

CHAPTER 20

ALUMINUM

SECTION 2001 GENERAL

2001.1 Scope. Provisions of this chapter shall govern the quality, design, fabrication and erection of aluminum alloys used in building construction.

Exception: Buildings and structures located within the high-velocity hurricane zone shall comply with the provisions of Section 2003.

SECTION 2002 MATERIALS

2002.1 General. The quality, design, fabrication and erection of aluminum used structurally in buildings or structures shall conform to good engineering practice, the provisions of this chapter and other applicable requirements of this code.

Exception: All buildings located within the high-velocity hurricane zone shall comply with the requirements of Section 2003.

2002.2 Structural aluminum construction. The design, fabrication and assembly of structural aluminum for buildings or structures shall conform to AA ASM 35 and Specifications for Aluminum Structures, Aluminum Design Manual, Part 1-A and 1-B, of the Aluminum Association. The use of aluminum alloys not listed in the manual shall be permitted provided their standard of performance is not less than those required in the manual and the performance is substantiated to the satisfaction of the building official.

2002.2.1 Definitions

PRIMARY MEMBER. Structural framing members providing structural support to other members and/or surfaces of a structure including, but not limited to beams, posts, columns, joists, structural gutters, headers, eave rail, purlins, roof brace.

SECONDARY MEMBERS. Structural framing members which do not provide basic support for the entire structure, generally including, but not limited to, such members as kickplate rails, chair rails, roof or wall panels, wall brace.

STRUCTURAL MEMBERS. Members or sections that provide support to an assembly and/or resist applied loads.

2002.3 Screen enclosures.

2002.3.1 Actual wall thickness of extruded aluminum members shall be not less than 0.040 inch (1 mm).

2002.3.2 Reserved.

2002.3.3 Vinyl and acrylic panels shall be removable. Removable panels shall be identified as removable by a decal. The identification decal shall essentially state "Removable panel SHALL be removed when wind speeds exceed 75 mph (34 m/s)." Decals shall be placed such that the decal is visible when the panel is installed.

2002.4 Loads. Structural members supporting screened enclosures shall be designed for wind in both of two orthogonal directions using the pressures given in Table 2002.4. Each primary member shall also be designed for a 300 pound (1.33 kN) load applied vertically downward along any 1 foot (305 mm) of any member, not occurring simultaneously with wind load.

Exception: In addition to wind pressures, purlins shall also be designed for a 200 pound (0.89 kN) load applied vertically downward along any 1 foot (305 mm) of any member, not occurring simultaneously with wind load.

2002.4.1 The following design guides shall be accepted as conforming to accepted engineering practices:

AAF Guide to Aluminum Construction in High Wind Areas.

2002.5 Wall panels. The minimum thickness for formed sheet aluminum structural wall panels shall be not less than 0.024 inch (0.6 mm), subject to approved tolerances.

2002.6 Sunrooms. Sunrooms shall comply with AAMA/NPEA/NSA 2100 and the structural requirements and testing provisions of Chapter 5.

AAMA 2100, Section 5.2.1 Wind Loads: Modify Section 5.2.1 as follows:

5.2.1 Wind Loads: Basic wind speed in miles per hour (mph) or kilometer per hour (kph) shall be determined in accordance with Section 1609.3. Sunrooms including exposed structures, components, cladding and roof covering shall be designed to resist the wind loads as established in Section 1609.1.1.

For the purpose of applying the criteria of the AAMA Standard for sunrooms based on the intended use, sunrooms shall be categorized in one of the following categories.

Category I: A roof or a covering of an outdoor space. The openings shall be permitted to be enclosed with insect screening or 0.5 mm (20 mil) maximum thickness plastic film. The space is defined as nonhabitable and unconditioned.

Category II: A roof or a covering of an outdoor space with enclosed walls. The openings are permitted to be enclosed with translucent or transparent plastic or glass. The space is defined as nonhabitable and unconditioned.

Category III: A roof or a covering of an outdoor space with enclosed walls. The openings are permitted to be enclosed with translucent or transparent plastic or glass. The sunroom complies with additional requirements for forced-entry resistance, air-leakage resistance and water-penetration resistance. The space is defined as nonhabitable and unconditioned.

