

**SECTION 08 44 13  
GLAZED ALUMINUM CURTAIN WALLS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. Section specifies glazed aluminum curtain wall system.
  - 1. Thermally isolated, pressure equalized on interior.
  - 2. Type: Stick system to include following:
    - a. Glass Uninsulated Metal Panels and Glass Spandrel Panels.
    - b. Integral reinforcing.
    - c. Closures, trim, subsills and flashings.
    - d. Column covers.
    - e. Fasteners, anchors, and related reinforcement.

**1.2 RELATED WORK**

- A. Structural steel: Section 05 12 00, STRUCTURAL STEEL FRAMING.
- B. Miscellaneous metal members: Section 05 50 00, METAL FABRICATIONS.
- C. Firestopping between curtain wall and structure: Section 07 84 00, FIRESTOPPING.
- D. Sheet metal flashing and trim: Section 07 60 00, FLASHING AND SHEET METAL.
  - a. Joint sealants: Section 07 92 00, JOINT SEALANTS.
- E. Aluminum and glass hinged entry doors and storefront construction: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
- F. Aluminum windows: Section 08 51 13, ALUMINUM WINDOWS.
- G. Glazing: Section 08 80 00, GLAZING.

- H. Interior Daylighting Louvers - Section 12 26 00 OPTICAL SIDE DAY-LIGHTING SYSTEM.
- I. Exterior Sun-shading Devices - Section 10 71 13 EXTERIOR SUN CONTROL DEVICES
- J. Sustainability and LEED requirements. Section 01 81 11, SUSTAINABLE DESIGN REQUIREMENTS.
- K. Blast-Resistant Design: Section 01 36 00 Blast-Resistant Design
- L. Blast Resistant Windows. Section 08 56 53, BLAST RESISTANT WINDOWS.
- M. Metal Wall Panels: Section 07 42 13 METAL WALL PANELS (SOLID PHENOLIC EXTERIOR WALL PANELS.

**1.3 QUALITY ASSURANCE**

- A. Qualifications:
  - 1. Approval is required of products or service of proposed manufacturer, suppliers and installers, and will be based upon submission by Contractor of certification that:

- a. Manufacturers Qualifications: Manufacturer with five (5) years continuous documented experience in design, fabrication, and installation of glazed aluminum curtain wall systems of type and size required for that project.
  - b. Installer: Manufacturer approved in writing. Continuously installed glazed aluminum curtain walls systems for previous five (5) years.
  - c. Manufacturer shall provide technical field representation at project site, as a minimum, at start of project, during middle, towards end of project, and during field testing of field mockup panel.
  - d. Testing Laboratory: Contractor retained. Engage an AAMA accredited commercial testing laboratory to perform tests specified. Submit information regarding testing laboratory's facilities and qualifications of technical personnel to perform testing specified in this section.
  - e. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of glazed aluminum curtain wall system. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, one another, and adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, or in-service performance.
    - 1) Do not modify intended aesthetic effects. If modifications are proposed, submit comprehensive explanatory data for review.
  - f. Qualification of Welders:
    - 1) Welding shall be performed by certified welders qualified in accordance with AWS D1.2, using procedures, materials, and equipment of the type required for this work.
- C. Pre-Installation Conference
- 1. Prior to starting installation of glazed curtain wall system schedule conference with Contracting Officer to ensure following:
    - a. Clear understanding of drawings and specifications.
    - b. Onsite inspection and acceptance of structural and pertinent structural details relating to curtain wall system.
    - c. Coordination of work of various trades involved in providing system. Conference shall be attended by Contractor; personnel directly responsible for installation of curtain wall system,

exterior sun-control devices, flashing and sheet metal work, firestopping system and curtain wall manufacturer and their Technical Field Representatives. Conflicts shall be resolved and confirmed in writing.

