



SECTION 05 73 00
DECORATIVE METAL RAILINGS
SIGHTLINE COMMERCIAL SOLUTIONS
Tensiline™ Cable Railing System

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Tensiline™ Cable railing system. Including:

1. Posts
2. Top Rail
3. Cable infill & fittings
4. Handrail

1.2 RELATED SECTION

- A. Section 05 51 00 - Metal Stairs.
- B. Section 05 52 00 - Metal Railings.
- C. Section 05 52 13 – Pipe and Tube Railings.
- D. Section 05 70 00 - Decorative Metal.

1.3 REFERENCES

A. American National Standards Institute (ANSI)

1. A17.1 Accessible and Usable Buildings and Facilities.
2. A21.1 Safety Requirements for Floor and Wall Openings, Railings and Toe Boards.
3. A58.1 Minimum Design Loads in Buildings and Other Structures.

B. American Society for Testing and Materials (ASTM)

1. A240/A240M – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
2. A554 - Standard Specification for Welded Stainless Steel Mechanical Tubing.

3. A555 - Standard Specification for General Requirements for Stainless Steel Wire and Wire Rods.
 4. A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar. B26/B26M - Standard Specification for Aluminum-Alloy Sand Castings.
 5. B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 6. B210 – Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
 7. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 8. B247 - Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings.
 9. B429 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
 10. C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink).
 11. E488 - Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
 12. E894 - Standard Test Method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
 13. E2358 – Standard Specification for the Performance in Permanent Glass Railings, Guards and Balustrades.
 14. E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
- C. National Association of Architectural Metal Manufacturers (NAAMM):
1. AMP 500-505 – Metal Finishes Manual.
 2. AMP 521 – Pipe Railing Systems.
- D. Aluminum Association (AA):
1. ASD-1 Aluminum Standards and Data.
 2. DAF-45 Designation System for Aluminum Finishes.
 3. SAA-46 Standards for Anodized Architectural Aluminum.
 4. ADM-2015 Aluminum Design Manual
- E. American Welding Society (AWS):
1. ANSI/AWS D1.1/D1.1M Structural Welding Code - Steel.
 2. ANSI/AWS D1.2/D1.2M Structural Welding Code - Aluminum.
 3. ANSI/AWS D1.6/D1.6M Structural Welding Code – Stainless Steel.
- F. Americans with Disabilities Act (ADA).
- G. Americans with Disabilities Act Accessibility Guidelines (ADAAG).

H. International Code Council (ICC): International Building Code.

I. National Fire Protection Association (NFPA)

1.4 PERFORMANCE REQUIREMENTS

- A. General: Railings & handrails shall withstand structural loading as determined by allowable design working stresses of materials.
- B. Structural Performance: Provide railings & handrails capable of withstanding effects of gravity loads and the following structural loads without exceeding allowable design working stress of materials for handrails, railings, anchors and connections:
1. Top of Guards & Handrails:
 - a. Concentrated load of 200 lbf (0.89kN) applied at any point and in any direction.
 - b. Uniform load of 50 lbf/ft. (0.7kN/m) applied in any direction.
 - c. Concentrated and uniform loads need not be assumed to act concurrently.
 2. Guards Infill Area:
 - a. Concentrated load of 50 lbf (0.22 kN) applied horizontally to a 1 sq. ft. (0.09 sq. m) at any point in system. Including panels, intermediate rails, balusters, or other elements composing infill area.
 - b. Infill load need not be assumed to act concurrently with other loads in determining stress on guard.
 3. Thermal Movements: Design and engineer railing system to allow for movements resulting from a minimum 60 degree F (16 C) changes in ambient as required for exterior rail applications only.
 4. Corrosion Resistance: Separate incompatible materials to prevent galvanic corrosion.
 5. Wind Load: Provide railings capable of withstanding the project specific wind loads without exceeding allowable design working stress of materials for handrails, railings, anchors, and connections.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01 33 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- C. Shop Drawings: Submit plan and typical section detail to depict the proper configuration, assembly, installation, and termination of each product specified in this section. Including: Section details, Mounting methods, Typical Elevations, and Key plan layout.
- D. Verification Samples: For each finish product specified, two samples, representing actual product, color, and finish.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of five (5) years' experience.

1. Sightline Commercial Solutions, 7008 Northland Drive North, Minneapolis, MN 55428; Toll Free Tel: 877-215-7245; Email: info@sightlinecommercial.com.

B. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

2. Refinish mock-up area as required to produce acceptable work.

C. Railing System:

1. System components: Pre-engineered by registered Professional Engineer licensed in the State in which project is located.

2. Attachments to building structure: Pre-engineered by registered Professional Engineer licensed in State in which project is located.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

C. Store products indoors in temperature-controlled facility.

1.8 PROJECT CONDITIONS

A. Field Measurements: Where products are indicated to fit to other construction, check actual dimensions of other construction by accurate field measurements before fabrication.

B. Where field measurements cannot be made without delaying the products fabrication and delivery, obtain guaranteed dimensions in writing by the Contractor and proceed with fabrication of products to not delay fabrication, delivery and installation.

C. Coordinate fabrication and delivery schedule of products with construction progress and sequence to avoid delay of product installation.

D. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Sightline Commercial Solutions, 7008 Northland Drive North, Minneapolis, MN 55428; Toll Free Tel: 877-215-7245; Email: info@sightlinecommercial.com.
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00.

2.2 MATERIALS

A. Aluminum:

- 1. Extruded Pipe: Alloy 6061-T6 or similar.
- 2. Extruded Bars, Shapes and Moldings: Alloy 6005A-T51 or 6061-T6 or similar.

B. Stainless Steel:

- 1. Tubing: ASTM A 554, Type 304 or 316.
- 2. Pipe: ASTM A 312/A 312M, Type 304 or 316.
- 3. Castings: ASTM A 743/A 743M, Grade CF 8 or CF 20 or CF 8M or CF 3M.
- 4. Sheet, Strip, Plate, and Flat Bar: ASTM A 666 or ASTM A 240/A 240M, Type 316.
- 5. Bars and Shapes: ASTM A 276 - Type 316

C. Steel:

- 1. Tubing: ASTM A 500/A 500M, A 513
- 2. Pipe: ASTM A 53
- 3. Sheet, Strip, Plate, and Flat Bar: ASTM A 36/A 36M
- 4. Bars and Shapes: ASTM A 29/ A 28M

2.3 Railing Components

A. Posts:

- 1. Material: **[6061-T6 aluminum] [Type 304] [Type 316] [stainless steel] [steel]**
- 2. Shape
 - a. Round: **[1.66 inch (42.2 mm)] [1.9 inch (48.3 mm)] [2 inch (50.8 mm)] [Custom].**
 - b. Square: **[1.5 inch (38.1 mm)] [2 inch (50.8 mm)] [2.5 inch (63.5 mm)] [Custom].**
 - c. Rectangular: **[.75 inch x 2 inch (19 mm x 38.1 mm)] [.75 inch x 2.5 inch (19 mm x 63.5 mm)] [.75 inch x 3 inch (19 mm x 76.2 mm)] [1 inch x 2 inch (25.4 mm x 50.8 mm)] [Custom].**
- 3. End conditions may vary from typical post sizing to accommodate cable tension, including the addition of a cantilevered section.

B. Top Rail:

- 1. Material: **[6061-T6 aluminum] [Type 304] [Type 316] [stainless steel] [steel]**

2. Shape:
 - a. Round: **[1.5 inch (38.1 mm)] [1.66 inch (42.2 mm)] [2 inch (50.8 mm)] [Custom].**
 - b. Square: **[1.5 inch (38.1 mm)] [2 inch (50.8 mm)] [2.5 inch (63.5 mm)] [Custom].**
 - c. Rectangular: **[.75 inch x 2 inch (19 mm x38.1 mm)] [.75 inch x 2.5 inch (19 mm x 63.5 mm)] [.75 inch x 3 inch (19 mm x 76.2 mm)] [1 inch x 2 inch (25.4 mm x 50.8 mm)] [Custom].**
3. Height (from walking surface): **[36 inch (914.4 mm)] [43 inch (1092.2 mm)] [48 inch (1219.2 mm)] [Custom_____].**

C. Cable Infill & Fittings:

1. Material: Stainless Steel
2. Wire Diameter: **[.1875 inch (4.8 mm) typ.] [.25 inch (6.3 mm)]**
3. Construction: 1x19
4. Fittings: Stainless steel shop swaged cable fittings
 - a. Termination stud
 - b. Threaded adjustable termination stud with hex key
 - c. Turnbuckle
 - d. Pivoting adjustable eye bolt
5. Spacing: Spaced to not allow 4" sphere to pass. 3.25 inch (82.6 mm) O.C. typical.

D. Handrails:

1. Material: **[Type 304] [Type 316] [stainless steel] -OR- [6061-T6 aluminum]** round tube/pipe
2. Diameter: **[1.5 inch (38.1 mm)] [1.66 inch (42.2 mm)] [1.9 inch (48.3 mm)] [Custom].**
3. Height: 36 inch (914.4 mm).

E. Handrail Brackets/Standoff:

- a. Rod & saddle type bracket – mechanically attached to handrail
- b. Material: Match handrail material (except when wood or brass is used).
- c. Style: **[Bent Rod] [Adjustable Rod (stainless only)] [Custom].**

F. Mounting Style:

1. Top Mount directly to surface.
2. Top Mount below walking surface
3. Top Mount to embed plates.
4. Top Mount to vertical stanchions.
5. Fascia/Side Mount.

G. Mounting Method:

1. Baseplate with concrete anchors

2. Baseplate with embed and weld studs
3. Core drill
4. Baseplate to stair stringer (weld stud or tap bolt)
5. Direct weld to stringer, embed, or pour stop

2.4 FASTENERS

- A. Anchors: Select fasteners of type, grade and class required to produce connections suitable for anchoring system to other types of construction indicated.
- B. Component Hardware: Type best suited to application, stainless steel. Do not use metals that are corrosive or incompatible with materials joined.
 1. Provide concealed fasteners for interconnecting components and for attaching them to other work, unless exposed fasteners are unavoidable or are a standard fastening method for products indicated.

2.5 GROUT AND ANCHORING CEMENT

- A. Non-shrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.6 FABRICATION

- A. Assemble railing in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- B. Mechanical Connections: Fabricate handrails and railings by connecting members with railing manufacturer's standard concealed mechanical fasteners and fittings, unless otherwise indicated. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
- C. Provide inserts and other anchorage devices to connect posts to concrete or other construction. Fabricate anchorage devices capable of withstanding loads imposed by railing system. Coordinate anchorage devices with supporting structure.
- D. Fabricate railings in accordance with approved Shop Drawings.
- E. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- F. Cut, reinforce, drill and tap components as indicated on drawings to receive finish hardware, screws and similar items.
- G. Fabricate railings with joints tightly fitted and secured. Furnish fittings to accommodate site assembly and installation. Make exposed joints butt tight and flush.
- H. Provide mounted handrails wall returns at wall ends unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch (6mm) or less.
- I. Accommodate for expansion and contraction of members and building movement without damage to connections or members.

2.7 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for applying and designating finishes.
 - 1. Aluminum: AA DAF-45.
 - 2. Stainless Steel: NAAMM AMP 503.
- B. Appearance of Finished Work:
 - 1. Variations in appearance of abutting or adjacent units are acceptable if they are within one-half of the range of approved samples. Noticeable variations in the same unit are not acceptable.
 - 2. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.
- C. Finish: Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with manufacturer's written instructions. All unexposed metals to be mill finish.
 - 1. Anodize: Clear Anodize AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker unless indicated otherwise.
 - 2. No. 4 Brushed (Stainless Steel)
 - a. Circumferential on all round pipe and tube.
 - b. Linear running the length of the rail on all other materials.
 - 3. Powder coat:
 - a. Material: AAMA 2603 - Polyester powder coating, 3 mil average film thickness
 - b. **[Color _____]**

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages. These include items such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete and masonry construction.
 - 1. Coordinate delivery of anchorages to project site.
 - 2. Coordinate that blocking is in place for all mounting fasteners.
- B. Clean debris and dust from surfaces and embed holes thoroughly prior to installation.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install railing system in accordance with manufacturer's approved Shop Drawings and instructions.
- B. Install components plumb and level, accurately fitted, free from distortion and defects.
- C. Provide anchors for connecting railings to supporting construction.
- D. Perform cutting, drilling, and fitting required for installation of handrails. Accurately set handrails in location, alignment, and elevation, measured from established lines and levels.
- E. Fit exposed connections accurately together to form tight joints except as necessary for expansion.

3.4 PROTECTION

- A. After installation, General Contractor or Owner shall be responsible for protection of products during the balance of construction.
- B. Touch-up, repair or replace damaged products before Substantial Completion.
- C. When cleaning aluminum surfaces use plain water containing a mild soap or detergent. No abrasive agents or harsh chemicals shall be used.

END OF SECTION