

SECTION 05510

METAL STAIRS, LADDERS, AND WALKWAYS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Technical requirements for metal stairs, ladder, and walkways.

1.2 REFERENCES

- A. General: References to standards, specifications, manuals, or codes of any technical society, organization or association, or to the Laws or Regulations of any government authority, whether such reference be specific or by implication, shall mean the latest standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
- B. ANSI Standards
1. ANSI A14.3 Safety Requirements for Fixed Ladders
- C. ASTM Standards
1. ASTM A36 Specification for Structural Steel
 2. ASTM A53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
 3. ASTM A123 Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products
 4. ASTM A193 Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
 5. ASTM A500 Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- D. AWS Standards

1. AWS D1.1 Welding in Building Construction

1.3 SYSTEM DESCRIPTION

- A. Furnish and install metal stairs, ladders, and walkways required to complete work show and specified
- B. Furnish and install metal stairs, ladders, and walkways as shown on the Drawings and specified in this Section.

1.4 SUBMITTALS

- A. Shop Drawings.
 - 1. Show stair, ladder and walkway fabrication and construction details.
 - 2. Including necessary plans, sections and elevations to show Life Safety features.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements
 - 1. Design, fabrication and construction of stairs, ladders and walkways shall comply with SBC, OSHA and NFPA 101 Life Safety code.
 - 2. Stairs, ladders and walkways for utility facilities shall conform to “industrial occupancy” Anaccessible to the public, unless otherwise indicated on the Drawings

PART 2 – PRODUCTS

2.1 MATERIALS FOR METAL STAIR, LADDERS, AND WALKWAYS

- A. Steel
 - 1. Steel bars, plates, shapes, and connections for steel stairs and walkways shall meet the requirements of ASTM A36.
 - 2. Structural steel tubing for steel walkways shall meet the requirements of ASTM A500, Grade B. Wall thickness shall be as shown on the Drawings.
 - 3. Steel pipe for steel walkways shall meet the requirements of ASTM A53, Schedule 40.
 - 4. Steel fabrications shall be galvanized by the hot dip method, after fabrication, in accordance with the requirements of ASTM A1 23.

B. Aluminum

1. Aluminum bars, plates, rods, and shapes for aluminum stairs, ladders, and walkways shall be Alloy 6061 -T6, unless otherwise shown or specified.
2. Aluminum bars, plates, rods, and shapes shall have standard mill finish.

C. Welding Electrodes

1. Welding electrodes for structural steel shall conform to AWS A5.5, E70XX.
2. Use 4043 filler metal for aluminum.
3. Use type E308 electrode where the base metal is type 304 stainless steel and type E309 where the base metal is type 316 stainless steel or where stainless steel is welded to carbon steel.
4. Field welding of galvanized steel shall not be acceptable.

D. Anchor Bolts and Fasteners

1. Anchor bolts and fasteners shall meet the requirements of ASTM A193, Grade B8M.
2. Anchor bolts and fasteners for metal stairs, ladders, and walkways shall be wedge or adhesive anchors, unless otherwise noted. Wedge anchors shall be as manufactured by "HILTI", or equal. Adhesive anchors shall consist of a self-contained vinylester adhesive cartridge and anchor rods. Adhesive anchor shall be AVA adhesive anchoring system as manufactured by "HILTI", or equal.

2.2 METAL STAIRS

A. General

1. Fabricate metal stairs to meet the requirements of SBC, OSHA, NFPA 101 and the standard practice for stairs of the National Association of Ornamental Metal Manufacturers.
2. Size of various members and number of parts indicated on the Drawings are minimum, and shall be increased as necessary to meet the requirements of this Section.
3. Stair members shall be constructed to support dead loads and additional live working stresses permitted for materials in Standard Building Code.

B. Aluminum Stairs

1. Aluminum Stairs, General
 - a. Fabricate aluminum stairway frame of aluminum structural shapes. Frame for each run of aluminum stairway shall be continuous, without joints.
 - b. Provide aluminum stairways with aluminum treads and aluminum handrail and guard railing.
2. Aluminum Stairway Connections
 - a. Connections between aluminum stairway members shall be aluminum bars, plates, and shapes or fabricated of AISI 304 or AISI 316 stainless steel.
 - b. Connections between aluminum stairway sections and aluminum fabrications, such as landings, walkways, and platforms, shall be aluminum bars, plates, and shapes or fabricated of AISI 304 or AISI 316 stainless steel.
 - c. Connections between aluminum stairway and concrete shall be fabricated of AISI 316 stainless steel.
 - d. Connections between aluminum stairway and steel fabrications, such as landings, walkways, and platforms, shall be fabricated of AISI 316 stainless steel.
3. Aluminum Stair Treads
 - a. Aluminum stair treads shall be same pattern and alloys as aluminum walkway grating.
 - b. Aluminum stair treads shall be a minimum of 1-1/2 inches thick, unless otherwise indicated on the drawings.
 - c. Aluminum stair treads shall have 1-1/4-inch wide abrasive nosing.
4. Aluminum Handrail and Guard Railing: Aluminum handrail and guard railing shall meet the requirements of Section 05521 Aluminum Handrails and Railings.

2.3 METAL LADDERS

- A. Metal Ladders, General
 1. Ladders and cages shall be designed and fabricated in accordance with Part 19 10 of the Occupational Safety and Health Standards and ANSI A14.3.

2. Provide ladder with safety cage or safety climbing device if ladder height is such that safety cage or safety climbing device is required to meet OSHA requirements. Provide safety cage unless safety-climbing device is specifically shown or noted on the Drawings.

