

**SECTION 05 51 00- METAL STAIRS****PART 1 – GENERAL****1.1 SCOPE OF WORK**

Fabricate and install metal stair assemblies in accordance with the requirements set forth in this section.

*Note: This specification applies to industrial egress type stairs.*

**1.2 ADDITIONAL WORK INCLUDED IN THIS SECTION**

*Some items of work are usually specified in sections other than section 05 51 00, If they are to be part of the metal stair contractor's work they must be specified here.*

**\*\* NOTE:** Delete any sections below not relevant to this project; add others as required.

- \*\***
- A. Field measurements of stair installation sites, and verification of vertical drop between floors.
  - B. Installation of protective pans under stairs.
  - C. \_\_\_\_\_
  - D. \_\_\_\_\_.

**1.3 WORK SPECIFICALLY EXCLUDED IN THIS SECTION**

*The items in this section are not to be included in the metal stair contractor's work:*

- A. Temporary shoring or bracing.
- B. Demolition and removal of existing work.
- C. Clean up of site prior to installation.
- D. Cutting, grouting and patching of tread fillers.
- E. Temporary wood filler for steel tread pans.
- F. Concrete supports for steel.
- G. Cutting; preparation of pockets; setting of plates, inserts, adapters, or other hardware of built in items.
- H. Placement of wire mesh and re-bar for concrete fill
- I. Concrete or other fill for pans or platforms.
- J. Temporary lights or electricity.
- K. Temporary safety rails.
- L. Protection after erection.
- M. Wood trim or moldings, for treads or stringers.
- N. Rubber treads or carpets.
- O. Slip resistant concrete treatments.
- P. Field painting other than touch up of damaged surfaces.
- Q. Final surface cleaning, passivation, or application of surface protectant after installation.

**1.4 RELATED DOCUMENTS:**

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

**1.5 SUMMARY:**

- A. Provide all material, labor, equipment and services and perform all operations necessary or required for the work of this section, in accordance with the Drawings and Specifications, and including fabrication and installation of Metal Stairs.
  
- B. Related work specified in other section may include but is not limited to: \*\*
  - a. Section 03 30 00 - Cast in place Concrete: \_\_\_\_\_
  - b. Section 03 33 00 – Architectural Concrete: \_\_\_\_\_
  - c. Section 03 48 00 - Pre-cast Concrete Specialties: \_\_\_\_\_
  - d. Section 04 20 00 – Unit Masonry: \_\_\_\_\_
  - e. Section 04 40 00 – Stone: \_\_\_\_\_
  - f. Section 05 05 23 – Welding: \_\_\_\_\_
  - g. Section 05 12 00 – Structural Steel: \_\_\_\_\_
  - h. Section 05 50 00 - Metal Fabrications: \_\_\_\_\_
  - i. Section 05 51 00 – Metal Stairs: \_\_\_\_\_
  - j. Section 05 52 00 – Handrails & Railings: \_\_\_\_\_
  - k. Section 05 52 13 – Pipe & Tube Railings: \_\_\_\_\_
  - l. Section 05 53 00 – Grating: \_\_\_\_\_
  - m. Section 05 54 00 – Floor Plates: \_\_\_\_\_
  - n. Section 05 55 00 – Stair Treads & Nosing: \_\_\_\_\_
  - o. Section 05 56 00 – Metal Castings: \_\_\_\_\_
  - p. Section 05 73 00 – Decorative Railings: \_\_\_\_\_
  - q. Section 05 59 00 – Metal Specialties: \_\_\_\_\_
  - r. Section 06 43 00 – Wood Stairs & Railings: \_\_\_\_\_
  - s. Section 07 72 00 – Roof Accessories: \_\_\_\_\_
  - t. Section 09 22 00 – Plaster and Gypsum Board: \_\_\_\_\_
  - u. Section 09 66 00 – Terrazzo: \_\_\_\_\_
  - v. Section 09 65 00 – Resilient Flooring: \_\_\_\_\_
  - w. Section 09 68 00 – Carpeting: \_\_\_\_\_
  - x. Section 09 90 00 - Paints and Coatings: \_\_\_\_\_
  - y. Section 10 22 00 – Partitions: \_\_\_\_\_

Stair support: Bearing and anchorage points shall be structurally adequate to support the stair. Inserts, anchors, connectors, backup support, and pockets to be installed by others shall be verified to be in accordance with architect approved drawings prior to the start of erection.

