

Section 05 51 00**METAL STAIRS****1.0 GENERAL****1.1 SUMMARY**

A. Selection Includes: This Section specifies prefabricated metal stairs and railings.

B. Related Requirements:

- 1) Section 03 30 00 Cast-in-Place Concrete.
 - a) Test
 - a.1) Test
 - a.2) Test
- 2) Section 05 55 17 Stair Nosings.
- 3) Section 10 14 44 Photoluminescent Isle Markers or Signage.

1.2 REFERENCES

A. Reference Standards

- 1) American Society for Testing and Materials International (ASTM):
 - a) ASTM A36 Standard Specification for Carbon Structural Steel.
 - b) ASTM A53 Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - c) ASTM A500 Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - d) ASTM A513 Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
 - e) ASTM A786 Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy and Alloy Steel Floor Plates.
 - f) ASTM A1008 Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened and Bake harden able.
 - g) ASTM A1011 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low Alloy with Improved Formability, and Ultra-High Strength.
- 2) American Welding Society (AWS):
 - a) AWS D1.1 Structural Welding Code – Steel.
 - b) AWS D1.3 Structural Welding Code – Sheet Steel.
- 3) American National Standards Institute (ANSI):
 - a) ANSI A117.1 Accessible and Useable Buildings and Facilities Standards.
- 4) The Society for Protective Coatings (SSPC):
 - a) SSPC-SP3 Power Tool Cleaning.
 - b) SSPC-SP2 Hand Tool Cleaning.
- 5) National Association of Architectural Metal Manufacturers (NAAMM):
 - a) SSPC-SP3 Power Tool Cleaning.
 - b) SSPC-SP2 Hand Tool Cleaning.
- 6) National Ornamental and Miscellaneous Metals Association:
 - a) Weld Finish Type(s).
- 7) American Institute of Steel Construction (AISC):

- a) AISC Manual of Practice.
 - 8) ICC International Building Code:
 - a) Chapter 10: Means of Egress.
 - 9) UL 1994 Luminous Egress Path Marking Systems.
 - 10) New York City Reference Standard for Photoluminescent Exit Path Markings:
 - a) RS6-1
 - b) RS6-1A
- 1.3 ADMINISTRATIVE REQUIREMENTS
- A. Coordination: Coordinate work of this section with work of other trades for proper time and sequence to avoid construction delays.
- 1.4 ACTION SUBMITTALS
- A. General: Submit listed submittals in accordance with Contract Conditions.
 - B. Product data: Submit specified products as follows:
 - 1) Manufacturer's product data.
 - 2) Manufacturer's installation instructions.
 - C. Shop Drawings: Indicate information on shop drawings as follows:
 - 1) Stair plans, elevations, details, methods of installation and anchoring.
 - a) Show members, sizes and thickness, anchorage locations and accessory items.
 - b) Furnish setting diagrams for anchorage installation as required.
 - c) Include calculations stamped by a structural engineer registered in the jurisdiction where the project the project is located.
 - D. Samples: Submit as follows:
 - 1) Two samples of factory tread system 3 inches wide. "IF" tread specified is a manufacturer's System and not otherwise a common "Field Poured Concrete Pan or Common Checker / Smooth plate.
 - 2) If Photoluminescent Nosing is specified submit integral sample of complete nosing and tread system (3" wide) regardless of tread type.
- 1.5 INFORMATION SUBMITTALS
- A. Manufacturer's Storage and Installation Instructions.
 - B. Submit documentation verifying that components and materials specified in this section are from a single source manufacture approved by this specification.
 - C. Qualification Statements:
 - 1) Submit Certificate that manufacturer is a Certified Fabricator with the American Institute of Steel Construction (AISC).
- 1.6 QUALITY ASSURANCE
- A. Qualifications:
 - 1) Manufacturer:
 - a) American Institute of Steel Construction (AISC) Certified Fabricator, having a minimum of 10 years' experience manufacturing components similar to or exceeding requirements specified in scope of project.
 - b) Having sufficient capacity to produce and deliver required materials without causing delay in work.
 - c) Installer: Acceptable and approved by Stair Manufacturer.
- 1.7 DELIVERY, STORAGE & HANDLING
- A. Delivery and Acceptance Requirements:
 - 1) Deliver material in accordance projects schedule and in accordance with manufacturer's instructions.

- 2) Deliver materials in full truckload quantities in manufacturer's pre-bundled and banded lots with identification labels intact and in sizes to suit project hoisting equipment.
- B. Storage and Handling Requirements:
- 1) Store materials on skids or appropriate planks so material is not in direct contact with the ground and at least 4" above grade. Ensure rain or snow runoff freely flows under material making no contact with product(s).
 - 2) Protect material from adverse conditions. If not stored under roof, tarp accordingly to keep material dry. Inspect material regularly to ensure water is not pooling in stair tread or landing pans, frames, railing, hardware or packaging, etc.
- C. Packaging Waste Management:
- 1) Separate waste materials for refuse and recycling.
 - 2) Remove packaging materials from site and dispose of at appropriate facilities.
 - 3) Collect and separate for disposal paper, plastic, polystyrene, cardboard packing material in appropriate onsite bins for recycling.
 - 4) Fold metal and plastic banding; flatten and place in designated area for recycling.

2.0 PRODUCTS

2.1 METAL STAIRS

A. Manufacturer: Pacific Stair Corporation.

- 1) Basis of Design: Pre-Engineered Steel Stair System as manufactured by the Pacific Stair Corporation * 8690 Stair Way NE * Salem, OR 97305; Telephone: (503) 390-8305; Fax: (503) 390-3864; Email: sales@pacificstair.com ; website: www.pacificstair.com.
- 2) Single Source Responsibility: Provide components, products and materials specified in this section from a single American Institute of Steel Construction (AISC) certified manufacturer.
 - a) Unitized Flight Assemblies.
 - b) Unitized Landing Frames.
 - c) Manufactures standard rail products (Multi-Line, Picket, Mesh Panel, Rod, Glass Panel, Cable Assembly) as detailed or indicated on drawings.
 - d) Treads (Field Poured Pans, Checker Plate, Smooth Plate, Noise Reduction Tread Assemblies, Factory Furnished Tread Inserts, Photo luminescent and/or Abrasive Nosing's) as detailed or indicated on drawings.
- 3) Substitutions: Alternate manufacturers and products will be judged on the quality and complete system performance application of this specification and in accordance with substitution approval provisions of Section 01600. All manufacturers must seek prior approval to be considered.

B. Design Criteria:

- 1) Structural Performance of Stairs: Stairs shall withstand the following structural loads without exceeding the allowable design working stress of materials, including anchors and connections. Apply each load to produce the maximum stress in each component:
 - a) Treads and Platforms of Metal Stairs: Capable of withstanding a uniform load of 100 psf (4.8kN/m²) and concentrated load of 300 lbf (1.33kN) applied on an area of 4 square inches (2581 square mm). Concentrated and uniform loads need not be assumed to act concurrently.
 - b) Stair Framing: Capable of withstanding stresses resulting from loads specified, in addition to stresses resulting from railing system loads.
 - c) Limit Deflection of Treads, Platforms and Framing Members: To L/240.

- 2) Structural Performance of Handrails and Railings: Handrails and railings shall withstand the following structural loads without exceeding the allowable design working stress of materials, including handrails, railings, anchors and connections.
 - a) Top rail of Guardrail: Capable of withstanding a concentrated load of 200 lbf (0.89 kN) applied in any direction and a uniform load of 50 psf (2.39 kN/m²) applied in any direction. Concentrated and uniform loads need not be assumed to act concurrently.
- C. Standard Stair and Rail System:
- 1) Manufacturer's standard prefabricated, pre-engineered straight run stair and landing system, consisting of hot rolled steel sheet risers, treads, landings and structural plate, channel or angle frames, stringers or connection devices with fasteners/supports and railings.
 - a) Stringers:
 - a.1) Steel plate or channel with side mounted and/or top mounted railing frame attachment as detailed on drawings and/or in accordance with manufactures system recommendations.
 - a.2) Minimum thickness or weight as determined by structural design calculations, structural grade steel plate or channel.
 - 2) Risers: Closed riser, minimum 14 gage (1.9mm) hot rolled mild steel sheet, sloped maximum 1 ½ inches (38.1mm) and conforming to Americans with Disabilities Act (ADA) nosing requirements.
 - 3) Treads: Manufacturer's standard tread system, 14 gage (1.9mm) minimum hot rolled mild steel sheet or as determined by structural design calculations. All welds on the underside of tread assemblies to be exposed for proper inspection during the service life and/or after seismic, fire, flood, or potentially damaging event. Provide treads as indicated and noted on drawings for each stair.
 - a) Concrete Pan Filled Tread: Field poured (placed) concrete by concrete finisher trades after stair installation.
 - b) Checker Plate Tread: Pattern per manufacturer's standard.
 - c) Quiet Tread: Factory applied sound absorption material bonded to underside of tread and intermediate landing surface for checker plate tread systems.
 - d) Bar Grating and/or Traction Tread perforated tread systems for industrial stairs included in this section.
 - 4) Landings: A combination of structural plate, channel and angles for the frame with 1 ½" B-36 Composite Floor Decking x 20 gage and 10 gage (minimum) bent sheet lateral pour stops. Decking to be attached to frame by plug welding or other mechanical means provided recommended and engineered by the stair manufacturer.
 - a) Flight and landing assemblies fabricated by the stair manufacturer shall be connected by splined "Twist-Off" tension control bolts, grade to be A325 & A490 as engineered and specified by the stair manufacturer.
 - b) All pre-tensioning methods are to be conformant to the AISC Steel Construction Manual, Chapter 16; Section #3 Bolted Parts. Subsection 3.2.1 "pre-tensioned joints and related sections noted thereafter".
 - 5) Additional Fastener and Supports: Sized by the manufacturer to meet structural design criteria. If hanger rod connections are applicable to any of the landing connections, they shall be threaded rod type, size and grade as determined by stair manufacturer's structural design calculations.

- 6) Railings: Design style as shown on drawings for each stair, selected from manufacturer's standard pre-fabricated, pre-engineered rail styles.
- a) Multi-Strand Horizontal Rail: 1.5" x 1.5" x 11 gage HSS Top Line(s) and Posts with 1.25" I.D. pipe Mid Line and Hand Grab with 0.187" x 1.25" flat bar bracket. Weld Preparation to equal National Ornamental & Misc. Association (NOMMA) #3 or better.
 - b) Picket Rail: 1.5" x 1.5" x 11 gage HSS Top and Bottom Line Frame and Posts with 1.25" I.D. pipe Hand Grab with 0.187" x 1.25" flat bar bracket and 0.5" Square Bar Pickets spaced not more than 4" on center. Weld Prep to equal NOMMA #3 or better.
 - c) Mesh Rail: 1.5" x 1.5" x 11gage HSS Top and Bottom Line Frame and Posts with 1.25" I.D. pipe Hand Grab with 0.187" x 1.25" flat bar bracket and 8 gage x 2" x 2" Square Wire Mesh (crimped or welded per manufacturer's standard if not noted) with continuous 12 gage U-shaped receiver edging. Weld Prep to equal NOMMA #3 or better.
 - d) Rod Rail: .75" x 2" Flat Bar Frame and Posts with 1.25" I.D. pipe Hand Grab with .50" round bar bracket and .50" Round Bar Horizontals. Round bar shall continuously pass through intermediate posts for sections under 16 feet. Weld Prep to equal NOMMA #2 or better.
 - e) Cable Rail: .75" x 2" Flat Bar Frame and Posts with 1.25" I.D. pipe Hand Grab with .50" round bar bracket and 0.187" Stainless Steel connecting hardware and Wire Rope threaded continuously from end to end of each rail section, but not continuing to the next rail assembly (Hardware and Wire Rope can be Galvanized if noted). Weld Prep to equal NOMMA #2 or better.
 - f) Glass Panel Rail: 1.5" x 1.5" x 11 gage HSS Top and Bottom Line Frame and Posts with 1.25" I.D. pipe Hand Grab with 0.187" x 1.25" flat bar bracket with 0.375" Tempered Glass Panels. Glass Panels shall insert into 4'-0" sections of rail frame between posts (maximum) and be securely held into place with 2" x 2" brackets placed near each corner of panel. Weld Prep to equal NOMMA #2 or better.
 - g) Wall Rail: 1.25" I.D. pipe with pressed steel wall rail bracket with giving proper distance between face of wall and inside face of wall rail assembly.
 - h) Hand Grabs: 1.25" I.D. pipe Code Conforming 34" to 38" above plane of nosings and wrapped continuously past space between flights with pre-formed bend(s) which shall be field fitted with weld prep to equal NOMMA #1.
 - i) Barrier Gates: Manufacturers standard swing gate assembly with steel spring hinges and rubber bumper between space that barrier gate and rail post termination intersect. Fabricated from Hollow Structural Steel (HSS) or pipe stock.
- 7) Stringer Rail Mounting:
- a) Structural Plate Stringer: Railings to be Side Mounted. Rail Frame: In-Line or Side assembly, see drawings.
 - b) Structural Channel: Railing to be Top Mounted to channel flange or Side Mounted with railing post knife-blade steel plate connection extender to be received inside the channel flanges below the top flange. Rail Frame: In-Line or Side Assembly.
- 8) Materials:
- a) Steel Shapes and Plates: To ASTM A36.
 - b) Steel Pipe: To ASTM A53 Type E or S, Grade B.
 - c) Steel Tubing:
 - c.1) Structural Use: To ASTM A500, Grade B or C.

