

METAL RAILINGS

GENERAL INFORMATION

- 1.1 This section describes requirements pertaining to metal handrails and railings constructed of steel pipe and plate for interior and exterior use.
- 1.2 Reference Standards:
 - a. American Society for Testing and Materials (ASTM) A36 Specification for Structural Steel
 - b. ASTM A53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated, Welded and Seamless.
 - c. ASTM A123 Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products.
 - d. ASTM A143 Recommended Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
 - e. ASTM A153 Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - f. ASTM A307 Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile
 - g. ASTM A384 Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies
 - h. ASTM A385 Practice for Providing High-Quality Zinc Coatings (Hot-Dip)
 - i. ASTM A449 Specification for Quenched and Tempered Steel Bolts and Studs
 - j. ASTM A563 Specification for Carbon and Alloy Steel Nuts
 - k. ASTM A780 Practice for Repair of Damaged Hot-Dip Galvanized Coatings
 - l. ASTM D2092 Practices for Preparation of Zinc-Coated Galvanized Steel Surfaces for Paint
 - m. National Association of Architectural Metal Manufacturers (NAAMM) "Pipe Railing Manual, Including Round Tube"
 - n. Steel Structures Painting Council (SSPC) SP 1 Solvent Cleaning

DESIGN REQUIREMENTS

- o. SSPC-SP 3 Power Tool Cleaning
- p. SSPC-SP 10 Near-White Blast Cleaning
- q. SSPC-SP 11 Power Tool Cleaning to Bare Metal

DESIGN REQUIREMENTS

2.1 Materials:

- a. Metal handrails: Standard Steel Pipe, Architectural Handrail Grade, Exterior metal handrails shall be galvanized.
- b. Provide terminal safety returns for all stair handrails. Handrail brackets shall be galvanized malleable iron, manufactured for the purpose, for anchorage to concrete or other required substrates. Include all fittings and components, sleeves, hardware, backing plates, and accessories as required for a complete and finished handrail installation.
- c. Steel Pipe: Pipe for railings, pipe supports, and pipe sleeves shall be seamless steel pipe conforming to ASTM A53, Type S, Grade A, of diameters and sizes indicated. Special instructions shall be given the pipe manufacturer to provide Architectural Handrail Grade pipe.
- d. Plate: Steel plate for anchor plates shall be standard steel plate, conforming to ASTM A36, weldable quality.
- e. Specify all required anchors, fasteners, miscellaneous components, and accessories as required for a complete and finished railing installation. Bolts and studs, nuts, and washers shall conform to ASTM A307, A449, and A563, as applicable, and shall be galvanized in accordance with ASTM A153.
- f. Expansion Bolts: Where anchors are not included in concrete construction, specify galvanized expansion type anchors with matching galvanized steel bolts or studs with nuts of sizes as indicated or required. Specify washers under all bolt heads and nuts. Expansion bolts require approval of the Engineer before they may be installed in post-tensioned slabs. Expansion bolts are not permitted for use on concrete curbs or along the edge of concrete or a concrete joint.
- g. Paint: Corrosion-inhibitive metal primer as herein specified under "Cleaning and Painting."

2.2 Fabrication:

DESIGN REQUIREMENTS

- a. Metal handrails and railings shall be fabricated by firms or shops experienced and skilled in the custom fabrication of architectural metal handrails and railings, and shall meet the quality requirements of NAAMM's Pipe Railing Manual.
- b. Bends in rails shall be precision-formed to a smooth continuous radius by skilled workers. Work quality and finish shall be true to detail. Butt joints shall have internal pipe sleeve or dowel. Ends shall be closed with similar materials, welded and ground smooth.
- c. Welding shall be performed in the shop unless otherwise indicated. Welded joints of handrails and railings shall be ground and dressed smooth to match adjacent surfaces and so that the shape and profile of the item welded is maintained.
- d. Metal handrails and railings shall be prefabricated and preassembled in the factory or shop as far as practicable.

2.3 Galvanizing:

- a. Ferrous metal railings and related items on the exterior of buildings, or as otherwise indicated, shall be galvanized, after fabrication, by the hot-dip process in accordance with ASTM A123 and ASTM A385. Weight of zinc coating shall conform to requirements specified under "Weight of Coating" in ASTM A123.
- b. Safeguarding against embrittlement and warpage shall conform to applicable ASTM requirements noted above.
- c. Shop galvanized metalwork necessitating field welded which in any manner removes original galvanizing shall be restored in accordance with ASTM A780.
- d. Bolts and screws for attachment of galvanized items shall be galvanized in accordance with ASTM A153.

2.4 Cleaning and Painting:

- a. All surfaces of metal handrails and railings shall be cleaned and treated to assure maximum paint adherence, prior to application of the shop prime coat, in accordance with SSPC-SP 1, SSPC-SP 3, SSPC-SP 10, and SSPC-SP 11 as applicable for the type of substrate, exposure and application.
- b. Ferrous metalwork shall be given a coat of rust-inhibitive metal primer. All surfaces of the handrail and railings shall be spray-painted.
- c. Assure compatibility of prime coat and finish coats of paint.

CONSTRUCTION REQUIREMENTS

- 3.1 Submittals: Submit detailed shop drawings of metal handrails and railings, showing sizes, details of fabrications and construction, bends and radii, handrail brackets, locations of hardware, anchors, and accessories, and installation details. Submit manufacturers' product data of railing system and railing components, handrails, and handrail brackets. Include corrosion-inhibitive shop coat painting system.
- 3.2 Installation:
- a. Install metal handrails and railings as indicated and in accordance with approved shop drawings, using workers skilled and experienced in the installation of the type of work involved. Conform to installation requirements of NAAMM's Pipe Railing Manual, as applicable.
 - b. Installation of handrails and railings shall be true and horizontal, perpendicular, or at the required angle, as the case may be, level and square, with angles and edges parallel with related lines of the building or structure.
- 3.3 Galvanizing Repair: Galvanized surfaces which have become damaged from welding, handling, or installation with galvanizing repair material in accordance with ASTM A780.
- 3.4 Field Painting:
- a. After installation exposed painted surfaces, filed welds, and other abraded or damaged primed surfaces shall be prepared as required and touched up with an additional coat of the same primers for ferrous and galvanized surfaces and specified for shop painting.
 - b. Lightly sand and feather out such damaged surfaces so that paint touch-up becomes invisible.
 - c. Finish field painting is specified in Section 09 90 00 – Painting.

REFERENCE

- 4.1 The applicable CSI Specification Section is 05 52 00.