

## Section 907. FENCING MATERIALS

**907.01. General Requirements.** Materials for fencing property, right-of-way, and other installations, must meet the requirements of this section.

**907.02. Testing.** Fencing materials testing will be in accordance with the specified ASTM, AASHTO or Department methods, as modified by this section.

The weights of fencing material include the weight of coating, unless otherwise specified.

Zinc coating at 1 ounce per square foot corresponds to a coating thickness of 1.7 mils.

### **907.03. Woven Wire Fence.**

A. **Fabric.** Steel woven wire fabric must be zinc coated or aluminum coated.

1. **Zinc Coated.** Zinc coated fabric must meet the requirements of ASTM A 116, Design No. 1047-6-11, for Grade 60, Class 1 zinc coating.
2. **Aluminum Coated.** Aluminum coated fabric must meet the requirements of ASTM A 584, Design No. 1047-6-11.

B. **Barbed Wire.** Standard grade zinc coated or aluminum coated steel barbed wire must be composed of two strands of wire with four-point round barbs. Provide chain link fence grade barbed wire for use with chain link fence.

1. **Zinc Coated.** Zinc coated barbed wire must meet the requirements of ASTM A 121 and the following:
  - a. If the direction of the strand wire twist alternates between left and right, the strand wires must not untwist under a tensile force of 950 pounds for 12½ gauge wire, 850 pounds for 13½ gauge wire, or 750 pounds for 15½ gauge wire; and
  - b. Class 1 zinc coating is required for 12½ gauge steel wire, and Class 3 zinc coating is required for 13½ gauge wire and 15½ gauge wire.
2. **Aluminum Coated.** Aluminum coated barbed wire must meet the requirements of ASTM A 585, for Type I aluminum coated steel barbed wire with aluminum coated barbs.

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C. **Smooth Line Wire.** Smooth line wire must be No. 9 gauge coated steel wire meeting the requirements of ASTM A 116, for Grade 60, Class 1 zinc-coated smooth line wire or ASTM A 584, for aluminum-coated smooth line wire.

D. **Steel Posts.** After fabrication, galvanize steel fence posts, braces, and fittings in accordance with ASTM A 123 and this subsection.

The weight of zinc coating per square foot of surface on posts and braces must average at least 2.00 ounces and no individual specimen may have less than 1.80 ounces of zinc coating per square foot, regardless of metal thickness. The Department will include the weight of zinc coating in the weights specified for posts and braces, but will deduct the weight of galvanizing greater than 4.00 ounces per square foot of surface from the post weight.

The Department will allow an alternate zinc and clear coat system for pipe sections. The exterior surface of the pipe section must have 0.90 ounce per square foot of zinc coating and a clear acrylic coating at least 0.30 mil thick. The interior surface of the pipe section must have 0.35 ounce per square foot of zinc coating or 0.30 mil zinc-rich organic coating and a zinc powder loading of at least 91 percent by weight.

Zinc coating must be applied in accordance with ASTM A 123. Determine coating weights and thicknesses in accordance with AASHTO M 181.

1. **Line Posts.** Steel for line posts must meet the requirements of ASTM A 702, for Type A or Type B. Line posts must be 7 feet long,  $\pm 1$  inch, with a nominal weight of 1.12 pounds per foot. Exclusive of the anchor plate, individual line posts must weigh 1.08 pounds per foot. Posts must be notched, studded, or have other Department-approved means of holding the fabric in place on the post. Provide each post with a Department-approved anchor plate and at least seven 11 gauge galvanized or aluminum coated wire clamps.
2. **End, Corner, Gate, Intersection, and Intermediate Braced Posts.** Steel angle sections, steel pipe, or steel tubing end, corner, gate, intersection, and intermediate braced posts must have an average weight within 10 percent of the specified weight per foot. Angle sections for posts and braces must meet the physical requirements of ASTM A 36 or ASTM A 702, for Type A or Type B.

Provide the required fittings and braces with each post.

- a. **Posts.** End, corner, gate, intersection, and intermediate braced posts must be 8 feet long,  $\pm 1$  inch.

Angle sections must be nominal 2½ inch by 2½ inch by ½ inch. Pipe or tubing must be nominal 2-inch, (2.375 inch OD), weighing 3.650 pounds per foot.

