



4621 East 75<sup>th</sup> Terr.  
Kansas City, MO 64132  
Phone (816) 300 2828 | Fax (816) 300 0864  
LiversBronze.com | Livers@LiversBronze.com

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## SECTION 05 73 13 – ORNAMENTAL RAILING: STRUCT-U-RAIL

### PART 1 -- GENERAL

#### Section 1.01 SCOPE OF WORK

- A. Fabricate and install pre-engineered, component-based, ornamental railing system in accordance with the requirements set forth in this section.

#### Section 1.02 ADDITIONAL WORK INCLUDED IN THIS SECTION

- A. Reinforcing for wall rail brackets at dry wall partitions – supplied and installed by General Contractor.  
B. Field measuring for weld plates, sleeves and insert locations by railing installer.  
C. Field measuring by railing installer.  
D. Anchors or inserts for terrazzo or precast concrete by subcontractor.

*The following items are not to be included in the metal rail contractor's work:*

- Temporary shoring or bracing
- Demolition and removal of existing work
- Clean up of existing construction prior to installation of railings
- Cleaning out of stair wells
- Cutting; preparation of pockets; setting of plates, inserts, carpenter hardware or any other built ins
- Temporary lights and electricity
- Temporary safety rails after erection
- Field painting
- Final cleaning and protection of wood, aluminum, stainless steel, bronze and glass

#### Section 1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Section 03 30 00: Cast-in-Place Concrete  
B. Section 03 40 00: Precast Concrete  
C. Section 03 62 00: Non-Shrink Grouting  
D. Section 03 63 00: Epoxy Grouting  
E. Section 04 20 00: Unit Masonry  
F. Section 04 40 00: Stone Assemblies  
G. Section 05 12 00: Structural Steel Framing  
H. Section 05 51 00; Metal Stairs  
I. Section 05 52 00; Metal Railings  
J. Section 05 71 00; Decorative Metal Stairs  
K. Section 08 80 00: Glazing  
L. Section 09 20 00: Plaster and Gypsum Board Assemblies  
M. Section 09 30 00: Tiling  
N. Section 09 65 00: Resilient Flooring  
O. Section 09 68 00: Carpeting  
P. Section 09 90 00: Painting and Coating

#### Section 1.04 STRUCTURAL REQUIREMENTS

*The structural adequacy of the metal stair and railing design is the responsibility of the designer or professional of record.*

- A. Railing assembly shall withstand a minimum concentrated load of [200] [ ] pounds applied vertically downward or horizontally in any direction, but not simultaneously, at any point on the top rail.

*Codes may vary in method of application and magnitude of load. Governing code should be checked for specific requirements. Most codes require a 200 pound minimum concentrated load applied in any direction at any point on the top rail.*

- OR -

- A. Railing assembly shall withstand a minimum uniform load of [50] [ ] pounds per foot applied horizontally or vertically downward, but not simultaneously, on the top rail.

*Some codes have requirements for uniform loading on the top rails. Most codes require a 50 lb/ft minimum uniform load . Uniform loads are not to be applied concurrently with concentrated loads.*

### Section 1.05 QUALITY ASSURANCE

- A. Fabricator Qualifications: Furnish references listing projects of similar size and scope

*If special or unusual capabilities are required they should be set forth here.*

- B. Installer Qualifications

*State as required in 1.05.A or state specific qualifications required.*

- C. Regulatory Requirements

1. Components and installation are to be in accordance with state and local code authorities
2. Components and installation are to follow current ADA and ICC/ANSI A117.1 guidelines.

*Determine code regulations that govern this work. Specify requirements and drawings that are necessary to meet governing codes. Specify code and year of code.*

### Section 1.06 REFERENCES

*Include only reference standards that are to be indicated within the text of this section. Edit the following, adding and deleting as required for project and product selection.*

