

SECTION 08520
ALUMINUM WINDOWS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.

1.02 SUMMARY

- A. Work Included: Aluminum window units, shop-glazed, including trim and joint sealants within window framing system. Windows are fixed; no operable vents.
- B. Related Sections: The following sections contain requirements that relate to this Section:
 - 1. Sealant at perimeter of windows: Section 07920.
 - 2. Glass for aluminum windows: Section 08800.
 - 3. Aluminum curtainwall system: Section 08920.

1.03 REFERENCES

- A. Aluminum Association (AA): Designation System for Aluminum Finishes.
- B. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 101: Voluntary Specifications for Aluminum and Poly (Vinyl Chloride) (PVC) Prime Windows and Glass Doors.
 - 2. AAMA 502: Voluntary Specification for Field Testing of Windows and Sliding Glass Doors.
 - 3. AAMA 1503: Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
 - 4. AAMA 607: Voluntary Guide Specification and Inspection methods for Clear Anodic Finishes for Architectural Aluminum."
- C. American Society for Testing and Materials (ASTM):
 - 1. ASTM E 283, Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors.
 - 2. ASTM E 330, Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - 3. ASTM E 331, Test Method for Water Penetration of Exterior Windows, curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 - 4. ASTM E 783, Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.
 - 5. ASTM E 1105, Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform Cyclic Static Air Pressure Difference.

1.04 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum window units that comply with performance requirements specified, as demonstrated by testing manufacturer's corresponding stock systems, Test each type and size of required window unit through a recognized independent testing laboratory or agency, using tests and test pressures specified below, and in accordance with procedures specified in AAMA 101, including requirements of AAMA 101, Section 3, "Optional Performance Classes."
- B. Window Performance Class: F-AW-60 or better; design pressure 60 lbf/ft² or higher.
- C. Uniform Load Deflection Tests: Test in accordance with ASTM E330 at 60 psf. No member shall deflect more than 1/175 of its span under load, and there shall be no permanent deformation of any main frame member in excess of 0.2 percent of its span.
- D. Uniform Load Structural Test: Test in accordance with ASTM E330 at 90 psf. After each specified loading there shall be no glass breakage, permanent damage to fasteners. There shall be no permanent deformation of any main frame member in excess of 0.4 percent of its span.
- E. Air Infiltration: Test in accordance with ASTM E 283 at 6.24 lbf/ft². Air infiltration rate shall not exceed 0.06 cfm/sq for fixed sash.
- F. Water Penetration: Test in accordance with ASTM E331 and AAMA 910, at 12 lbf/ft². There shall be no water penetration as defined in the test method.
- G. Thermal Transmittance: Test in accordance with AAMA 1503.1 at 15-mph exterior wind velocity. Furnish window units with U-value maximum of 0.69 BTU/hour/sq. ft./deg F, glazed.
- H. Condensation Resistance Factor: Test in accordance with AAMA 1503.1. Furnish window units with (CRF) of 45 or greater.

1.05 SUBMITTALS

- A. Product Data: Submit manufacturer's illustrated product literature, specifications, and installation instructions for each type of window required, including:
 - 1. Construction details and fabrication methods.
 - 2. Profiles and dimensions of individual components.
 - 3. Data on accessories.
 - 4. Date on finish.
 - 5. Recommendations for maintenance and cleaning of exterior surfaces.
- B. Shop drawings: Furnish detailed shop drawings for each type of window required. Include information not fully detailed in manufacturer's standard product data and the following:
 - 1. Layout and installation details, including anchors.
 - 2. Elevations of typical window units at 3/4-inch scale.
 - 3. Full-size section details of typical composite members, including reinforcement.
 - 4. Glazing details.
 - 5. Accessories.

