
Standard Specification for Chain-Link Fence

AASHTO Designation: M 181-10 (2023)

Technically Revised: 2010

Reviewed but Not Updated: 2023

Technical Subcommittee: 4d, Safety Devices



American Association of State Highway and Transportation Officials
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1. SCOPE

- 1.1. This specification covers materials used in the construction of fences and gates that comprise (a) chain-link fence fabric and (b) posts, rails, ties, bands, bars, rods and other fittings, and hardware designed to support the fabric in a vertical, taut position.
- 1.2. The values stated in SI units are to be regarded as the standard.

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
- < M 111M/M 111, Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - < M 232M/M 232, Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - < T 65M/T 65, Mass [Weight] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
 - < T 213M/T 213, Mass [Weight] of Coating on Aluminum-Coated Iron or Steel Articles
 - < *Guide Specifications for Highway Construction*
- 2.2. *ASTM Standards:*
- < B6, Standard Specification for Zinc
 - < B26/B26M, Standard Specification for Aluminum-Alloy Sand Castings
 - < B85/B85M, Standard Specification for Aluminum-Alloy Die Castings
 - < B108/B108M, Standard Specification for Aluminum-Alloy Permanent Mold Castings
 - < B117, Standard Practice for Operating Salt Spray (Fog) Apparatus
 - < B209, Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
 - < B211, Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire
 - < B221, Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
 - < B429/B429M, Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube (withdrawn 2019)
 - < B750, Standard Specification for GALFAN (Zinc-5% Aluminum-Mischmetal) Alloy in Ingot Form for Hot-Dip Coatings
 - < D1535, Standard Practice for Specifying Color by the Munsell System
 - < D1729, Standard Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials

- < D2247, Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
- < E8/E8M, Standard Test Methods for Tension Testing of Metallic Materials
- < E376, Standard Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Testing Methods
- < F467, Standard Specification for Nonferrous Nuts for General Use
- < F468, Standard Specification for Nonferrous Bolts, Hex Cap Screws, Socket Head Cap Screws, and Studs for General Use
- < F1043, Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework
- < F1083, Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
- < F1664, Standard Specification for Poly(Vinyl Chloride) (PVC) and Other Conforming Organic Polymer-Coated Steel Tension Wire Used with Chain-Link Fence
- < G152, Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
- < G155, Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials

2.3. *ANSI Standard:*

- < H35.2, Dimensional Tolerances for Aluminum Mill Products

3. CLASSIFICATION

- 3.1. Chain-link fabric, posts, rails, ties, bands, bars, rods and other fittings, and hardware covered by this specification shall be composed of the following types of material, as specified:
- < *Type I*—Zinc-coated steel,
 - < *Type II*—Aluminum-coated steel,
 - < *Type III*—Aluminum alloy, and
 - < *Type IV*—Polyvinyl Chloride (PVC) and other organic polymer-coated steel.
- 3.1.1. Zinc-5 percent aluminum-mischmetal alloy meeting the requirements of ASTM B750 may be substituted for zinc coating (hot-dipped) at the application rate specified herein for hot-dip zinc coating.
- 3.2. *Metallic-coated steel posts, rails, or gate frames are furnished in two grades as follows:*
- 3.2.1. *Grade 1*—Steel posts, rails, or gate frames may be round or other shapes and shall have a hot-dip zinc interior and exterior coating meeting the requirements of ASTM F1083 and shall have a hot-dip zinc interior and exterior coating as prescribed in this specification.
- 3.2.2. *Grade 2*—Steel posts, rails, or gate frames shall be round pipe or tubing manufactured by electric resistance welding and shall have an exterior coating of hot-dip zinc plus an organic topcoat and a zinc-rich or hot-dip zinc interior coating conforming to the requirements of ASTM F1043 Group IC.
- 3.3. *Type IV fabric is furnished in two classes of coating as follows:*
- 3.3.1. *Class A*—Fabric with polymer-coated wire made by coating the wire with zinc by either the hot-dip or electrolytic process, prior to the wire being coated with either an extruded polymer coating or an extruded and bonded polymer coating.

