
(1) Products specified by product name, or a specific manufacturing processes and/or specific to "No Substitutions Allowed" are proprietary, sole source and unique to Mullet's Aluminum Products, Inc. and will be hereafter referred to as Proprietary Mullet's Aluminum Products.

a) You are expressly forbidden from using any substituting products along with any Proprietary Mullet's Aluminum Products without the express written consent of Mullet's Aluminum Products, Inc.

b) Any use of Proprietary Mullet's Aluminum Products without the express written consent of Mullet's Aluminum Products, Inc. is strictly prohibited.

c) Mullet's Aluminum Products, Inc. shall pursue all legal remedies available to enforce all unauthorized use of Proprietary Mullet's Aluminum Products.

SECTION 05 73 20 – GLASS RAIL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

(Specifier Note Delete glass rail paragraphs below not included in project. This series of glass supported guardrails available for both residential (36 inches) and commercial (42 inches) applications.)

A. Section Includes:

1. Mullet's Aluminum Products, Inc. Post Guardrail Systems "GRS-100".
2. Mullet's Aluminum Products, Inc. Bracket Guardrail Systems "GRS-200".
3. Mullet's Aluminum Products Inc. Base Guardrail Systems "GRS-300".

B. Related Sections:

(Specifier Note Retain or add Sections in subparagraphs below that contain railing requirements.)

1. Division 05 Section for aluminum tube railings included with metal stairs and ornamental metals.
2. Division 05 Section 05 73 20 for Glass Supported Railings.

1.3 DEFINITIONS

A. Railing: Guardrails, railings, handrails, and similar devices used for protection of occupants at open-sided floor areas, pedestrian guidance and support, visual separation, or wall protection.

1.4 PERFORMANCE REQUIREMENTS

(Specifier Note Include in paragraph below specific structural requirements according to project location, state and local codes.)

A. General: Engineer, fabricate and install guardrails and railing systems to withstand structural loads required by applicable codes.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C) material surfaces.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's specifications and installation instructions, for all components for each product type specified.

(Specifier Note Registered Engineer shall be licensed in state of project.)

2. Include sealed drawings by Registered Engineer responsible for structural design of system.
3. Grout, anchoring cement, metal components, glass, anchors, accessories and paint products.

B. LEED Submittals:

Retain subparagraph below if recycled content is required for LEED-NC, LEED-CI, or LEED-CS Credits MR 4.1 and MR 4.2.

1. Product Data for Credit MR 4.1[and Credit MR 4.2]: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

C. Shop Drawings: Include plans, elevations, sections, and details of profile, dimensions, type of fasteners, joint locations, anchorages, sizes, transitions, terminations and connection attachments to other work.

D. No substitutions permitted.

E. Samples: For products involving selection of color and texture.

F. Welding certificates.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

B. Railing Installer: Experienced in performing work of this section and specialized in installation of similar work required for this project.

1. Qualifications: As approved in writing by railing manufacturer.

C. Safety Glazing Labeling: Permanently mark glass with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

D. Pre-Installation Meetings: Conduct pre-installation meetings to verify project requirements, substrate conditions, installation instructions and warranty requirements.

1.7 REFERENCE STANDARDS

A. American Architectural and Manufactures Association (AAMA):

1. AAMA 2604 – Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings and Aluminum Extrusions and Panels.



2. AAMA 2605 – Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings and Aluminum Extrusions and Panels.
- B. American Society for Testing and Materials (ASTM):
1. ASTM B209-07 (ASTM B209M-07) – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 2. ASTM B221-08 (ASTM B221M-08) - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.
 3. ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type 1 (transparent flat glass), Quality-Q3.
 4. ASTM B 247 (ASTM B 247M).
 5. ASTM C1036-06 – Standard Specification for flat Glass.
 6. ASTM C1048-04 – Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
 7. ASTM C1107-07 (ASTM C1107M-07) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

1.8 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not suit structural performance requirements.