- C. Samples:
 - 1. Finish: Sample on 12” lengths of actual material to be used on the job.
 - 2. Sample window: Submit one complete window unit for Architect’s review of details and workmanship. If approved and acceptable to Architect, this sample may be incorporated into the work.
- D. Certification: Submit certification required under Quality Assurance article, this section.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Provide aluminum window units from one source and produced by a single manufacturer. Fabricator shall be a member of American Architectural Manufacturers Association (AAMA), and shall be able to demonstrate successful experience in fabricating architectural aluminum windows of type and variety required for this project.
- B. Installer Qualifications: Engage an experienced Installer who has completed installation of aluminum windows similar in design and extent to those required for the project and whose work has resulted in construction with a record of successful in-service performance.
- C. Performance Grade Certification: Provide certification by a recognized independent testing laboratory or agency showing that each type size of window unit complies with performance requirements; or test windows and furnish certified test results showing that windows comply.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Check actual window openings by accurate field measurement before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.

1.08 WARRANTY

- A. Aluminum Window Warranty: Submit a written warranty, executed by the window manufacturer, agreeing to repair or replace window units that fail in materials or workmanship within the specified warranty period. Failures include but are not necessarily limited to structural failures including excessive deflection, excessive leakage, or air infiltration; deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 1. Warranty Period: 10 years after the date of Substantial Completion.
- B. Finishes: Furnish warranty signed by window manufacturer and by coating manufacturer warranting anodic coating on extrusions against discoloration, chipping, peeling, cracking, blistering or other deterioration during the Warranty period.
 - 1. Warranty Period: 10 years after the date of Substantial Completion.

- C. These warranties shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and is in addition to and runs concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products of one of the following products:
 1. Wausau Window and Wall Systems; "3250 Structural Glazed"; 3-1/4-inch frame depth.
 2. EFCO Corporation; "Thermal Series 6600"; 4-inch frame depth.
 3. Graham Architectural Products Corporation; "Series 1400"; 4-inch frame depth.

2.02 MATERIALS

- A. Aluminum Extrusions: ASTM B221. Provide alloy and temper recommended by the window manufacturer for the strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate tensile strength and 16,000 psi yield strength (such as alloy 6063-T5).
- B. Aluminum Sheet or Plate: ASTM B 209, alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish.
- C. Glass: Specified in Section 08800.
- D. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by the manufacturer to be noncorrosive and compatible with aluminum window members, trim, anchors, and other components of window units.
 1. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.125 inch thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads or provide standard noncorrosive pressed-in splined grommet nuts.
 2. Use concealed fasteners.
- E. Anchors, Clips, and Window Accessories: Aluminum, nonmagnetic stainless steel, or hot-dip zinc-coated steel or iron complying with the requirements of ASTM B 633; provide sufficient strength to withstand design pressure indicated.
- F. Sealant: Elastomeric sealant complying with Section 07920, Joint Sealants; type standard with window unit manufacturer and compatible with contiguous materials and finishes.

2.03 ACCESSORIES

- A. General: Provide the manufacturer's standard accessories that comply with indicated standards.

