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## METALS

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## SECTION 05500

## MISCELLANEOUS METALS

## PART 1 GENERAL

## 1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

## ALUMINUM ASSOCIATION (AA)

AA DAF-45 (1980; R 1993) Designation System for  
Aluminum Finishes

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A14.3 (1992) Ladders - Fixed - Safety Requirements

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 36 (1991) Structural Steel

ASTM A 53 (1996) Pipe, Steel, Black and Hot-Dipped,  
Zinc-Coated, Welded and Seamless

ASTM A 123 (1989a) Zinc (Hot-Dip Galvanized) Coatings on  
Iron and Steel Products

ASTM A 283 (1993a) Low and Intermediate Tensile Strength  
Carbon Steel Plates

ASTM A 307 (1992a) Carbon Steel Bolts and Studs, 60,000  
PSI Tensile Strength

ASTM A 320 (1992) Alloy Steel Bolting Materials for Low-  
Temperature Service

ASTM A 467 (1993) Machine and Coil Chain

ASTM A 475 (1995) Zinc-Coated Steel Wire Strand

ASTM A 500 (1996) Cold-Formed Welded and Seamless Carbon  
Steel Structural Tubing in Rounds and  
Shapes

ASTM A 501 (1996) Hot-Formed Welded and Seamless Carbon  
Steel Structural Tubing

ASTM A 513 (1991a) Electric-Resistance-Welded Carbon and  
Alloy Steel Mechanical Tubing

ASTM A 653 (1996) Steel Sheet, Zinc-Coated (Galvanized)  
or Zinc-Iron Alloy-Coated (Galvannealed)  
by the Hot-Dip Process

ASTM A 924 (1996a) Steel Sheet, Metallic-Coated by the  
Hot-Dip Process

ASTM B 26 (1996a) Aluminum-Alloy Sand Castings  
 ASTM B 32 (1993) Solder Metal  
 ASTM B 221 (1996) Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes  
 ASTM B 429 (1995) Aluminum-Alloy Extruded Structural Pipe and Tube  
 ASTM F 1267 (1991) Metal, Expanded, Steel

## AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7 (1995) Minimum Design Loads for Buildings and Other Structures

## AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B16.3 (1985) Malleable Iron Threaded Fittings Classes 150 and 300  
 ASME B18.2.1 (1981; R 1992) Square and Hex Bolts and Screws (Inch Series)  
 ASME B18.2.2 (1987) Square and Hex Nuts (Inch Series)  
 ASME B18.22.1 (1965; R 1990) Plain Washers

## AMERICAN WELDING SOCIETY (AWS)

AWS D1.1 (1992) Structural Welding Code - Steel

## COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-344 (Rev B) Lacquer, Clear Gloss, Exterior, Interior

## FEDERAL SPECIFICATIONS (FS)

FS FF-S-325 (Basic; Int Am 3; Notice 1) Shield, Expansion; Nail, Expansion; and Nail, Drive Screw (Devices, Anchoring, Masonry)  
 FS RR-C-271 (Rev D) Chains and Attachments, Welded and Weldless  
 FS VV-G-632 (Rev A; Am 1) Grease, Industrial, General Purpose

## "GREEN BOOK" STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

SECTION 210-3 (1997; 1998 Supplement) Galvanizing  
 SECTION 206 (1997; 1998 Supplement) Miscellaneous Metal Items  
 SECTION 304-3 (1997; 1998 Supplement) Chain Link Fence  
 SECTION 310 (1997; 1998 Supplement) Painting

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM MBG 531 (1988; MBG 531S-89) Metal Bar Grating Manual

NAAMM MBG 532 (1988) Heavy Duty Metal Bar Grating Manual

1.2 GENERAL

1.2.1 Submittals

The following shall be submitted in accordance with SECTION 01330: SUBMITTAL PROCEDURES.

1.2.1.1 Shop Drawings; GA.

Complete shop drawings for fabrication of the trash rack, safety railing and ornamental fence panels and gates, posts, gate hinges, gate stops, and gate bollards shall indicate complete layout of the work based on field measurements, and shall clearly indicate all deviations from the plans, widths of gate openings, and direction of swing or travel. Shop Drawings for ornamental fencing shall not be copies of details on the plans, but shall be supplemental drawings indicating methods of fabrication and installation; hardware such as latches, rollers, hinges, etc.; and material list.