- c.2) Non-Structural Use: To ASTM A513, hot rolled or coiled rolled (mill option).
- d) Steel Sheet:
 - d.1) Structural Use: To ASTM A1011 (hot rolled), Checker Plate ASTM A786.
 - d.2) Non-Structural Use: To ASTM A786, ASTM A1008.
- e) Fasteners: As recommended by manufacturer.
- f) Welding Rods: In accordance with AWS code and AWS filler metal specifications.
- 9) Fabrication:
 - a) Use same material finish as parts being joined. Use stainless steel between dissimilar metals and non-corrosive fasteners at exterior connections or joints.
 - b) Provide fasteners of sufficient strength to support connected members and loads, and to develop full strength of parts fastened or connected.
 - c) Construct stair and rails with all components necessary for support and anchorage, and for a complete installation.
- 10) Finishes:
 - a) Rails, flights, landings and other stair components: Remove oil, grease, dirt, mill scale, rust, corrosion products, oxides, paint or other foreign matter from steel surface in accordance with SSPC-SP2 and/or SSPC-SP3.
 - b) Shop Primer: Immediately after fabrication and cleaning, spray apply primer to dry film thickness recommended by the primer manufacturer, but not less than 2.0 mil thickness. Apply one coat High Solids Red Oxide Anticorrosive Primer meeting SSPC-15 Paint.
 - c) Post Delivery: Primer coating offers minimal protection against rust and corrosion during transport and while stored at project site. Proper handling and care before during and after installation shall be taken to maintain effectiveness of primer coating prior to receiving final coats of finish paint.

2.2 ACCESSORIES

- A. Nosing Insert: Where indicated on drawings provide Integral Stair Nosing System with Metal Stair Systems meeting ICC International Building Code, Chapter 10 and NYC Reference Standards RS 6-1 and RS-1A Photoluminescent stair nosing requirements.
 - 1) Acceptable Nosing Manufacturer: Safe-T-Nose[®], Inc. www.safetnose.com
 - a) Products with Photo-Glo[®] self-illuminating guidance strip for direct installation or with integral nonconductive base isolator extrusion specifically designed to self-attached and position on edge of steel stair pan to assist with proper installation during placement of concrete for pan tread stairs. All applications shall be manufactured with a temporary and removable PVC extruded construction cover integral with the nosing system. Tape, plywood or other non-integral temporary protections shall not be allowed.
 - b) Adhesives, fasteners, and any incidental materials required for a complete installation, as recommended by the stair nosing manufacturer.

3.0 EXECUTION

3.1 EXAMINATION

- A. Verification of conditions: The Erector installing the Steel Stair System(s) shall verify that conditions of substrates previously installed under sections or contracts are acceptable for product installation in accordance with manufacturer's instructions prior to metal stair and railing installation.
 - 1) Inform General Contractor of unacceptable conditions.
 - 2) Proceed with installation after unacceptable conditions have been remedied.

3.2 PREPARATION

- A. Ensure structure being connected to is stable, and complete enough in the construction phase to commence the installation of the Steel Stair System(s).
- B. Remove all construction debris from work area and properly barricade the stair shaft(s) from general construction traffic while the Steel Stair System is being installed. Do not allow general construction traffic to use the stairs until all flight and landing frames are securely connected, and temporary railing is in place per approved OSHA guidelines or permanent railing is installed.

3.3 INSTALLATION

- A. Coordinate installation of metal stairs and railing with the General Contractor.
- B. Coordinate metal stairs and railings installation with the work of other trades for proper time and sequence to avoid construction delays.
- C. Install stairs, landings and handrails in accordance with manufacturer's instructions. Install square, plumb, straight, and true to line and level, with neatly fitted joints and intersections.
- D. Minimum Tolerances:
 - 1) Maximum variation of vertical alignment = 0.25" per floor, non-accumulative.
 - 2) Maximum differential of true elevation bench mark(s) = > 0.50" per floor, non-accumulative.
- E. Field Fitting:
 - 1) Do not cut or alter stair system assemblies or structural components without written authorization.
 - 2) Field welding and joining shall conform to AWS D1.1 and AWS D1.3.
 - 3) Grind and remove weld splatter. Prepare welds the same as the manufacturer's for item being fitted, except that continuous rail wraps to be ground smooth. Touch-up shop-primed areas with same primer as used by stair system manufacturer.

3.4 ADJUSTING

- A. Upon completion of stair(s) installation remove all tools, debris and surplus materials from the stair shaft(s).
- B. Remove any debris from stair assemblies which was acquired during transit and storage, leave ready for final finish coat preparation by the painting contractor.

3.5 WASTE MANAGEMENT

- A. Coordinate recycling of waste materials.
- B. Collect recyclable waste and dispose of or recycle field generated construction waste created during demolition, construction or final cleaning.
- C. Place waste in approved and appropriate job site recycling containers.

END OF SECTION