

SECTION 05 73 13 – ARCHITECTURAL GLASS RAILING

PART 1 -- GENERAL

Section 1.01 SCOPE OF WORK

- A. Fabricate and install architectural glass railings in accordance with the requirements set forth in this section.

Section 1.02 ADDITIONAL WORK INCLUDED IN THIS SECTION

- A. Reinforcing for wall rail brackets at dry wall partitions.
- B. Field measuring for weld plates, sleeves and insert locations.
- C. Field measuring.
- D. Anchors or inserts for terrazzo or precast concrete.

The following items are not to be included in the metal rail contractor's work:

- Temporary shoring or bracing
- Demolition and removal of existing work
- Clean up of existing construction prior to installation of stairs
- Cleaning out of stair wells
- Cutting; preparation of pockets; setting of plates, inserts, carpenter hardware or any other built ins
- Temporary lights and electricity
- Temporary safety rails after erection
- Field painting
- Final cleaning and protection of aluminum, stainless steel, bronze and glass

Section 1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Section 03 30 00: Cast-in-Place Concrete
- B. Section 03 40 00: Precast Concrete
- C. Section 03 62 00: Non-Shrink Grouting
- D. Section 03 63 00: Epoxy Grouting
- E. Section 04 20 00: Unit Masonry
- F. Section 04 40 00: Stone Assemblies
- G. Section 05 12 00: Structural Steel Framing
- H. Section 08 80 00: Glazing
- I. Section 09 20 00: Plaster and Gypsum Board Assemblies
- J. Section 09 30 00: Tiling
- K. Section 09 65 00: Resilient Flooring
- L. Section 09 68 00: Carpeting
- M. Section 09 90 00: Painting and Coating

Section 1.04 STRUCTURAL REQUIREMENTS

The structural adequacy of the metal stair design is the responsibility of the designer or professional of record.

- A. Railing assembly shall withstand a minimum concentrated load of [200] [] pounds applied vertically downward or horizontally in any direction, but not simultaneously, at any point on the top rail.

Codes may vary in method of application and magnitude of load. Governing code should be checked for specific requirements. Most codes require a 200 pound minimum concentrated load applied in any direction at any point on the top rail.

- OR -

- A. Railing assembly shall withstand a minimum uniform load of [50] [] pounds per foot applied horizontally or vertically downward, but not simultaneously, on the top rail.

Some codes have requirements for uniform loading on the top rails. Most codes require a 50 lb/ft minimum uniform load . Uniform loads are not to be applied concurrently with concentrated loads.

Section 1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Furnish references listing projects of similar size and scope
If special or unusual capabilities are required they should be set forth here.
- B. Installer Qualifications

State as required in 1.05.A or state specific qualifications required.

C. Regulatory Requirements

1. Components and installation are to be in accordance with state and local code authorities
2. Components and installation are to follow current ADA and ICC/ANSI A117.1 guidelines.

Determine code regulations that govern this work. Specify requirements and drawings that are necessary to meet governing codes.

D. Certifications

1. Furnish certification that all components and fittings are furnished by the same manufacturer or approved by the primary component manufacturer.
2. Furnish certification that components were installed in accordance to the manufacturer's engineering data to meet the specified design loads.

E. Pre-Installation Meeting

1. Prior to the beginning of work, conduct a pre-job conference at the job site.
2. Provide seven calendar days advance written notice ensuring the attendance by competent authorized representatives of the fabricator, building owner's representative, architect and subcontractors whose work interfaces with the work of this section.
3. Review the specifications to determine any potential problems, changes, scheduling, unique job site conditions, installation requirements and procedures and any other information pertinent to the installation.
4. Record the results of the conference and furnish copies to all participants.

Section 1.06 REFERENCES

Include only reference standards that are to be indicated within the text of this section. Edit the following, adding and deleting as required for project and product selection.

