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Standard Specification for Vinyl-Coated Glass Yarns[1]

This standard is issued under the fixed designation D 3374; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers vinyl-coated glass yarns. These yarns are manufactured in two basic classes. These classes have been established that when properly woven into screening, satisfactory strength, durability, and insect protection are obtained. The two classes are as follows:

1.1.1 *Class 1*—Nominal thickness 0.292 mm (0.0115 in.).

1.1.2 *Class 2*—Nominal thickness 0.330 mm (0.0130 in.).

1.2 The values stated in either SI 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 this specification.

1.3 The following precautionary statement pertains only to the test method portions, Sections 12–21, of this specification. *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:* [2]

D 123 Terminology Relating to Textiles

D 578 Specification for Glass Fiber Strands

D 1907 Test Method for Linear Density of Yarn (Yarn Number) by the Skein Method

D 2256 Test Method for Tensile Properties of Yarns by the Single-Strand Method

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

D 7018 Terminology Relating to Glass Fiber and Its Products

2.2 *ANSI/ASQC Standards:*

ANSI/ASQC Z1.4 Sampling Procedures for Inspection by Attributes[3]

ANSI/ASQC Z1.9 Sampling Procedures and Tables for Inspection by Variables for Percent Nonconforming[3]

2.3 *Federal Standard:*

CCC-D-950 Specification, Dyeing and After Treating Processes for Cotton Cloths[4]

2.4 *AATCC Standard:*

Evaluation Procedure 1, Gray Scale for Color Change[5]

3. Terminology

3.1 *Definitions:*

3.1.1 For all terminology under the jurisdiction of Subcommittee D13.18, refer to Terminology D 7018.

~~3.1.2For terminology of other textile terms used in this specification, refer to Terminology D123~~

3.1.2 The following terms are relevant to this standard: moisture equilibrium, vinyl-coated glass yarn.

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

[1] This specification is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.18 on Glass Fiber and its Products.

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

[4] Available from General Services Administration, Specification and Consumer Information Distribution Section (WFSIS), Washington Navy Yard, Bldg. 197, Washington, DC 20407.

[5] Available from American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.

4. Sampling and Number of Specimens

4.1 *Lot Sample*—As a lot sample for acceptance testing, take at random the number of yarn packages directed in an applicable material specification or other agreement between the purchaser and the supplier. Consider yarn packages to be the primary sampling unit. In the absence of such agreement, proceed as follows:

4.1.1 *Yarn Number, Ignition Loss, and Breaking Force*—Take the number of yarn packages specified in ANSI/ASQZ Z1.9 using the count of yarn packages in the lot as a measure of the lot size.

4.1.2 *Color and Workmanship*—Take the number of yarn packages specified in ANSI/ASQZ Z1.4 using the count of yarn packages in the lot as a measure of the lot size.

4.1.3 *Color Stability to Accelerated Weathering*—Use the yarn packages taken as a lot sample for strength, and yarn number as the lot sample for color stability to accelerated weathering.

NOTE 1—An adequate specification or other agreement between the purchaser and the supplier requires taking into account the variability between shipping cartons, yarn packages, yarn within a shipping carton, and test specimens from a yarn package to produce a sampling plan with meaningful producer's risk, consumer's risk, acceptable quality level, and limiting quality level.

4.2 *Laboratory Sample*—As a laboratory sample for acceptance testing, proceed as follows:

4.2.1 *Yarn Number, Ignition Loss, Breaking Force, Color, and Workmanship*—Use the lot sampling units as laboratory sampling units.

4.2.2 *Color Stability to Accelerated Weathering and Low-Temperature Flexibility*—Use every fifth yarn package in the lot sample for breaking force, and yarn number as the laboratory sampling units. For small lots, take at least one yarn package as a laboratory sampling unit.

4.3 *Test Specimens*—Proceed as follows:

4.3.1 *Yarn Number, Ignition Loss, and Breaking Force*—Take the number of specimens per laboratory sampling unit specified in the applicable test method. Evaluate the results of testing using ANSI/ASQ Z1.9, Inspection Level IV, normal inspection, and an acceptable quality level of 1.5 %.

4.3.2 *Color and Workmanship*—Use the yarn packages in the lot sample as the specimens. Evaluate the results of inspecting the specimens using ANSI/ASQZ Z1.4, Inspection Level II, normal inspection, and an acceptable quality level of 1.5 %.

4.3.3 *Color Stability to Accelerated Weathering*—Take the number of specimens per laboratory sampling unit specified in the test methods.

REQUIREMENTS

5. Material

5.1 *Input Yarn*—The yarn shall be glass continuous filament glass yarn which meets the requirements of Specification D 578 for the applicable yarn construction.

