



Standard Specification for Strength Requirements of Tubular Steel Posts and Rails for Residential Chain-Link Fence¹

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1. Scope

1.1 This specification covers strength requirements of tubular steel posts and rails for residential chain link fence up to 6 ft (1.83 m) high with line posts at a maximum spacing of 10 ft (3.05 m) on centers.

1.2 Fences other than open chain link are not covered in this specification. Chain-link fence framework of greater strength may be found in Specification F 1043.

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

2. Referenced Documents

2.1 ASTM Standards:

A 513 Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing²

E 8 Test Methods of Tension Testing of Metallic Materials³

F 1043 Specification for Strength Requirements of Metal Posts and Rails for Industrial Chain Link Fence⁴

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *posts*—vertical members of the fence. End, corner, and pull posts are those posts at which the chain-link fabric terminates. Gate posts are those to which gates are either attached or latched. Line posts are those posts which occur in a line of fence which the chain-link fabric passes and to which it is clipped or tied. Rails are horizontally placed and are either top rail, bottom rail, middle rail, or brace rail.

3.1.2 *residential fence*—a fence used around a family home primarily to define a property or boundary line.

4. Dimensions

4.1 The relationship of measured dimension used throughout the fence trade and industry is shown in Table 1.

TABLE 1 Size Terminology

Trade Size	Nominal Pipe Size, in. (mm) ^A	Actual Outside Diameter	
		in.	(mm)
1 3/8 (34.9 mm)	1 (25.4 mm)	1.315	(33.4)
1 5/8 (41.3 mm)	1 1/4 (31.8 mm)	1.660	(42.2)
2 (50.8 mm) ^B	1 1/2 (38.1 mm)	1.900	(48.3)
2 1/2 (63.5 mm) ^C	2 (50.8 mm)	2.375	(60.3)

^AHistorical pipe size reference.

^BAlternative terminology is 1 7/8 in. (47.6 mm).

^CAlternative terminology is 2 5/8 in. (60.3 mm).

5. Strength and Stiffness Requirements

5.1 *Steel Tubing*—It is the intent of this specification to permit the continuance of historically proven practices. Furthermore, this specification shows three possible frame-work systems which can be used depending on the fence requirements, a heavy duty framework is typically used in colder climates where the fence may be subject to heavy ice or snow loads, or where security is needed or where high winds and privacy inserts are used to where severe abuse can be expected; light duty framework is typically used where abuse or security is not a concern or in warmer climates where weather conditions are not as severe. Considerable past experience has shown that galvanized steel tubing performs satisfactorily as fence posts and rails for residential application if furnished to the standard width, maximum yield strength, and nominal dimension listed in Table 2. Therefore, fence posts and rails, consisting of galvanized steel tubing in the nominal size, weight, and yield strength listed in Table 2, shall be considered in compliance with this specification.

6. Strength and Stiffness Calculations

6.1 The strength and stiffness of a structural member can generally be predicted from established engineering principles. The intent of this section is to provide criteria to provide adequate strength and stiffness without premature failure by local buckling. Accordingly, the criteria of 6.2, 6.3, and 6.4 must all be satisfied even though, in general, only one will govern a particular design.

6.2 The elastic bending strength equals the yield strength times the section modulus of the entire cross section.

6.2.1 The yield strength may be considered to be either the minimum specified yield strength for the material used to form the part, or the value determined from tension tests performed

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² Annual Book of ASTM Standards, Vol 01.01.

³ Annual Book of ASTM Standards, Vol 03.01.

⁴ Annual Book of ASTM Standards, Vol 01.06.