#### 1.4 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Product Data:
  - 1. Manufacturer's standard details and fabrication methods.
  - 2. Data on finishing, components, and accessories.
  - 3. Instructions: Submit descriptive literature, detail specifications, available performance test data and instructions for installation, and adjustments.
  - 4. Recommendations for maintenance and cleaning of exterior surfaces.
- C. Shop Drawings:
  - 1. Show elevations of glazed curtain wall system at 1:50 (1/4 inch) scale, metal gages, details of construction, methods of anchorage, glazing details, exterior sun control device attachment details, and details of installation.
  - 2. Submit for curtain wall system, and accessories. Tentative approval of drawings shall be received before fabrication of mock-up. Final approval of drawings shall be deferred pending approval of mock-up and accessories. Drawings shall indicate in detail all system parts including elevations, full size sections, framing, jointing, panels, types and thickness of metal anchorage details, flashing and coping details, field connections, weep and drainage system, finishes, sealing methods, glazing, glass sizes and details, firestopping insulation materials, and erection details.
  - 3. Operation and Maintenance Manuals
    - a. Submit cleaning and maintenance instructions.
- D. Samples:
  - 1. Submit pairs of samples of each specified color and finish on 300 mm (12-inch) long section by width of each tubular, or extruded shape section or 300 mm by 300 mm (12-inch by 12-inch) wide sections of sheet shapes.
  - 2. Submit corner section of framing members showing fasteners, panels, glazing methods, glazing materials, and weather-stripping. Submit one sample minimum 300 mm by 300 mm (12 inches by 12 inches). In lieu of submitting separate samples for corner section, intermediate section,

and panel, one composite sample incorporating all components and features listed may be submitted.

3. Where normal color variations are anticipated, include 2 or more units in set indicating extreme limits of color variations.

E. Glass:

1. Specified in Section 08 80 00, GLAZING.

F. Quality Control Submittals:

1. Design Data:

- a. Submit structural and thermal calculations for complete wall assembly. Structural calculations and design shop drawings shall be signed and sealed by a structural engineer registered in state in which project is to be located.

2. Factory Test Reports:

- a. Test Reports: Provide certified test reports, for each of following listed tests, from a qualified independent testing laboratory showing that glazed aluminum curtain wall system assembly has been tested in accordance with specified test procedures and complies with performance characteristics as indicated by manufacturer's testing procedures. Manufacturer shall submit appropriate testing numbers for specific tests indicated below.

1) Deflection and structural tests.

2) Water penetration tests.

3) Air infiltration tests.

4) Delamination tests.

5) Thermal conductance tests.

6) Submit factory tests required except that where a curtain wall system or component of similar type, size, and design as specified for this project has been previously tested within last year, under conditions specified herein, resulting test reports may be submitted in lieu of listed testing.

G. Manufacturer's Certificates:

1. Submit Certificates of Compliance, with specification requirements, for the following:

a. Metal extrusions.

b. Metal accessories.

c. Stating that aluminum has been given specified thickness of anodizing or organic coating finish.

d. Indicating manufacturer's and installer's meet qualifications as specified.



- CW 11-85.....Design Windloads for Buildings and Boundary  
Layer Wind Tunnel Testing
- CW 13-85.....Structural Sealant Glazing Systems (A Design  
Guide)
- CWG 1-89.....Installation of Aluminum Curtain Walls
- TIR A1-04.....Sound Control for Fenestration Products
- TIR A8-08.....Structural Performance of Composite Thermal  
Barrier Framing Systems
- TIR A9-91.....Metal Curtain Wall Fasteners
- TIR A11-04.....Maximum Allowable Deflection of Framing Systems  
for Building Cladding Components of Design Wind  
Loads
- 101/I.S.2/A440-08.....Windows, Doors and Unit Skylights
- 501-05.....Methods of Test for Exterior Walls
- 503-08.....Field Testing of Metal Storefronts, Curtain  
walls and Sloped Glazing Systems
- 2605-05.....High Performance Organic Coatings on  
Architectural Extrusions and Panels
- 1503-09.....Thermal Transmission and Condensation Resistance  
of Windows, Doors and Glazed Wall Sections
- C. American National Standards Institute (ANSI):
- Z97.1-09.....Glazing Materials Used in Buildings, Safety  
Performance Specifications and Methods of Test
- D. American Society of Civil Engineers (ASCE):
- ASCE 7-10.....Minimum Design Loads for Buildings and Other  
Structures
- E. American Society for Testing and Materials (ASTM):
- A36/A36M-08.....Structural Steel
- A123-09.....Zinc (Hot-Dip Galvanized) Coatings on Iron and  
Steel Products
- A193-10.....Alloy-Steel and Stainless Steel Bolting  
Materials for High Temperature Service
- A307-10.....Carbon Steel Bolts and Studs, 60,000 PSI Tensile  
Strength
- B209-10.....Aluminum and Aluminum Alloy Sheet and Plate
- B211-03.....Aluminum and Aluminum Alloy Bar, Rod, Wire
- B221/B221M-08.....Aluminum and Aluminum Alloy Extruded Bars, Rods,  
Wire, Shapes and Tubes
- B316/B316M-10.....Aluminum and Aluminum Alloy Rivet and Cold-  
Heading, Wire, and Rods