Category IV: A roof or a covering of an outdoor space with enclosed walls. The sunroom is designed to be heated and/or cooled by a separate temperature control or system

**TABLE 2002.4
DESIGN WIND PRESSURES FOR ALUMINUM SCREENED ENCLOSURES^{a, b, c, i}
(STRENGTH DESIGN OR LRFD ONLY)**

SURFACE	ULTIMATE DESIGN WIND SPEED V_{ult} (mph)																				
	110			120			130			140			150			160			170		
SURFACE	Design Pressures by (psf)																				
	B	C	D	B	C	D	B	C	D	B	C	D	B	C	D	B	C	D	B	C	D
Horizontal Pressure on Windward Surfaces	17	24	28	20	28	33	23	32	38	27	38	44	31	43	51	36	49	58	40	56	66
Horizontal Pressure on Leeward Surfaces	13	18	21	15	22	26	20	26	31	21	29	34	22	34	40	25	40	46	29	44	52
Vertical Pressure on Screen Surfaces	4	7	8	6	8	9	6	9	11	8	11	12	9	12	14	10	14	16	11	15	18
Vertical Pressure on Solid Surfaces	14	19	23	17	23	27	20	27	32	23	32	37	25	36	42	30	41	48	33	46	54

For SI: 1 pound per square foot = 9.479 kN/m².

NOTES:

- a. Pressures based on Risk Category I determined in accordance with Table 1604.5 or Table 1.5-1 of ASCE 7.
- b. Pressures apply to enclosures with a mean enclosure roof height of 30 feet (10 m). For other heights, multiply the pressures in this table by the factors in Table 2002.4A.
- c. Apply horizontal pressures to the area of the enclosure projected on a vertical plane normal to the assumed wind direction, simultaneously inward on the windward side and outward on the leeward side.
- d. Apply vertical pressures upward and downward to the area of the enclosure projected on a horizontal plane.
- e. Apply horizontal pressures simultaneously with vertical pressures.
- f. Table pressures are MWFRS Loads. The design of solid roof panels and their attachments shall be based on component and cladding loads for enclosed or partially enclosed structures as appropriate.
- g. Table pressures apply to 20 × 20 × 0.013" mesh screen. For 18 × 14 × 0.013" mesh screen, pressures on screen surfaces may be multiplied by 0.88. For screen densities greater than 20 × 20 × 0.013", use pressures for enclosed buildings.
- h. Table pressures may be interpolated using ASCE 7 methodology.
- i. For allowable stress design (ASD) pressures shall be permitted to be multiplied by 0.6.

and is thermally isolated from the primary structure. The sunroom complies with additional requirements for forced-entry resistance, water-penetration resistance, air-leakage resistance, and thermal performance. The space is defined as habitable and conditioned.

Category V: A roof or a covering of an outdoor space with enclosed walls. The sunroom is designed to be heated and/or cooled and is open to the main structure. The sunroom complies with additional requirements for forced-entry resistance, water-penetration resistance, air-leakage resistance, and thermal performance. The space is defined as habitable and conditioned.

**SECTION 2003
HIGH-VELOCITY HURRICANE ZONES—
ALUMINUM**

2003.1 Design. Aluminum members shall be designed by methods admitting of rational analysis according to established principles of mechanics.

2003.2 Standards. The design, fabrication, and erection of structural aluminum shall conform to the Aluminum Design Manual.

2003.3 Workmanship. Aluminum construction shall be in conformance with the tolerances, quality and methods of construction as set forth in Section 2003.2 and the American Welding Society's Structural Welding Code-Aluminum (D1.2).

2003.4 Definitions. Members shall be defined as in Section 2002.2.1.

2003.5 Identification. Aluminum for structural elements shall at all times be segregated or otherwise handled in the fabricator's plant so that the separate alloys and tempers are positively identified and, after completion of fabrication, shall be marked to identify the alloy and temper. Such markings shall be affixed to complete members and assemblies or to boxed or bundled shipments of multiple units prior to shipment from the fabricator's plant.

Exception: Certification by the fabricator and or contractor shall be provided attesting to the alloy and temper of the material.

