



Designation: A1132/A1132M – 26

Standard Specification for Twisted Steel Fiber (TSF) for Concrete¹

This standard is issued under the fixed designation A1132/A1132M; 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 minimum requirements for twisted steel fiber (TSF) for concrete. TSF is a deformed steel wire with a non-circular cross-section that is twisted at least 360° about its axis. It is sufficiently small to be batched in large quantities and randomly dispersed in concrete like other steel fibers.

NOTE 1—The requirements in this specification are generally similar to, but more restrictive than, those for steel fibers in Specification A820/A820M Type I. In this specification, additional requirements are added that are unique to TSF. These include twist pitch, number of faces, perimeter of the cross-section, and parameters that govern the fiber's bond to concrete (for example, through an “untwisting” and stick-slip pull-out mechanism).

1.2 In the case of a conflict between a requirement of this specification and a more stringent requirement of the purchase order, the purchase order shall prevail. The purchase order requirements shall not take precedence if they in any way violate the requirements of this specification; for example, by waiving of a test requirement or making a test requirement less stringent.

1.3 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *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.*

¹ This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.05 on Steel Reinforcement.

Current edition approved Feb. 1, 2026. Published February 2026. DOI: 10.1520/A1132_A1132M-26.

2. Referenced Documents

2.1 *ASTM Standards*:²

- A153/A153M Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- A370 Test Methods and Definitions for Mechanical Testing of Steel Products
- A820/A820M Specification for Steel Fibers for Fiber-Reinforced Concrete
- A938 Test Method for Torsion Testing of Wire
- A941 Terminology Relating to Steel, Stainless Steel, Related Alloys, and Ferroalloys
- A1058 Test Methods for Mechanical Testing of Steel Products—Metric
- B456 Specification for Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
- B633 Specification for Electrodeposited Coatings of Zinc on Iron and Steel

3. Terminology

3.1 *Definition of Terms*—For definitions of terms used in this specification that are not included in 3.2, refer to Terminology A941 for general steel terminology, and Test Methods and Definitions A370 or Test Methods A1058 for mechanical testing of steel products.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *lot, n*—single continuous production run or shipment or 5 tons [4.5 Mg] of material, whichever is less.

3.2.2 *out-to-out, adj*—the longest projection of the fiber in the longitudinal direction.

3.2.3 *twisted steel fiber, TSF, n*—discrete short length of deformed steel with a non-circular polygonal (multi-faced) cross-section that has been twisted at least 360° about its longitudinal axis.

3.2.3.1 *Discussion*—TSF is used as fiber reinforcement in concrete. In industry publication and evaluation service acceptance criteria, this material is frequently referred to as “twisted steel micro reinforcement.”

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.



3.3 Symbols:

- 3.3.1 A —cross-sectional area, in.² [mm²]
- 3.3.2 d_e —equivalent diameter, in. [mm]
- 3.3.3 f_u —tensile strength, psi [MPa]
- 3.3.4 l_n —nominal length, in. [mm]
- 3.3.5 N —number of faces
- 3.3.6 P —perimeter of cross-section, in. [mm]
- 3.3.7 t_p —average twist pitch, in./360° twist [mm/360° twist]
- 3.3.8 t —thickness, in. [mm]
- 3.3.9 w —width, in. [mm]
- 3.3.10 $\lambda = l/d$ —aspect ratio

3.3.11 The subscript n on dimensional units indicates “nominal” and the subscript e indicates “equivalent.” “Nominal” and “equivalent” dimensions are calculated from other measurable dimensions or average weights [masses].

4. Ordering Information

4.1 Orders for TSF for concrete reinforcement under this specification shall contain the following information:

- 4.1.1 Quantity (weight) in pounds or tons [kg or Mg];
- 4.1.2 Equivalent diameter (8.1) or range of equivalent diameters (8.1);
- 4.1.3 Nominal length (out-to-out) after twisting or range of nominal lengths (8.1);
- 4.1.4 Number of faces (8.1);
- 4.1.5 Width (8.1);
- 4.1.6 Thickness (8.1);
- 4.1.7 Twist pitch or range of twist pitches (8.1);
- 4.1.8 Whether certification of compliance (see Section 12) by the manufacturer is required including whether a report is to be furnished;
- 4.1.9 ASTM Specification A1132/A1132M and year of issue.