- C578-10a.....Rigid Cellular Polystyrene Thermal Insulation  
C612-10.....Mineral Fiber Block and Board Thermal Insulation  
C920-11.....Elastomeric Joint Sealants  
C794-10.....Standard Test Method for Adhesion-In-Peel of  
Elastomeric Joint Sealants.  
C1363-11.....Thermal Performance of Building Materials and  
Envelope Assemblies by Means of a Hot Box  
Apparatus  
D1037-06a.....Evaluating the Properties of Wood-Base Fibers  
and Particle Panel Materials  
E84-11a.....Surface Burning Characteristics of Building  
Materials  
E90-09.....Laboratory Measurement of Airborne Sound  
Transmission Loss of Building Partitions and  
Elements  
E283-04.....Determining Rate of Air Leakage Through Exterior  
Windows, Curtain Walls, and Doors under  
Specified Pressure Difference Across this  
Specification  
E330-02(R2010).....Structural Performance of Exterior Windows,  
Curtain Walls, and Doors by Uniform Static Air  
Pressure Difference  
E331-00(R2009).....Water Penetration of Exterior Windows, Curtain  
Walls, and Doors By Uniform Static Air Pressure  
Difference  
E413-10.....Classification for Rating Sound Insulation  
E783-02(R2010).....Test Method for Field Measurement of Air Leakage  
Through Installed Exterior Windows and Doors.  
E1105-00(R2008).....Field Determination of Water Penetration of  
Installed Exterior Windows, Curtain Walls, and  
Doors By Uniform or Cyclic Static Air Pressure  
Differences  
F. American Welding Society, Inc. (AWS):  
D1.2-08.....Structural Welding Code-Aluminum  
G. Consumer Product Safety Commission (CPSC):  
16 CFR 1201.....Architectural Glazing Standards and Related  
Material  
H. Federal Specifications (FS):  
TT-P-645B-06.....Primer, Paint, Zinc-Molybdate, Alkyd Type

- I. Glass Association of North America (GANA):
  - 2010 Edition.....GANA Glazing Manual
  - 2008 Edition.....GANA Sealant Manual
  - 2009 Edition.....GANA Laminated Glazing Reference Manual
  - 2008 Edition.....Tempered Glass Engineering Standard Manual
- J. Military Specifications (MIL):
  - MIL-C-18480.....(Rev. B) Coating Compound, Bituminous Solvent,  
Coal Tar Base
- K. National Association of Architectural Metal Manufacturers (NAAMM):
  - 500 Series (2006).....Metal Finishes Manual.
- L. Steel Structures Painting Council (SSPC)
  - Paint 25-97 (2004).....Red Iron Oxide Raw Linseed Oil and Alkyd Primer  
(Without Lead and Chromate Pigments)

**1.8 WARRANTY**

- A. Submit manufacturer's written warranty for materials, installation and weathertightness, and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be extended to five (5) years from date of final acceptance of project by Government.

**PART 2 - PRODUCTS**

**2.1 SYSTEM DESCRIPTION**

- A. Design Requirements:
  - 1. Curtain Wall System: Tubular aluminum sections with thermal break condition self supporting framing, factory prefinished, vision glass, spandrel glass, uninsulated metal panel spandrel infill and louvers; related flashings, anchorage and attachment devices.
  - 2. System Assembly: Site assembled.
  - 3. No curtain wall framing member shall deflect, in a direction normal to plane of wall, more than 1/175 of its clear span or 20 mm (3/4 inch), whichever is less, when designed in accordance with requirements of TIR A11 and tested in accordance with ASTM E330, except that when a gypsum wallboard surface will be affected, deflection shall not exceed 1/360 of span. No framing member shall have a permanent deformation in excess of 0.2 percent of its clear span when tested in accordance with ASTM E330 for a minimum test period of 10 seconds at 1.5 times design wind pressures indicated as part of structural drawing wind load requirements. No glass breakage, damage to fasteners, hardware or accessories shall be permitted due to deformation stated above:

