

SECTION 05 73 10

OPEN GRILLE STEEL RAILING SYSTEM

******* MFR Manufacturing Corp, Inc. manufactures several types of ornamental metal fencing. This guide specification section can be used to specify ornamental steel railings fabricated from galvanized flat bars and rods welded into several open grille designs. MFR Manufacturing Corp, Inc. also manufactures several types of ornamental metal fencing which can be specified in SECTION 32 31 20 - ORNAMENTAL STEEL FENCING, SECTION 32 31 21 - ALUMINUM LOUVER FENCING, SECTION 32 31 22 - STAINLESS STEEL LOUVER FENCING, and SECTION 32 31 17 - ORNAMENTAL WELDED WIRE FENCING.**

The specifier will need to edit this product specification for a specific project to reflect the options and applications being used. The guide section has been written so that most editing can be accomplished by deleting unnecessary requirements. Options are indicated by []. Notes to assist the specifier in selecting options and editing the specification guide are printed in bold and indicated with *********. For final editing, all brackets and notes will need to be deleted from the guide.

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: Ornamental welded steel railing panels fabricated with galvanized flat bars and round rods welded into, modular, open grille railing panels including steel posts.
- B. Related sections:

******* List other specification sections dealing with work directly related to this section such as the following. *******

- 1. Section 03 30 00 - Cast-in-Place Concrete: Construction of floor slabs and concrete stairs and landings to receive metal railings.
- 2. Section 05 51 10 - Steel Stairs: Construction of steel stairs and landings to receive metal railings.

1.2 REFERENCES

****** List by number and full title reference standards referred to in remainder of specification section. Delete non-applicable references. ******

- A. American Society for Testing and Materials (ASTM) Publications:

1. ASTM A36 - Structural Steel.
2. ASTM A121 - Zinc-Coated (Galvanized) Steel Barbed Wire.
3. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4. ASTM A500 - Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
5. ASTM A1264 - Safety Requirements for Workplace Floor and Wall Openings, Stairs, and Railing Systems.
6. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.
7. ASTM D822 - Tests on Paint and Related Coatings Using Filtered Open-Flame Carbon-Arc Exposure Apparatus.
8. ASTM D1794 - Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
9. ASTM D3363 - Test Method for Film Hardness by Pencil Test.
10. ASTM E894 - Anchorage of Permanent Metal Railing Systems and Rails for Buildings.
11. ASTM E935 - Permanent Metal Railing Systems and Rails for Buildings.

1.3 DESIGN REQUIREMENTS

- A. Railing assemblies and attachments shall be designed, fabricated, and installed in accordance with ASTM A1264, ASTM E894, ASTM E935 to support:
 1. 200 pounds concentrated loading applied at any point in any direction.
 2. 50 pounds per linear foot uniform load applied horizontally to top of rail.

1.4 SUBMITTALS

- A. Provide in accordance with Section 01 33 00 - Submittal Procedures:
 1. Product data for components and accessories.
 2. Shop drawings showing railing layout, dimensions, spacing of components, and anchorage and installation details.
 3. Sample: [8 by 10 inches] [203 by 254 mm] minimum size sample of railing

panel illustrating design, fabrication workmanship, and selected color coating.

4. Copy of warranty specified in Paragraph 1.4 for review by Architect.

1.5 WARRANTY

A. Provide in accordance with Section 01 77 00 - Closeout Procedures:

1. The galvanized and/or polyester coated metal is guaranteed not to rust for the time periods stated below. Accidental damages, defects resulting from improper installation and damage from vandalism or abuse are not included. Fence & Railing materials installed within 0 to 1 miles from salt water coast line 1 year; Fence & Railing materials installed within 1 to 5 miles from salt water coast line 3 years; Fence & Railing materials installed within 1 to 10 miles from salt water coast line 5 years; Fence & Railing materials installed over 20 miles from salt water coast line 20 years. Warranty is limited to a prorated value of the coating, not to exceed the original value of the coating.
2. Components treated with Plascoat PP571 finish are guaranteed not to rust for the time periods stated below. Accidental damages, defects resulting from improper installation and damage from vandalism or abuse are not included. Fence & Railing materials installed within 0 to 1 miles from salt water coast line 5 years; Fence & Railing materials installed within 1 to 5 miles from salt water coast line 10 years; Fence & Railing materials installed within 1 to 10 miles from salt water coast line 15 years; Fence & Railing materials installed over 20 miles from salt water coast line 25 years. Warranty is limited to a prorated value of the coating, not to exceed the original value of the coating.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. MFR Manufacturing Corp, Inc., 586 Territorial Dr., Bldg. H, Bolingbrook, Illinois 60440; 800-708-2526.
- B. Manufacturers of equivalent products submitted and approved in accordance with Section 01 63 00 - Product Substitution Procedures.

