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USACE / NAVFAC / AFCEC / NASA | UFGS-08 41 13 (November 2016)
Change 1 - 08/18

Preparing Activity: NAVFAC | Superseding
UFGS-08 41 13 (February 2011)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in Agreement with UMRL dated July 2023
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SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

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SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
08/18, CHG 1: 08/18

****
NOTE: This guide specification covers the requirements for Aluminum Entrances, glass and glazing, door hardware and components.

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.

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

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 501	(2015) Methods of Test for Exterior Walls
AAMA 611	(2014) Voluntary Specification for Anodized Architectural Aluminum
AAMA 800	(2016) Voluntary Specifications and Test Methods for Sealants
AAMA 1503	(2009) Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections
AAMA 2605	(2020) Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-16	(2017; Errata 2018; Supp 1 2018) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

ASTM INTERNATIONAL (ASTM)

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 E330/E330M	(2014; R 2021) Standard Test Method for

	Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
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 E783	(2002; R 2018) Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
ASTM E1105	(2015; R 2023) Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference
ASTM E1424	(2022) Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure and Temperature Differences Across the Specimen
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

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

ANSI/BHMA A156.4	(2013) Door Controls - Closers
ANSI/BHMA A156.10	(2017) Power Operated Pedestrian Doors

INTERNATIONAL CODE COUNCIL (ICC)

ICC IBC	(2021) International Building Code

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-P-645	(Rev C; Notice 1) Primer, Paint, Zinc-Molybdate, Alkyd Type

UNDERWRITERS LABORATORIES (UL)

UL 325	(2017; Reprint Feb 2020) UL Standard for Safety Door, Drapery, Gate, Louver, and Window Operators and Systems

1.2 ADMINISTRATIVE REQUIREMENTS

1.2.1 Pre-Installation Meetings

Conduct a meeting before installation begins to verify the project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

Within [30] [_____] days of the Contract Award, submit the following for review and approval by the Contracting Officer:

a. List of product installations

b. Sample warranty

c. Finish and color samples

d. Manufacturer's catalog data

Concurrently submit certified test reports showing compliance with specified performance characteristics and UL 325 for the following:

a. Wind Load (Resistance) in accordance with AAMA 501

b. Deflection in accordance with ASTM F1642/F1642M

c. Condensation Resistance and Thermal Transmittance Performance Requirements in accordance with AAMA 1503

d. Water Infiltration in accordance with ASTM E331

e. Structural Requirements in accordance with ASTM F1642/F1642M

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-01 Preconstruction Submittals

Sample Warranty; G[, [____]]

List of Product Installations; G[, [____]]

SD-02 Shop Drawings

Installation Drawings; G[, [____]]

[Fabrication Drawings; G[, [____]]
]

SD-03 Product Data

Manufacturer's Catalog Data; G[, [____]]

Finish; G[, [____]]

Recycled Content of Aluminum Material; S

SD-04 Samples

Finish and Color Samples; G[, [____]]

SD-06 Test Reports

Certified Test Reports; G[, [____]]

Deflection

Air Infiltration

Condensation Resistance and Thermal Transmittance

Water Infiltration

SD-08 Manufacturer's Instructions

Manufacturer's Instructions

SD-11 Closeout Submittals

Manufacturer's Product Warranty

1.4 QUALITY CONTROL

1.4.1 Qualifications

1.4.1.1 Installer Qualifications

Provide documentation of the installer's experience [as determined by the Contractor] in performing the work specified in this section.

Ensure that the installers are specialized in work similar to that required for this project, and that they are acceptable to product manufacturer.

1.4.1.2 Manufacturer Qualifications

Ensure that manufacturers meet the requirements specified in this section and project drawings.

Ensure that the manufacturer is capable of providing field service representation during construction, approving acceptable installers and approving application methods.

1.4.2 Single-Source Responsibility

When aluminum entrances are part of a building enclosure system, that includes storefront framing, windows, a curtain wall system, and related products, provide building enclosure system products from a single-source manufacturer.

