



Designation: D4028/D4028M – 13 (Reapproved 2021)

Standard Specification for Solar Screening Woven from Vinyl-Coated Fiber Glass Yarn¹

This standard is issued under the fixed designation D4028/D4028M; 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 vinyl-coated fiber glass solar screening, and should help users recognize the characteristics of acceptable vinyl-coated fiber glass solar screening. This specification is limited in application to vinyl-coated fiber glass solar screening that is produced with a ribbed pattern woven in the warp direction. The applicability of this specification to vinyl-coated fiber glass type solar screening of a non-rib, a double rib (ribs in both warp and filling direction), or a filling rib construction is not known.

1.2 This specification shows the definitions, general requirements, and physical requirements for commercial standard vinyl-coated fiber glass solar screening designed and woven for installation in any dwelling, building, or structure for the purpose of providing a significant reduction in solar heat gain, while providing outward view and interior light. Solar screening provides a structure that has insect-restraining capabilities equivalent to standard insect screening.

NOTE 1—For information on standard insect screening, see Specification D3656/D3656M.

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 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 The following precautionary caveat pertains only to the test method portion, Sections 8 – 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, 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 standard-*

ization 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

D76/D76M Specification for Tensile Testing Machines for Textiles

D123 Terminology Relating to Textiles

D3374/D3374M Specification for Vinyl-Coated Glass Yarns

D3656/D3656M Specification for Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns

D3773/D3773M Test Methods for Length of Woven Fabric

D3774 Test Method for Width of Textile Fabric

D3775 Test Method for End (Warp) and Pick (Filling) Count of Woven Fabrics

D4909 Test Method for Color Stability of Vinyl-Coated Glass Textiles to Accelerated Weathering (Withdrawn 1996)³

D4912/D4912M Test Method for Fabric Stability of Vinyl-Coated Glass Yarn Insect Screening and Louver Cloth

D4963/D4963M Test Method for Ignition Loss of Glass Fiber Strands and Fabrics

D5035 Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)

D7018 Terminology Relating to Glass Fiber and Its Products

2.2 AATCC Standard:⁴

Evaluation Procedure 1 Grey Scale for Color Change

2.3 ANSI/ASHRAE Standard:⁵

Standard 74-1988 Method of Measuring Solar-Optical Properties of Materials

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 The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from American Association of Textile Chemists and Colorists (AATCC), P.O. Box 12215, Research Triangle Park, NC 27709-2215, <http://www.aatcc.org>.

⁵ Available from American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. (ASHRAE), 1791 Tullie Circle, NE, Atlanta, GA 30329, <http://www.ashrae.org>.

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.

Current edition approved July 1, 2021. Published September 2021. Originally approved in 1981. Last previous edition approved in 2013 as D4028/D4028M – 13. DOI: 10.1520/D4028_D4028M-13R21.

TABLE 1 Defects^A

Bias or bowed filling – distortion at any point 13 mm [½ in.] or more from horizontal	Scalloped selvage
Broken or missing end or pick	Slack, or tight selvage
Curled (doubled, rolled, or folded) selvage	Smash
Cut, hole, or tear	Splice – more than one in 929 cm ² [1 ft ²]
Damaged selvage extending into body of screening	Splice – more than 25 mm [1 in.] in length
Double picks	Splice – not well made or showing loose ends exceeding 25 mm [1 in.] in length
Floats	Spot, stain, streak, or mottled ^B
Hitch-back, open place, or slippage	Tight end or pick – causing waviness or ridge
Jerked-in filling, slough-off, or kinky filling	Uncoated yarns ^C
Knots	Warp streaks or filling bar
Offshade ^B	Wrong draw

^A For definitions of terms used in this table, refer to Terminology **D123**.

^B At normal inspection distance, approximately 1 m [1 yd].

^C Single ends or picks unevenly coated and giving the appearance of a streak, or light-colored, but coated yarn, shall not be scored as a defect when examined at normal inspection distance of approximately 1 m [1 yd].

TABLE 2 Generally Available Mesh, Widths, and Colors

Product	Nominal Yarn Diameter		Standard Constructions (Mesh)		Standard Minimum Widths		Colors
	µm	in.	Warp 25.4 mm [1 in.]	Fill 25.4 mm [1 in.]	cm	in.	
Fiber glass solar screening	292	0.0115	53	16	46, 51, 56, 61, 66, 71,	18, 20, 22, 24, 26, 28,	bronze
	330	0.0130	54	16	76, 81, 86, 91, 96, 102,	30, 32, 34, 36, 38, 40,	charcoal
			54	18	107, 112, 117, 122,	42, 44, 46, 48, 54, 60,	gray
					137, 152, 168, 183,	66, 72, 78, 84	
					198, 213		

2.4 Federal Test Method Standards:⁶

No. 191, Method 5872, Effect of High Temperature on Cloth Blocking, Textile Test Methods

No. 191, Method 5903, Flame Resistance of Cloth, Vertical, Textile Test Methods

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

2.5 Military Standard:⁶

MIL-STD-105D Sampling Procedures and Tables for Inspection by Attributes

3. Terminology

3.1 For all terminology relating to D13.18, Glass Fiber and Its Products, refer to Terminology **D7018**.

3.1.1 The following terms are relevant to this standard: acceptable quality level, atmosphere for testing textiles, fabric stability, mesh, shading coefficient, solar screening.

3.2 For all other terms related to textiles, refer to Terminology **D123**

4. General Requirements

4.1 Material:

4.1.1 **Workmanship**—All commercial standard vinyl-coated glass yarn solar screening shall be made of high grade material with good workmanship and meet the yarn requirements specified in Specification **D3374/D3374M**. Products shall be free of any defects that might affect serviceability or appearance, except those permitted in footnote C of **Table 1**.

The quality acceptance levels will be determined by agreement between the purchaser and the supplier.

4.1.2 **Plasticizers**—The material used to coat or impregnate the fibrous glass 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.

4.1.2.1 **Optional Plasticizer**—At the supplier's option, plasticizers other than phosphates and phthalates may be used provided the color is not affected and the coating compound is treated with solubilized copper 8 quinolinolate, which is listed as inhibitor (e) in Federal Standard CCC-D-950. The amount of fungicide shall be based on the nonvolatile content of the coating. The coating compound shall be chemically analyzed for copper 8 quinolinolate content in accordance with Federal Standard CCC-D-950.

4.1.3 **Color**—For colors listed in **Table 2**, the maximum and minimum shade limits shall be defined by color designations listed in Federal Standard 595A as agreed upon between the purchaser and the supplier.

4.1.4 **Selvage**—Vinyl-coated glass screening may be supplied with or without selvages as agreed between the purchaser and supplier.

4.1.5 **Yarn Splices**—Vinyl-coated glass yarn splices shall be permitted provided they show no tails and do not exceed 25 mm [1 in.] in length. Yarn splices in the solar screening shall not exceed 15 per standard 30 m [100 ft] roll, and no more than one splice shall occur in any 9.30 cm² [1 ft²] of product.

4.2 **Put-Up**—Vinyl-coated glass yarn solar screening shall be put-up on rolls and in containers whose dimensions shall be agreed upon between the purchaser and the supplier.

⁶ Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.