1.2.1.2 SD-13 Certificates; GA.

Certificates of compliance of material to the specification shall be furnished by the Contractor.

1.2.1.3 Paint System Reports

Contractor shall submit 5 copies of manufacturer's literature for the paint system proposed.

1.2.2 Welding

Welding shall conform to the provisions of AWS D1.1. Welders who have not been certified within 2 years of the date of commencement of work under this contract will not be allowed to perform the work.

1.2.3 Bolt Holes

Bolt holes shall be reamed or drilled normal to the member. Cutting bolt holes with a torch will not be permitted without the prior written approval of the Contracting Officer.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 General

Materials indicated on the drawings or required in the work and not covered elsewhere by detailed requirements shall conform to the requirements of this section. In all cases where materials are not specifically covered in these specifications, the Contractor shall furnish approved highest grade commercial materials or products.

Materials for chain link fence shall conform to "Green Book" Subsection 206-6.

## 2.1.2 Steel Pipe

Steel pipe shall be zinc-coated (galvanized) steel pipe conforming to the requirements of ASTM A 53, Standard Weight, Schedule 40.

## 2.1.3 Steel Shapes and Plates

2.1.3.1 Steel bars, angles, and plates shall conform to ASTM A 36. Galvanized coating, where required, shall conform to ASTM A 123.

2.1.3.2 Steel tubing shall conform to ASTM A 500, Grade A for posts, and ASTM A 513 for pickets and rails.

## 2.1.4 Concrete, Mortar and Grout

Concrete, mortar and grout shall conform to the requirements of SECTION 03301: CAST-IN-PLACE STRUCTURAL CONCRETE.

## 2.1.5 Formwork

Formwork shall conform to SECTION 03101:FORMWORK FOR CONCRETE.

## 2.1.6 Chain

Chain shall be galvanized and shall conform to the requirements of FS RR-C-271, Type 1, Grade C, Class 4. The chain shall be attached with a galvanized connecting link and shall accommodate a 5/16-inch diameter padlock shackle.

## 2.1.7 Bolts, Nuts, and Washers

Bolts, nuts, and washers shall be of the material, grade, type, class, style and finish indicated or best suited for intended use.

2.1.7.1 Bolts and nuts shall be ASTM A 307, Grade A, hot-dip galvanized or ASTM A 320.

2.1.7.2 Bolts shall be ASME B18.2.1.

2.1.7.3 Nuts shall be ASME B18.2.2.

2.1.7.4 Plain washers shall be ASME B18.22.1, Type B.

## 2.1.8 Expansion Bolts

Expansion bolts shall be galvanized and shall conform to FS FF-S-325.

## 2.1.9 Pipe Caps

Pipe caps shall conform to ASME B16.3.

## 2.1.10 Safety Railing

Safety railing shall be designed to resist a concentrated load of 200 pounds in any direction at any point of the top of the rail or 20 pounds per foot applied horizontally to top of the rail, whichever is more severe.

### 2.1.10.1 Steel Safety Railing, Including Carbon Steel Inserts

Steel safety railing, including inserts in concrete, shall be steel pipe conforming to ASTM A 53 or structural tubing conforming to ASTM A 500, Grade A or

B of equivalent strength. Steel railings shall be 2 inch nominal size. Railings shall be hot-dip galvanized. Pipe collars shall be hot-dip galvanized steel.

a. Joint posts, rail, and corners shall be fabricated by one of the following methods:

(1) Flush type rail fittings of commercial standard, welded and ground smooth with railing splice locks secured with 3/8 inch hexagonal recessed-head setscrews.

(2) Mitered and welded joints by fitting post to top rail and intermediate rail to post, mitering corners, groove welding joints, and grinding smooth. Railing splices shall be butted and reinforced by a tight fitting interior sleeve not less than 6 inches long.

(3) Railings may be bent at corners in lieu of jointing, provided bends are made in suitable jigs and the pipe is not crushed. b. Removable sections, toe-boards, and brackets shall be provided as indicated.

#### 2.1.11 Ladders

Ladders shall be galvanized steel or aluminum, fixed rail type in accordance with ANSI A14.3.

### 2.2 FABRICATION

#### 2.2.1 Picket Fence Panels

Pickets shall be galvanized steel tubing with caps welded at the top of the pickets. Pickets, rails, and brackets shall be finished to provide smooth, straight edges free of burrs. All surfaces of the fence panels and brackets shall be cleaned in the shop to remove all rust, scale, dirt, and other foreign matter. "Tight" mill scale that cannot be lifted by applying a sharp knife to any edge will be permitted. The cleaning shall be accomplished by scraping, wire brushing, and wiping or other approved methods. Any damage of the picket fence panels during transportation and/or installation will be cause for rejection of the fence panels.