- a. Provide system complete with framing, mullions, trim, fasteners, anchors, accessories, concealed auxiliary members, and attachment devices for securing wall to structure as specified or indicated. Unless noted otherwise, comply with MCWM-1.
  - b. Curtain wall system components and integral door and/or window units shall be furnished by one manufacturer or fabricator; however, all components need not be products of same manufacturer.
  - c. Fully coordinate system accessories directly incorporated, and adjacent to contiguous related work and insure materials compatibility, deflection limitations, thermal movements, and clearances and tolerances as indicated or specified.
  - d. Provide system with adequate allowances for expansion and contraction of components and fastenings to prevent buckling damage, joint seal failure, glass breakage, undue stress on fastenings or other detrimental effects. For design purposes, base provisions for thermal movement on assumed ambient temperature range of from -18 degrees C to 49 degrees C (0 degrees F to 120 degrees F).
  - e. Provide wall system to accommodate tolerances in building frame and other contiguous work as indicated or specified.
4. Provide window assemblies and glazing meeting GSA and ISC Performance Condition 3b, for blast mitigation where indicated.
- B. Manufacturer's Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of curtain walls that are similar to those indicated for this Project in material, design, and extent.
- C. Performance Requirements:
1. System shall meet or exceed all performance requirements specified.
  2. Curtain wall components shall have been tested in accordance with requirements below and shall meet performance requirements specified:
  3. System Design: Design and size components to withstand dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall as calculated in accordance with as measured in accordance with ASTM E330.
  4. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with IBC code.

5. Blast Loads: Design and size components and connections to withstand GP1 blast load pressure and impulse. Peak mullion deflections shall not exceed  $L/30$  under blast load.
6. Water Penetration:
  - a. No water penetration shall occur when wall is tested in accordance with ASTM E331 at a differential static test pressure of 20 percent of inward acting design wind pressure as indicated on structural drawings, but not less than 479 Pa (10 psf).
  - b. Make provision in wall construction for adequate drainage to outside of water leakage or condensation that occurs within outer face of wall. Leave drainage and weep openings in members and wall open during test.
7. Air Infiltration: Test glazed aluminum curtain wall system according to AAMA 503, which requires testing according to ASTM E783
  - a. Static-Air-Differential: 75 Pa (1.57 lbf/sq. ft.) minimum.
  - b. Air Leakage: 0.03 L/s per sq. m (0.06 cfm/sq ft) of surface maximum.
8. Deflections Test: ASTM E330, Procedure B:
  - a. No member shall deflect in a direction parallel to plane of wall, when carrying its full design load, more than an amount which will reduce edge cover or glass bite below 75 percent of design dimension. No member after deflection under full design load, shall have a clearance between itself and top of panel, glass, sash, or other part immediately below it less than 3 mm (1/8 inch); clearance between member and an operable window or door shall be minimum 1.5 mm (1/16 inch).
9. Thermal Conductance Tests: ASTM C236.
  - a. The thermal transmittance of opaque panels shall not exceed a U-value, Btu/hr/sq ft/ degree F, as required and indicated on contract drawings for exterior wall system, when tested in accordance with ASTM C236. Average calculated thermal transmittance of complete wall assembly including panels, windows, and all other components shall not exceed an R-value of 20.
  - b. Thermal break in framing system shall be improved from the standard 3/8" to 3/4".
10. Window Tests:
  - a. Windows shall meet the requirements specified in Section 08 51 13 ALUMINUM WINDOWS, except where requirements of this section differ, this section shall govern. Windows shall meet same requirements for deflection and structural adequacy as specified

for framing members when tested in accordance with ASTM E330 except permanent deformation shall not exceed 0.4 percent; there shall be no glass breakage, and no permanent damage to fasteners, anchors, hardware, or operating devices. Windows shall have no water penetration when tested in accordance with requirements of ASTM E331.

11. Sound Attenuation Through Wall System (Exterior to Interior):
  - a. STC 30 , measured in accordance with ASTM E413.
  - b. The STC achieved by the system needs to meet the requirements of the VA Design Criteria Noise Transmission Control in the PG-18-3.

