

SECTION 05 53 00
METAL GRATINGS

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Association of State Highway and Transportation Officials (AASHTO): Standard Specifications for Highway Bridges.
2. ASTM International (ASTM):
 - a. A36/A36M, Standard Specification for Carbon Structural Steel.
 - b. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - c. A1011/A1011M, Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
 - d. B210/B210M, Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes.
 - e. B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
3. National Association of Architectural Metal Manufacturers (NAAMM):
 - a. MBG 531, Metal Bar Grating Manual.
 - b. MBG 532, Heavy-Duty Metal Bar Grating Manual.

1.02 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
 - a. Grating: Show dimensions, weight, size, and location of connections to adjacent grating, supports, and other Work.
 - b. Grating Anchorage: Show details of anchorage to supports to prevent displacement from traffic impact.
 - c. Product data for grating, grating clips, anchors, accessories, and other manufactured products specified herein.
 - d. Manufacturer's specifications, including coatings, surface treatment, and finishes.

B. Informational Submittals:

1. Special handling and storage requirements.
2. Installation instructions.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. As far is practical, factory assemble items.
- B. Package and clearly tag parts and assemblies that are, due to necessity, shipped unassembled.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Materials, equipment, and accessories specified in this section shall be products of:
 - 1. Manufacturers:
 - a. Ohio Gratings, Inc., Canton, OH.
 - b. Or equal.
 - 2. Physical Characteristics: Specific to metal grating product type as specified herein.
 - 3. Functional Characteristics: Specific to metal grating product type as specified herein.
 - 4. Performance Characteristics: Specific to metal grating product type as specified herein.

2.02 METAL BAR GRATING (TYPE A AND TYPE B)

- A. Physical Characteristics:
 - 1. Grating Materials:
 - a. Aluminum: Provide alloy and temper as designated below.
 - 1) Bearing Bars and Banding: ASTM B221 alloy 6061-T6 or 6063-T6.
 - 2) Swaged Crossbar Rods: ASTM B221 alloy 6061 or 6063, or ASTM B210 alloy 3003.
 - 3) Finish: Mill.
 - b. Carbon Steel:
 - 1) Bearing Bars, Banding, and Rectangular Cross Bars: ASTM A1011/A1011M commercial steel Type II for hot rolled carbon steel sheet and strip, or ASTM A36/A36M.
 - 2) Cross Bars made from Wire Rods: Not permitted.
 - 3) Finish: Galvanized after fabrication.
 - c. Stainless Steel:
 - 1) Bearing Bars, Banding, and Cross Bars: ASTM A666, Type 316L.
 - 2) Finish: Mill.

2. Bearing Bar Spacing:
 - a. Light Duty: 1-3/16 inch maximum, center-to-center.
 - b. Medium Duty: 15/16 inch maximum, center-to-center.
3. Cross Bar Spacing: 4 inches maximum, center-to-center. For aluminum I-bar grating with depths greater than 2 inches, provide cross bars at 2 inches maximum, center-to-center.
4. Bearing Bars, Cross Bars and Banding: Minimum thickness as specified in NAAMM MBG 531 or as shown on the Drawings.
5. Grating Materials:
 - a. Aluminum, pressure-locked I-bar grating fabricated by swaging crossbars between extruded I-shaped bearing bars.
 - b. Galvanized steel welded, rectangular bar grating fabricated by electro-forging cross bars to bearing bars.
 - c. Stainless steel welded, rectangular bar grating fabricated by welding cross bars to bearing bars.
6. Surface:
 - a. Aluminum: Striated.
 - b. Steel and Stainless Steel: Plain.
7. Stair Treads:
 - a. Material and Type: Same as grating material and grating type as furnished for connecting walkway or work surface.
 - b. Nosings: Integral ribbing and serrated edge on one long axis of tread, or nonslip abrasive on each tread along one long edge.
 - c. Carrier Plate or Angle: Furnish at each end for connection to stair stringers.

B. Functional Characteristics: None.

C. Performance Characteristics:

1. Maximum Service Load:
 - a. Light Duty (Type A): 100 psf uniformly distributed load.
 - b. Medium Duty (Type B): 500 psf uniformly distributed load.
2. Maximum Deflection: Span/240 or 1/4 inch, whichever is less.

2.03 HEAVY-DUTY METAL BAR GRATING (TYPE C)

A. Physical Characteristics:

1. Materials:
 - a. Carbon Steel:
 - 1) Bearing Bars, Banding, and Rectangular Cross Bars: ASTM A1011/A1011M commercial steel Type II for hot rolled carbon steel sheet and strip, or ASTM A36/A36M.
 - 2) Cross Bars made from Wire Rods: Not permitted.
 - 3) Finish: Galvanized after fabrication.