2.2 MATERIALS

- A. Steel bar stock: ASTM A36.
- B. Steel tubing: ASTM A500, Grade B.
- C. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, and water reducing and plasticizing additives.

2.3 RAILING SYSTEM

- A. Type: Ornamental steel railing system consisting of modular open grille railing panels fabricated by welding flat steel bars and rods supported by steel posts with top rail; GRIGLIATO Railing System as manufactured by MFR Manufacturing Corp, Inc..

******* MFR Manufacturing Corp, Inc. provides 11 open grille railing panels. Refer to MFR product literature for illustrations of various patterns.**

- B. Railing panels: Fabricated from galvanized steel rods and flat bars welded to form an open grille pattern; Grigliato® type ["A"] ["B"] ["C"] ["D"] ["E"] ["F"] ["G"] ["H"] ["J"] ["K"] ["L"] as manufactured by MFR Manufacturing Corp, Inc..

******* Standard panels are provided in standard heights and widths as well as custom fabrications to accommodate stairs, curves, and other special railing conditions. Refer to MFR product literature for available sizes. *******

******* Include the following paragraph for GRIGLIATO® type "A" railing panel. *******

1. Vertical main bars: [1 by 1/8 inch] [25 by 3 mm] flat bars spaced at [2-3/8 inches] [60 mm].
2. Horizontal cross rods: [3/16 inch] [5 mm] diameter rods spaced at [5-3/16 inches] [132 mm.]
3. Top and bottom perimeter bars: [1 by 1/8 inch] [25 by 3 mm] flat bars.

******* Include the following paragraph for GRIGLIATO® type "B" railing panel. *******

1. Vertical main bars: [1 by 1/8 inch] [25 by 3 mm] flat bars spaced at [2-3/8 inches] [60 mm].
2. Horizontal cross rods: [3/16 inch] [5 mm] diameter rods spaced at [2 inches] [50 mm.]
3. Top and bottom perimeter bars: [1 by 1/8 inch] [25 by 3 mm] flat bars.

******* Include the following paragraph for GRIGLIATO® type "C" railing panel. *******

1. Vertical main bars: [1 by 1/8 inch] [25 by 3 mm] flat bars spaced at [4-1/16 inches] [103 mm].
2. Horizontal cross rods: [3/16 inch] [5 mm] diameter rods spaced at [4 inches] [100 mm.]
3. Top and bottom perimeter bars: [1 by 1/8 inch] [25 by 3 mm] flat bars.

******* Include the following paragraph for GRIGLIATO® type “D” pattern panel. *******

1. Vertical main bars: [1-1/4 by 3/16 inch] [30 by 5 mm] flat bars spaced at [2-3/8 inches] [60 mm].
2. Horizontal cross rods: [1/4 inch] [6 mm] diameter rods spaced at [5-3/16 inches] [132 mm.]
3. Top and bottom perimeter bars: [1-1/4 by 3/16 inch] [30 by 5 mm] flat bars.

******* Include the following paragraph for GRIGLIATO® type “E” railing panel. *******

1. Vertical main bars: [1 by 1/8 inch] [25 by 3 mm] flat bars spaced at [1-3/16 inches] [30 mm].
2. Horizontal cross rods: [3/16 inch] [5 mm] diameter rods spaced at [5-3/16 inches] [132 mm.]
3. Top and bottom perimeter bars: [1 by 1/8 inch] [25 by 3 mm] flat bars.

******* Include the following paragraph for GRIGLIATO® type “F” railing panel. *******

1. Vertical main bars: [1 by 5/64 inch] [25 by 2 mm] flat bars spaced at [1-3/16 inches] [30 mm].
2. Horizontal cross rods: [3/16 inch] [5 mm] diameter rods spaced at [1 inch] [25 mm.]
3. Top and bottom perimeter bars: [1 by 1/8 inch] [25 by 3 mm] flat bars.

******* Include the following paragraph for GRIGLIATO® type “G” railing panel. *******

1. Vertical main bars: [1 by 1/8 inch] [25 by 3 mm] flat bars spaced at [2-3/8 inches] [60 mm].
2. Horizontal cross rods: [3/16 inch] [5 mm] diameter rods spaced at [4 inches] [100 mm.]
3. Top and bottom perimeter bars: [1 by 1/8 inch] [25 by 3 mm] flat bars.