TABLE 2 Size Chart for Tubular Framework for Residential Chain Link Fence

Material	Light Duty	Medium Duty	Heavy Duty
Top-Rail-10-ft centers			
4 ft high	D=1.315 in. (25.4 mm) t=0.055 in. (1.4 mm) F=88 lb (39.9 kg)	D=1.315 in. (25.4 mm) t=0.065 in. (1.7 mm) F=102 lb (46.3 kg)	D=1.315 in. (25.4 mm) t=0.072 in. (1.8 mm) F=113 lb (51.3 kg)
6 ft high			D=1.660 in. (42.2 mm) t=0.072 in. (1.8 mm) F=186 lb (84.4 kg)
Line Posts			
4 ft high	D=1.660 in. (42.2 mm) t=0.055 in. (1.4 mm) F=90 lb (40 kg)	D=1.660 in. (42.2 mm) t=0.065 in. (1.7 mm) F=105 lb (47.6 kg)	D=1.660 in. (42.2 mm) t=0.072 in. (1.8 mm) F=116 lb (52.6 kg)
6 ft high	D=1.900 in. (48.3 mm) t=0.055 in. (1.4 mm) F=80 lb (36.3 kg)	D=1.900 in. (48.3 mm) t=0.065 in. (1.7 mm) F=93 lb (42.2 kg)	D=1.900 in. (48.3 mm) t=0.072 in. (1.8 mm) F=103 lb (46.7 kg)
Terminal Posts			
4 ft high	D=1.900 in. (48.3 mm) t=0.055 in. (1.4 mm) F=120 lb (54.4 kg)	D=1.900 in. (48.3 mm) t=0.065 in. (1.7 mm) F=140 lb (63.5 kg)	D=1.900 in. (48.3 mm) t=0.072 in. (1.8 mm) F=155 lb (70.3 kg)
6 ft high	D=2.375 in. t=0.055 in. (1.4 mm) F=127 lb (57.6 kg)	D=2.375 in. t=0.065 in. (1.7 mm) F=148 lb (67.2 kg)	D=2.375 in. t=0.076 in. (1.9 mm) F=174 lb (78.9 kg)
Gate Posts			
4 ft high	D=1.900 in. (48.3 mm) t=0.055 in. (1.4 mm) F=120 lb (54.4 kg)	D=1.900 in. (48.3 mm) t=0.065 in. (1.7 mm) F=140 lb (63.5 kg)	D=1.900 in. (48.3 mm) t=0.072 in. (1.8 mm) F=155 lb (70.3 kg)
6 ft high	D=2.375 in. t=0.055 in. (1.4 mm) F=127 lb (57.6 kg)	D=2.375 in. t=0.065 in. (1.7 mm) F=148 lb (67.2 kg)	D=2.375 in. t=0.076 in. (1.9 mm) F=174 lb (78.9 kg)

in accordance with Test Method E 8. The specimen may be cut either from the material before forming or the part after fabrication.

6.3 The elastic bending stiffness equals the modulus of elasticity times the moment of inertia of the entire cross section. The stiffness requirements limit the maximum deflection (without permanent “set”) at the design load.

6.4 Accepted engineering practice indicates that the full bending strength of a structure can be realized if the additional dimensional restrictions shown below are satisfied.

6.4.1 For circular shapes, the ratio of the diameter to the thickness shall not exceed the following:

$$0.1 E/Y \quad (1)$$

where:

E = modulus of elasticity, and

Y = yield strength.

7. Strength and Stiffness Tests

7.1 At the producer’s option, producer may provide data from appropriate bending tests, to demonstrate compliance

with Table 2. The producer shall provide test data from cantilever tests having a 6 ft (1.83 m) span from fixed end to the application of load.

7.2 Having once provided evidence of the validity of the designs, the producer’s responsibility shall thereafter be limited to the quality control provisions in Section 8

8. Quality Control Provisions

8.1 *Steel Tubing*—When requested, the producer shall furnish, at the time of delivery, a statement of conformance that shall include the following information for each size ordered:

- 8.1.1 Representative yield strength,
- 8.1.2 Actual weight per foot, and
- 8.1.3 Nominal cross-sectional dimensions.

8.2 Inspection:

8.2.1 *Sampling*—The purchaser may select one sample from each lot. A lot shall consist of the smaller of 500 pieces or all pieces, delivered at the same time. This sample will then be tested for any or all attributes specified in Table 2.

8.2.2 *Retest*—In case of failure of the initial test, two additional samples will be taken and tested. In the event of failure of either, the entire lot may be rejected.