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USACE / NAVFAC / AFCEC / NASA | UFGS-08 11 16 (May 2017)
Change 2 - 11/18

Preparing Activity: NAVFAC | Superseding
UFGS-08 11 16 (August 2008)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2023
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05/17, CHG 2: 11/18

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SECTION 08 11 16

ALUMINUM DOORS AND FRAMES
05/17, CHG 2: 11/18

****
NOTE: This guide specification covers aluminum doors and frames intended for use primarily as main entrance and vestibule doors, and for prominent interior doors from lobbies and similar spaces in buildings of public access where appearance is important.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Coordinate with or incorporate into this guide specification Aluminum-Framed Entrances and Storefronts, Curtain Wall and Glazed Assemblies (frames), Steel/Aluminum Doors and Frames and Glazing. Insert the appropriate assembly in the blanks as applicable. Choose apprpriate damage level/level of protection for building occupancy as defined in UFC 4-010-01 (Table 2-1).

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).
****

****
NOTE: On the drawings, show:

1. Size and types of door openings; thicknesses, swings and travel of doors; whether flush, paneled,

glazed, or louvered; width of stiles and rails, and power transfer components as applicable.

2. Elevations of each door and frame type, at 1:50 1/4 inch scale

3. Details of head, jamb, sill, mullions, and transom sections; key sections to door frame plans and elevations. Indicate type and spacing of anchors.

4. Indicate thickness of glazing required and cross reference to Section 08 81 00 GLAZING.

5. Details of weatherstripping for exterior doors.

6. Amount of free area for louvers.

7. A unique number for each door opening on door schedule.

****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

****

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.

ALUMINUM ASSOCIATION (AA)

AA DAF45 (2003; Reaffirmed 2009) Designation System for Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 2603 (2020) Voluntary Specification,

	Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels
AAMA 2604	(2017a) Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS (ASHRAE)

ASHRAE 90.1 - IP	(2019) Energy Standard for Buildings Except Low-Rise Residential Buildings
ASHRAE 90.1 - SI	(2019) Energy Standard for Buildings Except Low-Rise Residential Buildings

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B221	(2021) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2021) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM E283	(2019) Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E331	(2000; R 2023) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E1886	(2019) Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
ASTM E1996	(2017) Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes

ASTM F1642/F1642M	(2017) Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loadings
ASTM F1643	(2012) Standard Test Methods for Detention Sliding Door Locking Device Assembly
ASTM F2247	(2018) Standard Test Method for Metal Doors Used in Blast Resistant Applications (Equivalent Static Load Method)
ASTM F2927	(2012) Standard Test Method for Door Systems Subject to Airblast Loadings

NATIONAL FENESTRATION RATING COUNCIL (NFRC)

NFRC 100	(2020) Procedure for Determining Fenestration Product U-Factors
NFRC 200	(2020) Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

1.2 PERFORMANCE REQUIREMENTS

1.2.1 Structural Calculations

****

NOTE: Dynamic analysis is preferred because it typically yields a more appropriate and economical/efficient design. UFC 4-010-01 also indicates that for vestibules, foyers, or similar entry configurations into inhabited areas where there are inner and outer doors the vestibules, foyers, or similar entries are considered not to be routinely occupied spaces. Specify inner doors and glazing capable of mitigating any hazards resulting from the enclosed vestibule or foyer outer doors and glazing failure in response to the design blast event. This is to account for the fact that at levels of protection required in these standards the outer doors and glazing may fail, which would subject the inner doors and glazing to significant blast loads. To provide that debris resistance, the inner doors, sidelights, and transoms must meet the windborne debris resistance requirements of ASTM E1996 (missiles A and D in Table 2). For door assemblies into vestibules, foyers, and similar entry configurations into inhabited areas use the bracketed item "Wind-Borne Debris" below.

****

1.2.1.1 Minimum Antiterrorism Performance

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

[a. Dynamic Design Analysis Method

****
NOTE: Use the following bracketed paragraph if designing the door assembly using dynamic analysis.
****

As an alternative to the static equivalent load design approach described above, glazed opening framing members, anchors, and glazing may be designed using a dynamic analysis to prove the glazed opening system will provide performance equivalent to or better than a very low hazard rating in accordance with ASTM F1642/F1642M associated with the applicable low level of protection for the project.

][[a][b]. Standard Airblast Test Method

****
NOTE: Use the following bracketed paragraph if testing the door assembly in accordance with ASTM F2927 Standard Test Method for Door Systems Subject to Airblast Loadings.
****

Testing in accordance with ASTM F2927 may be by shock tube or arena test. Perform the test on the entire proposed door assembly, which must include, but not be limited to, the glazing, its framing/support system, operating devices, and all anchorage devices. Install door system anchorage that replicates the method of installation to be used for the project. Utilize the fasteners and anchorage methods used to attach the tested door assembly that are representative of the actual door installation. Demonstrate by calculation any deviations in actual installation of the connections or the connected elements from those tested to provide the damage level as indicated below.

