CHAPTER 3

DESIGN CRITERIA

SECTION 301
CLIMATE ZONES

301.1 General. Climate *zones* shown in Table 301.1 constitute the zones recognized for Florida by the *International Energy Conservation Code*. Prescriptive envelope compliance methods in this code, Section 402 (residential) and Section 502 (commercial) have no difference in compliance criteria by climate zone. Climate criteria for the performance-based code compliance methods, Section 405 (residential) and Section 506 (commercial), are determined by climate data from the weather data collection station nearest to the building's location.

Figure 301.1 Climate Zones. Reserved.

301.2 Warm humid counties. All Florida counties are considered warm humid counties.

301.3 International climate zones. Reserved.

Table 301.3(1) International Climate Zone Definitions. Reserved.

Table 301.3(2) International Climate Zone Definitions. Reserved.

TABLE 301.1
CLIMATE ZONES, MOISTURE REGIMES, AND WARM-HUMID DESIGNATIONS BY COUNTY

FLORIDA

2A Alachua
2A Baker
2A Bay
2A Bradford
2A Brevard
1A Broward
2A Calhoun
2A Charlotte
2A Citrus
2A Clay
2A Collier
2A Columbia
2A DeSoto
2A Dixie
2A Duval
2A Escambia
2A Flagler
2A Franklin
2A Gadsden
2A Gilchrist
2A Glades
2A Gulf
2A Hamilton
2A Hardee
2A Hendry
2A Hernando
2A Highlands
2A Hillsborough
2A Holmes
2A Indian River
2A Jackson
2A Jefferson
2A Lafayette
2A Lake
2A Lee
2A Leon
2A Levy
2A Liberty
2A Madison
2A Manatee
2A Marion
2A Martin
1A Miami-Dade
1A Monroe
2A Nassau
2A Okaloosa
2A Okeechobee
2A Orange
2A Osceola
2A Palm Beach
2A Pasco
2A Pinellas
2A Polk
2A Putnam
2A Santa Rosa
2A Sarasota
2A Seminole
2A St. Johns
2A St. Lucie
2A Sumter
2A Suwannee
2A Taylor
2A Union
2A Volusia
2A Wakulla
2A Walton
2A Washington

SECTION 302
DESIGN CONDITIONS

302.1 Interior design conditions. The interior design temperatures used for heating and cooling load calculations shall be a maximum of 72°F (22°C) for heating and minimum of 75°F (24°C) for cooling.

SECTION 303
MATERIALS, SYSTEMS AND EQUIPMENT

303.1 Identification. Materials, systems and equipment shall be identified in a manner that will allow a determination of compliance with the applicable provisions of this code.

303.1.1 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. The insulation installer shall sign, date and post the certification in a conspicuous location on the job site.

303.1.1.1 Blown or sprayed roof/ceiling insulation. The thickness of blown-in or sprayed roof/ceiling insulation (fiberglass or cellulose) shall be written in inches (mm) on markers that are installed at least one for every 300 square feet (28 m^2) throughout the attic space. The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers a minimum of 1 inch (25 mm) in height. Each marker shall face the attic access opening. Spray polyurethane foam thickness and installed *R*-value shall be *listed* on certification provided by the insulation installer.

303.1.2 Insulation mark installation. Insulating materials shall be installed such that the manufacturer's *R*-value mark is readily observable upon inspection.

303.1.3 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. Products lacking such a labeled *U*-factor shall be assigned a default *U*-factor from Table 303.1.3(1) or 303.1.3(2). The solar heat gain coefficient (SHGC) 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 shall be assigned a default SHGC from Table 303.1.3(3).

TABLE 303.1.3(1)
DEFAULT GLAZED FENESTRATION *U*-FACTOR

FRAME TYPE	SINGLE PANE	DOUBLE PANE	SKYLIGHT	
			Single	Double
Metal	1.20	0.80	2.00	1.30
Metal with Thermal Break	1.10	0.65	1.90	1.10
Nonmetal or Metal Clad	0.95	0.55	1.75	1.05
Glazed Block	0.60			

TABLE 303.1.3(2)
DEFAULT DOOR *U*-FACTORS

DOOR TYPE	*U*-FACTOR
Uninsulated Metal	1.20
Insulated Metal	0.60
Wood	0.50
Insulated, nonmetal edge, max 45% glazing, any glazing double pane	0.35

TABLE 303.1.3(3)
DEFAULT GLAZED FENESTRATION SHGC

SINGLE GLAZED		DOUBLE GLAZED		
Clear	Tinted	Clear	Tinted	GLAZED BLOCK
0.8	0.7	0.7	0.6	0.6

303.1.4 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, May 31, 2005) in units of $h \times ft^2 \times °F/Btu$ at a mean temperature of 75°F (24°C).