- A. Aluminum Association (AA)
  1. ABH-21 Aluminum Brazing Handbook
  2. ASD-1 Aluminum Standards and Data
  3. DAF-45 Designation System for Aluminum Finishes
  4. SAA-46 Standards for Anodized Architectural Aluminum
- B. American Architectural Manufacturers Association (AAMA)
  1. AAMA 605.1 Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
- C. American Concrete Institute (ACI)
  1. ACI 347 Recommended Practice for Concrete Formwork
- D. American Institute of Steel Construction (AISC)
  1. Manual of Steel Construction
- E. American Iron and Steel Institute (AISI)
  1. Steel Products Manual; Stainless and Heat Resisting Steel.
  2. Code of Standard Practice
- F. American National Standards Institute (ANSI)
  1. ANSI A58.1 Minimum Design Loads in Buildings and Other Structures.
  2. ICC/ANSI A117.1 Accessible and Usable Buildings and Facilities.
  3. ANSI A97.1 Safety Performance Specifications and Methods of Test for Safety Glazing Material used in Buildings.
- G. Society for Testing and Materials (ASTM)
  1. A 167 Specification for Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  2. A 269 Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
  3. A 312 Specification for Seamless and Welded Austenitic Stainless Steel Pipe.
  4. A1264-1 Safety Requirements for Workplace Floor and Wall Openings, Stairs and Railing Systems
  5. B 43 Specification for Standard Sizes of Seamless Red Brass Pipe.
  6. B 209 Specification for Aluminum and Aluminum Alloy Sheet and Plate.
  7. B 210 Specification for Aluminum and Aluminum Alloy Drawn Seamless Tubes.
  8. B 211 Aluminum and Aluminum Alloy Bar, Rod and Wire
  9. B 221 Specification for Aluminum-Alloy Bars, Rods, Wires, Shapes and Tubes
  10. B 241 Specification for Aluminum and Aluminum Alloy Seamless Pipe and Seamless Extruded Tube.
  11. B 429 Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
  12. B 455 Specification for Copper-Zinc-Lead Alloy (Leaded Brass) Extruded Shapes.
  13. B 584 Specification for Copper Alloy Sand Castings for General Applications.
  14. C 595 Specification for Blended Hydraulic Cements.
  15. C1036 Standard Specification for Flat Glass
  16. C 1172 Standard Specification for Laminated Architectural Flat Glass.
  17. D 1730 Recommended Practices for Preparation of Aluminum and Aluminum Alloy Surfaces for Painting.
  18. E 84 Test Method for Surface Burning Characteristics of Building Materials.
  19. E 894 Standard Test Methods for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
  20. E 935 Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.

21. E 985 Specification for Permanent Metal Railing Systems and Rails for Buildings.
  22. E 1300 Standard Practice for Determining Load Resistance of Glass in Buildings
  23. E 2353 Standard Test Methods for Performance of Glass in Permanent Glass Railing Systems, Guards, & Balustrades.
  24. E 2358 Standard Specification for Performance of Glass in Permanent Glass Railing Systems, Guards, & Balustrades.
- H. American Welding Society (AWS)
    1. Specifications for Welding Rods and Bare Electrodes.
  - I. Americans With Disabilities Act Accessibility Guidelines (ADAAG)
  - J. Copper Development Association (CDA)
    1. Standards Handbook, Wrought Copper and Copper Alloy Mill Products, Part 2 - Alloy Data.
    2. Standards Handbook, Cast Copper and Copper Alloy Products, Part 7 - Alloy Data.
    3. Copper, Brass and Bronze Design Handbook for Architectural Applications.
  - K. General Service Administration (GSA) Federal Specifications (FS)
    1. DD-G-1403 Glass, Plate (Float), Sheet, Figured, and Spandrel (Heat Strengthened and Fully Tempered).
    2. QQ-C-390 Copper Alloy Castings.
    3. QQ-S-766 Stainless Steel, Class 302 or 304.
    4. FS-TT-P-645 Primer, Paint, Zinc Chromate, Alkyd Type.
    5. FS-TT-P-645A Primer, Paint, Zinc Chromate, Alkyd Type.
  - L. Green Globes System
  - M. International Code Council (ICC)
    1. International Building Code (IBC)
    2. International Residential Code (IRC)
  - N. Iron and Steel Society (ISS)
    1. Steel Products Manual
      - a. Stainless and Heat Resisting Steels
  - O. Military Specifications (MIL)
    1. MIL-A-46104 Aluminum Alloy Extruded Rod, Bar, and Shapes, 7001.
    2. MIL-P-1144 Pipe, Corrosion Resistant, Stainless Steel, Seamless or Welded.
    3. MIL-P-25995 Pipe, Aluminum Alloy, Drawn or Extruded.
    4. MIL-R-36516 Rail, Restraint.
  - P. National Association of Architectural Metal Manufacturers (NAAMM) and National Ornamental and Miscellaneous Metals Association (NOMMA)
    1. Metal Finishes Manual
  - Q. National Association of Architectural Metal Manufacturers (NAAMM)
    1. Metal Stair Manual
  - R. National Association of Home Builders' Research Center (NAHBRC)
    1. Review of Fall Safety of Children Between the Ages of 18 Months and 4 Years in Relations to Guards and Climbing in the Built Environment.
  - S. National Fire Protection Association (NFPA)
    1. 101 Life Safety Code
  - T. Institute of Building Sciences
    1. Metric Guide for Federal Construction
  - U. U.S. Green Building Council
    1. The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™