**TABLE 2002.4A
HEIGHT ADJUSTMENT FACTORS**

MEAN ROOF HEIGHT	EXPOSURE		
	B	C	D
0-15	1	0.86	0.89
20	1	0.92	0.93
25	1	0.96	0.97
30	1	1	1
35	1.05	1.03	1.03
40	1.09	1.06	1.05
45	1.12	1.09	1.07
50	1.16	1.11	1.09
55	1.19	1.14	1.11
60	1.22	1.16	1.13

2003.6 Allowable unit stresses.

2003.6.1 The design, fabrication and assembly of aluminum members for building and other structures shall conform to the standard set forth in Section 2003.2 and as otherwise set forth herein.

2003.6.2 The use of aluminum alloys, other than those listed in the standard shall provide performance not less than those required by the standard and as set forth herein.

2003.6.3 Aluminum members shall be limited by the deflections set forth in Section 1615.3.

2003.7 The building official may require that any structure using aluminum primary or secondary members be designed by a Florida-registered professional engineer.

2003.7.1 Reserved.

2003.7.2 In addition to flexural and shearing stresses, the critical factors of buckling, fatigue, stress raisers such as notches or holes or shape re-entrant corners, deflection and connections shall be considered and provided for by proper design.

2003.7.3 All solid roof systems shall be designed for a minimum 30 psf (1436 Pa) live load.

2003.7.4 All buildings and structures shall be designed to resist uplift. In the case of placement on existing slabs and

foundations, sufficient information and calculations shall be provided by the professional engineer and/or architect to verify the ability of the slab or foundation to resist uplift loads.

2003.7.5 All connection devices shall be rated by load testing by an approved testing laboratory.

2003.7.5.1 All expansion anchors shall not be installed less than 3 inches (76 mm) from the edge of concrete slab and/or footings. All expansion anchors shall develop an ultimate withdrawal resisting force equal to four times the imposed load, with no stress increase for duration of load.

2003.8 Fabrication and construction details.

2003.8.1 Connections. Aluminum members shall be designed as set forth in the standards in Section 2003.2.

2003.8.1.1 Fasteners. Bolts and other fasteners shall be aluminum, stainless steel, hot-dip or electro-galvanized steel. Double cadmium plated steel bolts may also be used.

2003.8.1.2 Painting. Except as prescribed in Section 2003.8.4, painting or coating of aluminum alloy parts shall be required only when called for on the plans.

2003.8.1.3 Welding. Aluminum parts shall be welded with an inert-gas-shielded arc or resistance welding process. No welding process that requires a welding flux shall be used. Filler alloys complying with the requirements of the standard in this chapter shall be used.

2003.8.1.4 Welder qualifications. All welding of structural aluminum member shall be performed by certified welders.

2003.8.1.5 Erection. During erection, structural aluminum shall be adequately braced and fastened to resist dead, wind and erection loads.

2003.8.2 Structural aluminum decking and siding.

2003.8.2.1 Aluminum sections spanning between supports shall be limited in span to satisfactorily support the positive and negative loads set forth in Chapter 16 (High-Velocity Hurricane Zones). The deflection of decking shall not exceed that set forth in Section 1615.3.

2003.8.2.2 Aluminum sheet used for roof decking or siding shall be not less than 0.032 inch (0.8 mm) in thickness.

2003.8.2.3 Aluminum sheets shall be secured to the supports to adequately resist positive and negative loads. Attachments shall be at intervals not exceeding 8 inches (203 mm) o.c. and shall be secured to each other at side laps at intervals as required by rational analysis and/or tests, but shall not exceed 12 inches (305 mm) o.c.

2003.8.2.4 Fasteners shall have a head, and/or be provided with washers not less than 1/2 inch (13 mm) in diameter.

2003.8.2.5 Fasteners located at end laps shall be placed not more than 2 inches (51 mm) nor less than 1 inch (25 mm) from the end of overlapping sheets.

2003.8.2.6 Where roof or wall cladding is of aluminum, an approved membrane to protect against water intrusion to the interior shall be provided or the aluminum cladding shall be designed and constructed with an approved continuous edge-interlock, overlap or seam to prevent water intrusion.

2003.8.3 Nonstructural aluminum decking and siding.

2003.8.3.1 Nonstructural aluminum sheets shall be backed with cladding as set forth in Chapter 23 and Chapter 24 (High-Velocity Hurricane Zones).

2003.8.3.2 Nonstructural aluminum sheets shall have a minimum thickness of 0.032 inches (0.8 mm).

2003.8.3.3 An approved membrane to protect against water intrusion shall be provided or the aluminum cladding shall be designed and constructed with an approved continuous edge-interlock, overlap or seam to prevent water intrusion.

