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Standard Specification for Fence Fittings[1]

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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 the standard. The SI values given in parentheses are for information only.

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
B209M Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
B211 Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire
B211M Specification for Aluminum and Aluminum-Alloy Rolled or Cold-Finished Bar, Rod, and Wire (Metric)
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
F668 Specification for Polyvinyl Chloride (PVC), Polyolefin and Other Polymer-Coated Steel Chain Link Fence Fabric
F934 Specification for Colors for Polymer-Coated Chain Link Fence Materials

2.2 *U.S. Government Standard:*

MIL-R-60346-C Roving, Glass, Fibrous (For Prepreg Tape and Roving, Filament Winding, and Pultrusion Applications)[3]

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 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

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

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 Tie wires or clips, or both, 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 Round Wire Ties* with either a preformed hook or pigtail at one end, shall be designed of sufficient length to engage one picket of the chain-link fabric at the preformed end of the tie by wrapping it with two 360 degree turns and then wrapping the body of the tie around the rail or post a minimum of 180 degrees. The opposite end of the tie should be secured to the nearest chain-link fabric picket on this other side of the post or rail also with two 360 degree wraps. The final process of tightening the tie on the fabric picket wire should draw the fabric and the main body to the tie tightly to the rail or post. Care must be taken to ensure that the ends of the ties or clips do not protrude beyond the vertical plane on either side of the chain-link fabric to avoid injury to pedestrians in contact with the fence. Standard round wire ties shall be of one of the following materials, as selected by the purchaser:

6.1.1.1 Twelve-gage (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-gage (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-gage (0.148 ± 0.005-in. (3.76 ± 0.125-mm)) or (6-gage 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 Round Wire Ties,* preformed to the radius of the rail or post and configurated to wrap a full 360° around the rail or post and minimum of one complete diamond of the chain-link fabric. The two ends of the tie shall be preformed in such a manner that they can be twisted together in a close helix of 1½ machine turns, which is equivalent to 3 full twists, thereby drawing up tightly around the rail or post and the chain-link fabric. Power-fastened round wire ties shall be of either 6-gage (0.192 ± 0.005-in. (4.88 ± 0.125-mm)) or 9-gage (0.148 ± 0.005-in. (3.76 ± 0.125-mm)) steel as selected by the purchaser, with a tensile strength range from 65 to 75 ksi, and with one of the following coatings, as selected by the purchaser:

(*1*) A minimum of 2.00 oz/ft^2 (600 g/m^2) of zinc for 6-gage or 1.80 oz/ft^2 (540 g/m^2) of zinc for 9-gage 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-gage or 9-gage in accordance with Specification A809.

6.1.2.2 *Manually Fastened Round Wire Ties,* of sufficient length to weave through the fence fabric, wrap around the post or rail a full 360° and be twisted securely with three full twists. At the contractor's option, these ties may be power twisted. After twisting, the protruding wire ends shall be cut off to prevent untwisting by hand. Manually fastened round wire ties shall be of either 6-gage (0.192 ± 0.005-in. (4.88 ± 0.125 mm)) or 9-gage (0.148 ± 0.005-in. (3.76 ± 0.125-mm)) steel as selected by the purchaser, 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 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 Flat Wire 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 *Power-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-gage or 11-gage fabric other than 3⁄8-in. (9.53-mm) mesh, the pin shall be 1 in.