2009	Electric Duct Heaters-with revisions through ~~July 2009~~ November 2011	IRC	IMC					
2017-2008	Standards for General-Purpose Signaling Devices and Systems-with Revisions through ~~October 2009~~ May 2011	IBC	IRC					
2024-~~2008~~ 2011	Standard for Safety Optical-Fiber and Communications Cable Raceway ,with Revisions through April 2011	IMC						
2158-1997	For Electric Clothes Dryers - with Revisions through March 2009	IMC						
2158A-~~2006~~ 2010	Outline of Investigation for Clothes Dryer Transition Duct	IRC	IMC					
2200-~~98~~ 2012	Stationary Engine Generator Assemblies ~~with Revisions through December 2009~~	IBC	IFC	IMC	IFGC			

2208-~~2005~~ 2010	Solvent Distillation Units - with Revisions through ~~December 2009~~ March 2011	IFC							
2221-~~2001~~ 2010	Tests of Fire Resistive Grease Duct Enclosure Assemblies	IMC							
2335-~~01~~ 2010	Fire Tests of Storage Pallets-with Revisions through ~~March 2010~~ September 2012	IFC							
2518-~~02~~ 2005	Air Dispersion System Materials	IMC							
2523-09	Standard for Solid Fuel-Fired Hydronic Heating Appliances, Water Heaters, and Boilers, with Revisions through October 2011	IRC	IgCC	IMC					

ULC/CAN	**Underwriters Laboratories Canada**							
Standard Reference Number	**Title**	**Referenced in Code(s):**						
CAN/ULC S102.2-~~1988~~ 2010	Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies ~~- with 2000 Revisions~~	IBC	IRC					

Reason: *The CP 28 Code Development Policy, Section 4.5.1 requires the updating of referenced standards to be accomplished administratively, and be proces as a Code Change Proposal for consideration by the Administrative Code Change Committee. In September 2012, a letter was sent to each developer of standa that is referenced in the International Codes, asking them to provide ICC with a list of their standards in order to update to the current edition. Above is the list of referenced standards that are to be updated based upon responses from standards developer.*

Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

Public Hearing Results

Committee Action: **Approved as Modified**

Errata to this proposal is contained in the Updates to the 2013 Proposed Changes posted on the ICC website. Please go to http://www.iccsafe.org/cs/codes/Documents/2012-2014Cycle/Proposed-B/00-CompleteGroupB-MonographUpdates.pdf for more information

The following is errata that was not posted to the ICC website.

ASTM D5019, while withdrawn by ASTM, is still referenced in the IBC and IRC, so it will remain in the list of referenced standards. This standard will be removed from this update proposal.

ASTM	**ASTM International**	
Standard Reference Number	**Title**	**Referenced in Code(s):**
D5019-07a	Specification for Reinforced CSM Polymeric Sheet Used in Roofing Membrane	IBC, IRC

FM 4470 was indicated in the posted errata as being updated to 2013, however, the correct reference is 2012.

FM	**FM Global**	
Standard Reference Number	**Title**	**Referenced in Code(s):**
FM 4470 ~~2009~~ 2012	Approval Standard for Single-Ply Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction.	IBC

The following revisions are modifications to the proposal.

The following standards were in the automatic update code change proposals. Revise the referenced edition as follows.

AISI	**American Iron and Steel Institute**	
Standard Reference Number	**Title**	**Referenced in Code(s):**
AISI S110-07/S1-09 (2012)	Standard for Seismic Design of Cold-Formed Steel Structural Systems-Special Moment Frames, 2007 with Supplement 1, dated 2009, (Reaffirmed 2012)	IBC
AISI S210-07 (2012)	North American Standard for Cold-formed Steel Framing-Floor and Roof System Design, 2007, (Reaffirmed 2012)	IBC
AISI S211-07/S1-12 (2012)	North American Standard for Cold-Formed Steel Framing-Wall Stud Design, 2007, including Supplement 1, dated 2012, (Reaffirmed 2012)	IBC
AISI S212-07 (2012)	North American Standard for Cold-Formed Steel Framing-Header Design, 2007, (Reaffirmed 2012)	IBC
AISI S213-07/S1-09 (2012)	North American Standard for Cold-Formed Steel Framing-Lateral Design, with Supplement 1, dated 2009, (Reaffirmed 2012)	IBC
AISI S230-07-07/S2-08 /S3-12 (2012)	Standard for Cold-formed Steel Framing-Prescriptive Method for One- and Two-family Dwellings, 2007, with Supplement 2 3, dated 2008 dated 2012, (Reaffirmed 2012)	IBC, IRC

The following standards will be removed from the automatic update code change proposal. The current edition will remain the referenced edition.