## 2.2 MATERIALS

- A. Extruded Aluminum Framing Members: ASTM B221M; 6063-T5 extruded aluminum for non-structural components or 6063-T6 extruded aluminum for structural members; temper and alloy as recommended by manufacturer.
- B. Sheet Aluminum: ASTM B209M; 6065-T5 temper and alloy as recommended by manufacturer.
  1. Formed flashing and closures: Minimum 1.58 mm (0.062 inch) thick aluminum, in finish as selected.
  2. Extruded sill members: Minimum 1.58 mm (0.062 inch) thick aluminum, in finish as selected.
- C. Steel Sections: ASTM A36M.
- D. Primer: TS TT-P-645; red, for shop application and field touch-up.
- E. Fasteners:
  1. For Exterior Cap Retainers: ASTM A193 B8 300 series, stainless steel screws.
  2. For Framework Connections: ASTM B211M 2024-T4 aluminum, ASTM A193 B8 300 series, stainless steel, and ASTM B316 aluminum rivets, as required by connection.
  3. For Anchoring Glazed Aluminum Curtain Wall to Support Structure: ASTM A307 zinc plated steel fasteners.
- F. Shims: Metal or plastic.
- G. Joint Sealants and Accessories:
  1. In accordance with requirements specified in Section 07 92 00, JOINT SEALANTS.
  2. Structural Flush Glazed Joints: High performance silicone sealant applied in accordance with manufacturer's recommendations.
  3. Non-structural Flush Glazed Joints and Weather Seal Joints: Silicone sealants applied in accordance with manufacturer's recommendations.
  4. Structural silicone sealant performance requirements: ASTM C920.
    - a. Hardness: Type A, 30 durometer.

- b. Ultimate Tensile Strength: 1172 kPa (170 psi).
  - c. Tensile at 150% Elongation: 55 kPa (80 psi).
  - d. Joint Movement Capability after 14 Day Cure: +/- 50%.
  - e. Peel Strength aluminum, after 21 Day Cure: 599 g/mm (34 pounds per inch).
- 5. Structural silicone shall not be used to support dead weight of vertical glass or panels.
  - 6. Comply with recommendations of sealant manufacturer for specific sealant selections.
  - 7. Provide only sealants that have been tested per ASTM C794 to exhibit adequate adhesion to samples of glass and metal equivalent to those required for project.
  - 8. Exposed metal to metal joints: Silicone sealant selected from manufacturer's standard colors.
- H. Glazing Materials:
- 1. As specified under Section 08 80 00, GLAZING.
  - 2. Glazing Gaskets:
    - a. Exterior: Continuous EPDM gaskets at each glass and spandrel panel.
    - b. Interior: Continuous, closed cell PVC foam sealant tape, sealed at corners.
  - 3. Glass Sizes and Clearances:
    - a. Accommodate up to 25 mm (1 inch) glazing.
    - b. Sizes indicated are nominal. Verify actual sizes required by measuring frames. Coordinate dimensions for glass and glass holding members to meet applicable minimum clearances as recommended by glass manufacturer. Do not nip glass to remove flares or to reduce oversized dimensions. All cutting shall occur in factory.
  - 4. Glass Setting Materials:
    - a. Provide head bead and drive wedge required for glass installation to suit curtain wall system in accordance with manufacture's recommendations.
    - b. If used in psychiatric facilities, the glass shall be retained in the framing system in such a manner that it can withstand lateral forces in excess of force required to break the glass. Plastic clips for holding glass are not permitted.
- I. Louvers:
- 1. As specified under Section 08 90 00, LOUVERS AND VENTS.
- J. Firestopping: Refer to Section 07 84 00, FIRESTOPPING for requirements.