303.2 Insulation installation. Insulation materials shall comply with the requirements of their respective ASTM standard specification and shall be installed in accordance with their respective ASTM installation practice in Table 303.2 in such a manner as to achieve rated *R*-value of insulation. Open-blown or poured loose-fill insulation shall not be used in attic roof spaces when the slope of the ceiling is more than three in twelve. When eave vents are installed, baffling of the vent openings shall be provided to deflect the incoming air above the surface of the insulation.

Exception: Where *metal building roof* and *metal building wall* insulation is compressed between the *roof* or *wall* skin and the structure.

303.2.1 Compressed insulation. Insulation that has been compressed to 85-percent or less of the manufacturer's rated thickness for the product shall use the *R*-values given in Table 303.2.1. These values are to be used except where data developed by an independent testing laboratory is provided.

303.2.2 Substantial contact. Insulation shall be installed in a permanent manner in substantial contact with the inside surface in accordance with manufacturer's recommendations for the framing system used. Flexible batt insulation installed in floor cavities shall be supported in a permanent manner by supports no greater than 24 inches (610 mm) on center (o.c.).

Exception: Insulation materials that rely on airspaces adjacent to reflective surfaces for their rated performance.

303.2.3 Recessed Equipment. Lighting fixtures; heating, ventilating, and air-conditioning equipment, including wall heaters, ducts, and plenums; and other equipment shall not be recessed in such a manner as to affect the insulation thickness unless:

1. The total combined area affected (including necessary clearances) is less than one percent of the opaque area of the assembly;
2. The entire roof, wall, or floor is covered with insulation to the full depth required; or
3. The effects of reduced insulation are included in calculations using an area-weighted average method and compressed insulation values obtained from Table 303.2.1.

In all cases, air leakage through or around the recessed equipment to the conditioned space shall be limited in accordance with Section 402.4.5 or 502.3.8, as applicable.

303.2.4 Insulation protection. Exterior insulation shall be covered with a protective material to prevent damage from sunlight, moisture, landscaping operations, equipment maintenance, and wind. In *attics* and mechanical rooms, a way to access equipment that prevents damaging or compressing the insulation shall be provided. Foundation vents shall not interfere with the insulation. Insulation materials in ground contact shall have a water absorption rate no greater than 0.3 percent when tested in accordance with ASTM C 272, shall cover the exposed exterior insulation, and shall extend a minimum of 6 inches (153 mm) below grade.

TABLE 303.2
INSULATION INSTALLATION STANDARDS

Insulation Material	Standard Specification	Installation Practice
Mineral Fiber Batt/Blanket	ASTM C 665	ASTM C 1320
Mineral Fiber Loose Fill	ASTM C 764	ASTM C 1015
Cellulose Loose Fill	ASTM C 739	ASTM C 1015
Polystyrene Foam	ASTM C 578	
Polyisocyanurate Foam	ASTM C 1289	
Reflective	ASTM C 1224	ASTM C 727
Radiant Barrier	ASTM C 1313	ASTM C 1158
Vermiculite	ASTM C 516	
Perlite	ASTM C 549	
Spray-Applied Rigid Cellular Polyurethane Foam	ASTM C 1029	
Interior Radiation Control Coating Systems		ASTM C 1321

TABLE 303.2.1
***R*-VALUES OF COMPRESSED INSULATION**

% of Original Thickness	R-5	R-7	R-11	R-14	R-19	R-30	R-38
90	5	6	10	13	18	28	36
80	4	6	10	12	17	26	33
70	4	5	9	11	15	24	30
60	3	5	8	10	14	22	27
50	3	4	7	9	12	18	24
40	2	4	6	8	10	15	20
30	2	3	4	6	8	12	16
20	20	2	2	3	4	10	10

303.3 Maintenance information. Maintenance instructions shall be furnished for equipment and systems that require preventive maintenance. Required regular maintenance actions shall be clearly stated and incorporated on a readily accessible label. The label shall include the title or publication number for the operation and maintenance manual for that particular model and type of product.

303.3.1 Commercial buildings. The *code official* shall ensure that the construction documents require an operating and maintenance manual be transmitted to the building owner for all commercial buildings. The manual shall include basic data relating to the design, operation and maintenance of HVAC and lighting systems and equipment. Required routine maintenance actions shall be clearly identified. Where applicable, control information such as diagrams, schematics, control sequence descriptions, and maintenance and calibration information shall be included.

SECTION 304
MATERIALS TESTING AND THERMAL PROPERTIES

304.1 Building material thermal properties, general.

304.1.1 Commerical and residential high-rise. *R*-values for *building materials* used to demonstrate code compliance with Chapter 5 shall be taken from ASHRAE 90.1 Normative Appendix A, from manufacturer's product literature or from other nationally recognized engineering sources. Assembly *U*-factor calculations shall follow the procedure(s) detailed in Section 304.3 or be tested in accordance with procedures(s) described in Section 304.2.

