



SECTION 055200 - ALUMINUM HANDRAILS & GUARD RAILINGS
(See Section 057010 for Aluminum and Glass Guard Railings)

1.0 GENERAL

1.1 RELATED DOCUMENTS

- A. Architectural Drawings, Site Plans, Landscape Drawings and/or Interior Design Drawings.

1.2 SUMMARY

- A. This section includes furnishing and installing all Aluminum Handrails and Guardrails as indicated on drawings and includes Miscellaneous Aluminum Handrails and Guardrails not included in other sections of these specifications.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: In engineering handrail and guard railings systems to withstand structural loads indicated determine allowable design working stresses of railing materials based on the following:
 - 1. For Aluminum: The Aluminum Association's specification for Aluminum Structures
- B. Structural Performance of Handrails and Guard Railing Systems: Engineer, fabricate, and install handrails and railing systems to withstand the following structural loads without exceeding the allowable design working stress of the materials for handrails, railings systems, anchors, and connections. Apply each load to produce the maximum stress in each of the respective components comprising handrails and railing systems.
 - 1. Top Rail of Guardrail Systems & Handrails Not Serving as Top Rails: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 lb. applied at any point and in any direction.
 - b. Uniform load of 50 lb. per linear ft. applied in any direction.
 - c. Concentrated load need not to be assumed to act concurrently with uniform loads.
 - 2. Infill Area of Guardrail Systems: Capable of withstanding the following loads applied as indicated:
 - a. Horizontal normal load of 50 lb. applied over one sq. ft. at any point in the system.
 - b. Vertical downward load of 50 lb. per linear ft.
 - c. Concentrated upward load of 50 lb. at the most critical location.
 - d. Above loads need not to be assumed to act concurrently with one another, and are not required to be superimposed with the loads specified in the preceding paragraph.

- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from the direct contact with incompatible materials.
- D. Thermal Movements: Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in the design, fabrication, and installation of handrails and railings to prevent buckling, opening up of joints, overstressing of components, connections and other detrimental effects. Base design calculation on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.
 - a. Temperature Change (Range): 100 degrees F ambient; 150 degree F material.

1.4 SUBMITTALS

- A. Product Data for each type of product specified.
- B. Shop drawings showing Welding, Fabrication and Installation of handrails including all plans, typical elevations, sections, details of components, and attachment to other units of work.
 - 1. Where installed products are indicated to comply with certain design loadings, include structural computations, material properties and other information needed for structural analysis review by the design architect and/or engineer of record.
- C. Samples for initial selection purposes in the form of S&S Manufacturing standard color chart showing full range of colors available. Or for custom color request minimum 2" x 2" color chip from the customer for color matching purposes. Then submit at least two chips of color match for approval by architect or owner.
- D. Submit at least two 6" long samples of the top rail when its shape is other than standard rounds, squares or rectangles and when specifically requested by architects.

1.5 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain handrails and railing systems from:
 - S&S Manufacturing
 - 17 Timber Lane
 - Marlboro, NJ 07746
 - Phone: (732) 698-2400
 - Fax: (732) 662-5046
 - www.handrails.com
 - jesse@handrails.com
 - steven@handrails.com

- B. Engineering Responsibility: Engineer hand railing and railing systems by the fabricator/manufacturer unless sizes and configurations are specifically called out on architect's/engineer's drawings.

1.6 STORAGE

- A. Store handrails and railing systems in clean, dry location, away from uncured concrete and masonry, protected against damage.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Where handrails and railings are indicated to fit to other construction, check actual dimensions of other construction by accurate field measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.
 - 1. Where field measurements cannot be made without delaying the work, obtain guaranteed dimensions in writing and proceed with fabrication of products without field measurements if specifically requested to do so by architects, owner or contractor.