The minimum airblast loading parameters for the test must be as follows: peak positive pressure of [_____] kilopascals (kPa) [_____] pounds per square inch (psi); and peak positive phase impulse of [_____] kilopascal-millisecond (kPa-msec) [_____] pounds per square inch - millisecond (psi-msec).

The acceptance criteria for the proposed door systems, as determined by the damage level/door response damage criteria of [ASTM F2247][ASTM F2927], will provide a performance equivalent to or better than a category [IV]; [III]; [_____] door damage level rating.[Door glazing performance must be equivalent to or better than [H3- Very Low][H4-Low] hazard rating in accordance with ASTM F1642/F1642M.]

][1.2.2 Wind Borne Debris

****
NOTE: In projects located in windborne debris regions, design performance requirements may exceed blast mitigation requirements. Select the most stringent requirement based on geographic region and AT standoff.
****

Provide impact resistant door [_____] assemblies meeting the Windborne-Debris-Impact Resistant Performance requirements of

ASTM E1996 and ASTM E1886 as follows:

(1) Pass missile-impact tests when tested according to ASTM E1886 and meeting performance requirements according to ASTM E1996 for missiles A and D in Table 2.

]1.2.3 Air Infiltration

When tested in accordance with ASTM E283, air infiltration per door leaf cannot exceed 2.83 by 10-4 cms per square meter 0.6 cubic feet per minute per square foot of fixed area at a test pressure of 0.30 kPa 6.24 pounds per square foot.

1.2.4 Water Penetration

When tested in accordance with ASTM E331, there can be no water penetration at a pressure of 0.14 kPa 2.86 pounds per square foot of fixed area.

1.2.5 Thermal Transmittance, Solar Heat Gain, Visible Light Transmittance

****

NOTE: Coordinate compliance with ASHRAE 90.1 for "whole-window" (or overall assembly) thermal transmittance value (U-factor), Solar Heat Gain Coefficient (SHGC) and visible light transmittance (VT) for field assembled fenestration. Enter required values in brackets. Certification of system is by means of NFRC validated Project Label Certificates for all field assembled fenestration.

****

Provide products bearing NFRC Project Label Certificates for Fenestration verifying compliance with requirements for each assembly indicated. An NFRC Bid Report, or approved equal, for field assembled exterior doors may be submitted in lieu of Project Label Certificates for Fenestration if such reports are created in accordance with NFRC CAMP procedures and are provided by the manufacturer. Such alternate reports may be submitted with shop drawings, however, NFRC validated Project Label Certificates for Fenestration are required as a Closeout Submittal. Contact NFRC for information on NFRC 100 and NFRC 200 Compliance and Monitoring Program (CAMP) rating requirements:
http://www.nfrc.org/industry/certification/compliance-and-monitoring-program-camp/

1.2.5.1 U-Factor

Provide exterior glazed assemblies, including aluminum entrances doors with greater than 50 percent glazed area, certified by the NFRC as having a whole window U-factor of [_____] or less as determined in accordance with ASHRAE 90.1 - SI ASHRAE 90.1 - IP and as verified in accordance with NFRC 100.

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 [_____] or less as determined in accordance with ASHRAE 90.1 - SI ASHRAE 90.1 - IP and as verified in accordance with NFRC 200.

1.2.5.3 Visible Light Transmittance (VLT)

Provide exterior glazed assemblies, including aluminum entrances doors with greater than 50 percent glazed area, certified by the NFRC with a whole window VLT of [_____] or greater as determined in accordance with ASHRAE 90.1 - SI ASHRAE 90.1 - IP and as verified in accordance with NFRC 200.

[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 and must be certified by the National Fenestration Rating Council with a whole window U-Factor, SHGC and VLT as required above.

]1.3 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.

****

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that

will review the submittal for the Government.] 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-03 Product Data

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

Recycled Content of Aluminum Material; S

SD-04 Samples

Finish Samples; G[, [_____]]

SD-05 Design Data

[Design Analysis; G[, [_____]]

] Structural Calculations for Deflection and Antiterrorism; G[, [_____]]

SD-06 Test Reports

Air Infiltration; G[, [_____]]

Water Penetration; G[, [_____]]

[Standard Airblast; G[, [_____]]

] SD-07 Certificates

NFRC Project Label Certificates for Fenestration; G[, [_____]]

SD-08 Manufacturer's Instructions

Installation of Each Type of Door and Frame Assembly; G[, [_____]]

SD-10 Operation and Maintenance Data

Adjustments, Cleaning, and Maintenance; G[, [_____]]

SD-11 Closeout Submittals

NFRC Project Label Certificates for Fenestration; 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 Design Analysis

Submit design analysis with calculations showing that the design of each different size and type of door unit [_____]and its anchorage to the structure meets the minimum antiterrorism standards required by paragraph MINIMUM ANTITERRORISM PERFORMANCE[, unless conformance is demonstrated by standard blast test results]. Calculations verifying the performance of each door [_____] proposed for use, under the given loads, must be prepared and signed by a registered Professional Engineer. The door [_____] components and anchorage devices to the structure, as determined by the design analysis, must be reflected in the shop drawings.