Use a single source manufacturer with sole responsibility for providing design, structural engineering, and custom fabrication for door portal systems and for supplying components, materials, and products. Do not use products provided from numerous sources for assembly at the site. Ensure that the following work items and components are fabricated or supplied by a single source are:

****

NOTE: Edit the following list to reflect components required for glass wall and door portal assembly. Verify that sole source responsibility requirement is included in other sections.

****

a. Door assemblies to be installed in door portals as specified in [Section 08 11 16 ALUMINUM DOORS AND FRAMES][_____].

b. Glazed walls to be constructed around door portals as specified in [this Section][_____].

c. Door operating hardware to be installed on or within door portals as specified in Section 08 71 00 DOOR HARDWARE.

d. Glass as specified in [Section 08 81 00 GLAZING][_____].

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Ordering

To avoid construction delays, comply with the manufacturer's lead-time requirements and instructions for ordering.

1.5.2 Packing, Shipping, Handling and Unloading

Deliver materials in the manufacturer's original, unopened, undamaged containers with identification labels intact.

1.5.3 Storage and Protection

Store materials in a way that protects them from exposure to harmful weather conditions. Avoid damaging the storefront material and components during handling. Protect storefront material against damage from elements, construction activities, and other hazards before, during, and after storefront installation.

Do not use adhesive papers or sprayed coatings that become firmly bonded when exposed to sunlight. Do not leave coating residue on surfaces.

1.6 PROJECT / SITE CONDITIONS

1.6.1 Field Measurements

Verify actual measurements or openings by taking field measurements before fabrication; record these measurements on shop drawings. To avoid construction delays, coordinate field measurements, and fabrication schedule with construction progress.

1.7 WARRANTY

Provide a written manufacturer's warranty, executed by a company official, warranting against defects in materials and products for [_____] [2] years from the date of shipment. Warrant that the door corner construction is for the life of the project.[Provide a written installer's warranty, warranting work to be watertight and free from defective materials, defective workmanship, and glass breakage as a result of defective design, and agreeing to replace components that fail within [_____] [2] years.]

The warranty states the following:

a. Watertight and airtight system installation is completed within specified tolerances.

b. The completed installation remains free of rattles, wind whistles and noise caused by thermal movement and wind pressure.

c. System is structurally sound and free from distortion.

d. Glass and glazing gaskets will not break or "pop" from frames as a

result of design, wind load pressure, movement caused by expansion or contraction, or structural loading.

e. Glazing sealants and gaskets remain free of abnormal deterioration or dislocation as a result of sunlight, weather, or oxidation.

****
NOTE: Delete paragraph below if high performance exterior finish is not used.
****

[Provide written warranty stating that the organic coating finish will not fade more than 10 percent or show chalking, yellowing, peeling, cracking, pitting, corroding or variations in color, or gloss deterioration beyond the manufacturer's descriptive standards for [_____] years from the shipment date and agreeing to promptly correct defects.

] **********
NOTE: Delete paragraph below if thermal barrier framing system is not used.
****

[Provide a written thermal integrity warranty for [_____] years from ship date against thermal barrier system failure resulting from the following:

a. Longitudinal and transverse thermal barrier shrinkage.

b. Thermal barrier cracking.

c. Structural failure of the thermal barrier material.

d. Loss of adhesion or loss of prescribed edge pressure on glazing material, resulting in excessive air and water infiltration.

]PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Provide aluminum entrances, with glass and glazing, door hardware, and components.

Aluminum entrances include impact resistance entrances; [medium stile, 88.9 mm 3 1/2 inch] [_____] vertical face dimension, [44.45 mm 1-3/4 inch] [_____] depth, for interior structural silicone glaze, for high-traffic/impact-resistant applications.

