

**GUIDE SPECIFICATIONS:** These guide specifications are intended to be used as the basis for developing job specifications and **must be edited** to fit specific job requirements. Inapplicable provisions should be deleted, appropriate information should be provided in the blank spaces, and provisions applicable to the job should be added as necessary. Items, which represent an option or choice, are enclosed in brackets [ ] or braces { }. Notes to specifiers are given in *Italics*.

## SECTION 05720 - ALUMINUM MULTI-LINE RAILING

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. Furnish and install aluminum multi-line railings and components.

#### 1.02 WORK FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

- A. Furnish [anchors] [fabrications] to be cast in concrete to Section [03000 – Concrete] [03300 - Cast-in-Place Concrete].
- B. Furnish [anchors] [fabrications] for embedding in masonry to Section [04200 - Masonry Unit System] [\_\_\_\_\_].
- C. Furnish anchors for placement in [\_\_\_\_\_] walls to Section [\_\_\_\_\_ - \_\_\_\_\_].

#### 1.03 RELATED WORK

- A. Section 03000 - Concrete:
- B. Section 03300 - Cast-in-Place Concrete:
- C. Section 04200 - Unit Masonry Systems: Grout
- D. Section 05030 - Metal Finishes:
- E. Section 05510 - Metal Stairs: Handrailing at Stairs
- F. Section 06100 - Rough Carpentry:
- G. Section 08800 - Glazing: Glass; Plastic Glazing; Glazing Accessories
- H. Section 09900 - Painting: Paint Finish

#### 1.04 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. ASD-1 Aluminum Standards and Data
  - 2. DAF-45 Designation System for Aluminum Finishes
- B. American Architectural Manufacturers Association (AAMA)
  - 1. AAMA 2605-05: Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
  - 2. AAMA 2604-05: Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
  - 3. AAMA 2603-02: Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
- C. American National Standards Institute (ANSI)
  - 1. A21 .1 Safety Requirements for Floor and Wall Openings, Railings and Toe Boards.
  - 2. A58.1 Minimum Design Loads in Buildings and Other Structures.
  - 3. AI 17.1 Accessible and Usable Buildings and Facilities.

- D. American Society for Testing and Materials (ASTM)
  - 1. B 221 Specification for Aluminum-Alloy Bars, Rods, Wires, Shapes and Tubes.
  - 2. B 429 Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
  - 3. D 1730 Recommended Practices for Preparation of Aluminum and Aluminum Alloy Surfaces for Painting.
  - 4. E 894 Standard Test Methods for Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
  - 5. E 935 Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
  - 6. E 985 Specification for Permanent Metal Railing Systems and Rails for Buildings.
- E. 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.
- F. National Association of Architectural Metal Manufacturers (NAAMM)
  - 1. Metal Finishes Manual
  - 2. Pipe Railing Manual
  - 3. Stair Manual
- G. National Ornamental and Miscellaneous Metals Association (NOMMA)
  - 1. Metal Rail Manual

## 1.05 PERFORMANCE REQUIREMENTS

*Check governing codes for requirements.*

- A. General: In engineering handrail and railing systems to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
  - 1. Aluminum: AA "Specifications for Aluminum Structures."
- B. Structural Performance of Handrails and 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, railing systems, anchors, and connections. Apply each load to produce the maximum stress in each of the respective components comprising handrails and railing systems.
  - 1. Toprail of Guardrail System: Capable of withstanding the following loads applied as indicated:
    - a. Uniform load of [20] [50] pounds per lineal foot applied horizontally at right angles to the top rail.
  - 2. Infill Area of Guardrail Systems: Capable of withstanding the following loads applied as indicated:
    - a. Concentrated load of 25 pounds per square foot applied horizontally at right angles over the entire tributary area, including openings and spaces between rails.
    - b. Reactions due to the above load need not be combined with those loads on the toprail of guardrail system.
  - 3. Handrails: The mounting of handrails shall be such that the completed handrail and supporting structure are capable of withstanding the following loads applied as indicated:
    - a. Concentrated load of 200 pounds applied in any direction at any point on the handrail.
    - b. These loads shall not be assumed to act cumulatively with those loads on the infill area of guardrail system.
- C. Thermal Movements: Allow for thermal movement resulting from the following maximum change (range) in ambient temperature in engineering, fabricating, and installing of joints, overstressing of components and connections, and other detrimental effects. Base engineering calculations on actual surface temperatures of materials due to both solar heat gain and nighttime sky heat loss.
  - 1. Temperature Change (Range): 120 deg. F ambient; 180 deg. F material surfaces.
- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