- b. Stainless Steel:
 - 1) Bearing Bars, Banding, and Cross Bars: ASTM A666, Type 316L.
 - 2) Finish: Mill.
 - 2. Bearing Bar Spacing: 1-7/8 inch maximum center-to-center.
 - 3. Cross Bar Spacing: 4 inches maximum center-to-center.
 - 4. Bearing Bars, Cross Bars and Banding: Minimum thickness as specified in NAAMM MBG 532 or as shown on the Drawings.
 - 5. Grating Type: Galvanized steel or stainless steel, heavy-duty, rectangular bar grating fabricated by welding crossbars between rectangular bearing bars.
- B. Functional Characteristics: None.
- C. Performance Characteristics:
 - 1. Maximum Service Load: AASHTO H-20.
 - 2. Maximum Deflection: Span/240.

2.04 ACCESSORIES

- A. Embedded Frames: As indicated on the Drawings and as specified in Section 05 50 00, Metal Fabrications.
- B. Grating Clamps:
 - 1. Use at flanged beam and bolted angle frame supports.
 - 2. Manufacturers and Products:
 - a. Direct Metals Company, LLC, Kennesaw, GA; Grating Clamp.
 - b. Or equal.
 - 3. Physical Characteristics: Hat bracket, recessed bolt, and bottom clamp of same material as grating.
 - 4. Functional Characteristics: Removable from above grating walkway surface.
 - 5. Performance Characteristics: None.
- C. Anchor Stud and Saddle Clip:
 - 1. Use at embedded angle frame supports with stud anchor and nut recessed below top of grating surface.
 - 2. Manufacturers and Products:
 - a. Welded Stud Anchor:
 - 1) Nelson Stud Welding, Inc., Elyria, OH.
 - 2) Or equal.
 - b. Saddle Clip:
 - 1) Direct Metals Company, LLC, Kennesaw, GA; Saddle Clip or equal.

3. Physical Characteristics: AISI type 316 stainless steel welded threaded stud anchor, nut, washer, and saddle clip.
4. Functional Characteristics: Removable from above grating walkway surface.
5. Performance Characteristics: None.

2.05 FABRICATION

A. General:

1. In accordance with NAAMM MBG 531 or NAAMM MBG 532.
2. Do not weld aluminum grating.
3. Conceal fastenings where practical.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.
5. Cutouts:
 - a. Fabricate in grating sections for penetrations indicated.
 - b. Arrange to permit grating removal without disturbing items penetrating grating.
 - c. Edge band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.
6. Do not notch bearing bars at supports to maintain elevation.
7. Field measure areas to receive grating. Verify dimensions of new fabricated supports and fabricate to dimension required for specified clearances.
8. Section Length: Sufficient to prevent section from falling through clear opening when oriented in the span direction and one end is touching either the concrete or the vertical leg of grating support.
9. Minimum Bearing: 1 inch for grating depth up to 2-1/4 inches and 2 inches for grating depth greater than 2-1/4 inches.
10. Banding and Toe Plates: Same material as grating and welded to bearing bars in accordance with requirements of NAAMM MBG 531 and NAAMM MBG 532.

B. Light-Duty and Medium-Duty Metal Bar Grating: Single grating section shall be not less than 1.5 feet or greater than 3 feet in width or weigh more than 150 pounds.

C. Heavy-Duty Metal Bar Grating: Minimum width of grating sections shall be 2 feet regardless of length and weight.

D. Supports:

1. Same material as grating, except that supports which are to be embedded in concrete shall be Type 316 stainless steel, unless part of an extruded aluminum system.

2. Coordinate dimensions and fabrication with grating to be supported.
3. Coordinate dimensions with increased depth due to serrations.

PART 3 EXECUTION

3.01 PREPARATION

A. Electrolytic Protection:

1. Protect aluminum surfaces in contact with dissimilar metals, or embedded or in contact with masonry, grout, or concrete as specified in Section 09 90 00, Painting and Coating.
2. Allow paint to dry before installation of material.

3.02 INSTALLATION

- A. Until grating sections are securely fastened in place, area shall be appropriately barricaded or flagged to alert people working in area of potential fall hazard.
- B. Install manufactured products in accordance with manufacturer's recommendations.
- C. Install supports such that grating sections have a solid bearing on both ends, and that grating sections will not rock or wobble under design loads.
- D. Install grating supports plumb and level as applicable.
- E. Install sections of welded frames with anchors to straight plane without offsets.
- F. Field locate and install fasteners to fit grating layout.
- G. Anchor grating securely to supports using minimum of four fastener clips and bolts per grating section.
- H. Each grating or plank section shall be easily removable and replaceable.
- I. Completed installation shall be rigid and neat in appearance.
- J. Protect painted and galvanized surfaces during installation.
- K. Repair damaged coatings as specified in Section 09 90 00, Painting and Coating.

END OF SECTION