#### **Section 1.07 SUBMITTALS**

- A. Submit product data under provisions of Section [01 30 00] [01 34 00]. Including description of materials, components, fabrication, finishes.
  1. Submit manufacturer's shop drawings, including plans, elevations, sections, and details, indicating materials, components, sizes, dimensions, tolerances, hardware, fasteners, finishes, options, accessories, and installation. Show details of attaching railing system to supports. Submit [one] [\_\_\_\_\_] set[s] of CAD files for approval.
- B. Submit manufacturer's samples of standard materials, finishes, colors, and textures.
- C. Submit mock up: [Full size in place mock up complete with two posts, glass and full size hardware] [18" tall mock up using full size components]
- D. Test Reports: Submit test reports indicating compliance with ASTM E985.
- E. Manufacturers Quality Assurance: Submit manufacturer's certification that materials comply with specified requirements and are suitable for the intended application. Submit certification that the manufacturer has not less than 5 years experience producing the product specified in this section. The manufacturer or an approved installer will do the installation of this product.
- F. Maintenance Instructions: Submit manufacturer's maintenance and cleaning instructions.
- G. Warranty: Submit manufacturer's standard warranty.

H. Certificates:

- a. Furnish manufacturer's certification that materials meet specification requirements.

– OR –

- a. Furnish [certification] [and] [or] [calculations] by an engineer registered in the state where the project is located showing that safety requirements are met.

*This requirement should be included only if called for by contract documents.*

I. Substitutions:

1. Any changes in specified material must meet requirements of the General Conditions "or equal" clause. (See # \_\_\_\_\_)

*Indicate Section and Paragraph of the General Conditions that sets out "or equal" requirements.*

2. Submit the following with the substitution request.
- Detailed specifications of construction and fabrication
  - Independent certified test reports indicating compliance with design and performance requirements specified in this section.
  - Full size samples of major components.
  - 12 inch long sample of top railing

**Section 1.08 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials to the job site in good condition and properly protected against damage to finished surfaces.
- B. Storage on site:
- Store material in a location and in a manner to avoid damage. Stacking shall be done in a way, which will prevent bending.
  - Store material in a clean, dry location away from uncured concrete and masonry. Cover with waterproof paper, tarpaulin, or polyethylene sheeting in a manner that will permit circulation of air inside the covering.
  - Keep handling on site to a minimum. Exercise particular care to avoid damage to finishes of material.

**PART 2 -- PRODUCTS**

**Section 2.01 ACCEPTABLE MANUFACTURER**

- A. Railing system shall be STRUCT-U-RAIL as manufactured by LIVERS BRONZE CO. Phone: 816-300-2828. Web site: [www.liversbronze.com](http://www.liversbronze.com). E-mail: [livers@liversbronze.com](mailto:livers@liversbronze.com)

**Section 2.02 MATERIALS AND FINISHES**

- A. Stainless Steel: Type 304
- Finish: [Ornamental Grade, [ AISI No. 4] [AISI No. 7] [AISI No. \_\_\_\_].
- B. Copper Alloys:
- Drawn Pipe: C23000 (Red Brass), ASTM B 43
  - Extruded products: C385 (Architectural Bronze)
  - Sheet: C28000 (Muntz Metal)
  - Finish: [#4 satin] [#7 polished] [antiqued] – all finishes complete with clear lacquer coating
- C. Steel:
- Bars: meeting ASTM A 36.
  - Finish
    - Powder coating: Select [color] from Livers Bronze standards.
    - Blackened steel
    - Clear matte powder coat over raw steel
- E. Glass:
- Fully tempered ASTM C 1048 Kind FT quality q3 conforming to the safety requirements of ANSI Z97.1.
  - Laminated, [fully tempered] [heat strengthened], ASTM C 1172, with rigid interlayer – PVB or SGP. Laminated glass is required per IBC, SGP Interlayer required for exterior glass.
  - Tint: [None] [Gray] [Low iron] [\_\_\_\_\_].
- F. Wood: Sanded finish – final finish to be applied in the field by another trade.

**Section 2.03 RAILING SYSTEM**

- A. Material shall conform to 2.02. and be finished in accordance with 2.02.
- B. Railing system shall Livers Bronze Co STRUCT-U-RAIL system.
- C. Cap Railing: Standard cap railing for glass is a formed stainless steel channel. Alternative cap railings are available [consult Livers Bronze for alternatives]
- D. Side Railings: Fabricate 1.5" diameter side rails from [brass] [stainless steel] or 2" diameter hardwood [select species]



- E. Glass support bases: Use standard extruded aluminum base for 9/16" laminated glass, 11/16" laminated glass or 13/16" laminated glass. Top mount or side mount base to 1/2" embedded steel plate (by steel trade) or steel stringer. Aluminum base is mounted continuous and is anchored at 27" o.c. for steel and 9" o.c. for concrete.
- F. Glass infill shall be 1/2" tempered glass or laminated glass, conform to the safety requirements of ANSI Z97.1. Glass is mechanically locked into aluminum base using Livers Lock devices at 9" centers. Curved laminated glass is grouted into the aluminum base.
- G. Fittings: Shall be stainless steel. Select Side railing bracket [RB1053SS] [RB2000SS]
- H. Trim: Trim profiles to be as shown on the drawings and fabricated from the material / finish as shown.

#### **Section 2.04 FASTENERS**

- A. All mechanical fasteners used in the assembly of stainless steel railings shall be manufactured from stainless steel.
- B. Exposed mechanical fasteners for use with bronze materials shall be manufactured from yellow brass.
- C. Cement: Hydraulic, ASTM C 595, factory prepared with accelerator.

#### **Section 2.05 HANDRAIL BRACKETS**

- A. Stainless steel – fabricators standard bracket for product specified.

#### **Section 2.06 FABRICATION**

- A. All metal fabrication to be performed by a single source fabricator.

### **PART 3 --EXECUTION**

#### **Section 3.01 PREPARATION**

- A. Supply items to be [cast in concrete] [embedded in masonry] [placed in partitions]. These items are to be shown on shop drawings if provided by the fabricator.

#### **Section 3.02 METAL INTERACTION**

- A. When bronze and aluminum components come into contact with dissimilar metals, surfaces shall be kept from direct contact by painting the dissimilar metal with [a heavy coat of a proper primer] [asphalt paint].
- B. When aluminum components come into contact with cement or lime mortar, exposed aluminum surfaces shall be painted with [heavy bodied bituminous paint] [water-white methacrylate lacquer] [zinc chromate].

#### **Section 3.03 INSTALLATION**

- A. Install in accordance with shop drawings [and manufacturer's instructions] at locations indicated on the drawings.
- B. Erect work [square and level,] [horizontal or parallel to rake of steps or ramp,] rigid, [and] free from distortion or defects detrimental to appearance or performance.
- C. Expansion joints shall be provided as needed to allow for thermal expansion or contraction.

#### **Section 3.04 CLEANING**

- A. As installation is completed, wash thoroughly using clean water and soap; rinse with clean water.
- B. Do not use acid solution, steel wool or other harsh abrasives.

#### **Section 3.05 REPAIR OF DEFECTIVE WORK**

- A. Remove stained or otherwise defective work and replace with material that meets specification requirements.
- B. Repair damaged finish as directed by Architect
- C. Replace defective or damaged components as directed by Architect.