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SUPERCEDING
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FEDERAL SPECIFICATION SHEET

FENCING, WIRE AND POST METAL (CHAIN-LINK FENCE FABRIC)
(DETAIL SPECIFICATION)

This Federal Specification is approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

(This specification forms a part of the latest issue of Federal Specification RR-F-191K/GEN).

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers requirements for chain-link fabric.

1.2 Classification. Chain-link fabric will be of the following types, mesh sizes, wire gage size, and fabric height as specified (see 6.1):

Type I - Zinc-coated steel.
Type II - Aluminum-coated steel.
Type III - Aluminum alloy.
Type IV - Polyvinyl chloride (PVC) coated over zinc or aluminum coated steel.

Mesh size in inches:

1 inch (9 and 11 wire gage size only).
1-3/4 inch (all wire gage sizes).
2 inch (all wire gage sizes).
2-1/8 inch (all wire gage sizes).

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*data which may be of use in improving this document should be addressed to: *
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Wire gage size = outside diameter of metal core wire in inches:

11 gage = 0.120 inches
9 gage = 0.148 inches
6 gage = 0.192 inches

Fabric height in inches:

36 inches
42 inches
48 inches
60 inches
72 inches
84 inches
96 inches
120 inches
144 inches

2. APPLICABLE DOCUMENTS

2.1 Non-Government documents. The following other non-Government documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

ASTM

ASTM A 90 - Test for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles.
ASTM A 370 - Mechanical Testing of Steel Products.
ASTM A 428 - Tests for Weight of Coating on Aluminum-Coated Iron or Steel Articles.
ASTM B 211 - Aluminum-Alloy Bars, Rods, and Wires.
ASTM D 1499 - Operating Light-and-Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Plastics.
ASTM D 1535 - Specifying Color by the Munsell System.
ASTM D 1729 - Visual Evaluation of Color Differences of Opaque Materials.
ASTM G 23 - Operating Light and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials.
ASTM G 26 - Operating Light and Water-Exposure Apparatus) Xenon-Arc Type) for Exposure of Nonmetallic Materials.

(Application for copies should be addressed to the ASTM, 1916 Race Street, Philadelphia, PA 19103.)

3. REQUIREMENTS

3.1 Fabric The chain-link fence fabric shall be helically woven into a diamond mesh. Fabric shall be woven from the type of wire, mesh size and wire gage size, and to the height selected (see 1.2 and 6.1).

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3.2 Steel wire. Unless otherwise specified (see 6.1) the steel wire for the fabric shall be of such quality and purity that, when drawn to the wire gage size specified, the wire shall have a minimum tensile strength of 75,000 pounds per square inch when tested in accordance with 4.4.3. The breakload for steel is: 11 gage - 850 pounds (lbs); 9 gage - 1290 lbs; and 6 gage - 2170 lbs. The breakload for aluminum alloy is 9 gage - 925 lbs; 6 gage - 1560 lbs.

3.3 Wire gage size. Wire for fabric shall be of the wire gage size selected (see 1.2 and 6.1). The outside diameter cited in 1.2 is the metal wire diameter allowable for that wire gage size and includes the metallic coating. When type IV wire is required, the wire gage size shall be that of the core wire only, the PVC coating shall not be considered when determining wire size. Tolerance for wire size +/-0.005 inches.

3.4 Type I, zinc-coated steel wire. Unless otherwise specified (see 6.1), the minimum weight of coating on the wire shall be 1.2 ounces of zinc per square foot of coated surface area when determined in accordance with 4.4.2.1.

3.5 Type II, aluminum-coated steel wire. The minimum weight of aluminum coating for 6- and 9-gage wire shall be 0.4 ounces per square foot. The minimum weight of aluminum coating for 11-gage wire shall be 0.35 ounces per square foot. Weight of aluminum shall be determined in accordance with 4.4.2.2.

3.6 Type III, aluminum alloy wire. The aluminum wire shall conform to the requirements of ASTM B 211, alloy 6061-T94.

3.7 Type IV, PVC coated over zinc or aluminum coated steel wire. The PVC coating shall meet the requirements of 3.7.1 thru 3.7.4. Minimum thickness of the PVC coating shall be 0.007 inches as determined in 4.4.4.1. Unless otherwise specified (see 6.1), the method of applying the PVC coating (see 6.4) shall be the manufacturer's option. Minimum weight of zinc coating on the steel wire shall be 0.4 ounces per square foot for 6 gage and 0.3 ounces per square foot for 9 and 11 gage. Aluminum coated steel wire shall meet the requirements of 3.5.

3.7.1 Color of PVC-coated wire. The color of PVC-coated wire shall be one of the standard colors cited in table I as specified (see 6.1). When colors not cited in table I are required, the color shall be as specified (see 6.1).