4.2 The purchaser shall have the option to specify additional requirements, including but not limited to, the following:

- 4.2.1 Perimeter or range of perimeters (8.1), if required;
- 4.2.2 Deformations other than twists, if required;
- 4.2.3 Coating material (7.1), if required; and
- 4.2.4 Coating thickness in oz/ft² [g/m²] (7.1), if required.

5. Materials and Manufacture

5.1 The fibers shall be manufactured from clean steel wire that is formed to the specified polygonal cross-section and twisted along its length. Materials and processes (cold drawing, cutting, shaping, twisting, and so forth) shall be such that the finished fibers conform to all requirements of this specification.

6. Mechanical Properties

6.1 Tensile Requirements:

6.1.1 Tensile testing shall be performed on at least one sample of ten randomly selected finished fiber specimens, for each 5 tons [4.5 Mg] of material or each shipment, whichever is less, unless otherwise specified. The average tensile strength, f_u , shall not be less than 100 000 psi [690 MPa]. The tensile strength of any one of the ten specimens shall not be less than

90 000 psi [620 MPa]. Where the parent source material consists of wire, tensile tests by the manufacturer may be performed on larger samples of source material. Where the parent wire is tested in lieu of finished fibers, tensile testing shall be performed on at least one sample of ten randomly selected parent wire specimens for each 5 tons [4.5 Mg] of material or each shipment, whichever is less.

6.1.2 Tensile testing shall be performed on at least one sample of ten randomly selected finished fiber specimens, of each different source material used for each 5 tons [4.5 Mg] of material or each shipment, whichever is less. The average tensile strength, f_u , shall not be less than 100 000 psi [690 MPa].

6.1.3 The cross-sectional area used to compute f_u shall be carried out to five decimal places in units of square inches [three decimal places in units of square millimeters] and shall be: (1) the area calculated from the area of each specimen of reinforcement calculated from measured length and weight [mass] of the reinforcement measured to the nearest 2.2×10^{-7} lb [0.0001 g] based on a density of 0.2836 lb/in.³ [7850 kg/m³]; or (2) the area calculated from the equivalent diameter of the reinforcement to the nearest 10^{-6} in.² [10^{-4} mm²]. Because of the non-circular cross-section of the fiber, an equivalent diameter (see 8.1) is used for specifying dimensions and calculating cross-sectional area.

6.1.4 The ultimate tensile load in pounds-force [Newtons] for individual reinforcement shall be measured to at least three significant figures. Testing shall be in accordance with Test Methods and Definitions A370, where applicable.

6.2 Bending Requirements:

6.2.1 Reinforcement shall withstand being bent around a 0.125 in. [3.18 mm] diameter pin to an angle of 90° at temperatures not less than 60 °F [16 °C] without breaking.

6.2.2 Bend tests shall be conducted on ten randomly selected specimens of finished reinforcement. It shall be permissible to perform bend tests manually. At least one test consisting of ten specimens shall be made for each 5 tons [4.5 Mg] of material or each shipment, whichever is less, unless otherwise specified. At least 90 % of the specimens shall pass the test.

NOTE 2—The bending requirements of this specification provide a general indication of TSF ductility as may be important in resisting breakage during handling and mixing operations. Ductility measures of concrete with TSF are outside the scope of this specification.

6.3 Torsion Requirements:

6.3.1 Reinforcement shall withstand 20 turns applied in the same direction as the fiber’s existing twist minimum using a 12 in. [250 mm] wire sample with 8 in. [200 mm] wire length between clamps and a 2.6 oz [75 g] constant load while testing. Torsion testing shall be conducted in accordance with Test Method A938. At least 90 % of the specimens shall pass the test.

6.3.2 At least one torsion test of ten randomly selected specimens of raw material wire shall be performed for each 5 tons [4.5 Mg] unless otherwise specified.

7. Coating

7.1 It shall be permissible to verify the material and thickness of an applied coating using the raw material supplier’s