A. Aluminum Association (AA)

1. ABH-21 Aluminum Brazing Handbook
2. ASD-1 Aluminum Standards and Data
3. DAF-45 Designation System for Aluminum Finishes
4. SAA-46 Standards for Anodized Architectural Aluminum

B. American Architectural Manufacturers Association (AAMA)

1. AAMA 605.1 Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
2. AAMA 606.1 Voluntary Guide Specifications and Inspection Methods of Integral Color Anodic Finishes for Architectural Aluminum.
3. AAMA 607.1 Voluntary Guide Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
4. AAMA 608.1 Voluntary Guide Specifications and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.

C. American Concrete Institute (ACI)

1. ACI 347 Recommended Practice for Concrete Formwork

D. American Institute of Steel Construction (AISC)

1. Manual of Steel Construction

E. American Iron and Steel Institute (AISI)

1. Steel Products Manual; Stainless and Heat Resisting Steel.
2. Code of Standard Practice

F. American National Standards Institute (ANSI)

1. ANSI A58.1 Minimum Design Loads in Buildings and Other Structures.
2. ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities.
3. ANSI A97.1 Safety Performance Specifications and Methods of Test for Safety Glazing Material used in Buildings.

G. Society for Testing and Materials (ASTM)

1. A 167 Specification for Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
2. A 269 Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
3. A 312 Specification for Seamless and Welded Austenitic Stainless Steel Pipe.
4. A1264-1 Safety Requirements for Workplace Floor and Wall Openings, Stairs and Railing Systems
5. B 43 Specification for Standard Sizes of Seamless Red Brass Pipe.
6. B 209 Specification for Aluminum and Aluminum Alloy Sheet and Plate.
7. B 210 Specification for Aluminum and Aluminum Alloy Drawn Seamless Tubes.
8. B 211 Aluminum and Aluminum Alloy Bar, Rod and Wire
9. B 221 Specification for Aluminum-Alloy Bars, Rods, Wires, Shapes and Tubes

10. B 241 Specification for Aluminum and Aluminum Alloy Seamless Pipe and Seamless Extruded Tube.
 11. B 429 Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
 12. B 455 Specification for Copper-Zinc-Lead Alloy (Leaded Brass) Extruded Shapes.
 13. B 584 Specification for Copper Alloy Sand Castings for General Applications.
 14. C 595 Specification for Blended Hydraulic Cements.
 15. C1036 Standard Specification for Flat Glass
 16. C 1048 Standard Specification for Heat-Treated Flat Glass - Kind HS, Kind FT Coated and Uncoated Glass.
 17. C 1172 Standard Specification for Laminated Architectural Flat Glass.
 18. D 1730 Recommended Practices for Preparation of Aluminum and Aluminum Alloy Surfaces for Painting.
 19. E 84 Test Method for Surface Burning Characteristics of Building Materials.
 20. E 894 Standard Test Methods for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
 21. E 935 Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
 22. E 985 Specification for Permanent Metal Railing Systems and Rails for Buildings.
 23. E 1300 Standard Practice for Determining Load Resistance of Glass in Buildings
 24. E 2353 Standard Test Methods for Performance of Glass in Permanent Glass Railing Systems, Guards, & Balustrades.
 25. E 2358 Standard Specification for Performance of Glass in Permanent Glass Railing Systems, Guards, & Balustrades.
- H. American Welding Society (AWS)
1. Specifications for Welding Rods and Bare Electrodes.
- I. Americans With Disabilities Act Accessibility Guidelines (ADAAG)
- J. Copper Development Association (CDA)
1. Standards Handbook, Wrought Copper and Copper Alloy Mill Products, Part 2 - Alloy Data.
 2. Standards Handbook, Cast Copper and Copper Alloy Products, Part 7 - Alloy Data.
 3. Copper, Brass and Bronze Design Handbook for Architectural Applications.
- K. General Service Administration (GSA) Federal Specifications (FS)
1. DD-G-1403 Glass, Plate (Float), Sheet, Figured, and Spandrel (Heat Strengthened and Fully Tempered).
 2. QQ-C-390 Copper Alloy Castings.
 3. QQ-S-766 Stainless Steel, Class 302 or 304.
 4. FS-TT-P-645 Primer, Paint, Zinc Chromate, Alkyd Type.
 5. FS-TT-P-645A Primer, Paint, Zinc Chromate, Alkyd Type.
- L. Green Globes System
- M. International Code Council (ICC)
1. International Building Code (IBC)
 2. International Residential Code (IRC)
- N. Iron and Steel Society (ISS)
1. Steel Products Manual
 - a. Stainless and Heat Resisting Steels
- O. Military Specifications (MIL)
1. MIL-A-46104 Aluminum Alloy Extruded Rod, Bar, and Shapes, 7001.
 2. MIL-P-1144 Pipe, Corrosion Resistant, Stainless Steel, Seamless or Welded.
 3. MIL-P-25995 Pipe, Aluminum Alloy, Drawn or Extruded.
 4. MIL-R-36516 Rail, Restraint.
- P. National Association of Architectural Metal Manufacturers (NAAMM) and National Ornamental and Miscellaneous Metals Association (NOMMA)
1. Metal Finishes Manual
- Q. National Association of Architectural Metal Manufacturers (NAAMM)
1. Metal Stair Manual
- R. National Association of Home Builders (NAHB)
1. Model Green Home Building Guidelines.
- S. National Association of Home Builders' Research Center (NAHBRC)
1. Review of Fall Safety of Children Between the Ages of 18 Months and 4 Years in Relations to Guards and Climbing in the Built Environment.
- T. National Fire Protection Association (NFPA)
1. 101 Life Safety Code
- U. Institute of Building Sciences
1. Metric Guide for Federal Construction
- V. U.S. Green Building Council
1. The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™