## 1.06 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section [01300] [01340].
- B. Indicate component details, materials, finishes, connection and joining methods, and the relationship to adjoining work.
- C. Submit manufacturer's installation instructions under provisions of Section [01300] [01340].

## 1.07 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:
  - 1. Store material in a location and in a manner to avoid damage. Stacking shall be done in a way that will prevent bending.
  - 2. 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.
- C. Keep handling on site to a minimum. Exercise particular care to avoid damage to finishes of material.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURER

- A. Manufacturers: Subject to compliance with requirements, provide handrails and railing systems by one of the following:
  - 1. Aluminum Ornamental Railing Systems:
    - a. ALUMINUM TUBE RAILINGS manufactured by

ATR Technologies, Inc.  
805 Towne Center Drive  
Pomona, CA 91767-5901

Toll Free Phone: (800) 423-4148  
Fax: (909) 399-5834  
Website: [www-ATR-Technologies.com](http://www-ATR-Technologies.com)  
Email: [railings@ATR-Technologies.com](mailto:railings@ATR-Technologies.com)

### 2.02 METALS

- A. General: Provide metal free from surface blemishes where exposed to view in the finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.
- B. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required:
  - 1. Extruded Bar and Tube: ASTM B 221, Alloys 6005-T5, 6061-T6 and 6063-T6.
  - 2. Extruded Structural Pipe and Tube: ASTM 429, Alloy 6063-T6
  - 3. Drawn Seamless Tube: ASTM B 210, 6063-T832.
  - 4. Plate and Sheet: ASTM B 209, Alloys 6061-T6 and 6063-T6.
  - 5. Die and Hand Forging: ASTM B 247, 6061-T6.
  - 6. Castings: ASTM B 26, A356-T6.

## 2.03 RAILING SYSTEM

- A. Material shall conform to 2.02 and be finished in accordance with 2.07.
- B. Railing system shall be [permanently anchored] [removable].
- C. Top Rails
  - 1. Fabricate Top Rails from [anodized] [painted] aluminum tube with nominal size of [ ] in. w x [ ] in. h, Part Number [ ]
  - 2. Include [flat] [rounded] closure.
- D. Handrails and/or Griprails
  - 1. Fabricate Handrails and/or Griprails from [anodized] [painted] aluminum tube with nominal size of [ ] in. w x [ ] in. h, Part Number [ ]
  - 2. Include [flat] [rounded] closure.
- E. Mid Rails
  - 1. Fabricate Mid Rails from [anodized] [painted] aluminum tube with nominal size of [ ] in. w x [ ] in. h, Part Number [ ]
  - 2. [Include] [Exclude] closure.
- F. Bottom Rails
  - 1. Fabricate Bottom Rail from [anodized] [painted] aluminum tube with nominal size of [ ] in. w x [ ] in. h, Part Number [ ]
  - 2. [Include] [Exclude] closure.
- G. Posts
  - 1. Fabricate posts from [anodized] [painted] aluminum tube with a nominal size of [ ] in. w x [ ] in. h, Part Number [ ]
  - 2. If required, provide post reinforcement to meet loading criteria.
- H. Connection Splices
  - 1. Internal connection splices shall be of extruded aluminum.
- I. Mounting Base Plates
  - 1. Base plates shall be of aluminum attached to ends of Posts by means of mechanical attachment. Screws shall be of [stainless] [galvanized] [cadmium plated] steel flat socket head machine screws.
- J. Mounting Wall Brackets
  - 1. Wall mounted brackets shall be of aluminum attached to bottom side of Handrail and/or Griprail by means of mechanical attachment. Screws shall be of [stainless] [galvanized] [cadmium plated] steel flat socket head machine screws.