- b. **Braces.** Angle section braces must be nominal 1¾ inch by 1¾ inch by ¼ inch (2 inch by 2 inch by ⅜ inch). Steel pipe braces must be nominal 1½ inch, (1.900 inch OD), weighing 2.72 pounds per foot. Steel tubing braces must be nominal 1.750 inch OD weighing 3.13 pounds per foot.

Braces must be long enough to support the posts. Provide at least one brace with each end post or gate posts. Provide at least two braces with each corner post and each intermediate braced post. Provide at least three braces with each intersection post.

E. **Wood Posts.** Wood posts must meet the requirements of subsection 912.08.

F. **Gates.** Provide gates for woven wire fence of the width and height shown on the plans. Provide each gate with Department-approved hinges, latches and auxiliary braces to prevent sagging. Weld or fit to form a rigid and watertight frame. Use woven wire in accordance with subsection 907.03.A to fill gate frames.

#### **907.04. Steel Chain Link Fence.**

A. **Fabric.** Chain link fence fabric must be zinc coated steel fabric meeting the requirements of ASTM A 392, for Class 2 coating, aluminum coated steel fabric meeting the requirements of ASTM A 491, or polymer coated steel fabric meeting the requirements of ASTM F 668, as modified by this subsection.

Galvanize zinc coated fabric after weaving.

Polymer coated steel chain link fence fabric must meet ASTM F 668, Class 2a except that the steel core wire may be either hot-dipped zinc coated (galvanized) or aluminum coated (aluminized) prior to polymer coating. Both the metallic coating and the polymer coating must be applied before weaving. The minimum weight of metallic coating must conform to ASTM F 668, Class 2a for zinc galvanized, or ASTM A 817 for aluminum. Provide fabric height and polymer coating color as shown on the plans.

Provide steel chain link fence fabric with the following characteristics:

1. Mesh size of 2.0 inches, or as shown on the plans;

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2. Wire size of 9 gauge zinc coated, 9 gauge aluminum coated, or 10 gauge aluminum coated; and
3. Top and bottom selvages knuckled.

**B. Tension Wire.** Tension wire must meet the steel wire requirements of ASTM A 824 for Type I aluminum coating and Type II, Class 3, zinc coating.

As an alternative for tension wire coatings, the Contractor may use hot-dipped Type I aluminized or hot-dipped Type II, Class 1 galvanized, followed by a polymer coating. The polymer coating must meet the requirements for polymer coated steel chain link fence fabric and match the color of the polymer coated steel chain link fence fabric.

**C. Posts for Fence and Gates.** Fence posts and gate posts for chain link fence must be metallic coated steel meeting the requirements of Table 907-1 and Table 907-2.

<b>Table 907-1 Posts and Rail for Steel Chain Link Fence</b>				
Use	Fabric Height (in)	Diameter (a) (in)	Nominal Weight (lb/ft)	ASTM Steel Specification (b)
End, Corner, Angle, and Intermediate Braced Posts (c)	≤120	2½ (2.875)	5.80	F 1083
		2½ (2.875)	4.64	F 1043
		3½ by 3½ RF Corner (d)	5.10	F 1043
Line Posts	≤120	2 (2.375)	3.65	F 1083
		2 (2.375)	3.12	F 1043
		1⅞ by 1⅞ H-Section	2.72	F 1043
		2¼ by 14 <sup>5</sup> / <sub>64</sub> H-Section	3.26	F 1043
		2¼ by 1⅞ C-Section (c)	2.70	F 1043
	≤72	2 (2.375)	2.31	F 1043
		1⅞ by 1⅞ C-Section (c)	2.26	F 1043
	≤60	1½ (1.900)	2.72	F 1083
			2.28	F1043
	Horizontal Rail	—	1¼ (1.660)	2.27
1¼ (1.660)			1.84	F 1043
a. Outside pipe diameter with nominal diameter given first; actual diameter in brackets. b. ASTM F 1083 references are for standard weight (Schedule 40) pipe. c. Posts for fencing on structures must be 2 in (2.875) nominal outside pipe diameter and must meet the requirements of either ASTM F 1083 (Schedule 40) or ASTM F 1043 (Group 1C) or as called for on the plans. d. RF: Roll-Formed Sections.				

