



Designation: F2589 – 16 (Reapproved 2021)

Standard Specification for Ornamental Fences Employing Steel Tubular Pickets¹

This standard is issued under the fixed designation F2589; 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 establishes the minimum requirements for coated tubular picket ornamental fence systems fabricated from black (that is, not galvanized) steel components.

1.2 The requirements of this specification do not apply to vertical bar fence systems utilizing solid bar or wrought iron materials.

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

1.4 *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

- A500 Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- A501 Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
- B117 Practice for Operating Salt Spray (Fog) Apparatus
- D714 Test Method for Evaluating Degree of Blistering of Paints
- D523 Test Method for Specular Gloss
- D822 Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
- D1654 Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
- D2244 Practice for Calculation of Color Tolerances and

Color Differences from Instrumentally Measured Color Coordinates

- D2794 Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
- D3359 Test Methods for Rating Adhesion by Tape Test
- E4 Practices for Force Calibration and Verification of Testing Machines
- F2814 Guide for Design and Construction of Ornamental Steel Picket Fence Systems for Security Purposes

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *adhesion*—the bonding integrity of an organic coating to the base metal substrate.

3.1.2 *corrosion resistance*—the ability of an organically coated metal product to resist attack due to the base metal attempting to return to a more passive oxidized state.

3.1.3 *fence panel*—fabricated unit consisting of rails and pickets. Also referred to as a fence section.

3.1.4 *impact resistance*—the measure of an organically coated metal product to resist indentation; the ability of a coating to resist cracking or loss of adhesion due to reforming the metal during bending or a shape change from abuse.

3.1.5 *ornamental accessory*—any fitting that adds further decoration to an ornamental metal fence system including items such as finials, caps, picket collars, rings, scrolls, or other ornamental panel inserts.

3.1.6 *post*—vertical fence structural component that supports the panel in the ornamental metal fence system.

3.1.7 *rail*—horizontal structural component of a fence panel.

3.1.8 *tubular picket*—hollow vertical ornamental component of a fence panel.

3.1.9 *tubular picket ornamental metal fence system*—an architectural metal fence system that combines ornamental fence structural components (that is, tubular pickets, rails, and posts) with ornamental accessories and fasteners, assembled and evaluated as a complete installed structure.

3.1.10 *weathering resistance*—the ability of an organically coated metal product to resist loss of coating gloss or color change due to excessive humidity or ultra-violet (UV) sunlight exposure.

¹ This specification is under the jurisdiction of ASTM Committee F14 on Fences and is the direct responsibility of Subcommittee F14.35 on Architectural Metal Fence Systems.

Current edition approved Oct. 1, 2021. Published November 2021. Originally approved in 2006. Last previous edition approved in 2016 as F2589 – 16. DOI:10.1520/F2589-16R21.

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.

4. Significance and Use

4.1 The purpose of this specification is to define minimum selection criteria and test procedures to ensure product users that a tubular picket ornamental metal fence system has the strength necessary to withstand reasonable loads and penetration forces, and has the appropriate combination of material and surface protection to withstand the harmful effects of corrosion and weathering for an extended period of time.

4.2 For security applications, more definitive requirements are listed in Guide [F2814](#).

5. Materials and Manufacture

5.1 Steel material for tubular picket ornamental fence system structural components (that is, tubular pickets, rails and posts) shall conform to the requirements of Specifications [A500](#) or [A501](#) and shall have a minimum yield strength of 45 000 psi (310 MPa).

5.2 Organic Coating Materials

5.2.1 Powder coatings applied to the exterior surface of fence components shall be polymer material: polyester or epoxy and polyester combinations having a minimum thickness of 3 mils; polyolefin elastomer having a minimum thickness of 7 mils; or PVC having a minimum thickness of 10 mils.

5.2.2 Wet coating applied to the exterior surface of fence components shall be a two-coat paint application system (one coat of epoxy, polyester, or polyurethane primer; one coat of polyester, polyurethane, or acrylic liquid) with the total combined coating having a minimum thickness of 2 mils.

5.3 Fittings, fasteners, and decorative accessories for ornamental steel fence systems shall be manufactured with a material and finish coating that meets the same protective coating performance requirements as required for panels and posts.

6. Physical Dimensions

6.1 Cross-section and thickness dimensional requirements for ornamental metal fence structural components shall be as specified by the manufacturer, provided that the performance criteria of Section 8 are met. [Table 1](#) is provided as a guideline to show nominal values typically used for residential, commercial, and industrial applications.

6.2 Fence height and space between rails may vary in accordance with manufacturer's standards, provided local or-

dinances and building codes do not limit these dimensions for a specific application, such as might be the case for pool safety, gate safety, or structural wind load bearing capacity. No sharply pointed picket tops shall be used on fences less than 4 ft (1.22 m) in height.

NOTE 1—Fence height is a nominal value and is typically the distance from grade to the top of the fence.

6.3 The spacing between pickets shall be 4 in. (101.6 mm) or less; however, if applicable local regulations (such as may be applied to pool fencing, child care facility fencing, public railing systems, or fencing adjacent to automated gates, etc.) have more restrictive spacing requirements, then those local regulations shall govern.

7. Workmanship

7.1 All ornamental metal fence system components shall be produced using materials and finishes specified in Section 5, and shall be free from defects in workmanship.

8. Testing – Structural

8.1 Structural Test Method A – Application of Horizontal Concentrated Load

8.1.1 *Installation of Test Specimen*—One line of fence with a minimum of three panels of the fence system to be tested shall be installed in accordance with the manufacturer's specifications and drawings. Selection of the test specimen should consider the maximum range of styles and sizes to be certified (see Section 10).

8.1.2 Apparatus

8.1.2.1 *Testing Machine*—Any testing machine or loading device, capable of imposing forces accurate to within $\pm 1\%$, when calibrated in accordance with Practices [E4](#), is suitable and may be used, provided the requirements of specified rate of loading and unloading are met. The testing device shall be of sufficient capacity to prevent yielding of its various components and shall ensure that the applied load remains essentially parallel to the relevant axis of the assembly during testing.

8.1.2.2 *Test System*—A diagrammatic test set-up for applying horizontal tension forces to the assembly is shown in [Fig. 1](#). The bearing plate, normally 6-in. (150-mm) long, shall be of sufficient size to prevent local failure of the surrounding structural members or components. The loading device shall be attached to the assembly by means of pins or a swivel connector to prevent the direct transfer of any flexural forces through the connection.

TABLE 1 Nominal Sizes for Ornamental Fence Structural Components

Application	Component	Typical Cross-Section	Wall Thickness
Residential	Picket	5/8 in. by 5/8 in. (15.9 mm by 15.9 mm)	18 Ga.
	Rail	1 in. by 1 in. (25.4 mm by 25.4 mm)	18 Ga.
	Post	2 in. by 2 in. (50.8 mm by 50.8 mm)	16 Ga.
Commercial	Picket	3/4 in. by 3/4 in. (19.0 mm by 19.0 mm)	16 Ga.
	Rail	1 3/8 in. by 1 1/2 in. (44.4 mm by 38.1 mm) or 1 1/2 in. by 1 1/2 in. (38.1 mm by 38.1 mm)	14 Ga.
	Post	2 1/2 in. by 2 1/2 in. (63.5 mm by 63.5 mm)	14 Ga.
Industrial	Picket	1 in. by 1 in. (25.4 mm by 25.4 mm)	16 Ga.
	Rail	1 3/8 in. by 1 1/2 in. (44.4 mm by 38.1 mm) or 1 1/2 in. by 1 1/2 in. (38.1 mm by 38.1 mm)	14 Ga.
	Post	3 in. by 3 in. (76.2 mm by 76.2 mm)	12 Ga.