



SECTION 05520

HANDRAILS AND RAILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Aluminum welded and component railing systems.

1.2 RELATED SECTIONS

- A. Section 03300 - Cast-In-Place Concrete; coordination with substrate.
- B. Section 06100 - Rough Carpentry: Blocking requirements and installation.
- C. Section 06410 - Interior Architectural Woodwork: Wood rail cap installed on railing system.

1.3 REFERENCES

- A. American Architectural Manufacturers Association (AAMA) 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
- B. American Architectural Manufacturers Association (AAMA) 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- C. American National Standards Institute (ANSI) - A21.1 Safety Requirements for Floor and Wall Openings, Railings and Toe Boards.
- D. American National Standards Institute (ANSI) - A58.1 Minimum Design Loads in Buildings and Other Structures.
- E. Americans with Disabilities Act Accessibility Guidelines (ADA).
- F. American Society for Testing and Materials (ASTM) C1048 - Standard Specification for Heat-Treated Flat Glass - Hind HS, Kind FT Coated and Uncoated Glass.
- G. American Society for Testing and Materials (ASTM) B209 - Aluminum and Aluminum-Alloy Sheet and Plate.
- H. American Society for Testing and Materials (ASTM) B221 - Aluminum-Alloy Extruded Bar, Rod, Wire, Shape and Tube.
- I. American Society for Testing and Materials (ASTM) E 894 - Standard Test Method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.

- J. American Society for Testing and Materials (ASTM) E 935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
- K. American Society for Testing and Materials (ASTM) E 985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.
- L. American Welding Society (AWS) D 1.2 - Structural Welding Code - Aluminum.

1.4 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Railing shall comply with all requirements of the ADA and OSHA regulations.
 - 2. Provide metals free from surface blemishes where exposed to view in finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.
- B. Structural Requirements:
 - 1. Handrail, wall rail and guardrail assemblies and attachments shall resist a minimum concentrated load of 200 pounds (91 kg) applied in any direction at any point on the top rail and a vertical and horizontal thrust of 50 lb/lf (0.73 kN/m) applied to the top railing without permanent set or damage. The two loads are not cumulative.
 - 2. Infill area of guardrail system capable of resisting a horizontal concentrated load of 200 pounds applied to one square foot (8165 g/sq. m) at any point in the system. This loading shall not be applied simultaneously with other loading conditions.
 - 3. Handrail assemblies and guards shall be designed to resist a load of 50 pounds per linear foot (0.73 kN/m) applied in any direction at the top and to transfer this load through the supports to the structure.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- 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:
 - 1. Plans, elevations, and detail sections.
 - 2. Indicate materials, methods, finishes, and types of joinery, fasteners, anchorages, and accessory items. Specify finishes.
 - 3. Provide setting diagrams and templates for anchorages, sleeves, and bolts installed by others.
 - 4. Where materials or fabrications are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis.
- D. Certification: Submit independent testing report developed for the railing system certifying proposed railing system, including attachment method, compliance with load requirements and local codes.
- E. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
 - 1. Where normal color and texture variations are to be expected, include 2 or

2. more units in each set of samples showing the limits of such variations.
2. Finish shall represent color range, paint thickness, and sheen to be expected in the finished Work.

- F. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.
1. Where normal color and texture variations are to be expected, include 2 or more units in each set of samples showing the limits of such variations.
 2. Finish shall represent color range, paint thickness, and sheen to be expected in the finished Work.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Not less than 10 years' experience in the actual production of specified products.
- B. Installer Qualifications: Firm with 3 years' experience in installation of systems similar in complexity to those required for this Project, plus the following:
1. Trained and authorized by manufacturer to engineer and install the specified railing system.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish areas designated by Architect.
 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
 3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store on site in a location and manner to avoid damage. Stacking should be done in a manner that will prevent bending. Store material in a clean, dry location away from uncured concrete and masonry. Any protection on the railings during transportation should remain until installed.
- C. Keep handling on site to a minimum. Exercise caution to avoid damage to factory applied mechanical and painted finishes.

