

SECTION 1064 -- FENCES

1064.01 -- Description

This Section covers chain-link fence, woven wire fence, barbed wire fence, and the posts, fabric, wire, staples, ties, and fittings used in the construction of these fences.

1064.02 -- Material Characteristics

1. Chain-link Fence:

a. Approved types:

(1) Zinc-coated steel chain-link fence fabric shall conform to the requirements of ASTM A 392. The fabric shall be zinc-coated after weaving with a Class 2 coating.

(2) Aluminum-coated steel chain-link fence fabric shall conform to the requirements of ASTM A 491. The fabric shall be aluminum-coated before weaving.

(3) Zinc 5 percent aluminum-mischmetal alloy-coated steel chain link fence shall conform to the requirements of ASTM F 1345. The fabric shall be coated before weaving with a Class 2 coating.

(4) Vinyl-coated steel chain-link fence fabric shall conform to the requirements of Federal Specification RR-F-191/1. The vinyl coating shall be thermally bonded over the fabric and be the color shown in the plans or special provisions.

(5) The fabric shall be the height specified in the plans. Wire shall be 9 gauge (0.148 inch) in diameter. Mesh openings shall be 2 inches.

b. Steel Fence Posts, Braces, and Rails:

(1) Tubular steel pipe used for line posts, end posts, corner posts, pull posts, top rail, and brace rail shall be of the nominal pipe size (NPS) shown in the plans.

(2) Tubular steel pipe shall conform to the requirements of ASTM F 1083 Schedule 40 pipe. Pipe shall be coated in accordance with ASTM F 1234, Types A or C.

(3) Tubular steel pipe other than ASTM F 1083 Schedule 40 pipe meeting the outside dimensional requirements of ASTM F 1083 Schedule 40 pipe may be used provided the product of the yield strength of the pipe multiplied by its section modulus is not less than the product of the section modulus of an equivalent diameter F 1083 Schedule 40 pipe multiplied by 25,800 psi. Pipe meeting these requirements shall be hot-dipped galvanized in accordance with the applicable requirements of ASTM F 1083 or be coated as follows:

(i) The exterior surface shall be hot-dipped galvanized with a minimum of 0.9 oz/ft² and have a uniform, chromate conversion coating applied. The hot dipped galvanized exterior shall also be top coated with a clear organic coating such as urethane or polyurethane (the chromate conversion coating being applied either as a separate treatment or simultaneously with the organic topcoat).

(ii) The interior surface shall have a protective coating of zinc-rich paint with a minimum thickness of 0.3 mils or a hot-dipped zinc interior coating of not less than 0.35 oz/ft².

(iii) Pipe conforming to these requirements shall meet the applicable coating specification requirements of AASHTO M 181 for Grade 2 pipe.

(4) The manufacturer, fabricator, or supplier shall furnish the Engineer with test reports and a certificate of compliance stating that the material furnished meets these *Specification* requirements.

c. Roll Formed and "C" Sections for Posts, Braces, and Top Rail:

(1) End, corner, and pull posts shall be 3 1/2 inches x 3 1/2 inches roll formed sections with integral fabric loops. Posts shall weigh 5.15 lb/ft after galvanizing with a maximum weight tolerance of 2 1/2 percent and a minimum yield strength of 35,000 psi. Posts shall be galvanized in accordance with ASTM A 123.

(2) Line posts shall be 2.2 inches x 1.7 inch "C" Sections with a weight of 2.64 lb/ft after galvanizing with a maximum weight tolerance of 2 1/2 percent and a minimum yield strength of 45,000 psi. Posts shall be galvanized in accordance with ASTM A 123.

(3) Top rails and braces shall be 1 5/8 inches x 1 1/4 inches roll formed sections with a weight of 1.35 lb/ft after galvanizing with a maximum weight tolerance of 2 1/2 percent and a minimum yield strength of 35,000 psi. Top rails and braces shall be galvanized in accordance with ASTM A 123.

d. Vinyl Coated Fence Posts:

Vinyl coated fence posts shall meet the requirements of Federal Specification RR-F-191/3 and RR-F-191/4. Posts, top rails, and braces shall be Class 1 (Steel pipe), Class 3 (Formed steel), Class 4 (Steel H sections), or Class 6 (Steel square sections). Posts shall be of the length and color shown in the plans or special provisions. The vinyl coating shall be thermally bonded.

e. Ties and Fasteners:

(1) Ties and fasteners shall be made from at least 11 gauge (0.12 inch) diameter steel wire conforming to the requirements of Section 1063. Aluminum alloy wire 7 gauge (0.144 inch) in diameter having a minimum tensile strength of 20,000 psi and a minimum elongation of 8 percent may also be used.