**K. Exterior Sun Control Devices:**

1. As specified under Section 10 71 13 EXTERIOR SUN CONTROL DEVICES.

**2.3 FABRICATION**

- A. Curtain wall components shall be of materials and thickness indicated or specified. Details indicated are representative of required design and profiles. Maintain sightlines indicated on drawings. Unless specifically indicated or specified otherwise, methods of fabrication and assembly shall be at discretion of curtain wall manufacturer. Perform fitting and assembling of components in shop to maximum extent practicable. Anchorage devices shall permit adjustment in three directions. There shall be no exposed fasteners.
- B. Joints: Joints exceeding +1.5 mm (+1/16") shall be mechanically fastened.
- C. Ventilation and Drainage: Direct water leakage to exterior by means of concealed drainage system and weeps. Flashings and other materials used internally shall be nonstaining, noncorrosive, and nonbleeding.
- D. Protection and Treatment of Metals:
  1. Remove from metal surfaces lubricants used in fabrication and clean off other extraneous material before leaving shop.
  2. Provide protection against galvanic action wherever dissimilar metals are in contact, except in case of aluminum in permanent contact with galvanized steel, zinc, stainless steel, or relatively small areas of white bronze. Paint contact surfaces with one coat bituminous paint conforming to MIL-C-18480 or apply appropriate caulking material or nonabsorptive, noncorrosive, and nonstaining tape or gasket between contact surfaces.
- E. Metal sills and Closures: Fabricate accessories, spandrel panels, trim closures of sizes and shapes indicated from similar materials and finish as specified for wall system.

**2.4 PROTECTION**

- A. Provide protection for aluminum against galvanic action, wherever dissimilar materials are in contact, by painting contact surfaces of dissimilar material with a heavy coat of bituminous paint (complete coverage), or by separating contact surfaces with a preformed neoprene tape having pressure sensitive adhesive coating on one side.

**2.5 METAL FINISHES**

- A. In accordance with NAAMM AMP500 series.
- B. PVDF Finish: AAMA 2605.
  1. Color as selected in Section 09 06 00 SCHEDULE FOR FINISHES.

- C. Shop and Touch-Up Primer for Steel Components: SSPC Paint 25 red oxide.
- E. Touch-Up Primer for galvanized Steel Surfaces: SSPC Paint 20 zinc rich.
- F. Concealed Steel Items: Galvanized in accordance with ASTM A123 to 610 2.0 oz/sq ft Primed with iron oxide paint.
- G. Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Prior to installation of glazed curtain wall system, arrange for representative(s) of manufacturer to examine structure and substrate to determine that they are properly prepared, and ready to receive glazed curtain wall work included herein.
- B. Verifying Conditions and Adjacent Surfaces: After establishment of lines and grades and prior to system installation examine supporting structural elements. Verify governing dimensions, including floor elevations, floor to floor heights, minimum clearances between curtain wall and structural frames, and other permissible dimensional tolerances in building frame.

**3.2 PREPARATION**

- A. Take field dimensions and examine condition of substrates, supports, and other conditions under which work of this section is to be performed to verify that work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Contact between aluminum and dissimilar metals shall receive a protective coating of asphaltic paint for prevention of electrolytic action and corrosion.

**3.3 INSTALLATION**

- A. Installation and erection of glazed curtain wall system and all components shall be in accordance with written directions of curtain wall manufacturer. Match profiles, sizes, and spacing indicated on approved shop drawings.
- B. Bench Marks and Reference Points: Establish and permanently mark bench marks for elevations and building line offsets for alignment at convenient points on each floor level. Should any error or discrepancy be discovered in location of marks, stop erection work in that area until discrepancies have been corrected.
- C. Ensure that drainage system operates properly in accord with AAMA 501 procedures.
- D. Do not proceed with structural silicone work when metal temperature is below 0 degrees C (32 degrees F).

