



Designation: D 581 – 99

Standard Specification for Glass Fiber Greige Braided Tubular Sleaving¹

This standard is issued under the fixed designation D 581; 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 requirements for continuous glass filament greige braided tubular sleaving and is suitable for use as electrical insulation and for structural and mechanical applications.

1.2 This specification is intended to assist ultimate users by designating the types of these products that are typical in the industry.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 76 Specification for Tensile Testing Machines for Textiles²
- D 123 Terminology Relating to Textiles²
- D 350 Test Methods for Flexible Treated Sleaving Used for Electrical Insulation³
- D 374 Test Methods for Thickness of Solid Electrical Insulation³
- D 578 Specification for Glass Fiber Strands²
- D 579 Specification for Greige Woven Glass Fabrics²
- D 1059 Test Method for Yarn Number Based on Short-Length Specimens²
- D 1423 Test Method for Twist in Yarns by the Direct-Counting Method²
- D 1776 Practice for Conditioning Textiles for Testing²

¹ This specification is under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.18 on Glass Fiber and Its Products.

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² Annual Book of ASTM Standards, Vol 07.01.

³ Annual Book of ASTM Standards, Vol 10.01.

D 1907 Test Method for Yarn Number by the Skein Method²

D 3773 Test Methods for Length of Woven Fabric⁴

D 3775 Test Method for Fabric Count of Woven Fabric⁴

D 4963 Test Method for Ignition Loss of Glass Strands and Fabrics⁴

2.2 ANSI Standard:

ANSI/ASQC Z1.4 Sampling Procedures for Inspection by Attributes⁵

3. Terminology

3.1 Definitions:

3.1.1 *braid, n*—a narrow tubular or flat fabric produced by intertwining a single set of yarns according to a definite pattern (Maypole process).

3.1.2 *carrier, n*—in braiding machinery, that part of a braiding machine that holds the package of yarn, thread, or cord, and carries the yarn when the machine is operated.

3.1.3 *continuous filament yarn, n*—a yarn made of filaments that extend substantially throughout the length of the yarn.

3.1.4 *greige goods*—textile fabrics that have received no bleaching, dyeing, or finishing treatment after being produced by any textile process.

3.1.5 *sleaving*—braided, knitted, or woven fabric of cylindrical form having a width less than 100 mm (4 in.) (circumference less than 200 mm (8 in.)).

3.1.6 *tubing*—braided, knitted, or woven fabric of cylindrical form having a width of 100 mm (4 in.) or more (circumference of 200 mm (8 in.) or more).

3.1.7 For definitions of other textile terms used in this specification, refer to Terminology D 123.

CLASSIFICATION

4. Tubing Classifications

4.1 Glass fiber greige braided tubular sleaving is produced in one type and two styles within that type and uses yarns designated as directed in Specification D 578. The standard type and styles are:

⁴ Annual Book of ASTM Standards, Vol 07.02.

⁵ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

- 4.1.1 *Type G*—Glass fiber greige braided tubular sleeving.
- 4.1.2 *Style A*—Glass fiber greige braided tubular sleeving having a nominal wall thickness of 0.20 mm (0.008 in.).
- 4.1.3 *Style B*—Glass fiber greige braided tubular sleeving having a nominal wall thickness of 0.15 mm (0.006 in.).

REQUIREMENTS

5. Material

5.1 All yarns for braided tubular sleeving shall be electrical classification, continuous filament glass yarns, unless otherwise specified, have a “C” filament size designation which has a filament average diameter range from 4.00 to 4.74 μm (0.00016 to 0.000189 in.).

5.1.1 The fiber shall be free of any free alkali metal oxides, such as soda or potash, and foreign particles, dirt, and other impurities.

6. Yarn Number

6.1 The nominal yarn number of the yarns in the braided tubular sleeving shall be agreed upon between the purchaser and the supplier. The average yarn number shall fall within the interval: nominal yarn number $\pm 10\%$ of the nominal yarn number.

7. Strand Construction

7.1 The basis for specifying strand construction is given in Specification D 578. The construction of the component strands shall be agreed upon between the purchaser and the supplier.

8. Direction of Twist

8.1 Unless otherwise agreed upon between the purchaser and the supplier, the primary twist in the singles strands shall be “Z” twist and the final twist in the plied yarns shall be “S” twist.

9. Twist Level

9.1 The nominal twist in the component strands and the finished yarns shall be agreed upon between the purchaser and the supplier. The tolerances for the primary twist and the final twist shall conform to Table 1.

TABLE 1 Twist Tolerances

| | Tolerances |
|--------------------------------------|--|
| Turns per Centimetre: | |
| From zero to 0.4, incl | ± 0.1 turn per centimetre |
| Over 0.4 and up to and including 4.0 | ± 0.2 turn per centimetre |
| Over 4 | $\pm 5.0\%$ of the specified average twist |
| Turns per Metre: | |
| From zero to 40, incl | ± 10 turns per metre |
| Over 40 and up to and including 400 | ± 20 turns per metre |
| Over 400 | $\pm 5.0\%$ of the specified average twist |
| Turns per Inch: | |
| From zero to 1, incl | ± 0.25 turn per inch |
| Over 1 and up to and including 10 | ± 0.5 turn per inch |
| Over 10 | $\pm 5.0\%$ of the specified average twist |

10. Ends Per Carrier

10.1 The nominal number of ends per carrier shall be agreed upon between the purchaser and the supplier. The observed number of ends per carrier shall not exceed that specified.

11. Number of Carriers

11.1 The nominal number of carriers shall be agreed upon between the purchaser and the supplier. The observed number of carriers shall not be less than that specified.

12. Picks Per Unit Length

12.1 The nominal number of picks per centimetre (picks per inch) shall be agreed upon between the purchaser and the supplier. The observed number of picks per inch shall be within 1 pick per centimetre (3 picks per inch) of the specified value.

13. Inside Diameter

13.1 For braided tubular sleeving listed in Table 2, the nominal inside diameter shall conform to the requirements of Table 2. For sleeving not listed in Table 2, the nominal inside diameter shall be agreed upon between the purchaser and the supplier. The average inside diameter shall conform to the requirements of Table 3 unless otherwise agreed upon between the purchaser and the seller.

14. Wall Thickness

14.1 For braided tubular sleeving listed in Table 2, the nominal wall thickness shall conform to the requirements of Table 2. For sleeving not listed in Table 2, the nominal wall thickness shall be agreed upon between the purchaser and the supplier. The average wall thickness shall be within 0.03 mm (0.001 in.) of the nominal value.

15. Length Per Unit Mass

15.1 For braided tubular sleeving listed in Table 2, the nominal length per unit mass shall conform to the requirements of Table 2. For sleeving not listed in Table 2, the nominal length per unit mass shall be agreed upon between the purchaser and the supplier. The average length per unit mass shall be within the interval: nominal length per unit mass $\pm 10\%$ of the nominal length per unit mass.

16. Length Per Package

16.1 The nominal length of braided tubular sleeving on each package, such as a spool or serving tube, shall be no more than 108 m (120 yd) nor less than 72 m (80 yd) unless otherwise agreed upon between the purchaser and the supplier.

16.2 Unless otherwise agreed upon between the purchaser and the supplier, no piece of braided tubular sleeving shall be less than 14 m (15 yd) long and there shall be no more than three pieces in a package.

16.3 None of the sample tubes or serving spools shall contain more than the allowable pieces, and the combined length of all of the sample tubes or serving spools shall not be less than the combined length of those tubes or serving spools on the identification labels.