ACI	**American Concrete Institute**	
Standard Reference Number	**Title**	**Referenced in Code(s):**
318-11	Building Code Requirements for Structural Concrete	IBC, IRC, ISPSC

ICC	**International Code Council**	
Standard Reference Number	**Title**	**Referenced in Code(s):**
ICC A117.1-2009	Accessible and Useable Buildings and Facilities	IBC, IEBC, IFC, IRC, IZC

The following standard is not referenced and should be removed from the IMC Chapter 15.

NFPA	**National Fire Protection Association**	
Standard Reference Number	**Title**	**Referenced in Code(s):**
~~NFPA 274-09~~	~~Standard Test Method to Evaluate Fire~~	~~IMC~~

	~~Performance Characteristics of Pipe Insulation~~	

Committee Reason: The proponent indicated that AISI standard references were not revised and updated, but were instead reviewed and reaffirmed in 2012. The committee agreed that it is important to clarify this in the reference.

The committee agreed that the edition of ACI 318 should remain at 2011 instead of being updated to 2014. The specific references to sections in the ACI 318 in the International Codes are coordinated with the 2011 edition. The 2014 edition will be substantially reformatted and renumbered. The 2014 edition must be finalized before it is possible to verify that the references will still be complete and accurate. Some of the revisions to references may be considered technical revisions. This correlation may need to be done as part of the Group A codes changes next cycle. If possible to address this in the public comments for Group B, it should be done.

The committee agreed that the edition of ICC A117.1 should remain 2009 instead of being updated to 2014. The ICC A117.1 is undergoing significant changes in relation to the sizes required for accessibility. At the time of the hearings, the standard has not yet reached the stage of a public draft. Once the revisions are finalized, the scoping requirements in the IBC must be reviewed to understand the full impact on spaces and buildings. Since some of the coordination may include revisions to the codes, the reference of the new edition should be delayed to allow for this coordination effort in the Group A and Group B code change cycles.

The proponent pointed out that NFPA 274 is no longer referenced anywhere in the IMC, however, it is still included in the IMC Chapter 15. Rather than being included in the automatic update proposal, it should be removed from the IMC Chapter 15.

The committee approved the automatic updates for the remainder of the standards listed in the proposal. The proposed updates to the standard are consistent with the ICC policies for updates.

A question was raised during the testimony regarding the updating of NFPA 70, National Electrical Code. NFPA 70 will be automatically updated from the 2011 edition to the 2014 edition. The ICC Board of Directors have identified NFPA 70 as a member of the ICC family of codes, therefore, it will not be indicated in the automatic update proposal.

Assembly Action **None**

Public Comment(s)

Public Comment 1:

Matthew Senecal, P.E., representing the American Concrete Institute (ACI), requests Approval as Modified by this Public Comment.

Further modify the proposal as follows:

ACI

318 - ~~11~~ 14 Building Code Requirements for Structural Concrete

Commenter's Reason: At the Dallas Committee Action Hearings, a decision was made to retain the reference to ACI 318-11 instead of updating to the latest edition, ACI 318-14. This was based upon a concern expressed on the floor that, because ACI 318 is going through reorganization, specific ACI 318 section numbers cited within the 2015 IBC may become inconsistent with ACI 318-14, thereby causing confusion to the user..

On July 1, 2013, ACI assembled a task group consisting of the concerned parties to review this issue in detail. The group concluded that If the specific ACI 318 section numbers cited in the 2015 IBC can be editorially changed to the correct ACI 318-14 section numbers, then any potential problem to the user will be avoided.

Editorial changes of this kind are allowed according to Section 4.4 of CP#28. The 318-14 section references compatible with the 2015 IBC have been determined and will be forwarded to ICC Staff for inclusion in the 2015 IBC, and other ICC Codes as appropriate.

It is important to note that there are no technical changes in ACI 318-14 that affect the eight modifications in 2015 IBC Section 1905 or any other provision of the 2015 IBC. This means only the editorial changes discussed above are required to make ACI 318-14 compatible with the 2015 IBC.

ASTM

Public Comment 2:

Marcelo M. Hirschler, representing GBH International, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

E814-~~08b~~ 2013 Test Method of Fire Tests of Through-Penetration Firestops

E1537-~~12~~ 2013	Test Method for Fire Testing of Upholstered Furniture

Commenter's Reason: Standards date updates

Public Comment 3:

Marcelo M. Hirschler, representing GBH International, and Steve Mawn, representing ASTM International, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

D6662-~~09~~ 2013	Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards
E84-20~~12c~~ 2013A	Test Method for Surface Burning Characteristics of Building Materials
E1354-~~2011b~~ 2013	Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter
E1590-~~12~~ 2013	Test Method for Fire Testing of Mattresses
E2404~~—12~~ 2013E1	Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Vinyl Wall or Ceiling Coverings to Assess Surface Burning Characteristics

Commenter's Reason: Standards date updates

Public Comment 4:

Steve Mawn, representing ASTM International, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

A74-~~12~~ 13A	Specification for Cast Iron Soil Pipe and Fittings
A182-~~12A~~ 13	Standard Specification for Forged or Rolled Alloy and Stainless Steel Pipe Flanges, Forged Fittings and Valves and Parts for High-Temperature Service
A240/A 240M-~~12~~ 13A	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications
A283/A 283M-12A	Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
A307-~~10~~ 12	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
A312/A 312M-~~12A~~ 13A	Specification for Seamless, and Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
A403-~~12~~ 13	Standard Specification for Wrought Austenitic Stainless Steel Pipe Fittings
A480/A480M-~~12~~ 13	Specification for General Requirements for Flat-Rolled Stainless and Heat-/Resisting Steel Plate, Sheet and Strip
A510-~~11~~ 13	Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, Alloy Steel
A572/A 572M-12A	Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
A588/A 588M-~~05~~ 10	Specification for High-Strength Low-Alloy Structural Steel with 50 ksi (345 Mpa) Minimum Yield Point, with Atmospheric Corrosion Resistance
A875/A 875M-~~10~~ 13	Standard Specification for Steel Sheet Zinc-5%, Aluminum Alloy-Coated by the Hot-Dip Process

A888-~~11~~ 13A	Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Application
A924/A 924M-~~2010a~~ 13	Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot Dip Process
A1003/A 1003M-~~12~~ 13A	Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-formed Framing Members
A1008/A1008M-12A	Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake Hardenable
B152/B 152M-~~09~~ 13	Specification for Copper Sheet, Strip Plate and Rolled Bar
B241/B 241M-~~10~~ 12E1	Specification for Aluminum and Aluminum-Alloy, Seamless Pipe and Seamless Extruded Tube
B633-~~11~~ 13	Specification for Electodeposited Coatings of Zinc on Iron and Steel
C33/C33M-~~11a~~ 13	Specification for Concrete Aggregates
C34~~–10~~ 12	Specification for Structural Clay Load-Bearing Wall Tile
C42/C 42M-~~12~~ 13	Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
C56-~~2010~~ 12	Specification for Limestone Dimension Stone
C59/C 59M-00~~(2006)~~ (2011)	Specification for Gypsum Casting Plaster and Molding Plaster
C62-~~08~~ 13	Specification for Slate Dimension Stone
C67-~~12~~ 13	Test Methods of Sampling and Testing Brick and Structural Clay Tile
C76~~-12a~~ 13A	Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
C90-~~12~~ 13	Specification for Loadbearing Concrete Masonry Units
C94/C 94M-~~12~~ 13	Specification for Construction of Dry-stacked, Surface-Bonded Walls
C109/C 109M-~~2001b~~ 12	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
C126-~~12~~ 13	Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units
C140-~~2012a~~ 13	Test Method Sampling and Testing Concrete Masonry Units and Related Units
C143/C 143M-~~2010a~~ 12	Test Method for Slump of Hydraulic Cement Concrete
C207- ~~2011~~ 06(2011)	Specification for Hydrated Lime for Masonry Purposes
C216-~~12~~ 13	Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale)
C317/C 317M-00(2010)	Specification for Gypsum Concrete
C330-/C330M-2009	Specification for Lightweight Aggregates for Structural Concrete
C474-~~12~~ 13	Test Methods for Joint Treatment Materials for Gypsum Board Construction
C578—12~~a~~b	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
C587-04(2009)	Specification for Gypsum Veneer Plaster
C595/C95M-~~2012e1~~ 13	Specification for Blended Hydraulic Cements
C615/C615M-~~2011~~ 11	Specification for Granite Dimension Stone
C616/C616M-~~2010~~ 10	Specification for Quartz Dimension Stone