]1.5.4 Test Reports

Test door assembly [including glazing]for evaluation of hazards generated from airblast loading in accordance with [ASTM F2247][ASTM F2927] by an independent testing agency regularly engaged in blast testing. This test method and the resulting data are valid for the door size tested and smaller doors of identical construction.

****

NOTE: Use the following bracketed paragraph if designing the door assembly using dynamic analysis.

****

[Design Door assembly (including glazing) using a dynamic analysis to prove the performance equivalent to or better than a category [IV];[III];[_____] door damage level in accordance with ASTM F2927 for the peak positive pressure of [_____] kilopascals (kPa) [_____] pounds per square inch (psi); and peak positive phase impulse of [_____] kilopascal-millisecond (kPa-msec) [_____] pounds per square inch - millisecond (psi-msec). Use a triangular blast load using the applicable pressure and impulse identified above.

****

NOTE: Use the following bracketed paragraph if testing the door assembly in accordance with ASTM F2927 Standard Test Method for Door Systems Subject to Airblast Loadings.

****

][For minimum Antiterrorism doors [_____], in lieu of a Design Analysis, submit results of standard blast testing, included in a test report, providing information in accordance with [ASTM F2247][ASTM F2927], as prepared by the independent testing agency performing the test. The test results must demonstrate the ability of each door [_____] proposed for use to withstand the blast loading parameters and achieve the damage [hazard] level rating specified in paragraph TESTING.

][Testing in accordance with ASTM F2927 may be by shock tube or arena test. Perform the test on the entire proposed door assembly, which must include, but not be limited to, the glazing, its framing/support system, operating devices, and all anchorage devices. Install door system anchorage that replicates the method of installation to be used for the project. Utilize the fasteners and anchorage methods used to attach the tested door assembly that are representative of the actual door installation. Demonstrate by calculation any deviations in actual installation of the connections or the connected elements from those tested to provide the damage level as indicated below.

The minimum airblast loading parameters for the test must be as follows: peak positive pressure of [_____] kilopascals (kPa) [_____] pounds per square inch (psi); and peak positive phase impulse of [_____] kilopascal-millisecond (kPa-msec) [_____] pounds per square inch - millisecond (psi-msec).

] The acceptance criteria for the proposed door systems, as determined by the damage level/door response damage criterial of [ASTM F2247][ASTM F2927], will provide a performance equivalent to or better than a category [IV]; [III]; [_____] door damage level rating.[Door glazing performance must be equivalent to or better than [H3 - Very low][H4 - Low] hazard rating in accordance with ASTM F1643.]

1.5.5 Operation and Maintenance Data

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

1.6 QUALITY ASSURANCE

1.6.1 Engineer Qualifications for Blast Design

All blast design calculations must be performed by or under the direct supervision of a registered engineer with a minimum of 5 years' experience performing blast design. The engineering firm performing the blast design must be able to demonstrate experience on similar size projects using similar design methods to meet the requirements outlined in this specification.

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.

2.2.3 Aluminum Alloy for Doors and Frames

ASTM B221M, ASTM B221, Alloy 6063-T5 for extrusions. ASTM B209M, ASTM B209, alloy and temper best suited for aluminum sheets and strips. Provide aluminum materials that include a minimum of 30 percent recycled content. Provide data indicating percentage of recycled content of aluminum material.

2.2.4 Fasteners

Hard aluminum or stainless steel.

2.2.5 Structural Steel

ASTM A36/A36M.

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 12 inches 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 1-3/4 inch thick. minimum wall thickness, 3 mm 0.125 inch, except beads and trim, 1.25 mm 0.050 inch. Door sizes shown are nominal; include standard clearances as follows: 2.5 mm 0.093 inch at hinge and lock stiles, 3 mm 0.125 inch between meeting stiles, 3 mm 0.125 inch at top rails, 5 mm 0.187 inch between bottom and threshold, and 17 mm 0.687 inch between bottom and floor.[Provide bevel single-acting doors 2 or 3 mm 0.063 or 0.125 inch 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 3/8 or 1/2 inch 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

****

NOTE: The optional types of door construction may not be suitable for use in all facilities. Delete any option listed not considered desirable for a particular usage or for use in a particular facility.

