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.

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Standard Specification for Fence Fittings[1]

This standard is issued under the fixed designation F626; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers the materials, coating requirements, and inspection of fence accessories for chain-link fence for the following:

1.1.1 Post and line caps,
1.1.2 Rail and brace ends,
1.1.3 Top rail sleeves,
1.1.4 Tie wires, clips, and fasteners,
1.1.5 Tension and brace bands,
1.1.6 Tension bars,
1.1.7 Truss rod assembly,
1.1.8 Barbed wire arms,
1.1.9 Color coating of fittings, and
1.1.10 Fitting size terminology.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A641/A641M Specification for Zinc–Coated (Galvanized) Carbon Steel Wire
A809 Specification for Aluminum-Coated (Aluminized) Carbon Steel Wire
A817 Specification for Metallic-Coated Steel Wire for Chain-Link Fence Fabric and Marcelled Tension Wire
B26/B26M Specification for Aluminum-Alloy Sand Castings
B85 Specification for Aluminum-Alloy Die Castings
B108 Specification for Aluminum-Alloy Permanent Mold Castings
B117 Practice for Operating Salt Spray (Fog) Apparatus
B209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) B0209_B0209M
B209M Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) (Withdrawn 2021)[3]
B211 Specification for Aluminum and Aluminum-Alloy Rolled or Cold-Finished Bar, Rod, and Wire (Metric) B0211_B0211M
B211M Specification for Aluminum and Aluminum-Alloy Rolled or Cold-Finished Bar, Rod, and Wire (Metric) (Withdrawn 2019)[3]
B221 Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
B221M Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
B429/B429M Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
B800 Specification for 8000 Series Aluminum Alloy Wire for Electrical Purposes—Annealed and Intermediate Tempers
F552 Terminology Relating to Chain Link Fencing
F567 Practice for Installation of Chain-Link Fence
F668 Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric
F934 Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials

2.2 *U.S. Government Standard:*[4]

MIL-R-60346-C Roving, Glass, Fibrous (For Prepreg Tape and Roving, Filament Winding, and Pultrusion Applications)

3. Post and Line Caps

3.1 Post and line caps shall be fabricated from pressed steel or cast iron and hot-dip galvanized with a minimum of

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[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] The last approved version of this historical standard is referenced on www.astm.org.

[4] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111–5094, Attn: NPODS.

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1.2 oz/ft^2 (366 g/m^2) of zinc coating of surface area, or from aluminum alloy 360.0 conforming to die cast Specification B85, or sand cast or permanent mold alloy 356.0 or 713.0 conforming to Specification B26/B26M or B108.

3.2 Post and line caps shall be designed to fit snugly over posts and exclude moisture from inside when tubular posts are used.

4. Rail and Brace Ends

4.1 Rail and brace ends, when required, shall be fabricated from pressed steel or cast iron, and hot-dip galvanized with a minimum of 1.2 oz/ft^2 (366 g/m^2) of zinc coating of surface area, or from aluminum alloy 360.0 (see Specification B85), or alloy 356.0 or 713.0 (see Specification B26/B26M or Specification B108).

4.2 Rail and brace ends, or other approved means of connection, shall be provided when top rail or brace are required.

5. Top Rail Sleeves

5.1 Top rail sleeves shall be fabricated from pressed steel or round steel tubing and hot-dip galvanized with a minimum of 1.2 oz/ft^2 (366 g/m^2) of zinc coating of surface area, or from aluminum alloy 6063-T6 (see Specification B221, B221M or Specification B429/B429M).

5.2 Rail sleeve material shall be a minimum of 0.051 in. (1.3 mm) in thickness if steel, or a minimum of 0.062 in. (1.8 mm) in thickness if aluminum alloy, and a minimum of 6 in. (152.4 mm) in length.

5.3 The rail sleeve must be fabricated to prevent movement along the rail.

6. Tie Wires and Clips

6.1 Ties for attaching chain-link fabric to round tubular or rectangular roll-formed horizontal rails and intermediate posts shall be one of the following systems, as selected by the purchaser:

6.1.1 *Standard Straight, Preformed Hook or Pigtail Round Wire* having a preformed hook or pigtail at one end, shall be designed of sufficient length to comply with the installation practice within Practice F567. Galvanized steel or aluminum round wire ties shall be "soft/bendable" so that during the installation of the tie the tie wire coating or chain link fabric coating is not damaged by cutting through to the bare steel. Specify one of the following materials.

6.1.1.1 Twelve-gauge (0.106 ± 0.004-in. (2.69 ± 0.10-mm)) steel with a tensile strength range from 55 to 65 ksi and with one of the following coatings, as selected by the purchaser:

(1) A minimum of 0.80 oz/ft^2 (230 g/m^2) of zinc in accordance with Specification A641 (A641M), Class 3 or A coating.

(2) A minimum of 0.35 oz/ft^2 (107 g/m^2) of aluminum in accordance with Specification A809.