C629- ~~2010~~ 10	Specification for Slate Dimension Stone
C635/C635M-~~12~~ 13	Specification for the Manufacturer, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings
C645-~~11A~~ 13	Specification for Nonstructural Steel Framing Members
C652-~~12~~ 13	Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)
C700-~~11~~ 13	Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated
C728-05 ~~(2010)~~ (2013)	Standard Specification for Perlite Thermal Insulation Board
C926-~~12A~~ 13	Specification for Application of Portland Cement-Based Plaster
C932-06(2013)	Specification for Surface-Applied Bonding Compounds ~~Agents~~ for Exterior Plastering
C933-~~11~~ 13	Specification for Welded Wire Lath
C1019-~~11~~13	Test Method for Sampling and Testing Grout
C1029-~~10~~13	Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation
C1063-12~~C~~ D	Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster
C1072-~~11~~ 13	Standard Text Method for Measurement of Masonry Flexural Bond Strength
C1088-~~09~~ 13	Specification for Thin Veneer Brick Units Made From Clay or Shale
C1107/C1107M -~~11~~ 13	Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
C1116/C1116M-10A	Standard Specification for Fiber - Reinforced Concrete and Shotcrete
C1157/C1157M-11	Standard Performance Specification for Hydraulic Cement
C1173-10E1	Specification for Flexible Transition Couplings for Underground Piping Systems
C1186-08(2012)	Specification for Flat Fiber Cement Sheets
C1277-~~11~~ 12	Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings
C1280-~~12A~~ 13	Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing
C1289~~—12a~~ 13E1	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
C1314-~~11A~~ 12	Test Method for Compressive Strength of Masonry Prisms
C1396/1396M-~~11~~ 2013	Specification for Gypsum Ceiling Board
C1513-~~12~~ 2013	Standard Specification for Concrete Roof Tile
C1563-~~08~~ 2013	Standard Test Method for Gaskets for Use in Connection with Hub and Spigot Cast Iron Soil Pipe and Fittings for Sanitary Drain, Waste, Vent and Storm Piping Applications
D86-~~2011b~~ 2012	Test Method for Distillation of Petroleum Products at Atmospheric Pressure
D92-2012b	Test Method for Flash and Fire Points by Cleveland Open Cup Tester
D93-~~11~~ 2012	Test Method for Flash Point by Pensky-Martens Closed Cup Tester
D1693-~~12~~ 2013	Test Method for Environmental Stress-Cracking of Ethylene Plastics
D1970/D1970M-~~11~~ 2013	Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roof Underlayment for Ice Dam Protection
D2239-2012A	Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
D2513-~~12~~ 2013E1	Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings

D2683-2010E1	Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing
D2737-2012~~E1~~A	Specification for Polyethylene (PE) Plastic Tubing
D2974-~~07A~~ 2013	Standard Test Methods for Moisture, Ash and Organic Matter of Peat and other Organic Soils
D3035-2012E1	Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
D3161/D3161M-~~12~~ 2013	Test Method for a Wind Resistance of Asphalt Shingles (Fan Induced Method)
D3201-~~08AE1~~ 2013	Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Based Products
D3350-~~08~~ 2012E1	Specification for Polyethylene Plastics Pipe and Fittings Materials
D3689-~~07~~ 2013E1	Test Methods for Deep Foundations Under Static Axial Tensile Load
D3737-~~09E1~~ 2012	Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam)
D4637/D4637M-~~12~~ 2013	Specification for EPDM Sheet Used in Single-Ply Roof Membrane
D5055-~~12~~ 2013	Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists
D5456-~~12~~ 2013	Standard Specification for Evaluation of Structural Composite Lumber Products
D6223/D6223M-02(~~2009)~~(2011)E1	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements
D6757-~~07~~ 2013	Standard Specification for Underlayment Felt Containing Inorganic Fibers used in Steep-Slope Roofing
E96/E96M-~~10~~ 2013	Test Method for Water Vapor Transmission of Materials
E1332-90(20~~03~~10A)	Standard Classification for the Determination of Outdoor-Indoor Transmission Class
E1529-~~10~~ 2013	Test Method for Determining Effects of Large Hydrocarbon Pool Fires on Structural Members and Assemblies
E1537-~~12~~ 2013	Test Method for Fire Testing of Upholstered Furniture
E1996-2012A	Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
E2178~~-11~~ 2013	Standard Test Method for Air Permeance of Building Materials
E2307-~~12~~ 2010	Standard Test Method for Determining Fire Resistance of a Perimeter Joint System Between an Exterior Wall Assembly and a Floor Assembly Using the Intermediate-Scale, Multi-story Test Apparatus[1]
E2336-04(2013)	Standard Test Methods Fire Resistive Grease Duct Enclosure Systems
F441/F 441M-~~12~~ 2013	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
F442/F 442M-~~12~~ 2013	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)
F714-~~12E1~~ 2013	Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
F876-~~10E1~~ 2013	Specification for Crosslinked Polyethylene (PEX) Tubing
F877-2011A	Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems
F1055-~~11~~ 2013	Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene Pipe and Tubing
F1496-~~12~~ 2013	Standard Test Method for Performance of Convection Ovens

F1807-~~12~~ 2013	Specifications for Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing
F2080-~~09~~ 2012	Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Cross-linked Polyethylene (PEX) Pipe
F2200~~—11B~~ 2013	Standard Specification for Automated Vehicular Gate Construction
F2306/F 2306M-~~11~~ 2013	Specification for 12" to 60" 300 to 1500 mm annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications

Commenter's Reason: Further revisions to ASTM Standards.

ICC

Public Comment 5:

Jonathan Humble, representing ICC Reference Standards Committee, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

ICC A117.1 – ~~2009~~ 2014 Accessible and Usable Buildings and Facilities

Commenter's Reason (Humble): The ICC Reference Standards Committee (ICC-REF), a committee organized to review standards and provide an opinion of standards compliance based on Council Policy 28, requests that ADM 62-13 be further modified with the incorporation of ICC A117.1-2014 edition.

The ICC-REF disagrees with the ADM code development committee reasons for reverting back to the 2009 edition of ICC A117.1. Contrary to the code development committee's reason concerning significant changes, Section 4.5.1 of the Council Policy does not stipulate any restrictions to modifications to a standards updating. Rather, the intent is that an updated standard should coordinate with the various I-codes in which the standard is referenced. Since this standard is referenced generically in each of the referenced I-codes, and not specifically by individual section number, it is believed that the update will not yield the coordination issues cited in the code development committee's recommendation.

We therefore recommend that ADM62-13 be further modified by the updating of ICC A117.1 to the 2014 edition.

Public Comment 6:

Kenneth Schoonover, KMS Associates, Inc. representing self, requests Approval as Modified by this Public Comment.

Approve the proposed update to ICC/ANSI A117.1-14 for the IBC and the IRC. Retain the reference to ICC/ANSI A117.1-2009 for the IZC, IFC and IEBC.

Commenter's Reason: ICC/ANSI A117.1 Standard is going through its normal revision cycle, which is expected to be complete before the end of this code development cycle. The new edition of A117.1 will be published and available for reference in the 2015 International Codes.