## 2.04 FASTENERS

- A. Fasteners for Anchoring Railings to Other Construction: Select fasteners of the type, grade, and class required to produce connections that are suitable for anchoring railing to other types of construction indicated and capable of withstanding design loadings.
  - 1. For aluminum railings, provide fasteners fabricated from [cadmium plated] [galvanized] [type 304 stainless] [type 316 stainless] steel.
- B. Fasteners for Interconnecting Railing Components: Use fasteners of same basic metal as the fastened metal, unless otherwise indicated. Do not use metals that are corrosive or incompatible with materials joined.
- C. Cast-in-Place and Post-Installed Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, the loads determined by local code requirements.
  - 1. list anchors required

## 2.05 GROUT AND ANCHORING CEMENT

- A. Non-shrink, Non-metallic Grout: Premixed, factory-packaged, non-shrink, non-metallic, non-staining, non-corrosive grout. Provide grout specifically recommended by manufacturer for interior and exterior applications. Minimum 28 day compressive strength of \_\_\_\_\_ psi.

- B. Products: Subject to compliance with requirements, provide one of the following:
  - 1. Erosion-Resistant Anchoring Cement:
    - a. EMACO® GRIP by BASF Building Systems
    - b. QUIKRETE® Commercial Grade FastSet™ by The QUIKRETE Companies

## 2.06 FABRICATION

- A. Fabricate railing with non-welded, internal and mechanical connections with no exposed fasteners.
- B. Form all changes in rail direction by mitered, hairline mechanical joints.
- C. Cut materials square and remove burrs from all exposed edges, with no chamfer.
- D. Make exposed joints butt tight and flush.
- E. Close exposed visible ends of Toprails and Handrails by use of flat end cap.
- F. Locate [mid rails] [4 in. max.] [\_\_\_\_ in. max.] clearance below Top Rail.
- G. Locate [bottom rails] [4 in. max.] [\_\_\_\_ in. max.] clearance above finished adjacent mounting surface.
- H. Verify dimensions on site prior to shop fabrication.

## 2.07 FINISHES, GENERAL

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage per manufacturer's recommendations.
- C. Appearance of Finished Work: *(add notes as required)*

## 2.08 ALUMINUM FINISH

*Specifiers may use the following paragraphs "A" and "B" for anodized finishes.*

- A. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- B. Anodized finish shall be Class I provided in accordance with [AA-M12 C22 A41 (*use for Clear*)] [AA-M12 C22 A43 (*use for Gold*)] [AA-M12 C22 A44 (*use for Bronze or Black*)].

*Specifiers may use the following paragraph "A" for organic coatings (baked enamel and/or powder coat).*

- A. Finish designations prefixed AAMA conform to the system established by the American Architectural Manufacturers Association.

*Specifiers may choose one of the following options for paragraph "B" for organic coatings (baked enamel and/or powder coat) and edit the choices accordingly.*

### OPTION #1

- B. Painted finish shall be a baked enamel type that meets the requirements of AAMA 2605-05 (Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels). Finish shall be 70% Fluorocarbon Resin - Kynar 500 by Atochem North America or Hylar 5000 by Ausimont USA, Inc. applied over the manufacturer's recommended inhibitive primer. Applicator may use a chrome chemical conversion coating pretreatment process or a non-chrome conversion coating pretreatment process according to the supplier's recommendations in order to comply with AAMA 2605-05.

[PPG Industries: [Duranar] [Duranar XL] [Duranar XLT] [Duranar XLTS] [Sunstorm]]

[BASF: [Fluoroceram] [Fluoroceram CL] [Ultramet]]

[Valspar Corp.: [Fluropon] [Fluropon Classic] [Fluropon Classic II]]

[Lilly Industries: [Nubelar]]

[Akzo-Nobel: [Trinar] [Tri-escnt II]]

[Duracoat Products: [DC290 Series PVDF]]

OPTION #2

- B. Painted finish shall be a type that meets the requirements of AAMA 2604-05 (Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels). One of the following applications may be used:

1. Finish shall be a baked enamel containing 70% Fluorocarbon Resin - Kynar 500 by Atochem North America or Hylar 5000 by Ausimont USA, Inc. applied over the manufacturer's recommended inhibitive primer. Applicator may use a chrome chemical conversion coating pretreatment process or a non-chrome conversion coating pretreatment process according to the supplier's recommendations in order to comply with 2604-05.