Table 907-2 Pipe for Gate Posts and Frames				
Use	Gate Width (ft)	Diameter (a) (in)	Nominal Weight (lb/ft)	ASTM Steel Specification (b)
Gate Posts	≤6	2½ (2.875)	5.80	F 1083
		2½ (2.875)	4.64	F 1043
	7 – 13	3½ (4.000)	9.11	F 1083
		3½ (4.000)	7.65	F 1043
	14 – 18	6 (6.625)	18.97	F 1083
Gate Frames	≤6	1¼ (1.660)	2.27	F 1083
		1¼ (1.660)	1.40	F 1043
	7 – 18	1½ (1.900)	2.72	F 1083
		1½ (1.900)	2.28	F 1043
	a. Outside pipe diameter with nominal diameter given first; actual diameter in parenthesis.			
b. ASTM F 1083 references are for standard weight (Schedule 40) pipe.				

The average weight per foot of metallic coated fence posts must be within ±10 percent of the required weight per foot. Posts must be at least 32 inches longer than the height of the fence fabric.

Steel posts for chain link fence must be coated with zinc or aluminum inside and outside, or polymer-coated posts in accordance with one of the following methods.

1. **Zinc Coating.** Apply zinc coating meeting the requirements of ASTM A 123 or ASTM A 653. Use the alternate zinc and clear coat system described in subsection 907.03.D for pipe sections only.

The weight of zinc coating on pipe sections must average at least 1.80 ounces per square foot of surface and at least 1.60 ounces per square foot of surface per specimen when tested in accordance with ASTM A 90.

For posts, other than pipe sections, the weight of zinc coating on each post must average at least 2.00 ounces per square foot of surface and at least 1.80 ounces per square foot of surface per specimen when tested in accordance with ASTM A 90.

2. **Aluminum Coating.** Use Type 2 aluminum to coat posts. The weight of aluminum coating on each post must average at least 0.75 ounces per square foot of surface and at least 0.70 ounces per square foot of surface per specimen when tested in accordance with ASTM A 428.
3. **Polymer Coating.** After metallic coating, coat exterior surfaces with extruded and adhered polymer coating. Match the color of the post

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to the color of the polymer coated steel chain link fence fabric coating.

D. **Gates.** Provide gates for chain link fence as shown on the plans. Provide metallic-coated steel pipe gate frames in accordance with Table 907-2. The average weight per foot of the pipe for the gate frames must be within  $\pm 10$  percent of the required weight per foot. Use the same type and weight of coating required for posts.

Weld or fasten joints to form a rigid and watertight frame. Wire brush welded joints and paint with two coats of a Department-approved zinc-rich paint.

Provide gates with intermediate braces, and truss rods to prevent sagging, and provide Department-approved hinges, latches, keepers, and stops. Fill the gate frames with fabric meeting the same requirements as for the fence fabric.

Provide polymer coated gate frames the same as for metallic-coated gate frames, in accordance with Table 907-2. Apply polymer coating to gate frames, including hinges, latches, keepers, and stops. Match the color of the polymer coated gate frame to the color of polymer coated steel chain link fence fabric.

E. **Fence Fittings and Hardware.** Provide post caps, rail, or brace ends, tie wires and clips, tension and brace bands, tension bars, truss rods, barb arms, and other hardware, meeting the requirements of ASTM F 626 and the exceptions and additions specified in this subsection.

Bevel the ends of hog rings for fastening fabric to the tension wire to allow crimping.

Provide fittings made of malleable iron or pressed steel for fences and gates.

If using aluminum coated wire ties and clips, ensure the coating weighs at least 0.30 ounces per square foot of surface.

The Contractor may use flat aluminum alloy line post bands with an OD from 0.062 inch to 0.375 inch and with self locking ends to fasten fabric to posts with an OD no greater than 2.375 inches.

Use double twisted, No. 9 gauge, galvanized steel for fabric fasteners for structure fencing.

Polymer coated fence fittings and hardware must be as specified above. After metallic coating, coat exterior surfaces with extruded and adhered

polymer coating. Ensure the color of the polymer coating matches the color of the polymer coated steel chain link fence fabric.

**907.05. High-Tensile Wire Fence.**

A. **Wire.** High tensile wire must be 1½ gauge, Grade 200, with Class 3 zinc coating in accordance with ASTM A 854.

B. **Wood Posts.** Wood posts must be pressure treated and meet the requirements of subsection 912.08.

C. **Hardware.** Galvanize hardware in accordance with ASTM A 153.

**907.06. Protective Fencing.** Protective fencing must be orange-colored, high density polyethylene mesh fabric with a nominal 2 inch diamond design. Protective fencing must be 48 inches high and weigh at least 0.102 pounds per square foot.