(2) Ties and fasteners for vinyl coated steel chain-link fence shall meet the requirements of Federal Specification RR-F-191/4, and be the same color as the fabric. The vinyl coating shall be thermally bonded.

2. Woven Wire Fence:

a. The woven wire fence fabric shall be 47 inches high, have 10 horizontal wires, and have stay wires spaced on 6 inch centers. The intermediate line wires shall have a minimum breaking strength of 686 pounds (force). The top and bottom wires shall have a minimum breaking strength of 1029 pounds (force).

b. Approved Types:

(1) Zinc-coated steel woven wire fence fabric shall conform to the requirements of ASTM A 116 except that the minimum weight of the zinc coating shall be 2.63 oz/ft.

(2) Aluminum-coated steel woven wire fence fabric shall conform to the requirements of ASTM A 584.

c. Fence Posts:

(1) Wood Posts shall conform to the requirements of Section 1075.

(2) Tubular steel posts shall conform to Paragraph 1.b. of this Subsection.

(3) Studded "T" steel line posts shall meet the requirements of ASTM A 702.

d. Staples:

Staples for fastening fence materials to wood posts shall be made of steel wire at least 9 gauge (0.148 inch) in diameter and have 1 1/2 inches long barbed or serrated prongs.

e. Ties and Fasteners:

Ties and fasteners shall conform to Paragraph 1.e. of this Subsection.

f. Tension Wire and Cross Ties:

Tension wire and cross ties shall be smooth steel wire at least 9 gauge (0.148 inch) in diameter conforming to the requirements of Section 1063.

3. Barbed Wire Fence:

a. Zinc-coated and aluminum-coated steel barbed wire.

(1) (i) Zinc-coated steel barbed wire shall be 12 1/2 gauge (0.099 inch) in diameter conforming to the requirements of ASTM A 121 with a Class 3 coating. The barbs shall be 2 point at 4 inch centers or 4 point at 5 inch centers.

(ii) At his/her option, the Contractor may furnish two-strand high tensile strength steel barbed wire, 0.067 inch in diameter, meeting the requirements of

ASTM A 121 except that the minimum weight of the zinc coating shall be 2.63 oz/ft. The barbs shall be 4 point, 16.5 gauge (0.058 inch), at 5 inch centers.

(2) Aluminum-coated steel barbed wire shall be 12.5 gauge (0.1 inch) conforming to the requirements of ASTM A 585. The barbs shall be 4 point, 14 gauge (0.08 inch) at 5 inch centers.

b. Fence Posts:

(1) Wood posts shall conform to the requirements of Section 1075.

(2) Studded "T" steel line posts shall meet the requirements of
ASTM A 702.

(3) Staples shall conform to Paragraph 2.d. of this Subsection.

(4) Wire fasteners shall conform to Paragraph 1.e.(1) of this
Subsection.

(5) Tension wire and cross ties shall conform to Paragraph 2.f. of this
Subsection.

4. Fittings, Hardware, and Accessories:

a. All fittings, hardware, and accessories for use with chain-link, woven wire, and barbed wire fencing shall be pressed or rolled steel, forged steel, cast steel, or malleable iron, as appropriate, and have sufficient strength and other properties to meet the industry requirements for the fence's intended use.

b. Malleable iron and steel castings, bolts, nuts, and similar threaded fasteners and nails shall be galvanized in accordance with the requirements of Section 1059.

c. All other fittings and hardware items 1/8 inch thick and larger shall be galvanized in accordance with the requirements of the ASTM A 123.

d. Tubular steel posts shall have heavy malleable iron caps galvanized to ASTM A 153. The caps shall provide a drive fit over the posts to exclude moisture.

5. Vinyl-coated fence accessories shall meet the requirements of Federal Specification RR-F-191/4 and be the same color as the fabric. The vinyl coating shall be thermally bonded.

1064.03 -- Acceptance Requirements

Fences will be accepted based on requirements of this Section and sampling and testing requirements in accordance with the NDR *Materials Sampling Guide*.