- E. Isolate between aluminum and dissimilar metals with protective coating or plastic strip to prevent electrolytic corrosion.
- F. Install glazed aluminum curtain wall system so as to maintain a virtually flat face cap, with no visible bowing.
- G. Install entire system so that fasteners are not visible.
- H. Tolerances:
  - 1. Maximum variation from plane or location shown on approved shop drawings: 3 mm per 3600 mm (1/8 inch per 12 feet) of length up to not more than 13 mm (1/2 inch) in any total length.
  - 2. Maximum offset from true alignment between two identical members abutting end to end in line: 0.8 mm (1/32 inch).
  - 3. Sealant Space Between Curtain Wall Mullion and Adjacent Construction: Maximum of 19 mm (3/4 inch) and minimum of 6 mm (1/4 inch).
- I. Windows:
  - 1. Refer to Section 08 51 13, ALUMINUM WINDOWS for window requirements.
  - 2. Install windows in accordance with details indicated and approved shop drawing detail drawings.
  - 3. Seal exterior metal to metal joints between members of windows, frames, mullions, and mullion covers in accordance with requirements of Section 07 92 00, JOINT SEALANTS. Remove excess sealant.
- J. Joint Sealants:
  - 1. Joint Sealants: Shall be in accordance with requirements of Section 07 92 00, JOINT SEALANTS.
  - 2. Surfaces to be primed and sealed shall be clean, dry to touch, free from frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter. Enclose joints on three sides. Clean out grooves to proper depth. Joint dimensions shall conform to approved detail drawings with a tolerance of plus 3 mm (1/8 inch). Do not apply compound unless ambient temperature is between 5 and 35 degrees C (40 and 90 degrees F). Clean out loose particles and mortar just before sealing. Remove protective coatings or coverings from surfaces in contact with sealants before applying sealants or tapes. Solvents used to remove coatings shall be of type that leave no residue on metals.
  - 3. Match approved sample. Force compound into grooves with sufficient pressure to fill grooves solidly. Sealing compound shall be uniformly smooth and free of wrinkles and, unless indicated otherwise, shall be tooled and left sufficiently convex to result in a flush joint when dry. Do not trim edges of sealing material after joints are tooled. Mix only amount of multi-component sealant which can be installed

- within four hours, but at no time shall this amount exceed 19 liters (5 gallons).
4. Apply primer to masonry, concrete, wood, and other surfaces as recommended by sealant manufacturer. Do not apply primer to surfaces which will be exposed after caulking is completed.
  5. Tightly pack backing in bottom of joints which are over 13 mm (1/2 inch) in depth with specified backing material to depth indicated or specified. Roll backing material of hose or rod stock into joints to prevent lengthwise stretching.
  6. Install bond preventive material at back or bottom of joint cavities in which no backstop material is required, covering full width and length of joint cavities.
  7. Remove compound smears from surfaces of materials adjacent to sealed joints as work progresses. Use masking tape on each side of joint where texture of adjacent material will be difficult to clean. Remove masking tape immediately after filling joint. Scrape off fresh compound from adjacent surfaces immediately and rub clean with approved solvent. Upon completion of caulking and sealing, remove remaining smears, stains, and other soiling, and leave work in clean neat condition.

K. Glass:

1. Refer to Section 08 80 00, GLAZING, and drawings for glass types. Install in accordance with manufacturer's recommendations as modified herein.
2. Before installing glass, inspect sash and frames to receive glass for defects such as dimensional variations, glass clearances, open joints, or other conditions that will prevent satisfactory glass installation. Do not proceed with installation until defects have been corrected.
3. Clean sealing surfaces at perimeter of glass and sealing surfaces of rebates and stop beads before applying glazing compound, sealing compound, glazing tape, or gaskets. Use only approved solvents and cleaning agents recommended by compound or gasket manufacturer. All sashes shall be designed for outside glazing. Provide continuous snap in glazing beads to suit glass as specified.
4. Insulating and tempered glass, and glass of other types that exceed 100 united inches in size: Provide void space at head and jamb to allow glass to expand or move without exuding sealant. Perimeter frames and ventilator sections shall have glazing rebates providing

an unobstructed glazing surface 19 mm (3/4 inch) in height. Glazing rebate surfaces must be sloped to shed water.

5. Provide adequate means to weep incidental water and condensation away from sealed edges of insulated glass units and out of wall system. Weeping of lock-strip gaskets should be in accordance with recommendation of glass manufacturer.

L. Metal Copings:

1. Refer to Section 07 60 00, FLASHING AND SHEET METAL for requirements of metal copings when they are not a part of glazed curtain wall system work.
2. Coordinate curtain wall installation with metal coping detail on contract drawings. Provide watertight seal to meet criteria set forth in this section regarding air and water penetration.

M. Exterior Sun Control Devices:

1. Coordinate installation of the Exterior Sun Control Devices with installation of the aluminum curtain wall system.

- N. Ensure that junctions between building waterproof membrane and Air-Vapor barrier of glazing and curtainwall framing are continuous and watertight.

**3.4 ADJUSTING**

- A. Adjust doors to provide a tight fit at contact points and operate easily.
- B. Adjust weather-stripping to make even contact with surfaces.
- C. Adjust operating hardware and moving parts.

