

SECTION 08 11 16

ALUMINUM DOORS AND FRAMES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7 (2017) Minimum Design Loads for Buildings  
and Other Structures

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 16932 (2007) Glass in Buildings - Destructive  
Windstorm-Resistant Security Glazing -  
Test and Clarification

JAPANESE STANDARDS ASSOCIATION (JSA)

JIS A 1516 (1998) Windows and Doorsets - Air  
Permeability Test

JIS A 1517 (2020) Windows and Doorsets -  
Watertightness Test Under Dynamic Pressure

JIS A 4702 (2021) Doorsets

JIS H 4000 (2017) Aluminium and Aluminium Alloy  
Sheets, Strips and Plates (Amendment 1)

JIS H 4100 (2015) Aluminum and Aluminum Alloy  
Extruded Profiles

JIS H 4040 (2015) Aluminum and Aluminum Alloy Bars  
and Wires

JIS H 8602 (2010) Combined Coatings of Anodic Oxide  
and Organic Coatings on Aluminum and  
Aluminum Alloys

JIS K 5906 (1998) Aluminum Pigments For Paints

JIS R 3109 (2018) Glass in Building -  
Destructive-Windstorm-Resistant Security  
Glazing - Test Method

MINISTRY OF LAND, INFRASTRUCTURE, TRANSPORT AND TOURISM (MLIT)

MLIT SS Chapter 16 (2019) Building Construction Standard  
Specifications - Chapter 16 Opening  
Construction

## 1.2 PERFORMANCE REQUIREMENTS

### 1.2.1 Structural Calculations

Commentary: Add wind pressure requirements in accordance with ASCE 7.

#### 1.2.1.1 Minimum Antiterrorism Performance

Provide doors meeting the minimum antiterrorism performance as specified in the paragraphs below.

Aluminum door, window frame and window wall shall be designed to support the wind pressures specified, but not less than the minimum section properties indicated. The anchorages shall be designed to support the wind load reactions calculated, but not less than the support loads indicated on the contract documents.

If the minimum section properties and anchorages were not indicated, one of the following methods can be used as noted in the following:

[a. Static Equivalent Load Design

#### ]1.2.2 Wind Borne Debris

Provide impact resistant door [\_\_\_\_\_] assemblies meeting the Windborne-Debris-Impact Resistant Performance requirements of JIS R 3109 as follows:

- (1) Pass missile-impact tests when tested according to JIS R 3109 for missiles A and D in Table 2 or ISO 16932 (Missile C).

#### ]1.2.3 Air Infiltration

When tested in accordance with JIS A 1516, air infiltration per door leaf cannot exceed 2.83 by 10<sup>-4</sup> cms per square meter of fixed area at a test pressure of 0.30 kPa.

#### 1.2.4 Water Penetration

When tested in accordance with JIS A 1517, there can be no water penetration at a pressure of 0.14 kPa of fixed area.

#### 1.2.5 Thermal Transmittance, Solar Heat Gain, Visible Light Transmittance

##### 1.2.5.1 U-Factor

Provide exterior glazed assemblies, including aluminum entrances doors with greater than 50 percent glazed area with U-Factor [\_\_\_\_\_].

##### 1.2.5.2 Solar Heat Gain Coefficient (SHGC)

Provide exterior glazed assemblies, including aluminum entrances doors with greater than 50 percent glazed area, certified by the National Fenestration Rating Council with a whole window SHGC of [\_\_\_\_\_].

##### 1.2.5.3 Visible Light Transmittance (VLT)

Provide exterior glazed assemblies, including aluminum entrances doors

with greater than 50 percent glazed area with VLT [\_\_\_\_\_].

#### 1.2.5.4 Doors with Less than 50 Percent Glazed Area

For exterior aluminum entrances doors with less than 50 percent glazed area, the glazed area is considered the fenestration area with a whole window U-Factor, SHGC and VLT as required above.