Section 1.07 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section [01 30 00] [01 34 00].
1. Show sections and plans of stairs, dimensions and assembly of components.
 - a. Railings
 - b. Handrail
 - c. Brackets
 - d. Reinforcements
 - e. Anchors
 - f. Welded and bolted connections
 2. Show all field connections
 3. Provide setting diagrams for installation of anchors, location of pockets, weld plates for attachment of rails to structure, and blocking for attachment of wall rail.
 4. Specify adequate back up support for anchoring handrail bracket.
 5. Indicate all required field measurements.
 6. Submit [one] [] set[s] of CAD files for approval.
- B. Indicate component details, materials, finishes, connection and joining methods, and the relationship to adjoining work.
- C. Submit manufacturer's installation instructions under provisions of Section [01 30 00] [01 34 00].
- D. Samples:
1. Submit duplicate samples of railing showing style and finish. One approved sample will be returned to contractor.
 2. Submit sample(s) of _____
 3. Certificates:
 - a. Furnish manufacturer's certification that materials meet specification requirements.
- OR –
- a. Furnish [certification] [and] [or] [calculations] by an engineer registered in the state where the project is located showing that safety requirements are met.
- This requirement should be included only if called for by contract documents.*
- E. Substitutions:
1. Any changes in specified material must meet requirements of the General Conditions "or equal" clause. (See # _____)
Indicate Section and Paragraph of the General Conditions that sets out "or equal" requirements.
 2. Changes in architectural details to fabricator's standard procedures will be allowed when appearance and strength are not affected.
State any alternatives that affect the work and/or bid price of this section, such as a change in material or a change to contractor's standard details.

Section 1.08 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in good condition and properly protected against damage to finished surfaces.
- B. Storage on site:
1. Store material in a location and in a manner to avoid damage. Stacking shall be done in a way, which will prevent bending.
 2. Store material in a clean, dry location away from uncured concrete and masonry. Cover with waterproof paper, tarpaulin, or polyethylene sheeting in a manner that will permit circulation of air inside the covering.
 3. Keep handling on site to a minimum. Exercise particular care to avoid damage to finishes of material.