****

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 0.032 inch thick laminated to a 2.5 mm 0.10 inch 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 0.050 inch 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 0.050 inch 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 0.032 inch thick sheet aluminum internally reinforced with aluminum channels or Z-bars placed horizontally not more than 400 mm 16 inch 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 0.09 inch except at lock rails which must be minimum 3 mm0.125 inch thick, hinge lock rails which must be minimum 3 mm 0.125 inch thick, and hinge rail edges which must be minimum 5 mm 0.19 inch thick. Fill spaces in door with mineral insulation. Provide facing sheets of aluminum minimum 2.25 mm 0.09 inch 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 0.09 inch thick and reinforce for application of hardware. Cover framing members on both sides with aluminum facing sheets minimum 2 mm 0.064 inch thick. Fill door panels with [172 kPa25 pounds per square inch density polystyrene] [40 kg per cubic meter2.5 pound per cubic foot 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

****
NOTE: Maximum air leakage rates are 2.19 by 10-5 cms per sq. m 0.5 cfm per sq. ft. of door area for residential swinging doors and 5.48 by 10-5 cms per sq. m 1.25 cfm per sq. ft. of door area for non-residential doors. Both of the air leakage rates assume the use of threshold and sweep strip. Coordinate with Section 08 71 00 DOOR HARDWARE.
****

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 25 inch apart].

2.3.6 Provisions for Hardware

****
NOTE: This guide specification requires that hardware and glazing for aluminum doors be specified in their respective sections of the project specification.
****

****

NOTE: Where items of hardware such as operating mechanism for balanced doors, integral push bars, concealed closing devices, and special panic bolts for exceptionally narrow stile doors are designed as an integral part of door or frame construction, it may be necessary to revise specification so these items are furnished as part of door and frame unit. When accessories, such as finger guards, electric strikes, automatic power operators, and special thresholds are required, add as necessary.

****

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

****

NOTE: This guide specification requires that hardware and glazing for aluminum doors be specified in their respective sections of the project specification.

****

[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

****

NOTE: Specify finish designation AA-M10-C22-A31, Architectural Class II clear (natural) anodized finish or AA-M10-C22-A32, Architectural Class II color-anodized finish, when doors will not be subject to excessive wear or abrasion and will be regularly cleaned and maintained. Specify finish designation AA-M10-C22-A41, Architectural Class I clear (natural) anodized finish or AA-M10-C22-A42, Architectural Class I color-anodized finish, when doors will be subject to excessive wear and will not be regularly cleaned and maintained. Also specify these designations (Class I) are used in humid locations or project locations with Environmental Severity Classifications (ESC) of C3 thru C5. Humid locations are those in ASHRAE climate zones 0A, 1A, 2A, 3A, 3C, 4C and 5C (as identified in ASHRAE

90.1). See UFC 1-200-01 for determination of ESC for project locations.. Color-anodized finish is available in medium bronze, dark bronze, and black. Where revolving aluminum doors and frames are shown in connection with aluminum swing doors, exercise care to obtain matching color and finish of the two door types.

****

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 AA DAF45. Provide [clear (natural), designation AA-M10-C22-A31, Architectural Class II 0.01 to 0.0175 mm 0.4 mil to 0.7 mil][clear (natural), designation AA-M10-C22-A41, Architectural Class I 0.0175 mm 0.7 mil or thicker)][integral color-anodized, designation AA-M10-C22-A32, Architectural Class II 0.01 to 0.0175 0.4 mil to 0.7 mil][integral color-anodized, designation AA-M10-C22-A42, Architectural Class I 0.0175 mm 0.7 mil or thicker][electrolytically deposited color-anodized, designation AA-M10-C22-A34, Architectural Class II 0.01 to 0.0175 mm 0.4 mil to 0.7 mil][electrolytically deposited color-anodized, designation AA-M10-C22-A44, Architectural Class I 0.0175 mm 0.7 mil or thicker] finish.[Provide material(s) in color(s) [_____][as indicated][as selected from manufacturer's [standard][complete] range of color options]].

2.3.8.2 Organic Coating

****

NOTE: Specify baked enamel finish as an option to Class II anodized. Specify high-performance finish as an option to Class I anodized.

****

Clean and prime exposed aluminum surfaces. Provide [a baked enamel finish in accordance with AAMA 2603 with total dry film thickness minimum 0.02 mm 0.8 mil][a high-performance finish in accordance with AAMA 2604 with total dry film thickness of minimum 0.03 mm 1.2 mils]. 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]. 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 3/32 inch 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 BUILDING AIR BARRIER SYSTEM][, and Section 01 91 19 BUILDING ENCLOSURE COMMISSIONING]. 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 --