### 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

#### SD-02 Shop Drawings

For Each Type of Door and Frame Assembly; G[, [\_\_\_\_\_]]

#### SD-04 Samples

Finish Samples; G[, [\_\_\_\_\_]]

#### SD-05 Design Data

Structural Calculations for Deflection; G[, [\_\_\_\_\_]]

#### SD-06 Test Reports

Air Infiltration; G[, [\_\_\_\_\_]]

Water Penetration; G[, [\_\_\_\_\_]]

#### SD-10 Operation and Maintenance Data

Adjustments, Cleaning, and Maintenance; G[, [\_\_\_\_\_]]

### 1.4 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the site for damage. Unload and store with minimum handling. Provide storage space in dry location with adequate ventilation, free from dust or water, and easily accessible for inspection and handling. Stack materials on non-absorptive strips or wood platforms. Do not cover doors and frames with tarps, polyethylene film, or similar coverings. Protect finished surfaces during shipping and handling using manufacturer's standard method. Do not apply coatings or lacquers to surfaces to which caulking and glazing compounds must adhere.

### 1.5 QUALITY CONTROL

#### 1.5.1 Shop Drawing

Indicate elevations and sections for each type of door and frame assembly. Show sizes and details of each assembly, frame construction,[subframe attachment,] thickness and gages of metal, details of door and frame

construction, proposed method(s) of anchorage, glazing details, provisions for an location of hardware, [mullion details,] method and materials for flashing and weatherstripping, miscellaneous trim, installation details, and other related items necessary for a complete representation of all components. A qualified blast engineer must perform testing or calculations for door system design resistance to specified blast loads.

#### 1.5.2 Finish Samples

Submit two color charts and two finish sample chips from manufacturer's standard color and finish options for each type of finish indicated.

#### 1.5.3 Operation and Maintenance Data

Submit detailed instructions for installation, adjustments, cleaning, and maintenance of each type of assembly indicated.

### PART 2 PRODUCTS

#### 2.1 DOORS AND FRAMES

Provide swing-type aluminum doors and frames of size, design, and location indicated. Provide doors complete with frames, framing members[, subframes][, transoms][, adjoining side lites] , trim, and accessories.[ Coordinate side lites, window walls, adjacent curtainwall with Section 08 41 13 ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS][ and Section 08 44 00 CURTAIN WALL AND GLAZED ASSEMBLIES.]

#### 2.2 MATERIALS

##### 2.2.1 Anchors

Stainless steel [or steel with hot-dipped galvanized finish].

##### 2.2.2 Weatherstripping

Continuous wool pile, silicone treated, or type recommended by door manufacturer, and per JIS A 4702.

##### 2.2.3 Aluminum Alloy for Doors and Frames

JIS H 4040, Alloy 6063-T5 for extrusions. JIS H 4000, alloy and temper best suited for aluminum sheets and strips.

##### 2.2.4 Fasteners

Hard aluminum or stainless steel.

##### 2.2.5 Structural Steel

JIS H 4100.

##### 2.2.6 Aluminum Paint

Aluminum door manufacturer's standard aluminum paint.

## 2.3 FABRICATION

### 2.3.1 Aluminum Frames

Extruded aluminum shapes with contours approximately as indicated. Provide removable glass stops and glazing beads for frames accommodating fixed glass. Use countersunk stainless steel Phillips screws for exposed fastenings, and space not more than 300 mm on center. Mill joints in frame members to a hairline fit, reinforce, and secure mechanically.

### 2.3.2 Aluminum Doors

Of type, size, and design indicated and minimum 45 mm thick. minimum wall thickness, 3 mm, except beads and trim, 1.25 mm. Door sizes shown are nominal; include standard clearances as follows: 2.5 mm at hinge and lock stiles, 3 mm between meeting stiles, 3 mm at top rails, 5 mm between bottom and threshold, and 17 mm between bottom and floor.[ Provide bevel single-acting doors 2 or 3 mm at lock, hinge, and meeting stile edges.][ Provide double-acting doors rounded edges at hinge stile, lock stile, and meeting stile edges.]

#### 2.3.2.1 Full Glazed Stile and Rail Doors

Provide doors with [narrow][medium][wide] stiles and rails as indicated. Fabricate from extruded aluminum hollow seamless tubes or from a combination of open-shaped members interlocked or welded together. Fasten top and bottom rail together by means of welding or by 10 or 13 mm diameter cadmium-plated tensioned steel tie rods. Provide an adjustable mechanism of jack screws or other methods in the top rail to allow for minor clearance adjustments after installation.