PART 2 -- PRODUCTS

Section 2.01 ACCEPTABLE MANUFACTURER

- A. Railing [pipe] [tube] and components shall be as manufactured or supplied by The Wagner Companies; P.O. Box 423; Butler, WI 53007. Phone: 888-243-6914. Fax: 414-214-0550. Web site: www.wagnercompanies.com. E-mail: info@mailwagner.com.

Section 2.02 MATERIALS AND FINISHES

- A. Aluminum:
1. Extruded Pipe: Alloy [6061-T6] [6063-T52] [6063-T6] meeting ASTM B 221
 2. Extruded Bars, Shapes and Mouldings: Alloy [6063-T52] [6063-T6] meeting ASTM B 221
 3. Castings: Almag 35 meeting ASTM B 26
 4. Finish (*refer to NAAMM/NOMMA Metal Finishes Manual*):

- a. Anodized finish shall be [AA-M10-C22-A31 (204R1)] [provided in accordance with AA-M___-C ___-A___] and shall meet requirements of AAMA (606.1) (607.1) (608.1).
 - b. Painted finish shall be _____ type and _____ color and shall meet the requirements of AAMA 605.1 specification for high performance organic coatings.
- B. Stainless Steel: Type [304] [316] [_____]
1. Bar: ASTM A 167
 2. Pipe and Tubing: ASTM [A 269] [A 312]
 3. Finish: [Ornamental Grade, AISI No. 4] [AISI No.____].
- C. Copper Alloys:
1. Drawn Pipe: C23000 (Red Brass), ASTM B 43
 2. Drawn Tube: C27000
 3. Sheet: C28000 (Muntz Metal)
 4. Castings: [C83600] [C86500] meeting ASTM B 584 for sand castings]
 5. Finish (*refer to NAAMM/NOMMA Metal Finishes Manual*):
 - Mechanical: [M32-Medium Satin] [M__ - _____]
 - Chemical: C _____ - _____
 - Coating:
 - [Clear Organic: O _____ - _____]
 - Laminated: L _____ - _____]
 - [Wax: _____]
 - [Oil: _____]
- D. Steel:
1. Bars: meeting ASTM A 36.
 2. Finish (*refer to NAAMM/NOMMA Metal Finishes Manual*):
 - a. Surface Preparation: Remove loose scale, rust, grease, oil, moisture or other foreign materials to properly prepare the surface for subsequent coating application.
 1. Remove mill scale, rust and dirt following SSPC SP2 for hand cleaning and SSPC SP3 for power tool cleaning.
 - b. Galvanizing:
 1. Products fabricated from shapes, plates, bars and strips shall be galvanized in accordance with ASTM A 123.
 2. Sheet products shall be galvanized in accordance with ASTM A 525 and ASTM A 526.
 3. Minimum coating weight ___ oz/sq. ft.
 - c. Paint:
 1. Minimum one coat of rust-inhibitive primer _____, [FS-TT-P-641 Zinc Dust-Zinc Oxide Primer Coating (for Galvanized Surfaces)] [FS-TT-P-645 Alkyd Type, Zinc Chromate, Paint Primer]
 2. Painted finish shall be _____ type and _____ color.
 - d. Touch up for Galvanized Surfaces: Use paint primer meeting FS-TT-P-645.
- E. Glass:
1. Fully tempered ASTM C 1048 Kind FT quality q3 conforming to the safety requirements of ANSI Z97.1.
 2. Laminated, [fully tempered] [heat strengthened], ASTM C 1172, with [PVB] [rigid] interlayer.
 3. Tint: [None] [Gray] [_____].