While it is true that there are significant changes, that is not a good reason to freeze the I-Codes reference at the 2009 Edition of the standard. ICC Council Policy #CP28-05 specifically allows an administrative update of a standard to be approved, based upon completion before Dec. 1 of 2014. We anticipate that this standard will be published and available well before December 1, 2014. In writing this rule for completion of a referenced standard a full year after the update is approved, ICC is specifically allowing for completion of technical work on a standard to be completed, with no qualifications regarding the progress of that work. The revisions underway for A117.1 will not impact the content of the 2015 I-Codes. Further, there are a number of reasons why the update to this standard should be approved:

1. If the revisions in question are included in the new standard, there is no good reason not to move forward with them. The changes will have been well vetted, the benefits of the changes have already been established, and the basis for the changes will have been well substantiated.
2. The potential impact on design and construction is no reason delay implementation. It will be several years before the new edition of the I-Codes are widely adopted and enforced. The changes are significant, but not so dramatic as to cause a major upheaval in the design and construction industry. This would not be the first time, or the last, that changes in codes and standards will have had such effect. Designers and builders can and will adapt, and there will be sufficient time to adapt for those who choose to be proactive and plan ahead.
3. There are many other changes and improvements in the standard that will be delayed if the standard is not updated. Among them are revisions that will correlate to a great extent the I-Codes with the new 2010 ADA Standards, which are now adopted and in force. The I-Codes have long sought to be as technically consistent as possible with the ADA Accessibility Guidelines. Designers,

builders and building owners benefit from having model codes that match the federal accessibility requirements. Failure to update the standard will be a lost opportunity to continue that benefit.

4. The A117 Committee has, to date, agreed to minimize the impact of the changes on housing. The proposals under consideration by the committee include exceptions to Chapter 10 of the Standard that will limit the spatial impact Accessible, Type A and Type B units.

Analysis: Availability of older editions of a standard are determined by the policies of the standard promulgator. The IFC references the A117.1 in Sections 907.5.2.3.4 (Visible alarms) Group R-2, 1007.9 (Accessible means of egress) Signage and 1010.1 Ramps. Chapters 9 and 10 are repeated in the IBC and IFC. The IZC references the A117.1 in Sections 801.2.4 and 801.3.1. The references are specific to requirements for passenger loading zones and accessible parking spaces. Accessible parking requirements and passenger loading zones are also addressed in the IBC, Section 1106.

Public Comment 7:

Steve Orlowski, representing National Association of Home Builders (NAHB), and Tim Ryan, representing the International Association of Building Officials (IABO), requests Approved as Modified by the Code Committee.

Commenter's Reason: During the code development hearing, the committee agreed that there was a need to modify the list of referenced standard, specifically the updating of the A117.1 standard. CP policy 28 allows for standards that are already referenced in the I-Codes to be updated, even if they are still under development, provide they are completed before December 1, 2014. There are several standards that have been changed or are currently being changed without any opportunity to determine whether the standard should still be referenced in the code or the ability to change the code to reflect changes that have occurred in the standard.

For example the A117 standard is currently discussing changes that may possibly change the required dimensions of clear floor space and dimensions along the accessible route significantly. Without the opportunity to fully understand how existing buildings that were built in accordance with the previous edition of the standard and how the proposed changes will interact with ADA and FHA requirements, NAHB encourages the final assembly to support the modification approved by the committee to not update the reference to the 2014 A117.1 standard.

Public Comment 8:

Robert Eugene, representing UL LLC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

705-2004 ~~Revision 5~~ Standard for Power Ventilators with revisions through March 2012

Commenter's Reason: This modification provides no technical change. The re-formatting provides consistency with the formatting of the other UL referenced standards.

Public Comment 9:

Robert Eugene, representing UL LLC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

1703-02 Flat-plate Photovoltaic Modules and Panels - with revisions through ~~May 2012~~ November 2014

Commenter's Reason: This modification will incorporate additional fire testing provisions. It will also include various clarifications and editorial revisions to the standard.

Public Comment 10:

Robert Eugene, representing UL LLC, requests Approval as Modified by this Public Comment.