6.1.1.2 Nine-gauge (0.148 ± 0.005-in. (3.76 ± 0.10-mm)) steel with a tensile strength range from 55 to 65 ksi and with one of the following coatings, as selected by the purchaser:

(1) A minimum of 0.90 oz/ft^2 (270 g/m^2) of zinc in accordance with Specification A641 (A641M), Class 3 or A coating.

(2) A minimum of 0.40 oz/ft^2 (122 g/m^2) of aluminum in accordance with Specification A809.

NOTE 1—Heavier zinc coatings than those listed in 6.1.1.1 (*1*) and 6.1.1.2 (*1*) may be specified if desired, to match the minimum zinc coating specified for the fence fabric.

6.1.1.3 Nine-gauge (0.148 ± 0.005-in. (3.76 ± 0.125-mm)) or (6-gauge 0.192 ± 0.005-in. (4.88 ± 0.125-mm)) aluminum Alloy 1350-H19 or approved equal.

6.1.2 *High-Security Round Wire Ties* shall be one of the following, as selected by the purchaser:

6.1.2.1 *Power-Fastened Preformed Metallic Coated Steel Round Wire Ties,* preformed to the size of the rail or post and of a sufficient length to be installed according to Practice F567. Power-fastened round wire ties shall be 9-gauge (0.148 ± 0.005-in. (3.76 ± 0.125-mm)) or, for added security, 6-gauge (0.192 ± 0.005-in. (4.88 ± 0.125-mm)) steel with a tensile strength range from 65 to 75 ksi. Specify one of the following coatings:

(1) A minimum of 2.00 oz/ft^2 (600 g/m^2) of zinc for 6-gauge or 1.80 oz/ft^2 (540 g/m^2) of zinc for 9-gauge in accordance with Specification A641 (A641M), Class B coating.

(2) A minimum of 0.40 oz/ft^2 (122 g/m^2) of aluminum for 6-gauge or 9-gauge in accordance with Specification A809.

6.1.2.2 *Straight, Manually Fastened Coated Steel Round Wire Ties,* of sufficient length to be installed according to Practice F567. Wire ties shall be 9-gauge (0.148 ± 0.005-in. (3.76 ± 0.125-mm)) steel, "soft/blendable," having a tensile strength range from 55 to 65 ksi. Specify one of the following coatings:

(1) A minimum of 1.2 oz/ft^2 (366 g/m^2) of zinc in accordance with Specification A817, Type 2, Class 1.

(2) A minimum of 0.40 oz/ft^2 (122 g/m^2) of aluminum in accordance with Specification A809.

6.1.3 *Interlocking Preformed Flat Aluminum Band Ties,* preformed to the radius of the rail or post and configurated to wrap a full 360° around the rail or post and one picket of the chain-link fabric. The ends of the tie shall be preformed in such a manner that they will interlock and flatten down into a double closed loop against the rail or post. Interlocking flat wire ties shall be fabricated from 0.0625 by 0.375-in. (1.59 by 9.53-mm) flat aluminum Alloy 5052-H32 wire with a tolerance of ±0.005 in. (±1.25 mm).

6.1.4 *Powder-Driven Fasteners,* consisting of a knurled pin of carbon steel, heat treated to a hardness of RC 52–56 and a minimum tensile strength of 240 000 psi (1655 MPa). Finish shall be zinc electroplating of 0.0003-in. (0.0076-mm) minimum thickness, evaluated for corrosion resistance for 72 consecutive hours with no signs of rust or corrosion when tested in accordance with Practice B117. Cap shall be Type 304 stainless steel 3⁄32 in. (2.38 mm) thick. For 9-gauge or 11-gauge fabric other than 3⁄8-in. (9.53-mm) mesh, the pin shall be 1 in. (25.4 mm) long. For 3⁄8-in. mesh and 6-gauge fabric, the pin shall be 1¼ in. (31.75 mm) long.

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6.2 Round wire hog rings for attaching chain-link fabric to horizontal tension wire shall be either 12-gauge (0.106 ± 0.005-in. (2.69 ± 0.125-mm)) steel wire with a minimum of 0.80 oz/ft^2 (230 g/m^2) of zinc coating in accordance with Specification A641 (A641M), Class 3 or A coating, or 9-gauge (0.148 ± 0.005-in. (3.76 ± 0.125-mm)) aluminum Alloy 1350-H19 wire.

6.3 Round metallic-coated steel tie wires, clips, and hog rings shall withstand all forming or twisting operations, or both, without cracking or flaking of the coating to such an extent that any zinc or aluminum can be removed by rubbing with the bare fingers.

NOTE 2—Loosening or detachment during forming or twisting operations, or both, of superficial, small particles of coating metal formed by mechanical polishing of the surface of the coating wire shall not be considered cause for rejection.