Welding shall conform to the requirements of the "Structural Welding Code" AWS D1.1 for steel. All exposed welds shall be ground flush with adjacent surfaces.

Fence panels shall be straight and true to dimensions. Adjacent fence panels shall align with each other with a variation not-to-exceed 1/16 inch. Joints shall be matchmarked.

For fencing on curves, either horizontal or vertical, the fencing shall conform closely to the curvature of the grade by means of a series of uniform short chords. The length of chords shall be the distance center to center of fence posts. Height above finish grade shall be uniform.

Ornamental fence units shall be galvanized after fabrication in accordance with the requirements of the "Green Book", Section 210-3.

#### 2.2.2 Gratings and Frames

Steel gratings shall be manufactured in accordance with the NAAMM MBG 531 for bar-type gratings. Edges shall be banded with bars 1/4 inch less in height than bearing bars for grating sizes above 3/4 inch. Banding bars shall be flush with the top of bearing bars. Frames shall be of welded steel construction finished to match the grating. Gratings and frames shall be galvanized after fabrication.

## PART 3 EXECUTION

## 3.1 INSTALLATION

## 3.1.1 General

## 3.1.1.1 Picket Fence

All fence posts, bollards, gate posts, and pickets shall be installed plumb. Fence posts shall be installed to provide a straight and even alignment. Fence panels shall be installed level and in a straight alignment from one side of the post to the other. All bolts and nuts shall be tight. Expansion anchors shall be snug and shall not permit movement when tested by hand.

The fencing shall be erected in accordance with the plans. The fencing shall be carefully erected true to line and grade. Posts and balusters shall be vertical with the deviation from the vertical for the full height of the panel not exceeding 1/8 inch.

After erecting the fencing, all abrasions, welds, or exposed steel shall be repaired in accordance with "Green Book", Subsection 210-3.5.2.

All fencing shall be painted following erection. (Reference "Green Book", Sections 210 and 310.) All surfaces to be painted shall be clean of foreign material. Galvanized surfaces shall be treated as required to accept paint system.

Enamel Paint System. Ornamental steel fencing shall receive the following paint system:

- Pre-treatment of galvanized steel
- Rust-resistant primer, gray - one coat, 3 mils
- Flat black epoxy enamel - two coats, 3 mils

Powder Coat System. Ornamental steel fencing shall receive the following electrostatic paint system:

- Pre-treatment for galvanized steel
- Rust-resistant primer, gray - one coat, 1 1/2 mils
- Flat black finish coat - two coats, 1 mil each

## 3.1.1.2 Chain Link Fence

All fabric, gates, fence posts, gate posts and appurtenant parts shall be installed in accordance with "Green Book", Subsection 304-3.

## 3.1.2 Excavation for Concrete-Embedded Items

Excavation for concrete-embedded items shall be of the dimensions indicated on the drawings. Holes shall be cleared of loose materials prior to placement of concrete.

## 3.1.3 Non-Shrink Grout

The Contractor shall use non-shrink grout conforming to the requirements of SECTION 03301:CAST-IN-PLACE STRUCTURAL CONCRETE to fill the voids under and above the base plates for fence posts.

#### 3.1.4 Gate Hinge Greasing

The Contractor shall grease gate hinges thoroughly with grease conforming to FS VV-G-632 immediately after installation of gate leaves. The gates shall be installed in such a fashion that they work freely. The Contractor shall examine the operation of all gates not sooner than 30 days after installation for ease of operation. Any gates that cannot be operated by one person will be repaired (including any required structural modifications) by the Contractor at no additional cost to the Government, and requirements for repair shall conform to the requirements for installation above.

#### 3.2 ATTACHMENT OF SAFETY RAILING

Toeboards and brackets shall be installed where indicated. Splices, where required, shall be made at expansion joints. Removable sections shall be installed as indicated.

##### 3.2.1 Installation of Steel Safety Railings

Installation shall be in pipe sleeves embedded in concrete and filled with molten lead or sulphur with anchorage covered with standard pipe collar pinned to post. Rail ends shall be secured by steel pipe flanges.

-- End of Section --