5.2 *Plastic Coating*—The material used to coat or impregnate the glass continuous filament yarn shall be a compound of polymerized or copolymerized vinyl chloride resin, plasticized with phosphate or phthalate ester plasticizers exclusively, pigmented and stabilized to meet the requirements herein.

5.2.1 *Optional Plasticizer*—The use of plasticizers other than phosphates and phtalates shall be agreed upon between purchaser and supplier.

6. Put-Up

6.1 The vinyl-coated glass yarn shall be put up on packages or tubes, and in containers whose dimensions shall be agreed upon between the purchaser and the supplier.

7. Yarn Number, Ignition Loss, and Breaking Force

7.1 The requirements of yarn number, ignition loss, and breaking force are specified in Table 1.

8. Color

8.1 Samples shall be a commercial match to color standards agreed upon between the purchaser and the supplier.

TABLE 1 Physical Property Requirements[A]

Classification	Yarn Number, text (yd/lb)			Ignition Loss,	Breaking Force, min, N (lbf)	
	min	nominal	max	min,%	Conditioned	Wet
Class 1	99 (5000)	91 (5450)	84 (5900)	58	17.8 (4.0)	15.6 (3.5)
Class 2	160 (3100)	136 (3650)	118 (4200)	53	28.9 (6.5)	24.5 (5.5)

[A] Nominal values are supplied for information only.

NOTE 2—Gray and charcoal are considered standard colors. They are in general use and demand and are the most readily available. Other colors are usually available on a made-to-order basis.

9. Workmanship

9.1 As agreed upon between the purchaser and the supplier, the following defects shall be considered cause for rejection of the yarn package in which they occur:

9.1.1 Uncoated or partially coated sections of yarn.

9.1.2 Slubs, large lumps, or coating irregularities of such degree as to adversely affect weaveability of the yarn or cause excessive rejects of the final product. Small irregularities that represent inherent characteristics of the coating are permitted.

9.1.3 Yarns that have been bruised, cut, or mashed.

9.1.4 Splices exceeding 25 mm (1 in.) in length or having unbonded or fused ends.

9.1.5 Any defect affecting the free unhampered unwinding of yarn or affecting the secure holding of yarn winds on the package.

10. Color Stability to Accelerated Weathering

10.1 When tested as specified in Section 18, the observed color change after 480 h shall be no greater than Step 3 on the gray scale and after 960 h shall be no greater than Step 2 on the gray scale.

10.2 When agreed upon between the purchaser and the supplier, other exposure periods and other gray scale ratings shall be acceptable.

TEST METHODS

11. Conditioning

11.1 Condition the laboratory samples without preconditioning for a period of at least 5 h in the atmosphere for testing glass textiles as directed in Practice D 1776, unless otherwise specified.

NOTE 3—In any event, 24 h is considered ample exposure time to bring the samples to moisture equilibrium.

12. Material

12.1 Upon prior agreement, the purchaser shall accept the supplier's certification that the materials comply with the requirements of Section 5. In the absence of such an agreement compliance will be tested using Specification D 578 and Fed. Std. CCC-D-950.

13. Put-Up

13.1 Verify that the yarn packages and shipping containers conform to agreement by inspection in the purchaser's plant.

14. Yarn Number

14.1 Determine the yarn number as directed in Test Method D 1907. Report the yarn number as metres per kilogram (yards per pound). Test one specimen having a skein length of 27.5 m (30 yd) per laboratory sampling unit.

NOTE 4—Tex (metres per kilogram) is equal to 496 055 divided by the yards per pound.

14.2 See Annex A1 for information on precision and bias.

15. Ignition Loss

15.1 Determine the ignition loss as directed in Test Method D 4963 using one 27.5-m (30-yd) skein of vinyl-coated glass yarn from each laboratory sampling unit.

NOTE 5—An estimation of ignition loss can be obtained by subtracting input yardage from control yarn yardage.

16. Breaking Force

16.1 Test the breaking force as directed in Test Method D 2256. A constant rate of extension (CRE) tester is recommended with pneumatic type clamps with fixed nubbing surfaces which are integral with one of the clamping surfaces. The snubbing surfaces may be circular with a diameter of not less than 12.5 mm (0.5 in.) or may be semi-involute.

16.2 Test five specimens per laboratory sampling unit using each of the following procedures:

16.2.1 Use Option A1 for conditioned single-strand FORCE. Preconditioning is not required.

16.2.2 Use Option A2 for wet single-strand force. Immerse for 24 h in distilled water containing no wetting agents.

16.3 See Annex A1 for information on precision and bias.

17. Color and Workmanship

17.1 Examine each yarn package in the laboratory sample for visual appearance of its outer surface. Reject any yarn package having defects defined in Section 9 or whose color is not a commercial match to the color standard.