Modify the proposal as follows:

14B-2008 Sliding Hardware for Standard Horizontally Mounted Tin Clad Fire Doors with revisions through May 3, 2013

14C-2006 Swinging Hardware for Standard Tin Clad Fire Doors Mounted Singly and in Pairs, with revisions through ~~December 2008~~ May 2013

181A-~~05~~ 2013	Closure Systems for Use with Rigid Air Ducts and Air Connectors~~—with Revisions through February 2008~~
181B-~~05~~ 2013	Closure Systems for Use with Flexible Air Ducts and Air Connectors~~—with Revisions through February 2008~~
268~~—06~~2009	Smoke Detectors for Fire ~~Prevention Signaling~~ Alarm Systems ~~-with revisions through October 2003~~
325-2002	Door, Drapery, Gate, Louver and Window Operators and Systems - with Revisions through ~~January 2012~~ June 2013
343-2008	Pumps for Oil-Burning Appliances – with revisions through June 2013
441-2010	Gas Vents~~—with Revisions through August 2006~~
471-~~06~~ 2010	Commercial Refrigerators and Freezers—with Revisions through ~~October 2008~~ December 2012
499-05	Electric Heating Appliances-with revisions through ~~April 2012~~ February 2013
508-99	Industrial Control Equipment—with Revisions through ~~September 2008~~ March 2013
641~~—1995~~ 2010	Type L Low-Temperature Venting Systems with revisions through May 2013
710-~~95~~ 2012	Exhaust Hoods for Commercial Cooking Equipment~~—with Revisions through December 2009~~
834-04	Heating, Water Supply and Power Boilers Electric—with Revisions through ~~December 2009~~ January 2013
842-07	Valves for Flammable Fluids, with Revisions through ~~April 2011~~ October 2012
867-~~00~~ 2011	Electrostatic Air Cleaners-with Revisions through February 2013
923~~—2008~~ 2013	Microwave Cooking Appliances~~—with Revisions through June 2010~~
1042-~~94~~ 2009	Electric Baseboard Heating Equipment-with revisions through June ~~2010~~ 2013
1081-2008	Standard for Swimming Pool Pumps, Filters and Chlorinators, with revisions through ~~November 2011~~ May 2013
1240-2012	Electric Commercial Clothes-Drying Equipment - with Revisions through ~~February 2011~~ October 2012
1313-93	Standard for Nonmetallic Safety Cans for Petroleum Products—with Revisions through ~~August 2007~~ November 2012
1479-03	Fire Tests of Through-penetration Firestops—with Revisions through ~~*March 2010*~~ October 2012
1618-09	Wall Protectors, Floor Protectors and Hearth Extensions – with revisions through May 2013
1715-97	Fire Test of Interior Finish Material—with Revisions through ~~April 2008~~ January 2013
1812-~~2009~~ 2013	Standard for Ducted Heat Recovery Ventilators~~—with Revisions through June 2010~~
1820-04	Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics—with Revisions through ~~February 2009~~ May 2013
1887-04	Fire Tests of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics—with Revisions through ~~February 2009~~ May 2013
2075-~~04~~ 2013	Standard for Gas and Vapor Detectors and Sensors~~—with revisions through September 2007~~
2079-04	Tests for Fire Resistance of Building Joint Systems—with Revisions through ~~June 2008~~ December 2012
2085-97	Protected Above-ground Tanks for Flammable and Combustible Liquids—with Revisions through ~~December 1999~~ September 2010
2200-2012	Stationary Engine Generator Assemblies-- with Revisions through June 2013
2360-00	Test Methods for Determining the Combustibility Characteristics of Plastics Used in Semi-Conductor Tool Construction—with Revisions through ~~June, 2008~~ May 2013

2523-09	Standard for Solid Fuel-Fired Hydronic Heating Appliances, Water Heaters, and Boilers, with Revisions through ~~October 2011~~ February 2013

Commenter's Reason: This modification provides additional updates to referenced standards revision dates and titles as applicable.

Final Hearing Results

ADM62-13	**AMPC1,2,3,4,8,9,10**