B. Aluminum Ladders, Cages, and Supports

1. Aluminum Ladders

- a. Ladder frame, or uprights, shall be 3/8-inch by 2-inch aluminum bars. Ladder uprights shall be spaced 18 inches apart.
- b. Ladder rungs shall be aluminum rods. Rungs shall be not less than 1 inch in diameter. Rungs shall be smooth. Rungs shall be spaced 12 inches on centers. Ends of rungs shall be fitted into, and welded to, the uprights.

2. Aluminum Cages: Fabricate aluminum cages of aluminum bars bent to shape.

3. Supports for Aluminum Ladders and Cages

- a. Supports shall be 3/8-inch by 2-inch aluminum bars bent to shape.
- b. Supports shall be spaced not more than 5 feet apart.
- c. Supports shall be welded to uprights.

2.4 METAL, WALKWAYS

A. Metal Walkways, General

1. Fabricate metal walkways to meet the requirements of SBC, OSHA, and NFPA 101.
2. Size of various members and number of parts indicated on the Drawings are minimum, and shall be increased as necessary to meet the requirements of this Section.
3. Walkway members shall be constructed to support dead loads and additional live working stresses permitted for materials in Standard Building Code.

B. Aluminum Walkways

1. Aluminum Walkways, General

- a. Fabricate aluminum walkway frame of aluminum structural shapes and bars. Frame for each section of walkway between supports shall be continuous, without joints.
 - b. Provide aluminum walkways with aluminum grating floor plates as indicated on the Drawings. Provide aluminum walkways with aluminum guard railing.
2. Aluminum Walkway Connections
- a. Connections between aluminum walkway members shall be aluminum bars, plates, and shapes or fabricated of AISI 304 or AISI 316 stainless steel.
 - b. Connections between aluminum walkway sections and aluminum supports shall be aluminum bars, plates, and shapes or fabricated of AISI 304 or AISI 316 stainless steel.
 - c. Connections between aluminum walkway and concrete shall be fabricated of AISI 316 stainless steel.
 - d. Connections between aluminum walkway and steel fabrications, such as supports, landings, walkways, and platforms, shall be fabricated of AISI 316 stainless steel.
3. Aluminum Walkway Floor
- a. Aluminum walkway floor grating shall meet the requirements of Section 05530 Metal Grating, Trench Covers, and Floor Plates. Aluminum walkway floor grating shall be a minimum of 1-1/2 inches thick, unless otherwise indicated on the drawings.
 - b. Aluminum walkway floor plate shall meet the requirements of Section 05530 Metal, Grating, Trench Covers, and Floor Plates. Aluminum walkway floor plate shall be a minimum of 1/4 inch thick, unless otherwise indicated on the drawings.
4. Aluminum Handrail and Guard Railing: Aluminum handrail and guard railing shall meet the requirements of Section 0552 1 Aluminum Handrails and Railings.

PART 3 –EXECUTION

3.1 INSPECTION

- A. Take field measurements prior to preparation of shop drawings.

- B. Inspect structures, members, and surfaces on which stairs, ladders, and walkways are to be mounted. Correct defects prior to installation of metal stairs and walkways.

3.2 PREPARATION

- A. Clean and strip primed items to bare metals where site welding is required.
- B. Supply items required to be cast into concrete with setting templates, to appropriate sections.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers and struts required for connecting stairs to structure.
- C. Ladders shall be installed in accordance with the requirements of ANSI A14.3 and Part 1910 of the Occupational Safety and Health Standards. Ladders shall be rigidly supported not less than 7 inches from adjacent surfaces. Ladders shall be secured to concrete block wall by AISI Type 316 stainless steel toggle bolts embedded in the CMU wall. Ladder shall be secured to cast-in-place concrete wall by AISI Type 316 stainless steel anchor bolts and adhesive anchors.
- D. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- E. Field weld components indicated on Drawings. Perform field welding in accordance with AWS D1.1.
- F. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws wherever possible.
- G. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.
- H. Obtain Engineer's approval prior to site cutting or making adjustments not scheduled.
- I. Fabrication and Erection: Except as otherwise shown, the fabrication and erection of structural steel shall conform to the requirements of the American Institute of Steel Construction "manual of Steel Construction".

3.4 PREVENTION OF ELECTROLYSIS

- A. Aluminum in contact with dissimilar metals shall be separated with 1/8" thick layer of neoprene backing pad of full abutting area.
- B. Install corrosion barriers between aluminum and concrete.
 - 1. Isolate surface mounted aluminum with one of the following systems:
 - a. Coat bottom of surface mounted aluminum railing posts and aluminum clip angles as specified in Section 09961 Protective Coating for Embedments.
 - b. Install vinyl or neoprene barrier pad between bottom of surface mounted aluminum railing post, or angle clip, and concrete.' Area of pad shall equal area of aluminum surface.
 - 2. Coat aluminum embedded in concrete or grout as specified in Section 09961 Protective Coating for Embedments.

3.5 WELDING

- A. Welding shall be by the metal-arc method or gas-shielded a& method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.
- B. In assembly and during welding, component parts shall be adequately clamped, supported and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as specified by the AWS Code. Upon completion of welding, remove weld splatter, flux, slag and burrs left by attachments. Repair welds to produce a workmanlike appearance, with uniform weld contours and dimensions. Sharp comers of material, which is to be painted or coated, shall be ground to a minimum of 1/32 inch on the flat.

3.6 CLEANING

- A. A. Clean paint spatter, concrete slobbers, grease, oil, or any other debris from exterior surfaces of metal stairs, ladders, and walkways.

END OF SECTION