- 3.3.2. *Class B*—Fabric with bonded polymer-coated wire shall be made with wire coated with zinc by the hot-dip or electrolytic process, prior to having a polymer coating thermally fused and bonded to a primer that has been thermally cured onto the zinc-coated wire.
- 3.4. *Type I fabric is furnished in two classes of coating as follows:*
- 3.4.1. *Class C*—Fabric has a specified coating mass of 366 g/m² (1.2 oz/ft²), and
- 3.4.2. *Class D*—Fabric has a specified coating mass of 610 g/m² (2.0 oz/ft²).
- 3.5. *Type I tension wire is furnished in three classes as follows:*
- 3.5.1. *Class 1*—Wire has a minimum coating mass of 244 g/m² (0.8 oz/ft²),
- 3.5.2. *Class 2*—Wire has a minimum coating mass of 366 g/m² (1.2 oz/ft²), and
- 3.5.3. *Class 3*—Wire has a minimum coating mass of 610 g/m² (2.0 oz/ft²).
- 3.6. The type of fabric and type of framework need not be the same.

4. TERMINOLOGY

- 4.1. Unless the context clearly indicates another meaning, the terms used herein shall have the meaning as defined in Section 101, Definitions and Terms, *Guide Specifications for Highway Construction*, AASHTO (1998) or as amended.
- 4.2. *chain-link fence fabric*—a fencing material made from wire helically wound and interwoven in such a manner as to provide a continuous mesh without knots or ties except in the form of knuckling or of twisting to form the selva of the fabric.
- 4.3. *knuckling*—the selva obtained by interlocking adjacent pairs of wire ends and bending the wire back into a loop.
- 4.4. *twisting*—the type of selva obtained by twisting adjacent pairs of wire ends together in a close helix of 1.5 machine turns, which is the equivalent to three full twists, and cutting the wire end at an angle. The wire ends beyond the twist shall be at least 6.4 mm (1/4 in.) long.

5. ORDERING INFORMATION

- 5.1. *Orders for chain-link fence fabric purchased to this specification shall include the following information:*
- 5.1.1. Quantity of fabric (Section 17);
- 5.1.2. Number of gates;
- 5.1.3. Type (Section 3) and, if applicable, grade or class;
- 5.1.4. Size of mesh;
- 5.1.5. Size of wire;
- 5.1.6. Height of fabric;

- 5.1.7. Diamond count, if specified;
- 5.1.8. Type of selvage, if nonstandard;
- 5.1.9. For Type IV fabric, the class of polymer coating, and for Class A fabric whether an extruded coating or an extruded and bonded coating is required;
- 5.1.10. Color, if applicable;
- 5.1.11. Type and class of tension wire;
- 5.1.12. Type, grade, size, shape, and number of or spacing of posts, rails, rods, and other fittings;
- 5.1.13. Certification, if required;
- 5.1.14. AASHTO Designation and date of issue; and
- 5.1.15. Exceptions to this specification, or special requirements, if any.

Note 1—These details may be covered, in whole or in part, by accompanying the order with design drawings and notations thereon.

CHAIN-LINK FENCE FABRIC

6. MATERIALS (FABRIC)

- 6.1. Base metal for Type I, II, and IV chain-link fence fabric shall be steel of such quality and purity that, when drawn to the size of wire specified and coated as specified, the finished fabric shall be of uniform quality and have the properties and characteristics as prescribed in this specification.
- 6.2. Wire used for the manufacture of fabric that is zinc-coated, aluminum-coated, or polymer-coated before weaving shall meet the requirements of this specification and shall be capable of being woven into fabric without the coating cracking, flaking, or peeling to such an extent that any of the coating material can be removed by rubbing with the bare fingers.
Note 2—Loosening or detachment during the adhesion test of superficial, small particles of zinc, aluminum, or polymer formed by mechanical polishing of the surface of the coated wire should not be considered cause for rejection.
- 6.3. Zinc used for hot-dip galvanized or electrolytically zinc-plated coatings shall be of any grade of zinc conforming to the requirements of ASTM B6.
- 6.4. Ingot or pig aluminum used for coating shall conform to the following impurity limits:
 - < Copper, max, percent 0.10
 - < Iron, max, percent 0.50
- 6.5. Polymer coatings shall be formulated to conform to the requirements of this specification. These coatings shall be ultraviolet resistant or shall contain a UV inhibitor.
- 6.6. Type III chain-link fence fabric shall be made of aluminum-alloy wire meeting the requirements of ASTM B211, alloy 6061-T89 or T94. The finished fabric shall be of uniform quality and have the properties and characteristics as prescribed in this specification.