2.1.1 Design Requirements for Aluminum (Entrances and Components)

Provide a door portal system designed to withstand the following loads without breakage, loss, failure of seals, product deterioration, or other defects.

a. Dead and Live Loads: Determined by ASCE 7-16 and calculated in accordance with applicable codes.

b. Seismic Loads: Design and install the system to comply with the seismic requirements for the project location in accordance with Section 1613 of the International Building Code, ICC IBC.

c. Wind Loads: Design and install the system so that the effects of wind load acting inward and outward normal to the plane of the wall are in accordance with ASTM E330/E330M.

d. Thermal Loads And Movement:

(1) Ambient Temperature Range: [67][_____] degrees C [120][_____] degrees F

(2) Material Surfaces Range: [100][_____] degrees C [180][_____] degrees F

e. Water and Air Resistance: Provide weatherstripping, exterior gaskets, sealants, and other accessories to resist water and air penetration.

f. Impact-Protective Systems Provide an impact-protective system in accordance with [ASTM E1886][ASTM E1996].

2.1.1.1 Material Standard

ASTM B221MASTM B221; 6063-T5 alloy and tempered.

Provide door stile and rail face dimensions of the entrance doors as follows:

Vertical Stile	Top Rail	Bottom Rail
8.89 cm	8.89 cm	16.51 cm

Vertical Stile	Top Rail	Bottom Rail
3-1/2 inches	3-1/2 inches	6-1/2 inches

Provide major portions of the door members at 0.3175 cm 0.125 inches nominal in thickness and glazing molding at 0.127 cm 0.050 inches thick.

2.1.1.2 Recycled Content

Provide aluminum framed entrances and storefronts that have a minimum of 20 percent recycled content based upon the aluminum billet used in the original material. Provide data indicating percentage of recycled content of aluminum material.

2.1.1.3 Sealants

Provide either ethylene propylene diene monomer (EPDM) elastomeric extrusions or thermoplastic elastomer glazing gaskets. Structural silicone sealant is required.

Internal Sealants: Provide sealants that according to the manufacturer will remain permanently elastic, tacky, non-drying, non-migrating, and weather tight.

2.1.1.4 Thermal Barrier

Use a rigid, structural thermal barrier to separate all exterior aluminum from interior aluminum. For purposes of this specification, a structural

thermal barrier is defined as a system that transfers shear during bending and, therefore, promotes composite action between the exterior and interior extrusions. Do not use a nonstructural thermal barrier. Ensure that the thermal barrier provides a structural connection between the two sides of the door.

2.2 FABRICATION

Provide the following information when submitting fabrication drawings for custom fabrications:

a. Indicate elevations, detailed design, dimensions, member profiles, joint locations, arrangement of units, and member connections.

b. Show the following items:

(1) Details of special shapes.

(2) Reinforcing.

(3) Anchorage system.

(4) Interfacing with building construction.

(5) Provisions for expansion and contraction.

[(6) Thermal breaks.
]

c. Indicate typical glazing details[, locations of various types and thickness of glass][, emergency breakout locations,] and internal sealant requirements as recommended by the sealant manufacturer.

d. Clearly indicate locations of exposed fasteners and joints.

e. Clearly show where and how the manufacturer's system deviates from Contract drawings and these specifications.

2.2.1 Entrance System Fabrication

Provide door corner construction consisting of mechanical clip fastening, SIGMA deep penetration plug welds and 2.8575 cm 1-1/8 inch long fillet welds inside and outside all four corners. Provide a hook-in type exterior glazing stop with EPDM glazing gaskets reinforced with non-stretchable cord. Provide an interior glazing stop that is mechanically fastened to the door member and that incorporates a silicone-compatible spacer used with silicone sealant.

Accurately fit and secure joints and corners. Make joints hairline in appearance. Remove burrs and smooth edges. Prepare components with internal reinforcement for door hardware. Arrange fasteners and attachments so that they are concealed from view.

Separate dissimilar metals with protective coating or pre-formed separators to prevent contact and corrosion.

2.2.2 Shop Assembly

Fabricate and assemble units with joints only at the intersection of aluminum members with hairline joints; rigidly secure these units, and

seal them in accordance with the manufacturer's recommendations.

2.2.2.1 Welding

Conceal welds on aluminum members in accordance with AWS recommendations or methods recommended by the manufacturer. Members showing welding bloom or discoloration on finish or material distortion will be rejected by the Contacting Officer.

2.2.3 Finish

****
NOTE: Specify AA-M-10-C22-A31 clear (natural) anodized finish or AA-M-10-C22-A32 color anodized finish, when doors will not be subjected to excessive wear or abrasion and will be regularly cleaned and maintained.