2.04 WINDOW FABRICATION

- A. General: Fabricate aluminum window units to dimensions and profiles indicated on Drawings, and to comply with referenced standards. Include a complete system for assembly of components and anchorage of window units.
- B. Framing: Extruded aluminum; not less than 0.078 inches thick for frame and sash extrusion; mechanically fastened at corners; 3-7/8" inch frame depth.
- C. Thermal-Break: Fabricate window units with a cast-in, structural, concealed low-conductance thermal break between exterior and interior metal; debridging gap at least 1/4" wide.
 - 1. Provide thermal-break construction that has been in use for not less than 3 years, has been tested to demonstrate resistance to thermal conductance and condensation, and has been tested to show adequate strength and security of glass retention.
 - 2. Do not bridge thermal break with fasteners.
- D. Weeps: Provide weepholes and internal passages to conduct infiltrating water to the exterior.
- E. Subframes: Provide subframes with anchors for window units, where shown, of profile and dimensions indicated but not less than 0.078-inch-thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units.
- F. Receptors and Sub-sills: Furnish where indicated, or where required to suit field conditions. Fabricate from extruded aluminum, 0.078-inch minimum thickness, with thermal break. Finish to match window units.
 - 1. Receptor: 2-piece, snap together; provide at head and jamb; incorporate weatherstripping.
- G. Sills and Panning: Furnish special profile trim and panning components at locations indicated, in profiles shown on Drawings. Fabricate from aluminum not less than 0.090 inch thick; finish to match window frames.
- H. Trim: Furnish scroll profile interior and exterior trim where indicated on drawings; finish to match windows.
- I. Glazing: Provide fixed units that are reglazable without dismantling framing or sash. Specified units employ structural silicone glazing at exterior face of glass with gasket and snap-on stop at interior face of glass.
 - 1. Coordinate profile with glass thickness. Finish glazing stops to match window units.
 - 2. Glaze window units at the factory. Comply with glass and glazing requirements of the Section 08800, "Glass and Glazing" of these specifications and AAMA 101.

2.05 METAL FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Inspect openings before beginning installation. Verify that structural framing provides adequate anchorage, and that rough or masonry openings are plumb, level, square, and correctly sized to receive window units. Verify that the sill plate is level.
 - 1. Masonry surfaces should be visibly dry and free of excess mortar, sand, and other construction debris.
 - 2. Metal surfaces should be dry; clean; free of grease, oil, dirt, rust and corrosion, and welding slag; without sharp edges or offsets at joints.

3.02 PREPARATION

- A. Clean openings into which aluminum windows are going to be installed to remove loose material and contaminants which may damage window finishes.
- B. Coordinate with installation of wall flashings, specified in Division 7.

3.03 INSTALLATION

- A. Comply with manufacturer's specifications and recommendations for installation of window units and accessories.
- B. Set window units plumb, level, and true to line, without warp or rack of frames or sash. Provide proper support and anchor securely in place.
- C. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with the requirements specified under paragraph "Dissimilar Materials" in the Appendix to AAMA 101.
- D. Set sill members and other members in a bed of compound or with joint fillers or gaskets, as shown, to provide weathertight construction. Refer to the "Joint Sealer" sections of Division 7 for compounds, fillers, and gaskets to be installed concurrently with window units. Coordinate installation with wall flashings and other components of the work.

- E. Pack mineral fiber insulation between window frames and surrounding construction.

3.04 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
- B. Testing Services: The first window to be installed will be tested immediately after installation. Either the Architect or the Testing Agency will select the window.
 - 1. Testing Methodology: Windows will be tested for air infiltration and water resistance using AAMA 502, Test Method B, at a test pressure of 12 pounds per square foot.
- C. Make adjustments to window components and installation methods are required to bring the window into compliance with the specifications. Remove and replace windows which cannot be adjusted to comply.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.05 ADJUSTMENT AND CLEANING

- A. Replace glass which has been broken, chipped or cracked during installation.
- B. Clean aluminum and glass surfaces promptly after installation of windows. Do not damage protective coatings and finishes. Remove excess glazing and sealant compounds, dirt, and other substances.

3.06 PROTECTION AND FINAL CLEANING

- A. Protect installed window units from damage through the rest of the construction period.
- B. Protect aluminum and glass surfaces from contact with contaminating substances resulting from construction operations including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. During the remainder of the construction period, monitor glass adjacent to or below exterior concrete and masonry surfaces for build-up of dirt, scum, alkali deposits, or stains, and remove as recommended by glass manufacturer. Do not allow these contaminants to accumulate for longer than 1 month without cleaning.
- D. Remove and replace glass that has been broken, chipped, cracked, scratched, marred, or damaged during the construction period, whether by wind or weather, accidents or vandalism, or any other cause.
- E. Not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion, wash window glass on both faces in each area of Project. Wash glass as recommended by glass manufacturer.

END OF SECTION 08520