TABLE I. Color of PVC coated fabric wire.

Munsell Units (ASTM D 1535 and D 1729)			
	Medium green	Dark green	Black
Hue	8.8G	2.0G	1.8PB
Value	2.63	3.02	1.26
Chroma	5.8	2.35	0.5

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3.7.2 Weaveability to PVC coated wire. PVC coated wire shall be capable of being woven in to fabric without the PVC coating cracking, crazing, or peeling.

3.7.3 Accelerated aging of PVC coatings. PVC coatings shall not shrink more than 1/16 inch per foot of length, demonstrate a significant visual change in color or gloss, or exhibit breaks, cracks, crazing, crumbling, or other visual forms of failure when tested in accordance with 4.4.4.2.

3.7.4 Flexibility of PVC coating. PVC coating shall demonstrate flexibility by exhibiting no breaks, cracks, crazing, crumbling, or other visual forms of failure of the coating when tested in accordance with the mandrel bend test of 4.4.4.3.

3.8 Mesh size. The mesh size for fabric shall be one of the sizes selected (see 1.2). The mesh size shall be the inside measurement of the diamond shape of the tensioned fabric as determined in 4.3.2. Tolerance for mesh size is +/-1/8 of an inch.

3.9 Diamond count. Unless otherwise specified (see 6.1), the diamond count shall be the manufacturer's standard. All diamond counts shall be consistent within a lot.

3.10 Selvage. Unless otherwise specified (see 6.1), the fabric will be furnished with standard selvages as follows:

(a) Fabric up to and including 60 inches high with 2-inch mesh shall be knuckled at the top and bottom selvages.
(b) Fabric over 60 inches high with 2-inch mesh shall be twisted and barbed on the top selvage and knuckled on the bottom selvage.
(c) Fabric of all heights with 1-inch or 1-3/4 inch mesh shall be knuckled at the top and bottom selvages.

When specified (see 6.1), fabric shall be provided with one of the following selvage types:

(a) Knuckled at both selvages.
(b) Knuckled at one selvage and twisted and barbed at the other.
(c) Twisted and barbed at both selvages, except on fabric with 1-inch mesh.

3.10.1 Knuckled. Loops of knuckled selvage shall be closed or nearly closed with a space not exceeding the diameter of the wire.

3.10.2 Twisted and barbed. Wire shall be twisted in a closed helix of 1-1/2 machine turns equivalent to three full twists, and cut at an angle to provide sharp barbs. The wire ends beyond the twist shall be at least 1/4-inch long (see 4.3.3).

3.11 Fabric height. Fabric height shall be of the selected +/-1 inch (see 1.2 and 6.1), as determined by 4.3.4. Tolerance for fabric height is +/-1 inch.

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3.12 Fabric length. Unless otherwise specified (see 6.1), the standard length of fabric roll shall be 50 linear feet +/-1 percent as determined by 4.3.5.
Each roll of fabric shall be a one-piece length.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. (See RR-F-191K/GEN)

4.2 Sampling. (See RR-F-191K/GEN, section 6.)

4.3 Examination. Examine fabric for defects listed in table II.

TABLE II. Classification of defects.

Defects	Major	Minor
Height of fabric not as specified.	X	
Diamond count not as specified.	X	
Length of wire not as specified.	X	
Size of wire not as specified.	X	
Size of wire not as specified.	X	
Type of wire not as specified.	X	
Selvage not as specified.	X	
Color not as specified.	X	
Barbs on twisted and barbed selvage not sharp.		X
Frozen joints on zinc-coated fabric.	X	
Coating cut, scratched, or abraded exposing bare wire.	X	
Plastic coating cracked, crazed, or peeling.	X	

4.3.1 Wire gage. Determine the diameter of types I, II, and III wire by averaging two diameter measurements of the wire taken at right angles to each other (see 1.2 and 3.3.) The diameter of type IV wire shall be determined as above after removal of the PVC coating.

4.3.2 Size of mesh. Measure the clear distance in either direction between the wires forming the parallel sides of the mesh taking the mean of two dimensions at right angles to each other (see 1.2 and 3.8).

4.3.3 Length of barbs. Measure the wire ends along the inside of the twist from the last twist to the tip of barbs in twisted and barbed selvage (see 3.10.2).

4.3.4 Height of fabric. Measure the height with tension applied, between outer extremities of the fabric, including the overall dimension from ends of barbs or knuckles (see 3.11).

4.3.5 Length of fabric. When in rolls, measure the length by unrolling the rolls on a flat surface and apply tension to remove slack. Tension applied shall not reduce the actual height of the fabric by more than 1/16 inch per foot of height or by more than 1/2 inch in overall height, whichever is less (see 3.12).