******* Include the following paragraph for GRIGLIATO® type “H” railing panel. *******

1. Vertical main bars: [1 by 1/8 inch] [25 by 3 mm] flat bars spaced at [2-3/8 inches] [60 mm].
2. Horizontal cross rods: [3/16 inch] [5 mm] diameter rods spaced at [2 inches]

[50 mm.]

3. Top and bottom perimeter bars: [1 by 1/8 inch] [25 by 3 mm] flat bars.

******* Include the following paragraph for GRIGLIATO® type “J” railing panel. *******

1. Vertical main bars: [1 by 1/8 inch] [25 by 3 mm] flat bars spaced at [4-3/4 inches] [120 mm].
2. Horizontal cross rods: [3/16 inch] [5 mm] diameter rods spaced at [5-3/16 inches] [132 mm.]
3. Top and bottom perimeter bars: [1 by 1/8 inch] [25 by 3 mm] flat bars.

******* Include the following paragraph for GRIGLIATO® type “K” railing panel. *******

1. Vertical main bars: [1 by 1/8 inch] [25 by 3 mm] flat bars spaced at [1-5/8 inches] [42 mm].
2. Horizontal cross rods: [3/16 inch] [5 mm] diameter rods spaced at [5-3/16 inches] [132 mm.]
3. Top and bottom perimeter bars: [1 by 1/8 inch] [25 by 3 mm] flat bars.

******* Include the following paragraph for GRIGLIATO® type “L” railing panel. *******

1. Vertical main bars: [1 by 1/8 inch] [25 by 3 mm] flat bars spaced at [1-5/8 inches] [42 mm].
2. Horizontal cross rods: [3/16 inch] [5 mm] diameter rods spaced at [2 inches] [50 mm.]
3. Top and bottom perimeter bars: [1 by 1/8 inch] [25 by 3 mm] flat bars.

C. Panel configuration: Provide railing panels as detailed on Drawings and approved shop drawings.

******* Typical panel configuration is flat rectangular shape. Standard panel height is 40 inches (1016 mm). *******

1. Rectangular: [[] high by [] wide.] [As indicated on Drawings.]

******* Include the following paragraph if trapezoidal and other special shaped railings are required for stairs and ramps. *******

2. Irregular: Provide custom cut trapezoidal and other irregular shaped panels as

required for stair and ramp railings. Fabricate with vertical main bars and horizontal cross rods with perimeter edges cut diagonally.

******* Curved panels can be provided for railings with 9 inches (229 mm) minimum radius. *******

3. Curved: Bend steel railing panels and other horizontal components to [] radius [as indicated on Drawings and approved shop drawings].

******* Railing posts for MFR Railing System can be either flat steel bars or square steel tubing. Refer to MFR product literature for required sizes for heights, widths, and types of railing panel. Post can be anchored by inserting in sleeves or core drilled holes, with base plates and expansion anchors, or with wall brackets anchored to balcony or stair edge with expansion anchors.*******

D. Posts: Galvanized [flat steel bars] [square steel tubes].

1. Size: [] by [].
2. Length: [].
3. Mounting: Fabricate posts to be mounted [in sleeves or core drilled holes] [with base plates and expansion anchors] [with wall brackets and expansion anchors].

******* MFR Manufacturing Corp, Inc. various types of top rail which can be finished to match railing. Select required type in the following paragraph. *******

- E. Top rail: [Contoured, tubular steel railing [2-3/4 inches] [70 mm] wide by [1-1/4 inches] [32 mm] deep.] [[] by [] steel tubing.] [[] by [] channel.] Fabricate top rail for concealed attachment to railing panels and to adjacent walls where railing terminates.

******* Tubular steel bottom rails as well as complete perimeter frames for railing panels can be provided. Include the following paragraph for bottom rails. *******

- F. Bottom rail: [] by [] steel tubing for attachment to bottom of railing panels with concealed fasteners.

******* Include the following paragraph for perimeter frames. *******

- G. Perimeter railing frame: Welded frame fabricated from [] by [] steel tubing.
- H. Fasteners: Stainless steel bolts of type, size, and spacing as recommended by railing manufacturer for specific condition.

2.4 FACTORY FINISH

- A. Steel fence panels and posts shall be hot-dip galvanized to 1.25 ounces per square foot minimum zinc coating in accordance with ASTM A123 and/or components shall receive polyester powder coating. Large gate panels shall be coated with 2-part polyurethane coating.