6.4 Where specified, round metallic-coated tie wires, clips, and hog rings shall be polymer coated to match the color of the chain-link fabric, as selected from Specification F934. The coating process and metallic-coated core wire materials shall be in accordance with Specification F668. The diameter of the metallic-coated core wire shall be identical to that specified for the chain-link fabric, but shall not be smaller than 11 gauge (0.120 ± 0.005 in. (3.05 ± 0.125 mm)) and not larger than 9 gauge (0.148 ± 0.005 in. (3.76 ± 0.125 mm)). The tensile strength of the core wire constituting the tie wires, clips, and hog rings shall be suitable to accommodate a manual or power fastening process without causing damage to the metallic or polymer coatings.

NOTE 3—Although rust formation on the cut ends or other unprotected surface areas of steel tie wires is primarily an inherent characteristic of aluminum coated steel wire, rejections of material exhibiting this condition will not be warranted irrespective of the core wire material employed unless it causes significant and noticeable staining of the tie, the chain-link fabric, the post surface, or the rail surface.

7. Tension and Brace Bands

7.1 Tension and brace bands shall be fabricated from pressed steel and hot-dip galvanized with a minimum of 1.2 oz/ft^2 (366 g/m^2) of zinc coating of surface area, or from aluminum alloy 6063-T5, 6063-T6, or 8176–H19 (see Specification B211, B211M, B221, B221M, or B800).

7.2 Tension bands shall be a minimum of 14 gauge (0.074 in. (1.88 mm)) in thickness and a minimum of ¾ in. (19.05 mm) in width.

7.3 Brace bands shall be a minimum of 12 gauge (0.105 in. (2.66 mm)) in thickness and a minimum of ¾ in. (19.05 mm) in width.

8. Tension Bars

8.1 Steel tension bars shall be fabricated from merchant quality steel and hot-dip galvanized with a minimum of 1.2 oz/ft^2 (366 g/m^2) of zinc coating of surface area.

8.2 Fiberglass tension bars shall be manufactured from unidirectional E-glass fibers in accordance with MIL-R-60346-C and processed to produce the desired shape and mechanical properties. The outer surface shall consist of a minimum average 1.5 mil (0.0015 in. (0.038 mm)) thick weather resistant plastic coating.

8.3 Aluminum alloy tension bars shall be 6061-T6 or 6063-T6 alloy (see Specification B211M or B221M).

8.4 Steel or fiberglass tension bars used to connect 1¾ in. (44.5 mm) and 2 in. (50 mm) mesh fabric to end, gate, and corner posts shall be a minimum of 3⁄16 in. (4.8 mm) by 5⁄8 in. (15.9 mm) for fabric heights up to 5 ft (1.52 m) and a minimum of 3⁄16 in. (4.9 mm) by ¾ in. (19.1 mm) for fabric heights over 5 ft (1.52 m). Steel, fiberglass, or aluminum alloy tension bars used to connect 1 in. (25.4 mm) mesh fabric to end, gate, and corner posts shall be a minimum of ¼ in. (6.4 mm) by ⅜ in. (9.5 mm).

8.5 Aluminum alloy tension bars used to connect 1¾ in. (44.5 mm) and 2 in. (50 mm) mesh fabric to end, gate, and corner posts shall be a minimum of ¼ in. (6.4 mm) by ¾ in. (19.1 mm).

8.6 Minimum lengths of tension bar shall be 2 in. (50 mm) less than the full height of the chain link fabric.

9. Truss Rod Assembly

9.1 Steel truss rods shall be fabricated from 5⁄16 in. (7.9 mm) merchant quality rod and it and all related devices shall be hot-dip galvanized after threading with a minimum of 1.2 oz/ft^2 (366 g/m^2) of zinc coating of surface area.

9.2 Aluminum alloy truss rods shall be fabricated from ⅜ in. (9.5 mm) alloy 6061-T6 (see Specification B211 or B211M or B221 or B221M). Aluminum truss rod tighteners shall be alloy 356-T6 or 713–T5 (see Specifications B26/B26M or B28) or alloy 6061-T6 (see Specification B211 or B221).

9.3 Truss rod and tightener shall be capable of withstanding a tension of 2000 lb (907 kg).

10. Barbed Wire Arms

10.1 Barbed wire arms shall be fabricated from pressed steel or cast iron, and hot-dip galvanized with a minimum of 1.2 oz/ft^2 (366 g/m^2) of zinc coating of surface area, or from Aluminum alloy 360 (see Specification B85), or 356-T6 (see Specification B26/B26M and B108). Aluminum Barb Arm Blades shall be fabricated from aluminum alloy 3003-H14, 5052-H32, or 6061-T6 extruded bar or sheet having a minimum thickness of 0.080 in. (2 mm) (see Specifications B209, B209M, B211, B211M, B221, and B221M).

10.2 Barbed wire arms shall be of the following types as specified:

10.2.1 *Type I*—Single slanted arm, for three barbed wire strands;

10.2.2 *Type II*—Single vertical arm for three barbed wire strands;

10.2.3 *Type III*—V-shaped arm, for six barbed wire strands; or

10.2.4 *Type IV*—A-shaped arm, for five barbed wire strands.

10.3 Barbed wire arms shall be fitted with clips or slots for attaching the barbed wire to the arms.

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