7. MANUFACTURE (FABRIC)

- 7.1. Wire used for zinc-coated chain-link fence may be coated before or after weaving into fabric. Fabric that is zinc-coated after weaving shall be hot-dip galvanized in a continuous process and the coating shall not be applied to the fabric in roll form. Wire that is zinc-coated before weaving into fabric may be either electrolytically zinc-plated or hot-dip galvanized.
- 7.2. Wire used for aluminum-coated steel chain-link fabric shall be coated before weaving into fabric.
- 7.3. Wire used for polymer-coated chain-link fence shall be coated before weaving into fabric.

8. WEAVE (FABRIC)

- 8.1. 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 13.
- 8.2. A typical diamond count for each standard height is shown in Tables 1 and 2. Other diamond counts are permissible provided they are consistent within a lot. The purchaser has the option to specify the diamond count in the order, Section 5.1.7.

Table 1—Typical Diamond Counts (mm)

Specified Diameter of Types I, II, and III Coated Wire and Type IV's Metallic-Coated Core Wire, mm	Mesh Size, mm	Diamond Count Fabric Height, mm ^a									
		914.4	1066.8	1219.2	1524	1828.8	2133.6	2438.4	2743.2	3048	3657.6
4.88	50.8	266.7	317.5	342.9	444.5	520.7	622.3	698.5	800.1	876.3	1054.1
3.76	50.8	266.7	317.5	342.9	444.5	520.7	622.3	698.5	800.1	876.3	1054.1
3.05	50.8	266.7	317.5	342.9	444.5	520.7	622.3	—	—	—	—
3.05	44.4	—	—	—	—	—	—	800.1	901.7	1003.3	1206.5

^a Diamond count not available for 25.4-mm mesh size.

Table 2—Typical Diamond Counts (in.)

Specified Diameter of Types I, II, and III Coated Wire and Type IV's Metallic-Coated Core Wire, in.	Mesh Size, in.	Diamond Count Fabric Height, in. ^a									
		36	42	48	60	72	84	96	108	120	144
0.192	2	10 ¹ / ₂	12 ¹ / ₂	13 ¹ / ₂	17 ¹ / ₂	20 ¹ / ₂	24 ¹ / ₂	27 ¹ / ₂	31 ¹ / ₂	34 ¹ / ₂	41 ¹ / ₂
0.148	2	10 ¹ / ₂	12 ¹ / ₂	13 ¹ / ₂	17 ¹ / ₂	20 ¹ / ₂	24 ¹ / ₂	27 ¹ / ₂	31 ¹ / ₂	34 ¹ / ₂	41 ¹ / ₂
0.120	2	10 ¹ / ₂	12 ¹ / ₂	13 ¹ / ₂	17 ¹ / ₂	20 ¹ / ₂	24 ¹ / ₂	—	—	—	—
0.120	1 ³ / ₄	—	—	—	—	—	—	31 ¹ / ₂	35 ¹ / ₂	39 ¹ / ₂	47 ¹ / ₂

^a Diamond count not available for 1-in. mesh size.

9. SIZE OF MESH (FABRIC)

- 9.1. The size of mesh shall be as indicated in Tables 3 and 4. The permissible variation from the specified size of mesh shall be ± 3.2 mm ($\pm 1/8$ in.).