Due to do the nature of hot-dip galvanizing, the galvanized coating and powder coat can leave impurities on the treated surface, i.e., flashing, drips, drops, unevenness, roughness, pinholes etc. These do not impair the coating in terms of corrosion resistance and have no impact on the warranty. If a perfectly smooth surface is desired, non-galvanized powder coated only finish shall be specified.

[If materials are used in tropical or coastal areas specify per paragraph D]

- B. Polyester powder coating: Electrostatically applied colored polyester powder coating heat cured to chemically bond finish to metal substrate.
1. Minimum hardness measured in accordance with ASTM D3363: 2H.
 2. Direct impact resistance tested in accordance with ASTM D2794: Withstand 160 inch-pounds.
 3. Salt spray resistance tested in accordance with ASTM B117: No undercutting, rusting, or blistering after 500 hours in 5 percent salt spray at 95 degrees F and 95 percent relative humidity and after 1000 hours less than [3/16 inch] [5 mm] undercutting.
 4. Weatherability tested in accordance with ASTM D822: No film failure and 88 percent gloss retention after 1 year exposure in South Florida with test panels tilted at 45 degrees.
- C. Polyurethane coating: 1.0 mil dry film thickness of coating of steel test panel cured 30 minutes at 180 degree F and aged 14 days shall resist the following test conditions without failure:
1. 5 percent salt spray for 500 hours.
 2. 100 percent relative humidity for 1000 hours.
 3. Water immersion for 100 hours.
 4. 20 double rubs with cloth saturated with either lacquer thinner, acetone, MEK, gasoline, xylene.

5. Exposure to lubricating oils, hydraulic fluids, and cutting oils.
 6. 16 cycles of 24 hours at 100 percent humidity, 24 hours at 10 degrees F, and 24 hours at 77 degrees F.
 7. Hardness: H to 2H.
 8. Flexibility: [1/8 inch] [3 mm] conical mandrel.
- D. Installations in tropical or coastal areas: Apply zinc-phosphate pre-treatment to mill Steel components. Electro statically spray apply PLASCOAT PPA571. The PLASCOAT PPA571 shall comply with the following without failure:
1. Salt spray testing to ASTM B117 has exceeded 20,000 hours with no blistering, cracking, corrosion or flaking.
 2. Under-film corrosion from a scribe tested to ASTM B117 for 1,000 hours on pre-treated steel is 0 and 0.5 mm
 3. After 2,000 hours QUV ASTM G145-06 (which supercedes ASTM G53), Xenon arc (ASTM G26) or five years in Florida at 45 degrees to the sun by the sea, there is no significant change in color, gloss or mechanical properties

******* MFR Manufacturing Company provides 9 standard colors. Custom colors are available for minimum size orders. Contact MFR Manufacturing Company for information on custom colors. *******

- E. Color: [[Black9005] [White9010] [Red3000] [Yellow1021] [Grey7030] [Brown8014] [Green6005] [Blue5010] [Silver with clear coating] [White] as manufactured by MFR Manufacturing Company.] [Selected by Architect from manufacturer's standard range.] [Custom color as selected by Architect.]

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prior to fabrication, field verify required dimensions.

******* Size of concrete railing footings will depend on railing height, post spacing, and other project conditions. Footing dimensions may be indicated on Drawings or in this section but not both locations in order to eliminate potential conflicts. Edit the following paragraphs to reflect specific project conditions. *******

- B. Cast concrete footings in accordance with Section 03 3000 - Cast-in-Place Concrete as detailed on Drawings and approved shop drawings.

1. Minimum footing diameter:
 - a. Terminal and gate posts: [12 inches.] [305 mm.]
 - b. Intermediate posts: [10 inches.] [254 mm.]
 2. Allow [8 inches] [203 mm] [_____] minimum embedment of posts.
 3. Allow [6 inches] [152 mm] [_____] minimum concrete beneath post bottom.
- C. [Provide setting holes for embedment of railing posts.] [Core drill existing concrete footings for embedment of railing posts.] Hole shall be [2 inches] [51 mm] minimum greater than post width.

3.2 INSTALLATION

- A. Install railing in accordance with manufacturer's installation instructions to configurations indicated on Drawings and approved shop drawings.
- B. Install railing posts plumb and level [by setting post in hole [cast] [drilled] in concrete and grouting solid. Temporarily brace railing posts with 2 by 4 wood supports until grout is set.] [by attaching [base plates] [wall brackets] with expansion anchors.]
- C. Do not installed bent, bowed, or otherwise damaged panels. Remove damaged components from site and replace.
- D. Secure railing panels with standard stainless steel bolts.
- E. Touch-up damaged finish with paint supplied by manufacturer and matching original coating.

END OF SECTION