

## CHAPTER 20 LIGHT METAL ALLOYS

### SECTION 2001 GENERAL

**2001.1 Scope.** Provisions of this chapter shall govern the quality, design, fabrication and erection of light metal 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 STRUCTURAL ALUMINUM

**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 2003.

**2002.2 Structural aluminum construction.** The design, fabrication and assembly of structural aluminum for buildings or structures shall conform to Specifications for Aluminum Structures, Aluminum Design Manual, Part 1, 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.

#### 2002.3 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** Screen density shall be a maximum of 20 x 20 mesh.

**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 Design.** Structural members supporting screen enclosures shall be designed to support minimum wind loads given in Table 2002.4. Where any value is less than 10 psf (479 Pa) use 10 psf.

**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.

### 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 following Standards are hereby adopted as set forth in Chapter 35:

1. Specifications for Aluminum Structures, The Aluminum Association, Inc.
2. The Aluminum Formed Sheet Building Sheathing Design Guide, The Aluminum Association, Inc.
3. The Commentary on Specifications for Aluminum Structures, The Aluminum Association, Inc.
4. Engineering Data for Aluminum Structures, The Aluminum Association, Inc.
5. Guidelines for Structural Condition Assessment of Existing Buildings, ANSI/ASCE 11.

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

#### 2003.4 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, etc.

**Secondary members:** Structural framing members which do not provide basic support for the entire structure, generally including, but not limited to, such members as purlins, kickplate rails, chair rails, roof or wall panels, etc.

**Structural members:** Members or sections that provide support to an assembly and/or resist applied loads.

**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 2002.4

**TABLE 2002.4**  
**DESIGN WIND PRESSURES FOR ALUMINUM SCREEN ENCLOSURE FRAMING**  
**WITH AN IMPORTANCE FACTOR OF 0.77<sup>1,2,3</sup>**

		Basic Wind Speed (mph)											
		100		110		120		130		140		150	
Load Case	Wall	Exposure Category Design Pressure, psf											
		C	B	C	B	C	B	C	B	C	B	C	B
A <sup>4</sup>	Windward and leeward walls (flow thru) and windward wall (non-flow thru) L/W = 0-1	12	8	14	10	17	12	19	14	23	16	26	18
A <sup>4</sup>	Windward and leeward walls (flow thru) and windward wall (non-flow thru) L/W = 2	13	9	16	11	19	14	22	16	26	18	30	21
B <sup>5</sup>	Windward: Non-gable roof	16	12	20	14	24	17	28	20	32	23	37	26
B <sup>5</sup>	Windward: Gable roof	22	16	27	19	32	23	38	27	44	31	50	36
All <sup>6</sup>	Roof-screen	4	3	5	4	6	4	7	5	8	6	9	7
All <sup>6</sup>	Roof-solid	12	9	15	11	18	13	21	15	24	17	28	20

**Notes:**

1. Values have been reduced for 0.77 Importance Factor in accordance with Table 1606.
2. Minimum design pressure shall be 10 psf (479 Pa) in accordance with Section 1606.1.2.
3. Loads are applicable to screen enclosures with a mean roof height of 30 feet (10 m) or less. For screen enclosures of different heights the pressures given shall be adjusted by multiplying the table pressure by the adjustment factor given in Table 2002.4A.
4. For Load Case A flow thru condition the pressure given shall be applied simultaneously to both the upwind and downwind screen walls acting in the same direction as the wind. The structure shall also be analyzed for wind coming from the opposite direction. For the non-flow thru condition the screen enclosure wall shall be analyzed for the load applied acting toward the interior of the enclosure.
5. For Load Case B the table pressure multiplied by the projected frontal area of the screen enclosure is the total drag force, including drag on screen surfaces parallel to the wind, which must be transmitted to the ground. Use Load Case A for members directly supporting the screen surface perpendicular to the wind. Load Case B loads shall be applied only to structural members which carry wind loads from more than one surface.
6. The roof structure shall be analyzed for the pressure given occurring both upward and downward.

**TABLE 2002.4A**  
**HEIGHT ADJUSTMENT FACTORS**

Mean Roof Height	Exposure	
	B	C
15	1	0.86
20	1	0.92
25	1	0.96
30	1	1.00
35	1.05	1.03
40	1.09	1.06
45	1.12	1.09
50	1.16	1.11
55	1.19	1.14
60	1.22	1.16

**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 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 1612.

**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** Increases in allowable unit stresses as set forth for wind loads in 1612 shall be applicable to aluminum structural members except that allowable unit stresses thus increased shall not exceed 75 percent of the minimum yield strength.

**Exception.** No increase in allowable stresses caused by wind loads shall be permitted for aluminum sheet decking, siding and cladding.

**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 4 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 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 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 1612.

**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 Non-structural aluminum decking and siding.**

**2003.8.3.1** Non-structural aluminum sheets shall be backed with cladding as set forth in Chapters 23 and 24 (High Velocity Hurricane Zones).

**2003.8.3.2** Non-structural 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** Non-structural decking and siding shall be attached as set forth in 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 1 or 2 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 non-absorptive 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, or creosote, or zinc naphthanate, following the protective measures outlined in 2003.8.4.5.

**2003.8.5 Expansion and contraction.** Aluminum work shall be designed and anchored so that the work will not be distorted nor the fasteners over-stressed from the expansion and contraction of the metal.