**3.5 CLEANING**

- A. Install curtain wall frame and associated metal to avoid soiling or smudging finish.
- B. Clean metal surfaces promptly after installation, exercising care to avoid damage to coatings.
- C. Remove excess glazing and sealant compounds, dirt, and other substances.
- D. Follow recommendations of manufacturer in selection of cleaning agents. Do not use cleaning agents containing ammonia or other compounds that might damage finished metal surfaces.
- E. Replace cracked, broken, and defective glass with new glass at no additional cost to Government. Just prior to final acceptance of curtain wall system clean glass surfaces on both sides, remove labels, paint

spots, compounds, and other defacements, and clean metal fixed panels.  
Remove and replace components that cannot be cleaned successfully.

### 3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage an AAMA accredited commercial qualified independent testing and inspecting agency to perform field quality-control tests specified, and to prepare test reports: Submit information regarding testing laboratory's facilities and qualifications of technical personnel to Contracting Officer for approval.
- B. Conduct field check test for water leakage on designated wall areas after erection to comply with MCWM-1. Conduct test on two wall areas, two bays wide by two stories high where directed. Conduct test and take necessary remedial action as directed by Contracting Officer.
- C. Test Specimen:
  - 1. Test specimen shall include curtain wall assembly and construction. Test chamber shall be affixed to exterior side of test specimen and test shall be conducted using positive static air pressure.
  - 2. Test specimens shall be selected by Contracting Officer after curtain wall system has been installed in accordance with contract drawings and specification.
- D. Sealant Adhesion Tests: Test installed sealant, in presence of sealant manufacturer's field representative, in a minimum of two areas and as follows:
  - 1. Test structural silicone sealant according to field adhesion test method described in AAMA CW 13, "Structural Sealant Glazing Systems (A Design Guide)."
  - 2. Test weatherseal sealant as recommended in writing by sealant manufacturer.
- E. Air Infiltration: Test glazed aluminum curtain wall system according to AAMA 503, which requires testing according to ASTM E783.
  - 1. Field air leakage testing is not required for continuous curtain wall systems.
  - 2. Static-Air-Pressure Differential: 75 Pa (1.57 lbf/sq. ft.) minimum.
  - 3. Air Leakage: 0.03 L/s per sq. m (0.06 cfm/sq. ft.) of surface maximum.
- F. Water Penetration: Test glazed aluminum curtain wall system for compliance with requirements according to AAMA 503, which requires testing according to ASTM E1105.
  - 1. Uniform Static-Air-Pressure Difference: 20 percent of positive design wind load, but not less than 479 Pa (10 psf). No uncontrolled water shall be present.

G. Retesting:

1. Should system fail field test, system may be modified or repaired, and retested.
2. Should system fail second field test, system may be additionally modified or repaired, and retested.
3. All modifications and repairs made to tested areas shall be recorded, and same modifications and repairs made to all system and adjacent construction on project.
4. Should second test fail, Contracting Officer may require testing of additional areas of the curtain wall.

H. Rejection:

1. Failure of any of specimens to meet test requirements of third test shall be cause for rejection of wall system and adjacent construction on project.

**3.7 DEMONSTRATION, TESTING, AND ACCEPTANCE**

- A. Instruct Owner's personnel in proper operation and maintenance of horizontal sliding entrance door equipment. Train personnel in procedures to follow in event of operational failures or malfunctions.
- B. Acceptance: At completion of project, and as a condition of acceptance, horizontal sliding entrance door equipment and systems shall be operated for a period of fifteen (15) consecutive calendar days without breakdown.

**3.8 PROTECTION**

- A. After installation, protect windows, and other exposed surfaces from disfiguration, contamination, contact with harmful materials, and from other construction hazards that will interfere with their operation, or damage their appearance or finish. Protection methods shall be in accordance with recommendations of product manufacturers or of respective trade association. Remove paper or tape factory applied protection immediately after installation. Clean surfaces of mortar, plaster, paint, smears of sealants, and other foreign matter to present neat appearance and prevent fouling of operation. In addition, wash with a stiff fiber brush, soap and water, and thoroughly rinse. Where surfaces become stained or discolored, clean or restore finish in accordance with recommendations of product manufacturer or respective trade association.

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