Concrete block *R*-values shall be calculated using the isothermal planes method or a two-dimensional calculation program, thermal conductivities from ASHRAE 90.1 Normative Appendix A and dimensions from ASTM C 90. The parallel path calculation method is not acceptable.

Exception: *R*-values for *building materials* or thermal conductivities determined from testing in accordance with Section 304.2.

304.1.2 Residential one- and two-family. *R*-values referenced in Chapter 4 of this code refer to the *R*-values of the added insulation only. The *R*-values of structural building

materials such as framing members, concrete blocks or gypsum board shall not be included. Insulation levels shall be achieved with insulation products tested and rated according to the procedures recognized by the Federal Trade Commission (FTC) in 16 CFR Part 460.

304.1.2.1 When installing two layers of bulk or board insulation, the *R*-values of each material may be added together for a total *R*-value. When installing two separate reflective insulation products in layers, the total *R*-value of the system shall have been achieved by testing under FTC regulations, 16 CFR Part 460.

304.2 Testing of building materials thermal properties.

304.2.1 Single materials. If *building material R*-values or thermal conductivities are determined by testing, one of the following test procedures shall be used:

1. ASTM C 177
2. ASTM C 236
3. ASTM C 518

For concrete, the oven-dried conductivity shall be multiplied by 1.2 to reflect the moisture content as typically installed.

304.2.2 Assembly U-factors. If assembly *U-factors* are determined by testing, ASTM C 1363 shall be used.

Product samples tested shall be production line material or representative of material as purchased by the consumer or contractor. If the assembly is too large to be tested at one time in its entirety, then either a representative portion shall be tested or different portions shall be tested separately and a weighted average determined. To be representative, the portion tested shall include edges of panels, joints with other panels, typical framing percentages, and thermal bridges.

304.3 Calculation procedures and assumptions. The following procedures and assumptions shall be used for all Chapter 5 code calculations. *R*-values for air films, insulation, and *building materials* shall be taken from Section 304.3.1 or 304.3.2, respectively. In addition, the appropriate assumptions listed, including framing factors, shall be used.

304.3.1 Air films: Prescribed *R*-values for air films shall be as follows:

***R*-Value**	**Condition**
0.17	All exterior surfaces
0.46	All semi-exterior surfaces
0.61	Interior horizontal surfaces, heat flow up
0.92	Interior horizontal surfaces, heat flow down
0.68	Interior vertical surfaces

304.3.1.1 Exterior surfaces are areas exposed to the wind.

304.3.1.2 Semi-exterior surfaces are protected surfaces that face attics, crawl spaces, and parking garages with natural or mechanical ventilation.

304.3.1.3 Interior surfaces are surfaces within enclosed spaces.

304.3.1.4 The *R*-value for cavity airspaces shall be taken from ASHRAE 90.1 Normative Appendix A. No credit shall be given for airspaces in cavities that contain any insulation of less than 0.5 inch (12.7 mm). The values for 3.5 inch (84 mm) cavities shall be used for cavities of that width and greater.

304.3.2 Assembly *U*-Factor, *C*-Factor and *F*-Factor Calculation.

304.3.2.1 Pre-calculated assembly *U-factors, C-factors, F-factors*, or *heat capacities*. The *U-factors*, *C-factors*, *F-factors*, and *heat capacities* for typical construction assemblies from ASHRAE 90.1 Normative Appendix A shall be used for all calculations unless otherwise allowed by applicant-determined assembly *U*-factors, *C*-factors, *F*-factors, or heat capacities. Interpolation between values *for rated R-values of insulation*, including insulated sheathing is allowed; extrapolation beyond values in the ASHRAE 90.1 Normative Appendix A tables is not allowed.

304.3.2.2 Applicant-determined assembly *U*-factors, *C*-factors, *F*-factors, or *heat capacities*. If the *building official* determines that the proposed construction assembly is not adequately represented in the appropriate table of ASHRAE 90.1 Normative Appendix A, the applicant shall determine appropriate values for the assembly using the assumptions in ASHRAE 90.1 Normative Appendix A. An assembly is deemed to be adequately represented if:

1. the interior structure, hereafter referred to as the base assembly, for the *class of construction* is the same as described in Normative Appendix A *and*
2. changes in exterior or interior surface *building materials* added to the base assembly do not increase or decrease the *R*-value by more than 2 from that indicated in the descriptions in ASHRAE 90.1 Normative Appendix A.

Insulation, including insulated sheathing, is not considered a *building material*.