



SECTION 05520
HANDRAILS AND RAILINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The General Provisions of the contract, including General and Supplementary Provisions and General Requirements apply to work specified in this Section.

1.2 REFERENCES

- A. AA 30 - "Specifications for Aluminum Structures".
- B. AAMA 2604 – Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
- C. AAMA 2605 – Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
- D. ADA, Standards for Accessible Design, 1991.
- E. ANSI – Z97.1 Safety Performance Specifications and Methods of Testing for Safety Glazing Materials Used in Buildings.
- F. ASTM B 26/B 26M - Standard Specification for Aluminum-Alloy Sand Castings; 2005.
- G. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2004.
- H. ASTM B 210 - Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes; 2004.
- I. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2005.
- J. ASTM B 247 - Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings; 2000.
- K. ASTM B 429 - Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube; 2002.
- L. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink); 2002.

- M. ASTM E 935 - Standard Test Methods for Permanent Metal Railing Systems and Rails for Buildings.
- N. ASTM E 985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings.
- O. ASTM E 488 - Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements; 1996.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Handrails and railings shall withstand structural loading as determined by allowable design working stresses of materials based on the following standards.
 - 1. Aluminum: AA 30
 - 2. 4/3 Allowable Stress Increase is acceptable for design calculations where permitted by the governing local codes.
- B. Structural Performance: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stress of materials for handrails, railings, anchors and connections:
 - 1. Handrails and Guards: Shall withstand the following loads:
 - a. Concentrated load of 200 lbf (0.89kN) applied at any point and in any direction.
 - b. Uniform load of 50 lbf-ft. (0.07kN-m) applied in any direction.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.
 - 2. Intermediate components and Infill Area: Shall withstand the following loads:
 - a. Concentrated horizontal load of 200 lbf (0.89 kN) applied to a 1sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area. Loads need not be assumed to act concurrently, with loads on top rails in determining stress on guard.
- C. Thermal Movements: Design handrails and railings to allow for movements resulting from 120 degree F (49 C) changes in ambient and 180 degree F (82 C) surface temperatures. Base design upon surface temperatures of materials due to both solar heat gain and nighttimes-sky heat loss.
- D. Corrosion Resistance: To prevent galvanic corrosion, isolate metals and incompatible materials to eliminate direct contact.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: For Manufacturer's products assembled from standard components to be used, including:
 - 1. Powder Coat Paint or other finish provided.
- C. Shop Drawings:
 - 1. Submit Manufacturer's approved shop drawings detailing the section and elevation views of each product to be installed.

2. Coordinate with locations listed on Contract Drawings.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing railing manufacturer's full range of available colors.
- E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square representing actual product.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing through one source, from a single manufacturer.
- B. 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. Mock up may remain in place and become incorporated into the finished work, subject to approval of the architect.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating handrails and railings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 WARRANTY

- A. At project closeout, provide to the Owner or Owners Representative, an executed copy of the manufacturer's standard document outlining the terms, conditions and limitations of their Warranty.
 1. Material Warranty: Twenty (10) Years.
 2. Finish Warranty: Five (5) Years.
 3. Finish Warranty: Ten (10) Years.
 4. Finish Warranty: Fifteen (15) Years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: RGS Products Inc., located at: 4550 Old Meadville Road, Union City, PA 16438; Tel: 814-796-4515; Fax: 814-796-4009; Email: sales@rgsproductsinc.com; Web: www.rgsproductsinc.com

- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 METALS

- A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.
- B. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of alloy and temper designated below for each aluminum form required.
 - 1. Extruded Bar and Tube: ASTM B 221 (ASTM B 221 M), alloy 6063-T5/T52
 - 2. Extruded Structural Pipe and Tube: ASTM B 429, alloy 6063-T832.
 - 3. Plate and Sheet: ASTM B 209 (ASTM B 209M), alloy 6061-T6.
 - 4. Die and Hand Forgings: ASTM B 247 (ASTM B 247 M), alloy 6061-T6
 - 5. Castings: ASTM B 26/B 26M, alloy A356-T6.
- C. Brackets, Flanges and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.
 - 1. Provide brackets with flange for concealed anchorage to hanger bolt.
 - 2. Provide formed brackets with predrilled hole for exposed bolt anchorage.
 - 3. Provide brackets with internal sleeve connectors.

2.3 GLASS PRODUCTS AND GLAZING MATERIALS

- A. Tempered Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type 1 (transparent glass, flat), Quality q3 (glazing select). Provide products complying with requirements indicate below for class, thickness, and manufacturing process that have been tested for surface and edge compression according to ASTM C 1048 and for impact strength according to 16CFR, Part 1201 for Category II materials.
 - 1. Provide brackets with flange for concealed anchorage to hanger bolt.
 - 2. Provide formed brackets with predrilled hole for exposed bolt anchorage.
 - 3. Provide brackets with internal sleeve connectors.

2.4 FASTENERS

- A. Handrail Anchors: Select fasteners of type, grade and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.
- B. Handrail and Railing Component Anchors: Use fasteners fabricated from same basic metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are a standard fastening method for handrail and railing 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 handrails and railings in shop to greatest extent possible to minimize filed 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. Form changes in direction of railing members as shown in the Contract Drawings.
- C. 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.
- D. Brackets, Flanges, Fittings and Anchors: Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings and anchors to connect handrail and railing members to other construction.
- E. Provide inserts and other anchorage devices to connect handrails and railings to concrete or masonry. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.
- F. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- G. Cut, reinforce, drill and tap components as indicated on drawings to receive finish hardware, screws and similar items.
- H. Close exposed ends of railing members with prefabricated end fittings.
- I. 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.

2.7 FINISHES

- A. General:
 - 1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 2. Appearance of Finished Work:
 - a. 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.

- b. 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.
- B. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- C. HighPerformance Organic Coating Finish: AAC12C42R1X (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid chromate fluoridephosphate conversion coating; Powder Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with manufacturer's written instructions A minimum 5 stage cleaning and pre-treatment system shall be utilized to remove organic and inorganic surface oils, residual oxides, and apply a chrome containing conversion coating, weights should be a minimum of 431 mg/m² (40 mg/ft²). The pre-treatment when used in conjunction with a baked organic coating shall produce a total finishing system capable of meeting impact, adhesion, detergent, humidity and salt spray performance as specified in the appropriate AAMA 2605 specification.
- D. Polyester Powder Coating, 2-3 mil. Average film thickness complying with AAMA 2604.

Color and Gloss: As Selected by Architect from manufacturer's full range of standard colors.

PART 1 EXECUTION

1.1 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.

1.2 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

1.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Clean surfaces thoroughly with soap and water after installation is completed.

1.4 PROTECTION

- A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.

- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in field to shop; make requires alterations and refinish entire unit, or provide new units.

END OF SECTION