2003.8.3.4 Nonstructural decking and siding shall be attached as set forth in Section 2003.8.2 except that the attachment of aluminum residential siding shall be by rational analysis and/or tests using a minimum 0.120-inch (3 mm) diameter aluminum nails of sufficient length to penetrate studs a minimum of 2 inches (51 mm). Nails at wood studs shall be as required by rational analysis and/or tests, but spaced not greater than 24 inches (610 mm) o.c. horizontally and no greater than 8 inches (203 mm) o.c. vertically.

2003.8.4 Dissimilar materials.

2003.8.4.1 Aluminum may contact compatible metals such as, but not limited to:

1. Nonmagnetic stainless steel provided the contacting surfaces and any attachments are enclosed for protection from the weather.
2. Zinc.
3. White bronze.

2003.8.4.2 Aluminum contacting metals not considered compatible shall be protected as follows:

1. Painting the dissimilar metal with a prime coat of zinc-chromate primer or other suitable primer, followed by one or two coats of aluminum metal-and-masonry paint or other suitable protective coating, excluding those containing lead pigmentation.
2. Painting the dissimilar metal with a coating of a heavy-bodied bituminous paint.
3. Placing a good quality caulking material between the aluminum and the dissimilar metal.
4. Applying a nonabsorptive tape or gasket.
5. Hot-dip galvanizing or zinc-plating steel members after fabrication.

2003.8.4.3 Dissimilar metals shall be painted if used in locations where drainage from them passes over aluminum.

2003.8.4.4 Aluminum surfaces in contact with lime-mortar, concrete, or other masonry materials, shall be protected with alkali-resistant coatings, such as heavy-bodied bituminous paint or water-white methacrylate lacquer.

2003.8.4.5 Aluminum in contact with wood or other absorbing materials which may become repeatedly wet shall be painted with two coats of aluminum metal-and-masonry paint or a coat of heavy-bodied bituminous paint, or the wood or other absorbing material shall be painted with two coats of aluminum house paint and the joints sealed with a good quality caulking compound.

2003.8.4.6 Where aluminum is in contact with treated wood, wood shall be treated with pentachlorophenol, 5 percent minimum concentration, creosote, or zinc naphthanate, following the protective measures outlined in Section 2003.8.4.5.

2003.8.5 Expansion and contraction. Aluminum work shall be designed and anchored so the work will not be distorted nor the fasteners overstressed from the expansion and contraction of the metal.

2003.9 Sunrooms.

2003.9.1 Wind Loads: Basic wind speed in miles per hour (mph) shall be determined in accordance with Section 1620. Sunrooms including exposed structures, components, cladding, and roof covering shall be designed to resist the wind loads as established in Section 1620.1.

2003.9.2 Sunroom Categories. Sunrooms shall be categorized in one of the following categories by the permit applicant, design professional, or the property owner where the sunroom is being constructed.

Category I: A roof or a covering of an outdoor space. The openings shall be permitted to be enclosed with insect screening or 0.5 mm (20 mil) maximum thickness plastic film. The space is defined as nonhabitable and unconditioned.

Category II: A roof or a covering of an outdoor space with enclosed walls. The openings are permitted to be enclosed with translucent or transparent plastic or glass. The space is defined as nonhabitable and unconditioned.

Category III: A roof or a covering of an outdoor space with enclosed walls. The openings are permitted to be enclosed with translucent or transparent plastic or glass. The sunroom complies with additional requirements for forced-entry resistance, air-leakage resistance and water-penetration resistance. The space is defined as nonhabitable and unconditioned.

Category IV: A roof or a covering of an outdoor space with enclosed walls. The sunroom is designed to be heated and/or cooled by a separate temperature control or system and is thermally isolated from the primary structure. The sunroom complies with additional requirements for forced-entry resistance, water penetration resistance, air-leakage resistance, and thermal performance. The space is defined as habitable and conditioned.

Category V: A roof or a covering of an outdoor space with enclosed walls. The sunroom is designed to be heated and/or cooled and is open to the main structure. The sunroom complies with additional requirements for forced-entry resistance, water-penetration resistance, air-leakage resistance, and thermal performance. The space is defined as habitable and conditioned.