Specify AA-M-10-C22-A41 clear (natural) anodized finish or AA-M-10-C22-A42 color anodized finish, when doors will be subject to excessive wear and will not be regularly cleaned and maintained, or in highly corrosive industrial atmospheres with dust, gases, salts, or other disruptive elements that attack metal.

Color anodized finishes available include medium bronze, dark bronze, and black. Insert color desired in blank space provided. Of the choices indicated, black is generally most expensive.

In a tropical environment or in areas where corrosion is severe, specify the anodized finish as 0.0175 mm 0.7 mil thickness or greater.
****

Before fabrication, clean the units and give them a [AA-M-10-C22-A31 clear (natural) anodized finish] [AA-M-10-C22-A41 clear (natural) anodized finish] [AA-M-10-C22-A32 [_____] (color) anodized finish] [AA-M-10-C22-A42 [_____] (color) anodized finish] in accordance with the requirements of the AA DAF45. The finish thickness is [A41, 0.01 mm 0.4 mil or greater.] [A42, 0.0175 mm 0.7 mil or greater.]

****
NOTE: Select and edit following items for appropriate finish; delete inapplicable types.
****

a. Organic Coating (high-performance exterior coating):

(1) Comply with requirements of AAMA 2605.

(2) Clean surfaces and pretreat them with a conversion coating before applying 0.0076 0.3 mil dry-film thickness of epoxy or acrylic primer according to the recommendations of the finish coat manufacturer.

(3) Apply a finish coat of [70 percent][_____] minimum fluoropolymer resin fused to primed surfaces at the temperature recommended by

the manufacturer and at a minimum dry film thickness of 0.25 mm 1.0 mil.

(4) Use a 2-, 3-, or 4-coat system as required for the color selected.

[b. Clear Anodized; Conforming to [AA-M12C22A31][_____] and AAMA 611.

Select and edit the following items for the appropriate finish; delete types that do not apply.

(1) Architectural Class II [_____]

(2) Etched, medium matte [_____]

(3) Clear anodic coating, 0.10 mm 0.4 minimum thickness [_____]

]

****
NOTE: AA class 44 is a type I coating and is 0.018 mm 0.7 mil thick. AA Class 34 is a type II coating and is 0.010 mm 0.4 mil thick.
****

[c. Color Anodized: Conforming to [AA-M12C22A [34] [44]] [_____] and AAMA 611

Select and edit the following items for appropriate finish; delete types that do not apply.

(1) Architectural Class [II] [I]

(2) Etched, medium matte

(3) [Black] [dark bronze][medium bronze] [light bronze] anodic coating,[0.010 mm 0.4 mil][0.018 mm 0.7 mil] minimum thickness

]2.2.4 Fabrication Tolerance

Fabricate and assemble units with joints only at intersection of aluminum members with hairline joints; rigidly secure these units, and seal them in accordance with the manufacturer's recommendations.

Fabricate aluminum entrances in accordance with the entrance manufacturer's prescribed tolerances.

2.2.4.1 Material Cuts

Square to 0.8 mm 1/32 inch off square, over largest dimension; proportionate amount of 0.8 mm 1/32 inch on the two dimensions.

[2.2.4.2 Maximum Offset at Consecutive Members

0.4 mm 1/64 inch in alignment between two consecutive members in line, end to end.

][2.2.4.3 Maximum Offset at Glazing Pocket Corners

0.4 mm 1/64 inch between framing members at glazing pocket corners.

]2.2.4.4 Joints

Between adjacent members in same assembly: Joints are hairline and square to the adjacent member.

2.2.4.5 Variation

In squaring diagonals for doors and fabricated assemblies: 1.6 mm 1/16 inch.

2.2.4.6 Flatness

For doors and fabricated assemblies: 1.6 mm plus/minus 1/16 inch of neutral plane.

2.3 MATERIALS

2.3.1 Sealants

[Refer to Section 07 92 00 JOINT SEALANTS.]Ensure that all sealants conform to AAMA 800.