2.0 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Products specified as a standard of quality are to be fabricated by:
 - S&S Manufacturing
 - 17 Timber Lane
 - Marlboro, NJ 07746
 - Phone: (732) 698-2400
 - Fax: (732) 662-5046
 - www.handrails.com
 - jesse@handrails.com
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2.2 GROUT AND ANCHORING CEMENT

- A. Non-shrink, Non-metallic Grout: Premixed, factory-packaged, non-staining, non-corrosive, nongaseous grout complying with COE CRD-C 621. Provide grout specifically recommended by manufacturer for the interior and exterior applications of type specified in this section.
- B. Erosion-Resistant Anchoring Cement: Factory-prepackaged, non-shrink, non-staining, high strength cement formulation for mixing with water at project site to create pourable, anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure or provide a sealer or waterproof coating recommended for the exterior use by the manufacturer to be applied by the installer or the other qualified contractor or subcontractor.

2.3 WELDING MATERIALS, ANCHORS, AND FASTENERS

- A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Cast-in-Place and Post Installed Anchors: Provide anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.
 - 1. Cast-in-place anchors.
 - 2. Chemical anchors.
 - 3. Expansion anchors.
 - 4. Screw anchors.
- C. Fasteners for Interconnecting Railing Components: Use fasteners of same basic metals as the fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.

2.4 FABRICATION

- A. General: S&S Manufacturing fabricates handrails and railings systems to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of hollow members, post spacings, and anchorage, but not less than those required to support structural loads.
- B. Preassemble railing system 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 field assembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Assembly shall be in a neat workmanlike manner using M.I.G. or T.I.G. welding processes as required. Horizontal channels shall be punched to receive pickets and welds in this application shall be concealed from view.
 - 1. All posts shall be structurally welded to Top Rail, Mid, and Lower Horizontal Members to assure fixed fastening for the life of the rail.
 - 2. Corners shall be hairline fitted by mitre and further welded as required to obtain maximum assurance of strength through the railing's useful life.
 - 3. All splices shall be accomplished by butting one Top Rail to the next with a structural sleeve insert extending from one Top Rail to the next and further secured by means of Stainless Steel, Aluminum, or other proper screw or pop-rivet. Note: Butt splices to be either hairline fitted or properly gapped to provide for proper expansion and contraction movement. For expansion joints be sure that only one side of the sleeve insert is fastened to the top rail.

4. Provide weep holes when necessary to drain closed sections from pretreatment immersions and sprays also for moisture from condensation to escape.

2.5 ALUMINUM FINISHES

- A. All aluminum railings to receive an electrostatically applied baked on powder coat finish or high performance Fluoropolymer Kynar 500 finish for seacoast and severe environments over a full pretreatment except when specified to be natural or mill finish or when anodizing is specified.
- B. Pretreatment Process: A multi-stage pretreatment process is required prior to powder coating.
 1. The railing shall be dipped or sprayed in a concentrated alkaline cleaner then rinsed in clear water. This process provides cleaning, degreasing and deep etching on the surface.
 2. The product shall then be dipped or sprayed in a concentrated acidic treatment to deoxidize, desmut and neutralize the surface then rinsed in clear water.
 3. The product then shall be dipped or sprayed in an acidic conversion coating to act as a bonding coating for paint adhesion.
 4. The product must be completely dried before painting.
- C. Painting: Electrostatically applied thermosetting polyester powder paint over pretreatment bond coating. Baking process shall comply with coating manufacturer's written instructions. Color to be selected by the architect from S&S Manufacturing standard colors. Custom color matching available upon request.
 1. Baked on polyester powder coat meeting AAMA 2603 requirements.
 2. Super-durable powder coat meeting AAMA 2604
- D. Painting: Shop applied high performance Fluoropolymer coating over pretreatment bond coating. Baking process shall comply with manufacturers' written instructions. Color to be selected by the architect from manufacturers' standard colors. Custom color matching available upon request.
 1. 50% Kynar PVDF Resin based coating meeting AAMA 2604 requirements.
 2. 70% Kynar PVDF Resin based coating meeting AAMA 2605 requirements.