**1.6 REFERENCES**

*American Institute of Steel Construction (AISC)*

- A. Manual of Steel Construction
- B. Code of Standard Practice

*American National Standards Institute (ANSI)*

- A. ANSI/NAAMM MBG 531-00 Metal Bar Grating Manual- 6<sup>th</sup> edition

*American Society for Testing and Materials (ASTM)*

- A. ASTM A108-99 Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality
- B. ASTM A123 - Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

- C. ASTM A193/A193M - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
- D. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
- E. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes
- F. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- G. ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- H. ASTM A513 - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
- I. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
- J. ASTM A568/A568M – Specification for Steel Sheet, Carbon and High Strength, Low Alloy, Hot-Rolled and Cold Rolled, General Requirements for
- K. ASTM A780 - Standard Practice for Repair of Damaged and Un-coated Areas of Hot-Dip Galvanized Coatings
- L. ASTM A786/A786M Standard Specification for Hot-Rolled Carbon, Low-Alloy, High-Strength Low-Alloy, and Alloy Steel Floor Plates
- M. ASTM A1011/A1011M Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- N. ASTM F844 Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use

*International Code Council*

- A. International Building Code, 2000, 2003 and 2006 editions

*National Association of Architectural Metal Manufacturers (NAAMM)*

- A. NAAMM STANDARD AMP 510-92 Metal Stairs Manual 5<sup>th</sup> Edition

*Society of Automotive Engineers*

- A. SAE J403 Chemical Compositions of SAE Carbon Steels
- B. SAE J429 Mechanical and Material Requirements for Externally Threaded Fasteners

All References are latest edition unless noted otherwise.

**1.7 PERFORMANCE REQUIREMENTS:**

- A. Stair Treads: shall be capable of withstanding 100 pounds per square foot or a 300 pound load on an area of 4 square inches without exceeding the allowable working stress of the material; or a single concentrated 1000 pound load without permanent deformation. Treads shall also be designed to withstand all required design loads (i.e. wind, snow, seismic, etc.) in accordance with the required codes of the applicable project.
- B. Stair railings: shall be capable of withstanding a single concentrated load of 200 pounds or a uniform load of 50 pounds per linear foot applied in any direction at any point on the rail without exceeding the design working stress of the materials.
- C. Stair Stringers: shall be capable of withstanding a uniform live loading of 100 pounds per square foot applied in a downward direction to all installed tread surfaces or a 300 pound load on an area of 4 square inches without exceeding the allowable working stress of the material; or a single concentrated load of 1000 pounds at any point on the stair without permanent deformation. Stair stringers shall also be designed to withstand all required design loads (i.e. wind, snow, seismic, etc.) in accordance with the required codes of the applicable project.

- D. Guard Railings: shall be capable of withstanding a single concentrated load of 200 pounds or a uniform load of 50 pounds per linear foot applied in any direction at any point on the rail without exceeding the design working stress of the materials.

#### 1.8 CONSTRUCTION REQUIREMENTS:

- A. Stringers: shall be cut and formed from single piece material for its full length. Welded splicing of stringer materials along its length shall not be permitted.
- B. Treads: shall be attached to stringers by bolting.
- C. Stringer Mounting Flanges: where applicable shall be welded to the ends of the stringers.
- D. Riser Spacing: shall be equally spaced to within 3/16" for adjacent risers and to within 3/8" for any two non-adjacent risers on a stair.
- E. Stair railings & baluster tubes: shall be attached to the stringers by bolting, and shall be capped with a solid cap at each end or by a press punch closure method. No tubes having open ends shall be permitted. All closed tubes for hot dip galvanizing will have drain holes.
- F. Bar grate treads: shall be constructed in accordance with NAAMM MBG 533
- G. Diamond tread plate treads: walking surfaces shall be formed from single piece material with mounting flanges welded at each end.
- H. Grip-tread Treads: all surfaces shall be formed from single piece material, having rolled stiffeners on front and back edges, and with formed mounting flanges welded at each corner.
- I. Concrete pan treads: pans will be formed from single piece material with mounting flanges welded at each end.
- J. Cast Treads: each cast Tread will be cast as a single unit tread. Cast treads will be bolted to their mounting flanges or directly bolted to the stringer. No welding will be permitted on cast treads.

#### 1.9 DIMENSIONS:

- A. Stair Angle: from 20 to 50 degrees from horizontal as specified in the drawings.
- B. Vertical Drop: the change in elevation, as shown in the drawings, between the upper finished floor surface where the stair will be attached and the lower finished floor surface where the base of the stair will be secured.
- C. Stair Width: The distance transverse to the walking direction available for use as a walking surface, as shown in the drawings. Also, the length of the tread.

#### 1.10 SUBMITTALS:

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Provide manufacturer's installation instructions.
- C. Shop Drawings: Submit dimensioned prints showing critical dimensions, jointing and connections, and fasteners provided by manufacturer.
- D. Dimensional Prints: shall be submitted for approval prior to fabrication.

#### 1.11 DELIVERY, STORAGE AND HANDLING

*Reference AISC Code of Standard Practice, Sections 6 and 7*

- A. Deliver materials to the job-site in good condition and properly protected against damage to finished surfaces.

- B. Store material in a location and manner to avoid damage. Do not stack stair components. Lay out components on firm foundation material such that bending can not occur.
- C. Store metal components in a clean dry location, away from uncured concrete, cement, or masonry products, acids, oxidizers, rain water, or any other chemical or substance that might damage the stair material or finish.
- D. Plan work and storage locations to keep on-site handling to a minimum.
- E. Exercise particular care to avoid damage to material finishes or unprotected surfaces when handling.

## **PART 2- PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURER:**

- A. Provide pre-engineered stair systems fabricated by

LAPEYRE STAIR, INC.  
5117 Toler Street  
Harahan, LA. 70123;  
Phone# 1-(800)-535-7631 or 1-(504)-733-6009  
Fax# 1-(504)-733-4393  
LS.SALES@LAPEYRESTAIR.COM  
WEB: HTTP://WWW.LAPEYRESTAIR.COM

- B. Substitutions will not be considered.

### **2.2 MATERIALS:**

- A. Carbon Steel Stairs:

- 1. Stringers:
  - a. Guard Mounted: 1" x 2.75" x 12" x 2.75" x 11 gauge formed zee-section of carbon steel HRPO per ASTM A569/A1011 (50KSI minimum):
  - b. Wall Mounted: 1" x 1.25" x 12" x 2.75" x 11 gauge formed zee-section of carbon steel HRPO per ASTM A569/A1011 (50KSI minimum).
- 2. Stringer mounting flanges: Minimum 11 gauge carbon steel HRPO per ASTM A569/A1011 (50KSI minimum)
- 3. Cross bracing straps: Lengths of 1.0" width x .25" thick Hot Rolled Steel Flat Bar per ASTM A-36
- 4. Back pans: Minimum 16 gauge carbon steel HRPO per ASTM A569/A1011
- 5. Rails: 1-1/2"  $\Phi$  x 0.095" min. wall thickness, Min. 42 ksi yield strength; Carbon Steel per ASTM A1011; fully annealed tube per ASTM A500 grade B or A513 grade 1008 or higher as-welded tubing.
- 6. Balusters: 1-1/2"  $\Phi$  x 0.095" min. wall thickness, Min. 42 ksi yield strength; Carbon Steel per ASTM A569/1011; fully annealed tube per ASTM A500 grade B or A513 grade 1008 or higher as-welded tubing.
- 7. Rail tabs: Nominal .1875" thick carbon steel HRPO per ASTM A1011
- 8. Rail end caps:

- a. Standard: .75" spherical radius, finned, universal tube closure cap molded from low density polyethylene
  - b. Optional: .75" spherical radius closure cap machined from UNS-G12144 or SAE/AISI 12L14 Carbon Steel per SAE J403 or equivalent cold drawn round per ASTM A108
9. Rail end connectors: 1.5"  $\Phi$  connector machined from UNS-G12144 or SAE/AISI 12L14 Carbon Steel per SAE J403 or equivalent cold drawn round per ASTM A108
  10. Baluster clamp plate: Nominal .1875" thick 304L (UNS-S30403) Stainless Steel per ASTM A240
  11. Baluster end spacers: 1" external  $\Phi$ , 0.4375" internal  $\Phi$  x 1" Long XXS type 304 (UNS-S30400) Stainless Steel Pipe per ASTM A999
  12. Handrail Joiners: 5" x 1" x 1/4" slotted flat bar w/ 3/8" x 1" set screws, AISI 304 SS
  13. Handrail brackets
    - a. Wall mount: Wagner Companies Type B – 2-1/2" or equal
    - b. Baluster mount: 1-1/4" w x 2-3/4" L x 2-1/2" h x 1/4" L-shape ASTM A1011
  14. Tread, stair rail, cross bracing, or back pan fasteners:
    - a. Bolts: Hex Head SAE J429 Grade 5; 1/2"  $\Phi$  x 13TPI or Carriage Head A307 as shown on the Installation Instructions
    - b. Nuts: ASTM A563 Grade A, B, C, D or O
    - c. Washers: ASTM F844 or F436
  15. Bar Grating Treads: all materials will conform to ANSI/NAAMM MBG 531
  16. Diamond Tread plate Treads: minimum 11 gauge thickness hot rolled low carbon steel floor plate with medium diamond pattern per ASTM A786
  17. Grip-tread Treads: minimum 14 gauge thickness 240YP (FE360) carbon steel
  18. Concrete Pan Treads: minimum 11 gauge thickness hot rolled low carbon steel floor plate with medium diamond pattern per ASTM A786

**B. Miscellaneous Material:**

1. Stair rail to platform rail Clamp: Cast Aluminum Alloy ANSI 356.0F

**2.3 FINISHES:**

**A. Carbon Steel:**

1. Gray Primer: Epoxy Powder Coat or
2. Safety Yellow Paint: Polyester TGIC\* Powder Coat or
3. Iron Gray: TGIC\*
4. Typical RAL selections: Polyester Powder Coat
5. Hot-Dip Galvanized: per ASTM A123

\* Triglycidyl Isocyanurate

**2.4 FABRICATION:**

General: Fabricate metal stair components to conform with performance and construction requirements, and in accordance with approved shop drawings or dimensional prints.

- A. Carbon Steel: gas metal arc weld stringer mounting flanges to stringer ends; tread mounting flanges to tread ends; and stair rail mounting tabs to stair rails using the specified materials; permanently mark stringers for association with the aforementioned documentation.

## 2.5 PACKING & PACKAGING

Package stairs in a way to minimize the potential for damage during shipping and handling.

## **PART 3- EXECUTION:**

### 3.1 PREPARATIONS:

- A. Coordination: Coordinate start and installation of steel stairs with all other related and adjacent work. Installation shall not start until the construction has progressed to the point that weather conditions and remaining construction operations will not damage stair installation.
- B. Verification: Verify that dimensions and angle are correct and that substrate is in proper condition for stair installation. Do not proceed to install until all necessary corrections have been made.

### 3.2 INSTALLATION:

- A. Field Check and verify that all components of the structure required for installation are in place per the approved shop drawings. Report any discrepancies to the Architect or contractor for corrective action by responsible parties prior to erection of stair.
- B. Insure that stair-well or mounting location is clear of obstructions.
- C. Unload and handle material in a manner that will not strain, bend, deform or otherwise damage it.
- D. Inspect stringers for damage during shipment; if either stringer is pierced, creased, bent or permanently deformed **do not erect the stair** until replacement stringers are obtained. Slight bowing or crowning of stringers is acceptable if it is corrected by the assembly process.
- E. Inspect stair rails and balusters for damage during shipment. Stair rails that are damaged, bent, defaced, or deformed, that are still functional, (or can be made to be functional) and can be assembled, may be utilized on a temporary basis until replacement components are obtained. If any stair rail components are found to be damaged beyond the ability to function per the stair rail requirements, the stair may be erected but must be roped off or otherwise protected from use until such components are replaced.
- F. Where possible retain cardboard packing material or obtain other suitable material and use it to cover any rough concrete floor surface that might damage the stair surface during pre-assembly; or it may be used to protect any soft floor surface that might be damaged during the stair pre-assembly process.
- G. Pre-assemble all treads to stringers, utilizing the fasteners shipped with the unit. Place all treads with fasteners loose prior to tightening any single tread so as to maintain assembly clearance until all treads are placed. Top and bottom tread may be left out at pre-assembly to allow clearance for installation of stair mounting fasteners during erection.

- H. All carriage bolt heads should be installed such that heads are visible and appear on the outside/outboard sides of the stair stringer, except the baluster clamp bolts whose heads should appear on the top surface of the stringer.
- I. All tread, stair rail, cross brace, and/or back pan fasteners should be tightened to a minimum torque value of 25 to 35 foot-pounds.
- J. Pre-assemble stair rail components, utilizing the fasteners shipped with the unit. Place all carriage bolts for baluster clamps in the rectangular slots next to each baluster hole in the stringer, from the top surface, prior to inserting balusters in the holes.
- K. If supplied, back pan sheets should be bolted to stringers prior to erection.
- L. Balusters with an extra tab welded to the side should be placed in the two top most and two bottom most baluster holes in the stringers with the tab parallel to the stringers and pointing away from the stair in the direction of approach to the stair.
- M. Prepare mounting holes.
- N. Position stair with top landing tread at same elevation as upper finished floor or roof surface.
- O. Erect stairs square, plumb, straight, true to line and level.
- P. Secure stair assembly with the required hardware but with never less than two fasteners at the top mounting surface and never less than two fasteners at the bottom mounting surface. A minimum of one fastener at each end of each respective stringer.
- Q. Remove top or bottom tread if required to access bolts or nuts for tightening.
- R. Install and fasten any cross bracing components. Insure the installation is secure and rigid.
- S. Re-install top and bottom tread at their respective locations if removed for installation. A spreader jack may be used to gain some assembly clearance for reinstallation of top and bottom treads but great care must be taken not to scar or permanently deform the stringers.
- T. Touch up with matching paint any chipped or abraded damage to factory finish or
- U. Touch up any damage to galvanized surfaces using galvanized repair paint in accordance with ASTM A780.

### 3.3 CLEAN-UP:

Leave work area clean and free of debris.

END OF SECTION 05 51 00