2.3.2 Glass

Refer to Section 08 81 00 GLAZING.

2.4 ACCESSORIES

2.4.1 Fasteners

Provide stainless steel fasteners in areas where the fasteners are exposed.

Use non-corrosive and compatible fasteners with components being fastened. Do not use exposed fasteners, except where unavoidable for application of hardware.

In areas where fasteners are not exposed, use aluminum, non-magnetic stainless steel, or other materials warranted by the manufacturer.

For exposed locations, provide countersunk Phillips head screws when items with a matching finish are fastened. For concealed locations, provide the manufacturer's standard fasteners.

Provide nuts or washers that have been designed with a means to prevent disengagement; do not deform fastener threads.

2.4.2 Perimeter Anchors

When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

2.4.2.1 Inserts and Anchorage Devices

Provide manufacturer's standard formed or fabricated assemblies, steel or aluminum, of shapes, plates, bars, or tubes. Shop-coat steel assemblies after fabrication with an alkyd zinc chromate primer complying with FS TT-P-645.

2.4.3 Standard Entrance Hardware

2.4.3.1 Weatherstripping

Equip meeting stiles on pairs of doors with an adjustable astragal using wool pile with a polymeric fin.

Provide door weatherstripping on a single-acting offset pivot or butt-hung door and frame (single or pairs) consisting of a thermoplastic elastomer weatherstripping on a tubular shape with a semi-rigid polymeric backing.

Provide sill-sweep strips: Provide an EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners. (Provide as necessary to meet specified performance tests.)

2.4.3.2 Threshold

Provide an extruded aluminum threshold, one piece per door opening, with ribbed surface.

2.4.3.3 Offset Pivots

Provide the manufacturer's standard top and bottom pivots with one intermediate offset pivot.

2.4.3.4 Panic Device

Provide the manufacturer's recommended standard panic hardware.

2.4.3.5 Closer

Provide a surface closer in accordance with ANSI/BHMA A156.4.

2.4.3.6 Security Lock or Dead Lock

Provide [A/R MS 1850A lock with two A/R 1871 cylinder operated flush bolts] [_____].

2.4.3.7 Cylinder(s)/Thumb-turn

Provide the manufacturer's recommended standard.

2.4.3.8 Cylinder Guard

Provide the manufacturer's recommended standard.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Site Verification of Conditions

Verify that the condition of substrate previously installed under other sections is acceptable for product installation in accordance with the manufacturer's instructions.

Verify that openings are sized to receive the storefront system and that the sill plate is level in accordance with the manufacturer's acceptable

tolerances.

3.2 PREPARATION

Field-verify dimensions before fabricating components for the door portal assembly.

Coordinate requirements for locations of blockouts for anchorage of door portal columns and other embedded components with Section 03 30 00 CAST-IN-PLACE CONCRETE.

Coordinate the erection of door portal with installation of surrounding glass wall and door assemblies. Ensure that the door portals can provide support and anchorage for assembly components.

****

NOTE: Edit the following list to reflect components required for glass wall and door portal assembly. Verify that sole source responsibility requirement is included in other sections.

****

Coordinate electrical requirements for [automatic door assemblies] [electrified door hardware] to ensure proper power source, conduit, wiring, and boxes.

3.2.1 Adjacent Surfaces Protection

Protect adjacent work areas and finish surfaces from damage during product installation.

3.2.2 Aluminum Surface Protection

Protect aluminum surfaces from contact with lime, mortar, cement, acids, and other harmful contaminants.

3.3 INSTALLATION

Submit installation drawings for review and approval.

Install the entrance system in accordance with the manufacturer's instructions and the AAMA storefront and entrance guide specifications manual. Attach the entrance system to the structure, allowing it to be adjusted to accommodate construction tolerances and other irregularities. Provide alignment attachments and shims to permanently fasten the system to the building structure. Align the assembly so that it is plumb and level, and free of warp and twist. Maintain assembly dimensional tolerances aligning with adjacent work.