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4.4 Test methods.

4.4.1 Specimens. At least two specimens for each test shall be obtained from one linear foot of fabric cut from one of the rolls selected in accordance with 4.2.

4.4.2 Weight and thickness of metallic coatings.

4.4.2.1 Zinc coat. Determine weight of zinc in accordance with ASTM A 90 (see 3.4 and 3.7).

4.4.2.2 Weight of aluminum coat. Determine weight of aluminum coating in accordance with ASTM A 428 (see 3.5).

4.4.3 Tensile test of steel wire. The steel wire shall be tested for tensile strength in accordance with ASTM A 370 (see 3.2).

4.4.4 PVC coating tests.

4.4.4.1 PVC coating thickness. Determine thickness of PVC coating by stripping the coating and measuring the diameter of the wire as in 4.3.1. One-half the difference between this measurement and the outside diameter of the coated wire will be used to determine the thickness of the coating for conformance to 3.7.

4.4.4.2 Accelerated aging of a PVC coated wire. A sample of PVC coated wire from which the fabric is woven shall be subjected to accelerated aging by exposure for 1,000 hours at a black panel temperature of 145 degrees +/-9 degrees Fahrenheit (oF) (63 degrees +/-5 degrees Celsius (oC)) in accordance with ASTM D 1499. The apparatus used to perform this test shall be either ASTM G 23, type D, E, F, or HH or ASTM G 26, type BH. After completion of this aging, the coated wire shall be examined to determine compliance with 3.7.3. Shrinkage of the coating of more than 1/16 inch per foot of length, significant visual change in color or gloss, or breaks, cracks, crazing, crumbling, or other visual forms of failure shall be cause for rejection. In addition, samples of the coated wire which have completed this aging process must meet the requirements of the mandrel bend test of 4.4.4.3.

4.4.4.2.1 Frequency of test. Unless otherwise specified (see 6.1), the test for accelerated aging shall be performed on the initial inspection, and thereafter only when changes are made in the PVC coating.

4.4.4.3 Mandrel bend test. After the sample has been subjected to the accelerated aging of 4.4.4.2, it shall be tested as follows: A 12-inch length of PVC coated wire removed from the fabric, including bends and straight sections, but not including twists or knuckles, shall be used as the sample. This sample shall be cold soaked at -20oF (-29oC) for 1 hour. The sample shall be removed from the cold source and within 30 seconds wrapped around a mandrel one complete turn (360 degrees). The mandrel shall have a maximum diameter of 10 times the outside diameter of the wire being tested. The coating on the wire shall exhibit no breaks, cracks, crazing, crumbling or other visual forms of failure after completion of this test (see 3.7.4).

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5. PREPARATION FOR DELIVERY (See RR-F-191K/GEN)

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in acquisition documents:

a. Title, number, and date of this specification.
b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).
c. Size required (see 1.2).
d. When first article is required for inspection and approval (see 3.1).
e. Type, mesh size, wire gage size, and fabric height required (see 1.2, 3.3, 3.8, and 3.11).
f. When the steel wire is other than specified (see 3.2).
g. When weight of zinc coating is other than specified (see 3.4).
h. When method of applying the PVC coating is not manufacturers option and method specified (see 3.7 and 6.4).
i. Color of PVC coated wire is other than cited and color required (see 3.7.1).
j. When color of PVC coated wire is other than cited and color required (see 3.7.1).
k. When diamond counts are not as specified and diamond count required (see 3.9).
l. Type of selvage if other than standard (see 3.10).
m. Length of fabric if other than standard (see 3.10).
n. Frequency of test for accelerated aging of PVC coated wire (see 4.4.4.2.1).

6.2 Zinc-coated fabric. The surface of zinc coatings, particularly those produced by hot-dip galvanizing, are not always smooth and devoid of irregularities. Such irregularities ordinarily do not warrant rejection of zinc-coated fabric. Thickness of the zinc coat can be determined, using 1.2 ounces of zinc per square foot equivalent to a coating thickness of 2.0 mils (0.0020 inch) (see 3.4).

6.3 Aluminum-coated fabric. Discoloration of the wire and rust formations on the cut ends are inherent characteristics of this material and does not warrant rejection of aluminum-coated fabric. Thickness of the aluminum coat can be determined using 1 ounce of aluminum per square foot of surface equivalent to a coating thickness of 4.35 mils (0.00435 inch) (see 3.5).

6.4 PVC coated fabric. There are different PVC coated fabrics on the market. Some of the ways in which they may vary are: The methods of applying the PVC coating, wall thickness of the PVC coating, adhesion of the PVC coating to the wire, and cost. These factors should be taken into consideration when selecting a fence fabric for different environmental applications.

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