[PPG Industries: [Duranar] [Duranar XL] [Duranar XLT] [Duranar XLTS] [Sunstorm]]  
[BASF: [Fluoroceram] [Fluoroceram CL] [Ultramet]]  
[Valspar Corp.: [Fluropon] [Fluropon Classic] [Fluropon Classic II]]  
[Akzo-Nobel: [Trinar] [Tri-escent II]]  
[Lilly Industries: [Nubelar]]  
[Duracoat Products: [DC290 Series PVDF]]

2. Finish shall be a baked enamel containing 50% Fluorocarbon Resin Products or Silicone Polyester applied over the manufacturer's recommended primer. Applicator may use a chrome chemical conversion coating pretreatment process or a non-chrome conversion coating pretreatment process according to the supplier's recommendations in order to comply with AAMA 2604-05.

[BASF: [Superl SP]]  
[Valspar Corp.: [Acroflur] [Acrodize]]

3. Finish shall be a High Performance power coating in order to comply with AAMA 2604-05.

[Tiger Drylac: [Series 28 High Performance Powder]]  
[Other manufacturers with product information indicating compliance with AAMA 2604-05.]

OPTION #3

- B. Painted finish shall be a type that meets the requirements of AAMA 2603-02 (Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels). One of the following applications may be used:

1. Finish shall be a baked enamel containing Polyester, Acrylic or High Solids applied in accordance with AAMA 2603-02.

[PPG Industries: [Duracron (Acrylic)] [Polycron (High Solids)]]  
[BASF: [Polyester]]  
[Valspar Corp.: [Flurocyl Acrylic] [Valex High Solids Polyester] [Dynapon Polyester]]  
[Duracoat Products: [DC210 Series] [DC240 Polyester]]

2. Finish shall be an exterior quality power coating applied in accordance with AAMA 2603-02.

[Tiger Drylac: [TGIC Polyester]]  
[Dupont Powder Coatings: [Polyester]]  
[Morton Powder Coatings: [Polyester]]  
[Spraylat: [Polyester]]  
[Other manufacturers with product information indicating compliance with AAMA 2603-02.]

Specifiers may use the following paragraph "C" to clarify the finish color selection.

- C. Color:  
for anodized finishes: [Clear] [Gold] {[Medium] [Dark] Bronze} [Black]  
for organic coatings (baked enamel and/or powder coat): [As selected from manufacturer's standard colors] [Custom color as selected by Architect] [To match brand name, color number color number]

## PART 3- EXECUTION

### 3.01 PREPARATION

- A. Supply items to be [cast in concrete] [embedded in masonry] [placed in partitions].

### 3.02 DISSIMILAR METALS

- A. When 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 [epoxy/polyurethane] [proper primer] [asphalt paint] or provide a heavy vinyl tape barrier.  
B. When aluminum components come into contact with cement or lime mortar, exposed aluminum surfaces shall be painted with [epoxy/polyurethane].

### 3.03 INSTALLATION

- A. Install in accordance with shop drawings [and manufacturer's instructions].  
B. Erect work [square and level,] [horizontal or parallel to rake of steps or ramp,] [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.  
D. [Provide] [Do not provide] weep holes in hollow sections of railing.

### 3.04 CLEANING

- A. As installation is completed, wash thoroughly using plain water containing a mild soap or detergent. When preferred, an anodized finish shall be cleaned with white gasoline, kerosene or distillate. Aluminum with a painted finish shall be cleaned with plain water containing a mild soap or detergent.  
B. Do not use an acid solution, steel wool or other harsh abrasives.  
C. If stains remain after washing, remove paint finish and restore in accordance with NAAMM Metal Finishes Manual. Finish must not be removed from anodized aluminum. Reanodizing can only be done by removing railing and returning it to the anodizer.

### 3.05 REPAIR OF DEFECTIVE WORK

- A. Remove stained or otherwise defective work and replace with material that meets specification requirements.