- E. Anodized finish: Class I (also known as 215-R1 or one hour anodizing with 0.7 mill thickness or greater) complying with AAMA-611 & Aluminum Association AA-C12C22A4X specifications.
- All railing to be fabricated from the same alloy and be welded with 5356 filler to minimize discoloration between different members and welds (welds will still exhibit color variations from base metal due to heat effected zones).
1. Clear Anodized 215-R1 or Aluminum Associations AA-C12C22A41
- Step 1. (C12) Railing shall be dipped in a non-etching cleaner (inhibited chemical type of cleaner)
- Step 2. (C22) Railing should be submerged in medium matte etching solution (sodium hydroxide, 4-6oz. per gallon at 140°-150°F for 5-10 minutes).
- Step 3. (A1) Railing shall receive architectural class 1 anodizing (15% sulfuric acid used at 70°F ±2°F, at 12 amp per sq. ft. for 60 minutes).
2. Color Anodized finish: (medium bronze, dark bronze and black). All color anodized railings have “base” surface of Class I (215-R1) anodizing, and then an impregnated, inorganic coloring surface is electrodeposited on top of that.
- Step 1. (C12) Railing shall be dipped in a non-etching cleaner (inhibited chemical type of cleaner)
- Step 2. (C22) Railing should be submerged in medium matte etching solution (sodium hydroxide, 4-6oz. per gallon at 140°- 50°F for 5-10 minutes).
- Step 3. “A4XXX” Architectural Class I anodizing with impregnated coloring (15% sulfuric acid used at 70°F ±2°F, at 12 amp per sq. ft. for 60 minutes followed by 2 step coloring with non-organic colors:
- “A4312” Medium Bronze anodized with .07 mill thickness or greater
 - “A4313” Dark Bronze anodized with .07 mill thickness or greater
 - “A4315” Black anodized with .07 mill thickness or greater

3.0 EXECUTION

3.1 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorage's, such as sleeves, concrete inserts, anchor bolts, and miscellaneous items having integral anchors, that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION GENERAL

- A. Fit exposed connections accurately together to form tight, hairline joints, except as required for expansion. Install work in accordance with final shop drawings and manufacturer's instructions. Erect work plumb, square and level, free from distortion or defects detrimental to appearance or performance
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of handrails and railings. Set handrails and railings accurately in location, alignment, and elevation, measured from the established lines and levels and free from rack.
 - 1. Align rails so that variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed $\frac{1}{4}$ inch in 12 feet.
 - 2. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
- C. Corrosion Protection: Coat in field concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of paint or epoxy.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing handrails and for properly transferring loads to in-place construction. Follow anchor manufacturer's instructions for installation.
- E. Anchoring posts in concrete by means of preset Styrofoam or Steel sleeves into concrete. After posts have been inserted into sleeves, fill space between post and sleeve solid with non-shrink, nonmetallic, cementitious or epoxy grout mixed and placed to comply with anchoring material manufacturer's directions.
- F. Anchor posts in concrete by core drilling holes not less than 5" deep and 1" greater than outside diameter of posts. Clean holes of all loose material, insert posts, and fill space between post and concrete with non-shrink, nonmetallic, cementitious or epoxy grout mixed and placed to comply with anchoring material manufacturer's directions.
- G. Adjust handrails and railings before anchoring to ensure alignment abutting joint's space posts at interval indicated, but not less than required to achieve structural loads.

3.3 CLEANING AND PROTECTION

- A. After installation the General Contractor or Owner shall be responsible for protecting the railings during the balance of construction.
- B. Painted aluminum surfaces shall be cleaned with plain water containing a mild soap or detergent. No abrasive agents or harsh chemicals are to be used.
- C. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.
- D. Protect finishes of S&S Manufacturing's handrails and guard railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.

END OF SECTION