1.10 WARRANTY

- A. Manufacturer's Warranty: Furnish railing manufacturer's standard limited warranty document executed by an authorized company official. Manufacturer's warranty is in addition to and not a limitation of other rights Owner may have under the contract documents.
- B. Guardrail Warranty: One (1), Three (3) and Five (5) years commencing on Date of substantial completion.

PART 2 - PRODUCTS

(Specifier Note: Select product paragraphs below to suit the project requirements. Add product attributes performance characteristics, material standards and descriptions as applicable. Use of such phrases as "or equal" and "or approved equal" may cause ambiguity in the specification. Such phrases require verification, procedural, legal, regulatory and responsibility for determining equivalence of products.)

2.1 MANUFACTURER

- A. Drawings and Specifications based on products manufactured:
1. Mullet's Aluminum Products, Inc.
905 Ponder Ave.
Sarasota, FL 34232
1.877.685.5387

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.
 - 1. Provide machined aluminum glass brackets with 3/8 in. nylon tip set screw.
 - a. Bracket Size: As indicated.
 - b. Set Screw Location: As indicated.

2.3 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
- B. Extruded Bars and Shapes, Including Extruded Tubing: ASTM B 221 (ASTM B 221M), Alloy 6063-T5 and 6061-T6, unless otherwise indicated.
- C. Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6005-T5, 6061-T6 and Alloy 6063-T52.
- D. Die and Hand Castings: ASTM B 247 (ASTM B 247M), Alloy 6061-T6.

2.4 FINISH

- A. Exposed Finish: Thermosetting resin technology of high performance powder coating.

(Specifier Note: Select high performance coating below to suit project requirements.)

- B. Modified Polyester Powder Coat: Finish meeting AAMA 2604 with minimum dry film thickness of 1.5 mils (0.059 inch). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying baking finish. Applicator may use chrome or non-chrome chemical conversion coating. Pretreatment process complying with AAMA 2604. (5 year finish warranty)
- C. Seventy-percent Fluoropolymer Thermosetting Resin Powder Coat: Finish meeting AAMA 2605 with minimum dry film thickness of 1.5 mils (0.059 inch). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying baked finish. Applicator may use chrome or non-chrome chemical conversion coating pretreatment process complying with AAMA 2605. (10 year finish warranty)
- D. One-hundred percent Fluoropolymer Thermosetting Resin Powder Coat: Finish meeting AAMA 2605 with minimum dry film thickness of 1.5 mils (0.059 inch). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying baked finish. Applicator must use chrome chemical conversion coating pretreatment process complying with AAMA 2605. (15 year finish warranty)
- E. Seventy-percent Duranar XL Coating System: Kynar finish meeting AAMA 2605 and minimum dry film thickness of 1.5 mils (0.059 inch). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying baked finish. Applicator must use chrome chemical conversion coating pretreatment process in complying with AAMA 2605. (15 year finish warranty)

F. No substitution permitted.

(Specifier Note Ten (10) year and Fifteen (15) year warranties available at extra cost.)

G. Finish Warranty:

1. Five (5), Ten (10) or Fifteen (15) years.

(Specifier Note: Select glass type appropriate for project.)

2.5 GLASS AND GLAZING MATERIALS

(Specifier Note: Delete paragraph below if tempered glass type not used. Select color, configuration and thickness.)

A. Tempered Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type 1 (transparent flat glass), Quality-Q3. Provide products that have been tested for surface and edge compression according to ASTM C 1048 and for impact strength according to 16 CFR 1201 for Category II materials.

1. Glass Color: Clear, unless noted otherwise.
2. Thickness: As indicated on Drawings.
3. Sizes: As indicated on Drawings.
4. Edges: Ground smooth and polished.

(Specifiers Note: Post and guardrail with glass infill system below describes "Mullet's Aluminum GRS-100 System".)

2.6 GRS-100 POST GUARDRAIL SYSTEM

(Specifiers Note: Select Top Cap B-G Top Cap options below meeting project requirements. The caps are proprietary and no substitutions allowed.)