#### 2.3.2.2 Flush Doors

Use facing sheets with[ a vertical ribbed][ an embossed][ or][ a plain smooth] surface. Use one of the following constructions:

- a. A phenolic resin-impregnated kraft paper honeycomb core, surrounded at edges and around glass and louvered areas with extruded aluminum shapes. Provide cores with a minimum impregnation of 18 percent resin content. Provide sheet aluminum door facings minimum 0.8 mm thick laminated to a 2.5 mm thick tempered hardboard backing, with the backing bonded to the honeycomb core. Bond facing sheets to cores under heat and pressure with thermosetting adhesive and mechanically lock to extruded edge members.
- b. A phenolic resin-impregnated kraft paper honeycomb core. Use aluminum facing sheets minimum 1.25 mm thick and form into two pans to eliminate seams on faces. Bond honeycomb core to face sheets using epoxy resin or contact cement-type adhesive.
- c. A solid fibrous core, surrounded at edges and around glass and louvered areas and cross braced at intermediate points with extruded aluminum shapes. Use aluminum facing sheets of minimum 1.25 mm thickness. Bond facing sheets to core under heat and pressure with a thermosetting adhesive, and mechanically lock to the extruded edge members.
- d. Form from extruded tubular stiles and rails mitered at corners, reinforce, and continuously weld at miters. Provide facing sheets of

minimum 0.8 mm thick sheet aluminum internally reinforced with aluminum channels or Z-bars placed horizontally not more than 400 mm apart and extending the full width of panels. Fit spaces between reinforcing with sound-deadening insulation. Weld facing sheets to reinforcing bars or channels and to stiles and rails. Finish facing sheets flush with faces of stiles and rails.

- e. Form from an internal grid composed of extruded aluminum tubular sections. Provide tubular sections at all sides and perimeter of louver and glass openings. Provide three extruded aluminum tubular sections at top and bottom of each door. Provide wall thickness of tubular sections minimum 2.25 mm except at lock rails which must be minimum 3 mm thick, hinge lock rails which must be minimum 3 mm thick, and hinge rail edges which must be minimum 5 mm thick. Fill spaces in door with mineral insulation. Provide facing sheets of aluminum minimum 2.25 mm thick.
- f. Form from extruded aluminum members at top and bottom, both sides, and at perimeters of louver and glass openings. Provide wall sections of extruded aluminum members minimum 2.25 mm thick and reinforce for application of hardware. Cover framing members on both sides with aluminum facing sheets minimum 2 mm thick. Fill door panels with [172 kPa density polystyrene] [40 kg per cubic meter density, chlorofluorocarbon (CFC) free, foamed urethane] with a flame spread rating of no more than 25.

#### 2.3.3 Welding and Fastening

Where possible, locate welds on unexposed surfaces. Dress welds on exposed surfaces smoothly. Select welding rods, filler wire, and flux to produce a uniform texture and color in finished work. Remove flux and spatter from surfaces immediately after welding. Exposed screws or bolts will be permitted only in inconspicuous locations, and must have countersunk heads. Weld concealed reinforcements for hardware in place.

#### 2.3.4 Weatherstripping

Provide on stiles and rails of exterior doors. Fit into slots which are integral with doors or frames. Weatherstripping must be replaceable without special tools, and adjustable at meeting rails of pairs of doors. During installation, verify doors swing freely and close positively. Refer to paragraph AIR INFILTRATION for air leakage requirements and testing.

#### 2.3.5 Anchors

On the backs of subframes, provide anchors of the sizes and shapes indicated for securing subframes to adjacent construction. Anchor transom bars at ends and mullions at head and sill.[ Where indicated, reinforce vertical mullions with structural steel members of sufficient length to extend up to the overhead structural slab or framing and secure thereto.][ Reinforce and anchor freestanding door frames to floor construction as indicated on approved shop drawings and in accordance with manufacturer's recommendation.] Place anchors [as indicated][near top and bottom of each jamb and at intermediate points not more than 635 mm apart].

#### 2.3.6 Provisions for Hardware

Coordinate with Section 08 71 00 DOOR HARDWARE. Deliver hardware

templates and hardware (except field-applied hardware) to the door manufacturer for use in fabrication of aluminum doors and frames. Cut, reinforce, drill, and tap doors and frames at the factory to receive template hardware. Provide doors to receive surface-applied hardware, except push plates, kick plates, and mop plates, with reinforcing only; drill and tap in the field. Provide hardware reinforcements of stainless steel or steel with hot-dipped galvanized finish, and secure with stainless steel screws.[ Provide reinforcement in core of flush doors as required to receive locks, door closers, and other hardware.]