Set thresholds in a bed of mastic and secure the thresholds. Protect aluminum members in contact with masonry, steel, concrete, or dissimilar materials using nylon pads or a bituminous coating. Shim and brace the aluminum system before anchoring the system to the structure. Verify that weep holes are open, and the metal joints are sealed in accordance with the manufacturer's installation instructions. Seal metal-to-metal joints using a sealant recommended by the system manufacturer.

3.3.1 Tolerances

Ensure that tolerances for wall thickness and other cross-sectional dimensions of entrance members are nominal and in compliance with Aluminum Standards and Data, published by the Aluminum Association.

3.3.2 Adjusting

Adjust operating hardware for smooth operation, and as recommended by the manufacturer.

3.3.3 Related Products Installation Requirements

3.3.3.1 Sealants (Perimeter)

Refer to Section 07 92 00 JOINT SEALANTS.

3.3.3.2 Glass

Refer to Section 08 81 00 GLAZING.

3.4 FIELD QUALITY CONTROL

3.4.1 Air Infiltration

Test air infiltration in accordance with ASTM E783

Submit certified test reports showing compliance with specified performance characteristics as follows:

a. For single-acting offset pivot, butt hung, or continuous geared hinge entrances in the closed and locked position, test the specimen in accordance with ANSI/BHMA A156.10, and ASTM E283 at a pressure differential of 7.7.67 kilogram/square meter 1.57 psf for pairs of doors; ensure that maximum infiltration for a pair of 2.13 meter by 2.44 meter 7 foot by 8 foot entrance doors and frame is 0.034 cubic meters per minute/square meter 1.2 cfm/square foot.

b. Ensure the maximum allowable infiltration for a completed storefront system does not exceed 0.0017 cubic meters/square meter 0.06 cfm/square foot when tested in accordance with ASTM E1424 at a differential static pressure of 299 Pa 6.24 psf.

3.4.2 Wind Loads

Provide a completed storefront system capable of withstanding wind pressure loads, normal to the wall plane indicated, as follows:

a. Exterior Walls

(1) Positive Pressure: [_____] kilogram/square meter [_____] psf

(2) Negative Pressure: [_____] kilogram/square meter [_____] psf

b. Interior Walls: (pressure acting in either direction) [_____] kilogram/square meter [_____] psf

3.4.3 Deflection

Submit certified test reports showing that the maximum allowable deflection in a member when tested in accordance with ASTM E330/E330M with allowable stress is L/175 or 19.1 mm 3/4 inches maximum.

3.4.4 Condensation Resistance and Thermal Transmittance

Submit certified test reports showing compliance with specified performance characteristics as follows:

a. U-Value Requirements:

(1) Perform test in accordance with the AAMA 1503 procedure and on the configuration specified therein.

(2) Thermal Transmittance ("U" Value) maximum [_____] [3.69 W/sqm/deg C] at [_____] [24.14] kmph [_____] [0.65 (6250) BTU/hr/sf/deg F] at [15] [_____] mph exterior wind.

b. CRF Class Requirements:

(1) Perform a test in accordance with AAMA 1503.

(2) Condensation Resistance Factor Requirements (CRF) minimum [_____].

3.4.5 Water Infiltration

Submit certified test reports showing that the system is designed to provide no uncontrolled water when tested in accordance with ASTM E1105 at a static pressure of 956 Pa 8 psf.

3.5 ADJUSTING AND CLEANING

3.5.1 Protection

Protect the installed product's finish surfaces from damage during construction. Protect the aluminum storefront system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

3.5.2 Cleaning

Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions before acceptance remove excess mastic, mastic smears, and other foreign materials. Remove construction debris from the project site and legally dispose of this debris.

3.6 WARRANTY

Submit [three] [_____] signed copies of the manufacturer's product warranty for the entrance system as follows:

a. Warranty Period: [Five] [_____] years from Date of Substantial Completion of the project, provided that the Limited Warranty begins no later than [six] [_____] months from the date of shipment by the manufacturer. In addition, support welded door corner construction with a limited lifetime warranty for the life of the door under normal

use.

Ensure that the Warranty's language is identical to the "As Approved" version of the sample warranty submitted to and returned from the Contracting Officer.

-- End of Section --