



Designation: F668 – 17 (Reapproved 2022)

Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric¹

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1. Scope

1.1 This specification covers polyvinyl chloride and other conforming organic polymer-coated steel chain-link fabric, coated before weaving. Polyvinyl chloride, polyolefin, and other organic polymer coating hereinafter will be designated as polymer coating.

1.2 Fabric produced from three classes of wire coatings are covered as follows:

1.2.1 *Class 1* consists of polymer coatings extruded over zinc-coated, aluminum-coated, or zinc-5 % aluminum-mischmetal alloy-coated, or zinc-5 % aluminum-mischmetal alloy-coated steel wire.

1.2.2 *Class 2a* consists of polymer coating extruded and adhered to zinc-coated, aluminum-coated, or zinc-5 % aluminum-mischmetal alloy-coated steel wire.

1.2.3 *Class 2b* consists of polymer coating fused and adhered to zinc-coated, aluminum-coated, or zinc-5 % aluminum-mischmetal alloy-coated steel wire.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are provided for information only.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

¹ This specification is under the jurisdiction of ASTM Committee F14 on Fences and is the direct responsibility of Subcommittee F14.40 on Chain Link Fence and Wire Accessories.

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2. Referenced Documents

2.1 ASTM Standards:²

A90/A90M Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A428/A428M Test Method for Weight [Mass] of Coating on Aluminum-Coated Iron or Steel Articles

D1499 Practice for Filtered Open-Flame Carbon-Arc Exposures of Plastics

F552 Terminology Relating to Chain Link Fencing

F934 Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials

G152 Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

G153 Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

G155 Practice for Operating Xenon Arc Lamp Apparatus for Exposure of Materials

2.2 U.S. Federal Standard:³

Fed. Std. No. 123 Marking for Shipments (Civil Agencies)

2.3 U.S. Military Standards:³

MIL-STD-129 Marking for Shipment and Storage

3. Terminology

3.1 *Definitions*—For definitions of terms such as chain-link fence fabric, selvage, knuckle, twist, and diamond count, see Terminology F552.

4. Ordering Information

4.1 Orders for chain-link fence fabric purchased to this specification shall include the following information:

4.1.1 Quantity.

4.1.2 Class of polymer coating to be applied to the metallic-coated core wire.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from the procuring activity or as directed by the contracting office or from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

- 4.1.3 Color of coating (see 16.5.1).
- 4.1.4 Size of mesh (see Table 1).
- 4.1.5 Diameter of metallic-coated core wire or minimum breaking strength, or both (see Tables 1-3).
- 4.1.6 Height of fabric.
- 4.1.7 Type of selvage if nonstandard (see 12.1 and 12.2).
- 4.1.8 Diamond count if nonstandard (see 9.1 and Table 2).
- 4.1.9 Certification, if required.

4.2 Any tests required other than those specifically covered in this specification must be stipulated by the purchaser in the order or contract.

4.3 All rolls of fabric accepted by the purchaser shall be billed to him on the basis of the original footage of the rolls before sampling, unless changed by contractual agreement.

5. Materials

5.1 *Base Metal*—The base metal shall be steel of such quality and purity that, when drawn to the size of wire specified and coated with an organic polymer, the finished fencing shall be of uniform quality and have properties and characteristics as prescribed in the specification.

5.2 Wire used for the manufacture of fabric shall meet the requirements of this specification and shall be capable of being woven into fabric without the polymer coating cracking or peeling. The polymer coating shall be formulated and produced properly to conform to the requirements of this specification.

6. Manufacture

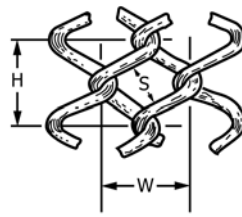
6.1 Class 1 polymer-coated wire shall have the polymer coating extruded onto wire that conforms to the requirements as shown in Table 3.

TABLE 1 Sizes of Wire and Mesh^A

NOTE 1—For custom fabric heights, see Section 11.

| Specified Diameter of Core Wire, in. | Size of Core Wire Gauge | Size of Mesh, in. | Height of Fence Fabric, in. | | | | | | | | | | |
|--------------------------------------|-------------------------|-------------------|-----------------------------|-----|-----|-----|-----|-----|-----|------|------|------|--|
| 0.192 | 6 | 2 | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.192 | 6 | 1¾ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.148 | 9 | 2 | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.148 | 9 | 1¾ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.148 ^B | 9 | 1¼ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.148 | 9 | 1 | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.120 | 11 | 2½ | 36, | 42, | 48, | 60, | 72, | | | | | | |
| 0.120 | 11 | 2 | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.120 | 11 | 1¾ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.120 ^B | 11 | 1¼ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144, | |
| 0.120 | 11 | 1 | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.120 | 11 | ¾ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.120 | 11 | ½ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.120 | 11 | ⅜ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.105 ^C | 12 | ⅝ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.105 ^C | 12 | ½ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.105 ^C | 12 | ⅜ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.080 ^C | 14 | ⅝ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.080 ^C | 14 | ½ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |
| 0.080 ^C | 14 | ⅜ | 36, | 42, | 48, | 60, | 72, | 84, | 96, | 108, | 120, | 144 | |

^A See Table X1.1 for metric equivalents.
^B This mesh size and smaller is recommended for swimming pools.
^C These wire sizes should only be used on ¾ in., ½ in., and ⅜ in. mesh fabrics. See Fig. 1 for criteria on mesh dimensions.



| S | H | W |
|------------|-----------|-----------|
| ¾ in. MESH | ¾ in. | ¾ in. |
| ½ in. MESH | 15/16 in. | 15/16 in. |
| ⅜ in. MESH | 1 1/8 in. | 1 1/8 in. |

FIG. 1 Mesh Dimensions for ¾-in., ½-in., and ⅜-in. Fabric

6.2 Class 2a polymer-coated wire shall have the polymer coating extruded and adhered to wire that is zinc-coated by the hot-dip method, zinc-coated by the electrolytic process, or aluminum-coated by the hot-dip method.

6.3 Class 2b polymer-coated wire shall have the polymer coating fused and adhered to wire that is zinc-coated by the hot-dip method, zinc-coated by the electrolytic process, or aluminum-coated by the hot-dip method. The use of a primer prior to the application of a polymer coating may be recommended by the polymer manufacturer.

NOTE 1—Under current practice, the process for producing a Class 2b PVC coating requires the use of a primer to attain chemical bonding to the substrate. In any event, the polymer manufacturer’s recommendation should be followed.

6.4 Type of metallic coating on the steel wire substrate shall be the choice of the producer unless otherwise specified.

7. Weave

7.1 The wire shall be woven throughout in the form of approximately uniform square mesh, having parallel sides and horizontal and vertical diagonals of approximately uniform dimensions. The top and bottom of the fabric shall be knuckled or twisted as specified in Section 12.

8. Size of Mesh

8.1 The size of mesh shall conform to the requirements as shown in Table 1.

8.2 The permissible variation from the specified size of mesh shall be ± 1/8 in. (3.2 mm) for all mesh sizes over 1 in. (25 mm) and ± 1/16 in. (1.6 mm) for all mesh sizes 1 in. (25 mm) and under.

8.3 Size of mesh shall be determined by unrolling a roll of fabric on a flat surface and exerting tension in accordance with the requirements of 18.2, then measuring the minimum clear distance between the wires forming the parallel sides of the mesh.

9. Diamond Count

9.1 Typical diamond count for each standard height is shown in Table 2. Other diamond counts are permissible, provided that they are consistent within a lot. The purchaser has the option to specify the typical diamond count of 4.1.8.

10. Size of Wire

10.1 Chain-link fabric shall be fabricated from wire diameters as necessary to meet the requirements of Table 1. The diameter shall be determined as the average of two readings

TABLE 2 Typical Diamond Count^A

NOTE 1—Other diamond counts are permitted (see Section 9 on Diamond Count).

NOTE 2— For fabric heights over 144 in., see Section 9.

| Nominal Diameter Core Wire, in. | Size of Mesh, in. | Height of Fence Fabric, in. | | | | | | | | | |
|------------------------------------|----------------------|-----------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | | 36 | 42 | 48 | 60 | 72 | 84 | 96 | 108 | 120 | 144 |
| 0.192 | 2 | 10½ | 12½ | 13½ | 17½ | 20½ | 24½ | 27½ | 31½ | 34½ | 41½ |
| 0.148 | 2 | 10½ | 12½ | 13 | 17½ | 20½ | 24½ | 27½ | 31½ | 34½ | 41½ |
| 0.148 | 1¾ | 11½ | 13½ | 15½ | 19½ | 23½ | 27½ | 31½ | 35½ | 39½ | 47½ |
| 0.148 | 1¼ | 17 | 21 | 23 | 29 | 35 | 41 | 46 | 52 | 56 | 70 |
| 0.120 | 2 | 10½ | 12½ | 14½ | 17½ | 20½ | 24½ | | | | |
| 0.120 | 2½ | 9½ | 11½ | 13½ | 16½ | 19½ | | | | | |
| 0.120 | 1¾ | 11½ | 13½ | 15½ | 19½ | 23½ | 27½ | 31½ | 35½ | 39½ | 47½ |
| 0.120 | 1¼ | 17 | 21 | 23 | 29 | 35 | 41 | 46 | 52 | 56 | 70 |
| 0.120 | 1 | 20 | 23 | 27 | 33 | 45 | 53 | 61 | 67 | 69 | |
| 0.120 | 5/8 | | | | | | | | | | |
| 0.120 | ½ | | | | | | | | | | |
| 0.120 | 3/8 | | | | | | | | | | |
| 0.105 | 5/8 | | | | | | | | | | |
| 0.105 | ½ | see Fig. 1 | | | | | | | | | |
| 0.105 | 3/8 | | | | | | | | | | |
| 0.080 | 5/8 | | | | | | | | | | |
| 0.080 | ½ | | | | | | | | | | |
| 0.080 | 3/8 | | | | | | | | | | |

^A See Table X1.1 for metric equivalents.

TABLE 3 Breaking Strength of Core Wire

| Specified Diameter of Core Wire, in. (mm) | Minimum Breaking Strength | |
|--|---------------------------|--------|
| | lbf | (N) |
| 0.192 (4.88) | 2170 | (9650) |
| 0.148 (4.76) | 1290 | (5740) |
| 0.120 (3.05) | 850 | (3780) |
| 0.105 (2.67) | 650 | (2890) |
| 0.080 (2.03) | 380 | (1690) |

taken at right angles to each other on the straight portion of the parallel sides of the mesh and measured to the nearest 0.001 in. (0.03 mm).

10.2 The permissible variation from the specified diameter of the core wire over 0.105 in. (2.67 mm) shall be ± 0.005 in. (0.13 mm). The permissible variation for the specified diameter on core wires 0.105 in. (2.67 mm) or less shall be ± 0.004 in. (0.10 mm).

11. Height of Fabric

11.1 Chain-link fabric, unless otherwise specified by the purchaser, shall be furnished in the standard heights shown in Table 1. Custom order fabric is available in heights to and including 240 ft. (6.56 m). The height of the fabric shall be the overall dimension from the ends of twists or knuckles. Permissible variations from the specified height shall be ± 1 in. (25 mm) for standard selvage on fabric with mesh sizes 1 in. (25 mm) and over and $\pm 1/2$ in. (13 mm) for all fabric with mesh sizes less than 1 in. (25 mm).

12. Selvage

12.1 Fabric with 2-in. (50.8-mm) or 2 1/8-in. (54.0-mm) mesh, in heights less than 72 in. (1829 mm), shall be knuckled at both selvages. Fabric 72 in. (1829 mm) high and over shall be knuckled at one selvage and twisted at the other. These are

the standard selvages. Other selvage combinations will be supplied only if specified by the purchaser.

NOTE 2—**Caution:** Twisted selvages for fences under 72 in. (1829 mm) in height are not recommended because of consumer safety considerations.

12.2 The selvages of fabrics with meshes of less than 2 in. (50.8 mm) shall be knuckled on both edges.

13. Breaking Strength

13.1 Wire constituting the fabric shall meet the minimum breaking strength shown in Table 3, as determined in accordance with Test Methods and Definitions A370. 72022

13.2 Specimens to establish conformance to this requirement shall comprise individual pickets from a section of the fence fabric. The specimens shall be of sufficient length so as to be firmly gripped in the testing machine after straightening. Polymer coating may be removed from the sample by chemical or mechanical means before testing. The actual gauge length (distance between jaws) of the specimen shall be limited to the undeformed length of wire between the two adjacent bends.

14. Weight of Zinc, Aluminum, or Zinc-5 % Aluminum-Mischmetal Alloy Coatings

14.1 The weight of zinc or aluminum coating shall conform to Table 4.

14.2 The weight of coating shall be determined on an individual piece of wire removed from the fabric. This specimen may be any length of wire over 12 in. (305 mm) and shall include both bends and straight sections, but shall not include either twists or knuckles.

14.3 The weight of zinc or zinc-5 % aluminum-mischmetal alloy coating shall be determined by the method contained in Test Method A90/A90M after stripping the polymer coating as outlined in Section 15.

**TABLE 4 Weight of Zinc, Aluminum, or Zinc-5 % Aluminum-Mischmetal Alloy Coatings**

| Specified Diameter of Core Wire, in. (mm) | Minimum Weight of Zinc or Zinc-5 % Aluminum-Mischmetal Alloy Coating, oz/ft ² (g/m ²) | Minimum Weight of Aluminum Coating, oz/ft ² (g/m ²) |
|---|--|--|
| 0.192 (4.88) | 0.40 (122) | 0.20 (61) |
| 0.148 (3.76) | 0.30 (92) | 0.20 (61) |
| 0.120 (3.05) | 0.30 (92) | 0.20 (61) |
| 0.105 (2.67) | 0.30 (92) | 0.20 (61) |
| 0.080 (2.03) | 0.25 (76) | 0.20 (61) |

14.4 The weight of aluminum coating shall be determined by the method contained in Test Method **A428/A428M**, after stripping the polymer coating as outlined in Section **15**.

15. Thickness of Polymer Coating

15.1 The thickness of the polymer coating shall be in accordance with **Table 5**.

15.2 The thickness of polymer coating shall be determined on an individual piece of wire removed from the fabric. This specimen may be any length of wire over 12 in. (305 mm) and shall include both bends and straight sections, but shall not include either twists or knuckles.

15.3 For Class 1 and Class 2a material, mechanically strip the polymer coating from the wire and measure the minimum and maximum thickness of the polymer coating with a suitable micrometer.

15.4 For Class 2b material, strip the polymer coating by chemical or mechanical means and determine the diameter of the bare wire. Scrape the coating from one side of the wire and measure the reduced diameter with a micrometer. The thickness of coating at this point is the difference between the measurement thus obtained and the measured diameter of the bare wire. In a similar manner, determine the thickness of coating at right angles to the first determination.

15.5 When removing polymer coating by scraping, take care not to remove any of the metallic surface.

16. Properties of Polymer-Coated Wire

16.1 The polymer-coated wire from which the fabric is woven shall have a demonstrated ability to conform to the following requirements:

16.2 Adhesion Tests:

16.2.1 Class 2a must conform to the requirements of **16.2.2**. Class 2b must conform to the requirements of **16.2.3**.

16.2.2 Three specimens from each lot shall be tested. Measure a distance of $\frac{3}{4}$ in. (19 mm) from the end of the specimen. With a regular hand grip wire stripper, exert maximum hand pull parallel to the axis of the wire. Attempt to remove the measured portion of the vinyl sleeve from the core

wire. The lot shall be acceptable if the polymer sleeve is not capable of being removed from the core wire on all three samples.

16.2.3 Three specimens from each lot shall be tested. Make two cuts parallel to the axis of the wire through the coating, approximately $\frac{1}{16}$ in. (1.6 mm) apart, at least $\frac{1}{2}$ in. (12.7 mm) long. With a knife peel back a section of the coating between $\frac{1}{8}$ in. (3.2 mm) and $\frac{1}{4}$ in. (6.4 mm) long to produce a tab. Attempt to remove the $\frac{1}{16}$ in. (1.6 mm) strip of coating by pulling the tab. The lot shall be acceptable if the coating breaks rather than separates from the core wire on all three specimens.

16.3 *Accelerated Aging*—Polymer-coated wire from which the fabric is woven shall withstand exposure for 1000 h without failure at a black panel temperature of 145°F (63°C) when tested in accordance with Practice **D1499**. Type D, E, or F apparatus described in Practices **G152** or **G153**, or Type BH apparatus described in Practice **G155** shall be used for the test. The product shall be construed to have failed the test if:

16.3.1 The wire fails to withstand the mandrel bend test described in **16.4**.

16.3.2 Shrinkage of the polymer coating is greater than $\frac{1}{16}$ in./ft (5.2 mm/m) of wire.

16.3.3 There is a significant change in color or gloss of the polymer surface as determined by visual inspection.

16.4 Mandrel Bend:

16.4.1 Polymer-coated wire when subjected to a single bend at 0°F (−17.8°C) around a mandrel no larger than ten times the diameter of the wire shall not exhibit breaks or cracks in the polymer coating.

16.4.2 The mandrel bend test shall be performed on an individual piece of wire removed from the fabric. This specimen may be any length of wire over 12 in. (305 mm) and shall include both bends and straight sections but shall not include either twists or knuckles.

16.5 Color:

16.5.1 Unless otherwise stipulated by the purchaser, the color of the polymer shall be in accordance with the standard colors contained in Specification **F934**: Green, Olive Green, Brown, and Black.

16.5.2 Compliance with this requirement shall be determined by comparison of specimens of the polymer-coated wire to standard flat specimens of fused film of approximately the thickness specified for the polymer coating to be applied to the wire, and measuring at least 1- $\frac{1}{2}$ by 1- $\frac{1}{2}$ in. (38 by 38 mm).

16.5.3 Standard flat specimens for the evaluation of color of Class 1 and Class 2a coatings shall be prepared by milling, calendaring, or compression molding polymer pellets, using temperatures approximating those to be used in the extrusion.

16.5.4 Standard flat specimens for the evaluation of Class 2 coatings shall be prepared by thermally fusing polymer powder onto a suitable base, using temperatures approximating those to be used in the powder coating process.

16.5.5 The color of the standard flat specimens shall be determined in accordance with Specification **F934**.

17. Workmanship

17.1 Chain-link fence fabric shall be produced by methods recognized as good commercial practices. The polymer coating

TABLE 5 Thickness of Polymer Coating

| | Class 1, Class 2a, in. (mm) | Class 2b, in. (mm) |
|--------------------------------|-----------------------------|--------------------|
| Minimum thickness at any point | 0.015 (0.38) | 0.006 (0.15) |
| Maximum thickness at any point | 0.025 (0.64) | 0.010 (0.25) |