1.8 PROJECT CONDITIONS

- A. 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.
- B. Field Measurements: Where handrails and railings are indicated to fit to other construction, check actual dimensions of other construction by accurate field measurements before fabrication; show recorded measurements on final shop drawings.
1. Where field measurements cannot be made without delaying the railing 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 handrails with construction progress and sequence to avoid delay of railing installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Tuttle A Dant Clayton Company, which is located at: 120 Shadowlawn Dr., Fishers, IN 46038; Tel: 317-842-2420; Email: [request info](mailto:request_info@tuttlerailings.com) (sales@tuttlerailings.com); Web: www.tuttlehandrailings.com
- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 INDUSTRIAL MECHANICAL ALUMINUM HANDRAIL SYSTEMS

- A. Set Screw System:
 - 1. Product: Tuttle A Dant Clayton Company Set Screw System - TABCO 8000.
 - 2. Pipe Material: Type 6005, 6063 or 6061 alloy, schedule 40 or schedule 80.
 - 3. Pipe Size: 1-1/2 inch (37 mm) diameter.
 - 4. Finish: Clear anodized (M10C22A41).
 - 5. Fasteners: Type 304 stainless steel.
 - 6. Fabrication: Horizontal rail design. Two line to six line horizontal rails as indicated or required to meet code.
 - a. Provide schedule 80 pipe material for posts where indicated or required to resist loading.
 - b. Post spacing - 6 feet (1.8 m) maximum.
 - c. Shop fabricated sections shall be assembled using mechanical construction with tang (expansion type) connectors.
 - d. Provide toe boards where indicated or required to meet code.
 - 7. Installation: Fabricated sections shall be assembled using mechanical construction with expansion and tang (expansion type) connectors.

2.3 MATERIALS

- A. Aluminum:
 - 1. Extruded Aluminum: ASTM B221; 6063 alloy, T6 temper.
 - 2. Sheet Aluminum: ASTM B209; 6061 alloy, T6 temper and 6005 alloy, T5 temper.

2.4 FABRICATION

- A. Tolerances: Verify dimensions on Site prior to shop fabrication.
 - 1. Fabricate items with joints neatly fitted and properly secured.
 - 2. Mill joints to a tight, hairline fit.
 - 3. Cope or miter corner joints.
- B. Design components to allow for expansion and contraction without causing buckling, excessive opening of joints, or overstressing of welds and fasteners.
- C. Form metal to the required shapes and sizes, with true curves, lines, and angles.
- D. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
- E. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- F. Preassemble items in shop or field to greatest extent possible to minimize splicing. Clearly mark units for assembly and coordinated installation.

- G. Supply components required for proper anchorage of ornamental metals. Fabricate anchorage and related components of same material and finish as metal fabrication, unless otherwise specified herein.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared. Fully inspect the supporting structure to verify a structurally sound base for anchoring railing system.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Surface Preparation: Coordinate and furnish anchorages and setting drawings, diagrams, templates, instructions, and directions for the installation of items having integral anchors which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the Project Site.

3.3 INSTALLATION

- A. Comply with manufacturer's recommendations.
- B. Provide anchorage devices and fasteners including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- C. Perform cutting, drilling, and fitting required for installation. Set accurately in location, alignment and elevation, plumb, level, and true, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry, or similar construction.
- D. Form tight joints with exposed connections accurately fitted with uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing, restore finishes to eliminate evidence of such corrective work.
- E. Mounting brackets shall be securely mounted to building structure in a positive manner including sufficient reinforcements and anchors as required.
 - 1. Fillers: Provide fillers made from plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.
- F. Installation shall be rigid and secure, installed by mechanics experienced in erection of architectural metal. All screws and fittings shall be drawn up tightly. Rails shall be set plumb and aligned.
- G. Close exposed ends of handrail and railing members with welded ends.
- H. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION