



SECTION 32 31 00

ALUMINUM AND GLASS BARRIER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Division 01 - General Requirements, and other applicable specification sections in the Project Manual apply to the work specified in this Section.

1.2 SUMMARY

- A. Scope: Provide design and engineering, labor, material, equipment, related services, and supervision required, including, but not limited to, manufacturing, fabrication, erection, and installation for aluminum and glass barrier systems as required for the complete performance of the work, and as shown on the Drawings and as herein specified.
- B. Section Includes: The work specified in this Section includes, but shall not be limited to, the following:

Edit list below to suit the Project. Add items if not listed.

- 1. Aluminum and glass wind and noise screen systems.
- 2. Aluminum and glass pool surround.

- C. Related Sections: Related sections include, but shall not be limited to, the following:
 - 1. Applicable sections is Division 03 - Concrete for concrete supporting structure, including, but not limited to concrete wall or concrete footings.
 - 2. Applicable sections is Division 04 - Masonry for concrete masonry unit (CMU) supporting structure.

1.3 REFERENCES

- A. General: The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by the basic designation only. The edition/revision of the referenced publications shall be the latest date as of the date of the Contract Documents, unless otherwise specified.
- B. Aluminum Association, Inc. (AA):
 - 1. AA SAS-30, "Specifications for Aluminum Structures."
- C. American Architectural Manufacturers Association (AAMA):

1. AAMA 2604, "Voluntary Specification, Performance Requirements, and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels."
 2. AAMA 2605, "Voluntary Specification, Performance Requirements, and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels."
 3. AAMA Aluminum Curtain Wall Series No. 12, "Structural Properties of Glass."
- D. American Iron and Steel Institute (AISI):
1. AISI SG-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."
- E. American Society of Civil Engineers (ASCE):
1. ASCE/SEI 7, "Minimum Design Loads for Buildings and Other Structures."
- F. American Welding Society (AWS):
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
- G. ASTM International (ASTM):
1. ASTM B26/B26M, "Standard Specification for Aluminum-Alloy Sand Castings."
 2. ASTM B209/B209M, "Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate."
 3. ASTM B210/B210M, "Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes."
 4. ASTM B221/B221M, "Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes."
 5. ASTM B247/B247M, "Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings."
 6. ASTM B429/B429M, "Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube."
 7. ASTM C1048, "Standard Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass."
 8. ASTM C1107, "Standard Specification for Packaged Dry, Hydraulic Cement Grout (Non-Shrink)."
- H. Code of Federal Regulation (CFR):
1. 16 CFR Part 1201, "Safety Standard for Architectural Glazing Material" (Consumer Products Safety Commission).
- I. National Association of Architectural Metal Manufacturers (NAAMM):
1. NAAMM MFM, "Metal Finishes Manual."

1.4 PERFORMANCE REQUIREMENTS

- A. General: Aluminum and glass barrier systems shall withstand structural loading as determined by allowable design working stresses of materials based on the following standards.
1. Aluminum: AA SAS-30.
 2. Cold-Formed Structural Steel: AISI SG-673, Part I.
 3. Glass: Fully tempered glass in aluminum and glass barrier systems require a design with a safety factor of three applied to the applicable modulus of rupture listed in "Mechanical Properties" in AAMA Aluminum Curtain Wall Series No. 12.
- B. Structural Performance: Provide aluminum and glass barrier systems capable of withstanding the following structural loads without exceeding allowable design working stress of materials for aluminum and glass barrier systems, anchors, and connections:
1. Concentrated Load:
 - a. 200 pounds (90.72 kg) on 1.0 square foot (929 cm²) of area at 42 inches (1067 mm) above grade.
 - b. 50 pounds (22.68 kg) on 1.0 square foot (929 cm²) of area.

2. Distributed Load: 50 lbf (222 N) at 42 inches (1067 mm) above grade.
 3. Uniform Load: 5.0 psf (239 Pa).
 4. Wind Load: As calculated based on ASCE/SEI 7 and as specific to the Project site and the system configuration.
- C. Thermal Movements: Aluminum and glass barrier systems shall allow for movements resulting from 120 degree F (49 degree C) changes in ambient and 180 degree F (82 degree C) surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
- D. Corrosion Resistance: Separate incompatible materials to prevent galvanic corrosion.

1.5 SUBMITTALS

- A. General: Submit under provisions of Section 01 33 00 - Submittal Procedures.
- B. Product Data:
1. Submit manufacturer's data sheets on each product to be used, including, but not limited to, the following:
 - a. Preparation instructions and recommendations.
 - b. Storage and handling requirements and recommendations.
 - c. Installation methods.
 2. Submit product data for manufacturers product lines of aluminum and glass barrier systems assembled from standard components, including, but not limited to, the following:
 - a. Grout, anchoring cements and paint products.
- C. Shop Drawings: Submit shop drawings showing fabrication and installation of aluminum and glass barrier systems, including, but not limited to, plans, elevations, sections, details, and attachments to other work.
- D. Samples:
1. Color Selection: Submit manufacturer's color charts showing the full range of colors available for products with factory-applied color finishes.
 2. Finish Selection: Provide sections of components or flat sheet metal which depict available mechanical surface finishes.
 3. Verification Samples: For each type of exposed finish required, prepared on components indicated below and of same thickness and metal indicated for the work. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
 - a. 6 inch (152 mm) long sections of each different system member.
- E. Quality Control Submittals:
1. Design Data: For installed aluminum and glass barrier systems indicated to comply with certain design loadings, include structural analysis data signed and sealed by the professional engineer who was responsible for their preparation.
 2. Qualification Data: Submit documentation demonstrating capability and experience in performing installations of the same type and scope as specified by this Section. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

Retain below if required for the Project.

3. Certificates: Submit certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOC's).

Retain below for Project requiring LEED certification.

- F. LEED Submittals: Submittals that are required to comply with requirements for LEED certification include, but shall not be limited to, the following:
1. Recycled Content: Provide product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content.

Above applies to Credit MR 4. Below applies to Credit MR 5.

2. Regional Materials: Provide product data for regional materials indicating location and distance from the Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Distance shall be within 500 miles (805 Km) of the Project Site.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer shall be a firm engaged in the manufacture of aluminum and glass barrier systems of types and sizes required, and whose products have been in satisfactory use in similar service for a minimum of 15 years.
2. Installer Qualifications: Installer shall be a firm that shall have a minimum of five years of successful installation experience with projects utilizing aluminum and glass barrier systems similar in type and scope to that required for this Project.

- B. Regulatory Requirements: Comply with applicable requirements of the laws, codes, ordinances, and regulations of Federal, State, and local authorities having jurisdiction. Obtain necessary approvals from such authorities.

- C. Mock-Ups: Prior to installation of the work, fabricate and erect mock-ups for each type of finish and application required to verify selections made under sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mock-ups to comply with the following requirements, using materials indicated for final unit of work. Locate mock-ups on site in location and of size indicated or, if not indicated, as directed by the Architect. Demonstrate the proposed range of aesthetic effects and workmanship to be expected in the completed work. Obtain the Architect's acceptance of mock-ups before start of final unit of work. Retain and maintain mock-ups during construction in undisturbed condition as a standard for judging completed unit of work.

1. When directed, demolish and remove mock-ups from the Project site.

Select above or below.

2. Accepted mock-ups in undisturbed condition at time of Substantial Completion may become part of completed unit of work.

- D. Single Source Responsibility: Obtain aluminum and glass barrier systems from a single source with resources to produce products of consistent quality in appearance and physical properties without delaying the work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.

- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

- A. Environmental Requirements: Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

- A. General: See Section 01 77 00 - Closeout Procedures.
- B. Warranty: Provide manufacturer's standard form outlining the terms and conditions of their Standard Limited Warranty:
 - 1. Surface Finish Warranty: One-year limited warranty.
 - 2. Material Integrity Warranty: One-year limited warranty.
- C. Additional Owner Rights: The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

1.10 EXTRA MATERIALS

- A. All supplemental materials not expressly specified in this section shall be approved by the Architect prior to installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Items specified are to establish a standard of quality for design, function, materials, and appearance. Equivalent products by other manufacturers are acceptable. The Architect will be the sole judge of the basis of what is equivalent.

2.2 MATERIALS

Retain below for Project requiring LEED Certification.

- A. LEED Requirements:
 - 1. Recycled Content: Provide building materials with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content shall constitute a minimum of [10 percent] [20 percent], based on cost, of the total value of materials in the Project.

Above applies to Credit MR 4. Select applicable percentage, 10 percent will allow the Project to achieve one point, 20 percent will allow the Project to achieve two points. Below applies to Credit MR 5. Select applicable percentage, 10 percent will allow the Project to achieve one point, 20 percent will allow the Project to achieve two points.

- 2. Regional Materials: Provide a minimum of [10 percent] [20 percent], based on cost, of building materials that are regionally extracted, processed, and manufactured.

- B. Application/Scope of Work:

Select system applications required for this Project, add others if not listed. Delete all applications not required.

1. Aluminum and glass wind and noise screen systems.
 2. Aluminum and glass pool surround.
- C. Basis of Design: "TECHWALL System" as manufactured by Hansen Architectural Systems, Inc.; 5500 SE Alexander Street, Hillsboro, OR 97123; Toll Free Tel: 800-599-2965, Fax: 503-356-8478; Email: info@aluminumrailing.com; Web: www.aluminumrailing.com.
- D. Metals: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.
1. Aluminum: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of alloy and temper designated below for each aluminum form required.
 - a. Extruded Bar and Tube: ASTM B221/B221M, Alloy 6063-T5/T52.
 - b. Extruded Structural Pipe and Tube: ASTM B429/B429M, Alloy 6063-T832.
 - c. Drawn Seamless Tube: ASTM B210/B210M, Alloy 6063-T832.
 - d. Plate and Sheet: ASTM B209/B209M, Alloy 6061-T6.
 - e. Die and Hand Forgings: ASTM B247/B247M, Alloy 6061-T6.
 - f. Castings: ASTM B26/B26M, Alloy A356-T6.
 2. Brackets, Flanges, and Anchors: Provide cast or formed metal of same type of material and finish as supported components, unless otherwise indicated.
- E. System Components:
1. Extruded Aluminum Components: Provide manufacturer's standard extruded aluminum components as follows:
 - a. Standard Square Post: 2-5/8 inches (67 mm) by 2 inches (51 mm), with 0.100 inch (2.54 mm) wall thickness.
 - 1) Corner Post: Manufacturer's standard 90 degree corner post.
 - 2) Corner Post: Manufacturer's standard 135 degree corner post.

Select square post above or round post below. With either post retained, select applicable type of corner post.

- b. Standard Round Post: 3-1/16 inches (78 mm) by 2-5/8 inches (67 mm), with 0.100 inch (2.54 mm) wall thickness.
 - 1) Corner Post: Manufacturer's standard 90 degree corner post.
 - 2) Corner Post: Manufacturer's standard 135 degree corner post.
 - c. Bottom Rail: 1-5/16 inches (33 mm) by 1 inch (25 mm), with 0.070 inch (1.78 mm) wall thickness.
 - d. Post Top Cap: Manufacturer's standard, finished to match post.
 2. Steel Stanchion: 1-1/2 inch (38 mm) u-shaped with a wall thickness of 1/4 inch (6 mm); 50 ksi (345 MPa), powder-coated steel channel stanchion.
- F. Glass Products and Glazing Materials:
1. Glass: Provide fully tempered, uncoated, transparent flat glass meeting the requirements of ASTM C1048, Type FT, Condition A, Type 1, Quality q3. Products shall comply with properties indicated for class, thickness, and manufacturing process that have been tested for surface and edge compression according to ASTM C1048 and for impact strength according to 16 CFR Part 1201 for Category II materials.
 - a. Clear Glass: Class 1 (clear).
 - b. Thickness: 1/4 inch (6.3 mm).

Select above or below.

- c. Thickness: 3/8 inch (9.5 mm).

- d. Manufacturing Process: By vertical (tong-held) or horizontal (roller-hearth) process, at manufacturer's option. Horizontal process shall be performed tongless. Glass shall be free of tong marks and other visual distortions.
 - e. Marking: Subject to compliance with requirements, provide glass permanently marked with certification label of Safety Glazing Certification Council or other agency acceptable to authorities having jurisdiction.
2. Vinyl Channel and Accessories: Provide vinyl channel and related accessories recommended or supplied by aluminum and glass barrier system manufacturer.

G. Fasteners and Anchors:

- 1. Select fasteners of type, grade and class required to produce connections suitable for anchoring aluminum and glass barrier systems to other types of construction indicated and capable of withstanding design loads.
- 2. Use fasteners and anchors fabricated from same basic metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

H. Non-Shrink, Non-Metallic Grout: Provide premixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C1107. Provide grout specifically recommended by manufacturer for application.

2.3 FABRICATION

- A. Fabricate aluminum and glass barrier systems by connecting members with aluminum and glass barrier system manufacturer's standard concealed mechanical fasteners and fittings, unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
- B. Provide manufacturer's standard fittings and anchors to connect aluminum and glass barrier system members to other construction.
- C. Tempered glass shall be cut to final size and shape before heat treatment; provide for proper edge clearance and bite on glass. Provide thickness indicated on the Drawings, not less than required to support structural loads.
- D. Provide inserts and other anchorage devices to connect aluminum and glass barrier systems to concrete or masonry. Fabricate anchorage devices capable of withstanding loads imposed by aluminum and glass barrier systems. Coordinate anchorage devices with supporting structure.
- E. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- F. Cut, reinforce, drill, and tap components as indicated on the Drawings to receive finish hardware, screws, and similar items.
- G. Close exposed ends of aluminum and glass barrier system members with prefabricated end fittings.

2.4 FINISHES

- A. General: Comply with NAAMM MFM for recommendations for applying and designating finishes.
 - 1. Appearance of Finished Work:
 - a. Variations in appearance of abutting or adjacent units are acceptable if they are within one-half of the range of final samples. Noticeable variations in the same unit are not acceptable.
 - b. Variations in appearance of other components are acceptable if they are within the range of final samples and are assembled or installed to minimize contrast.
- B. Aluminum Finish: Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

Retain finishes below which are applicable to the Project.

1. Powder Coat Finish: AA-C12-C42-R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply manufacturer's standard baked powder coat finish. Comply with coating manufacturer's written instructions for cleaning, surface preparation, pretreatment, and application.
 - a. Material: Polyester powder coating, 3.0 mil (0.076 mm). Comply with AAMA 2604, including, but not limited to, average film thickness. Subject to compliance with requirements, provide one of the following products:
 - 1) "1PC-406 Series," Forrest Paint Co.
 - 2) "Series 38," TIGER Drylac U.S.A., Inc.

Select above or below. Products below, which comply with AAMA 2605, are a superior performing, more expensive, finish.

- b. Material: Polyester powder coating, 3.0 mil (0.076 mm). Comply with AAMA 2605, including, but not limited to, average film thickness. Subject to compliance with requirements, provide one of the following products:
 - 1) "1PC-440 Series," Forrest Paint Co.
 - 2) "Series 75," TIGER Drylac U.S.A., Inc.

Insert color and gloss below.

- c. Color: [_____].
 - d. Gloss: [_____].

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
 1. Examine substrates to receive anchors verifying that locations have been clearly marked for the Installer.
 2. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installing anchors and other items that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the Project site.

3.3 INSTALLATION

- A. General:
 1. Fitting: Fit exposed connections together to form tight, hairline joints.
 2. Cutting and Placement: Set aluminum and glass barrier systems accurately in location, alignment, and elevation measured from established lines and levels and free from rack.

- a. Do not weld, cut, or abrade coated or finished surfaces of system components that are intended for field connection by mechanical or other means without further cutting or fitting.
- b. Align members so variations from level or parallel alignment do not exceed 1/4 inch in 12 feet (1.6 mm per m).
- c. Anchor posts in concrete with pipe sleeves preset and anchored into concrete. After posts have been inserted into sleeves, solidly fill annular space between post and sleeve with non-metallic, non-shrink grout, mixed and placed to comply with anchoring material manufacturer's directions.
- d. Anchor posts in concrete by forming or core drilling holes not less than 6 inches (152 mm) deep and 3/4 inch (19 mm) greater than outside diameter of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-metallic, non-shrink grout, mixed and placed to comply with anchoring material manufacturer's directions.

Select one of two subparagraphs above, both, or neither, for posts in concrete, to suit the Project. Retain below if post are to be installed in CMU.

- a. Anchor posts in CMU by installing them in fully grouted cells in accordance with manufacturer's requirements. Stanchion shall be embedded a minimum of 15 inches (381 mm) into the CMU.
3. Corrosion Protection: Provide separation as recommended by manufacturer on concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals.
 4. Adjusting: Adjust aluminum and glass barrier systems before anchoring to ensure alignment at abutting joint's space posts at interval indicated, but not less than required to achieve structural loads.
- B. Installing Glass Panels in Aluminum and Glass Barrier Systems: Install assembly to comply with aluminum and glass barrier system manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

- A. Touch-Up Painting: Immediately after erection, clean field welds, connections, and abraded areas of shop paint, and appoint exposed areas with same material.
- B. Cleaning: Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit, or provide new units.

3.5 PROTECTION

- A. Provide final protection and maintain conditions in a manner acceptable to the Installer, that shall ensure that the aluminum and glass barrier systems shall be without damage at time of Substantial Completion.
- B. Protect finishes of aluminum and glass barrier systems from damage during construction period with temporary protective coverings approved by aluminum and glass barrier system manufacturer. Remove protective coverings at the time of Substantial Completion.

END OF SECTION