Section 2.03 RAILING SYSTEM

- A. Material shall conform to 2.02. and be finished in accordance with 2.02.
- B. Railing system shall be [surface] [flush] [fascia] mounted.
- C. Rails: Fabricate rails from [aluminum] [brass] [stainless steel] Wagner No. _____
- D. Posts: Fabricate posts from [_____] inch outside diameter by [_____] inch wall [aluminum] [bronze] [brass] [stainless steel] tubing.
- E. Glass Structural Balustrade shall be [¹/₂] [³/₄] inch tempered glass and conform to the safety requirements of ANSI Z97.1.
- F. Shoe Moulding: Extruded aluminum alloy Wagner No. _____
- G. Cladding [aluminum] [brass] [stainless steel], Wagner No. _____.
- H. Fittings: Shall be of wrought material of [aluminum] [brass] [stainless steel].
- I. Glazing Accessories:
 1. Protective insert shall be of polyvinyl chloride (PVC); Wagner No. GR939__.
 2. Dry Glaze:
 - a. Wagner [PanelGrip™ No. PG2450] [GlassWedge™ No. (GR9500) (GR9750)]
 - b. Shoe Moulding insert [GR9300] [GR9398] [GR9354]
 2. Wet Glaze:
 - a. Setting block shall be Wagner No. [GR9392] [GR9393].

- b. Filler: [Rockite] [Type _____ ; Color: _____]
- c. Shoe Moulding insert [GR9396] [GR9398]

Section 2.04 FASTENERS

- A. All mechanical fasteners used in the assembly of stainless steel or aluminum railings shall be manufactured from stainless steel.
- B. Exposed mechanical fasteners for use with bronze materials shall be manufactured from yellow brass.
- C. Cement: Hydraulic, ASTM C 595, factory prepared with accelerator.

Section 2.05 HANDRAIL BRACKETS

- A. [Aluminum] [Bronze] [Stainless steel]; [cast] [extruded] [stamped] [machined]: Wagner No. _____
Check governing codes for dimensional and structural requirements.

Section 2.06 FABRICATION

- A. Form [rail-to-end post connections and] all changes in rail direction by [miter] [radius] elbows.
- B. Cut material square and remove burrs from all exposed edges, with no chamfer.
- C. Make exposed joints butt tight and flush.
- D. Close exposed ends of [pipe] [handrail] by use of appropriate end cap.
- E. For posts set in concrete, furnish matching sleeves or inserts not less than 5 inches long.
- F. Locate intermediate rails [midway] [equally spaced] between top rail and finished floor or center line of tread.
- G. Verify dimensions on site prior to shop fabrication.

PART 3 --EXECUTION

Section 3.01 PREPARATION

- A. Supply items to be [cast in concrete] [embedded in masonry] [placed in partitions].

Section 3.02 METAL INTERACTION

- A. When bronze and aluminum components come into contact with dissimilar metals, surfaces shall be kept from direct contact by painting the dissimilar metal with [a heavy coat of a proper primer] [asphalt paint].
- B. When aluminum components come into contact with cement or lime mortar, exposed aluminum surfaces shall be painted with [heavy bodied bituminous paint] [water-white methacrylate lacquer] [zinc chromate].

Section 3.03 INSTALLATION

- A. Install in accordance with shop drawings [and manufacturer's instructions] at locations indicated on the drawings.
- B. Erect work [square and level,] [horizontal or parallel to rake of steps or ramp,] rigid, [and] free from distortion or defects detrimental to appearance or performance.
- C. Expansion joints shall be provided as needed to allow for thermal expansion or contraction.

Section 3.04 CLEANING

- A. As installation is completed, wash thoroughly using clean water and soap; rinse with clean water.
- B. Do not use acid solution, steel wool or other harsh abrasives.
- C. If stain remains after washing, remove finish and restore in accordance with *NAAMM/NOMMA Metal Finishes Manual*.
- D. Finish must not be removed from anodized aluminum. Reanodizing can only be done by removing railing and returning it to the anodizer.

Section 3.05 REPAIR OF DEFECTIVE WORK

- A. Remove stained or otherwise defective work and replace with material that meets specification requirements.
- B. Repair damaged finish as directed by Architect
- C. Replace defective or damaged components as directed by Architect.