A. Description: Engineered, post and glass channel supported aluminum guardrail system with glass infill panels.

B. Top Cap: 3-3/8 in (86mm) diameter by 2-7/8 in. (76mm) by 1/8 in.(3mm).

C. Top Cap: Oval 4 in.(102mm) by 2in. (52mm) by 1/8 in.(3mm).

D. Top Cap: Type #133.

E. Top Cap: MA114 by 1/8 in. (3mm).

F. Top Cap: 2-1/4 in. (56mm) by 1-5/8 in. (47mm) LG. Dixie.

G. Top and Bottom Glass Channels: Aluminum, 6061-T6 alloy; 1-3/4 in. (44mm) wide by 1-3/4 in. (44mm) high by 1/8 in.(3mm) square profile.

1. Proprietary and No substitutions Allowed.

H. Post: Aluminum 6061-T6 alloy; 2 in. (51mm) by 2 in. (51mm) by 1/8-in. (3mm) square profile.

I. Gap Filler: Aluminum 6063-T52 alloy; 3/4 in.(19mm) by 1-1/2 in. (39mm) by 1/16 in. (1.6mm) rectangular profile.

J. Setting Block: Silicone rubber 1/2in. (13mm) by 3/4 in.(19mm) by 2 in. (51mm) rectangular profile.

K. Sealant/Gasket: Silicone Rubber.

L. Glass and Glazing: As specified this section.

(Specifiers Note: Bracket Guardrail System with glass infill system below describes “Mullet’s Aluminum GRS-200 System”.)

2.7 GRS-200 BRACKET RAIL SYSTEM

A. Description: Engineered, bottom rail and post with point glass bracket supported aluminum rail system with glass infill panels.

B. Post Cap: Aluminum 6061-T6 alloy; 1-3/4 in (44mm) by 3 in. (76mm) by 1/4 in.(3mm).

C. Bottom Rail: Aluminum, 6063-T52 alloy; 1-3/4 in. (44mm) wide by 1-3/4 in. (44mm) high by 1/8 in. (3mm) rectangular profile.

(Specifiers Note: Select Top Cap option below meeting project requirements)

D. Post: Aluminum 6063-T52 alloy; 1-3/4 in (44mm) by 3in. (76mm) by 1/4 in.(3mm) rectangular profile.

(Specifiers Note: Select either Post Aluminum options below or above meeting project requirements).

E. Post: Aluminum 6061-T6 alloy; 2 in (51mm) by 2 in. (51mm) square profile.

F. Glass Bracket: Machined Aluminum 6061-T6 alloy; 1-3/4in. (44mm) by 1-1/2 in. diameter (39mm) circular profile with 3/8 in. (9.5mm) nylon tip set screw located side as indicated.

G. Sealant/Gasket: Silicone Rubber as standard with manufacturer.

H. Glass Panel:

(Specifiers Note: Revise glass color below, if different, that will meet project requirements)

1. Color: Clear, unless otherwise indicated.

2. Edges: Polished.

(Specifiers Note: Revise thickness below, if different, that will meet project requirements)

3. Thickness: 1/2-inch. (13mm), tempered, unless noted otherwise.

4. Additional Information: As specified this section.

(Specifiers Note: Base Mounted Guardrail System with glass infill system below describes “Mulle’s Aluminum GRS-300 System”.)

2.8 GRS-300 BASE MOUNTED GLASS RAILING SYSTEM

A. Description: Engineered, base mounted supported railing system with point glass shoe clamps and glass infill panels.



(Specifiers Note: Select Alternate Top Cap option below if required by project requirements)

B. Top Cap: Aluminum 6061-T6 alloy; 2 in. (51mm) diameter circular profile.

(Specifiers Note: Select Alternate Glass Bracket option below as detailed by manufacturer if required by project requirements)

C. Continuous Base Shoe: Aluminum, 6061-T6 alloy; 2-3/4 in. (70mm) wide by 4in. (102mm) high by 3/8 in. (9.5mm) rectangular profile, mill finish.