### 2.3.7 Provisions for Glazing

[Provide extruded aluminum snap-in glazing beads on interior side of doors.][Provide extruded aluminum, theft-proof, snap-in glazing beads or fixed glazing beads on exterior or security side of doors.][ Provide glazing beads with vinyl insert glazing gaskets.][ Design glazing beads to receive thickness indicated for each glazed assembly.] Coordinate requirements with Section 08 81 00 GLAZING.

### 2.3.8 Finishes

Provide exposed aluminum surfaces with [mill finish] [factory finish of anodic coating or organic coating].

#### 2.3.8.1 Anodic Coating

Clean exposed aluminum surfaces and provide an anodized finish conforming to JIS H 8602. Provide [as selected from manufacturer's [standard][complete] range of color options].

#### 2.3.8.2 Organic Coating

Clean and prime exposed aluminum surfaces. Provide [a baked enamel finish in accordance with JIS K 5906 with total dry film thickness minimum 0.02 mm]. Finish color to be [\_\_\_\_\_] [as indicated] [as selected from manufacturer's [standard][complete] range of color options].

## PART 3 EXECUTION

### 3.1 INSTALLATION

Plumb, square, level, and align frames and framing members to receive doors[, transoms][, adjoining side lites][, and][, adjoining window walls] per MLIT SS Chapter 16. Anchor frames to adjacent construction as indicated and in accordance with manufacturer's printed instructions and the approved shop drawings. Install anchorage that complies with applicable structural requirements. Anchor bottom of each frame to rough floor construction with 2.4 mm thick minimum stainless steel angle clips secured to back of each jamb and to floor construction; use stainless steel bolts and expansion rivets for fastening clip anchors. Hang doors to produce clearances specified in paragraph ALUMINUM DOORS. After erection and glazing, adjust doors and hardware to operate properly.

### 3.2 PROTECTION FROM DISSIMILAR MATERIALS

#### 3.2.1 Dissimilar Metals

Where aluminum surfaces come in contact with metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact

to dissimilar metals.

#### 3.2.1.1 Protection

Provide one of the following systems to protect surfaces in contact with dissimilar metals:

- a. Paint the dissimilar metal with one coat of heavy-bodied bituminous paint.
- b. Apply elastomeric sealant between aluminum and dissimilar metals in accordance with Section 07 92 00 JOINT SEALANTS.
- c. Paint dissimilar metals with one coat of primer and one coat of aluminum paint.
- d. Use a non-absorptive tape or gasket in permanently dry locations.

#### 3.2.2 Drainage from Dissimilar Metals

In locations where drainage from dissimilar metals has direct contact with aluminum, provide protective paint to prevent aluminum discoloration.

#### 3.2.3 Masonry and Concrete

Provide aluminum surfaces in contact with mortar, concrete, or other masonry materials with one coat of heavy-bodied bituminous paint.

#### 3.2.4 Wood or Other Absorptive Materials

Provide aluminum surfaces in contact with absorptive materials subject to frequent moisture, and aluminum surfaces in contact with treated wood, with two coats of aluminum paint or one coat of heavy-bodied bituminous paint. In lieu of painting aluminum, paint the wood or other absorptive surface with two coats of aluminum paint and seal joints with elastomeric sealant.

### 3.3 SEALING AROUND ASSEMBLIES

Seal all penetrations of the air barrier by sealing around door openings as necessary to achieve compliance with air leakage requirements indicated in [the air barrier sections of the specifications][, the requirements of Section 07 27 10.00 10 BUILDING AIR BARRIER SYSTEM][, and Section 07 05 23 PRESSURE TESTING AN AIR BARRIER SYSTEM FOR AIR TIGHTNESS]. Flash all doors with corrosion resistant flashing to prevent water intrusion.

### 3.4 CLEANING

Upon completion of installation, clean door and frame surfaces in accordance with door manufacturer's written recommended procedure. Do not use abrasive, caustic, or acid cleaning agents.

### 3.5 PROTECTION



Protect doors and frames from damage and from contamination by other materials such as cement mortar. Prior to completion and acceptance of the work, restore damaged doors and frames to original condition, or replace with new ones.

-- End of Section --