D. Continuous Drainage Block: Aluminum, 6061-T6 alloy; 2-1/4in (56mm) by 2-1/2in. (64mm) by 3/8 in. (9.5mm) rectangular profile, black finish for continuous shoe base support.

E. Shoe Clamp Assembly: Wedge Plate Aluminum 6061-T6 alloy; custom size and shape with (9.5 mm) plastic inset as indicated.

F. Plastic Wedge: Manufacturers standard high density plastic wedged into continuous shoe base for glass panel glazing.

G. Gasket: Manufacturers standard high density extruded black silicone rubber 3/4 in. (19mm) by 9/16 in. (14mm).

H. High Density Foam: Manufacturers standard high density foam for spacing and sealing pad.

I. Glass Panel:

(Specifiers Note: Revise glass color below, as required by project requirements)

1. Color: Clear, unless otherwise indicated.
2. Edges: Ground Smooth and Polished.

(Specifiers Note: Revise thickness below, as required by project requirements)

3. Thickness: 1/2-inch. (13mm), 3/4-inch (19mm) and 1-inch (25 mm) tempered, unless noted otherwise.
4. Panel Joint: Butt, 1/4-inch. (6mm).
5. Additional Information: As specified this section.

2.9 FASTENERS

A. Fastener Materials: Unless otherwise indicated, provide the following:

1. Aluminum Components: Stainless-steel fasteners.

B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

2.10 MISCELLANEOUS MATERIALS

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.11 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (0.79 mm).
- D. Form work true to line and level with accurate angles and surfaces unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
- I. Bend members in jigs to produce uniform curvature for each configuration as required.
- J. Close exposed ends of hollow railing members with prefabricated end fittings.
- K. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/2 inch (12 mm) or less.
- L. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- M. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.12 GLAZING PANEL FABRICATION

- A. General: Fabricate to sizes and shapes required; provide for proper edge clearance and bite on glazing panels.
 - 1. Clean-cut or flat-grind edges at butt-glazed sealant joints to produce square edges with slight chamfers at junctions of edges and faces



2. Grind smooth exposed edges, including those at open joints, to produce square edges with slight chamfers at junctions of edges and faces.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install railing systems in accordance with manufacturer's written instructions and shop drawings.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 2. Set posts plumb within a tolerance of 1/8 inch in 3 feet (3 mm in 1 m)
 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).
- C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with fabricators protective coating or with heavy coat bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.2 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections whether welding is performed in the shop or in the field.
- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches (150 mm).

3.3 ANCHORING POSTS

- A. Form or core-drill holes not less than 3 inches (76 mm) deep and 3/4 inch (20 mm) larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Leave anchorage joint exposed with 1/8-inch (3-mm).
 1. For aluminum railings, attach posts as indicated using fittings designed and engineered for this purpose.

3.4 ATTACHING RAILINGS

- A. Use manufacturers supplied hardware.
- B. Anchor railing ends to concrete and masonry with brackets on underside of rails connected to railing ends and anchored to wall construction with anchors and bolts.

- C. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends.
- D. Attach handrails to walls with wall brackets except where end flanges are used. Provide brackets with 1-1/2-inch (38-mm).
 - 1. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- E. Secure wall brackets and railing end flanges to building construction as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields “Tapcon” or Wedge Bolt.
 - 2. For hollow masonry anchorage, use “Tri-lobe” Anchor and sheet metal screw.

3.5 INSTALLING GLASS PANELS

- A. Glass Railing: Install assembly to comply with railing manufacturer’s written instructions.
 - 1. Attach base channel to building structure, then insert and connect factory-fabricated and assembled glass panels if glass was bonded to base and top rail channels in factory.
 - 2. Adjust spacing of glass panels so gaps between panels are equal before securing in position.
 - 3. Erect glass railings under direct supervision of manufacturer’s authorized technical personnel.

3.6 CLEANING

- A. Clean aluminum by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.
- B. Clean and polish glass as recommended in writing by manufacturer. Wash both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion.
- C. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with manufacturer’s recommendations for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm).

3.7 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 73 20

