



Designation: **D3656—07 D3656/D3656M – 13**

Standard Specification for Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns¹

This standard is issued under the fixed designation **D3656/D3656M**; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

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

1. Scope

1.1 This specification covers the requirements for vinyl-coated glass yarn insect screening and louver cloth.

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

1.3 This specification shows the terminology and requirements for:

1.3.1 Commercial standard vinyl-coated glass yarn insect screening designed and woven primarily for installation in or on any dwelling, patio, screening enclosure, building, or structure for the purpose of keeping out flies, mosquitoes, and most insects.

1.3.2 Vinyl-coated glass yarn louver cloth used extensively in soffit and louver vents to keep out most large insects, birds, and airborne litter, while at the same time providing for adequate ventilation and air circulation.

1.4 ~~This specification shows the values in both SI units and inch-pound units. “SI units” is the technically correct name for a system of metric units known as the International System of Units. “Inch-pound units” is the technically correct name for the customary units used in the United States. The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in inch-pound units are to be regarded as the standard. The value in SI units are provided for information only; 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 non-conformance with the standard.~~

1.5 The following precautionary caveat pertains only to the test methods portions, Sections 8-19, 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

[D123 Terminology Relating to Textiles](#)

[D1776 Practice for Conditioning and Testing Textiles](#)

[D3374 Specification for Vinyl-Coated Glass Yarns](#)

[D3773 Test Methods for Length of Woven Fabric](#)

[D3774 Test Method for Width of Textile Fabric](#)

[D3775 Test Method for Warp \(End\) and Filling \(Pick\) Count of Woven Fabrics](#)

[D3776 Test Methods for Mass Per Unit Area \(Weight\) of Fabric](#)

[D3786 Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method](#)

[D4028 Specification for Solar Screening Woven from Vinyl-Coated Fiber Glass Yarn](#)

[D4372 Specification for Flame-Resistant Materials Used in Camping Tentage \(Withdrawn 2002\)](#)³

[D4912 Test Method for Fabric Stability of Vinyl-Coated Glass Yarn Insect Screening and Louver Cloth](#)

[D4929 Test Methods for Determination of Organic Chloride Content in Crude Oil](#)

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 Dec. 1, 2007; Jan. 1, 2013. Published January 2008; January 2013. Originally approved in 1978. Last previous edition approved in 2004/2007 as **D3656—04-D3656 – 07**. DOI: 10.1520/D3656-07.10.1520/D3656-13.

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.

D7018 Terminology Relating to Glass Fiber and Its Products

2.2 **AATCC Standards:**⁴

Evaluation Procedure 1, Gray Scale for Color Change

2.3 **ANSI/ASQC Standards:**⁵

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

ANSI/ASQC Z1.9 Sampling Procedures and Tables for Inspection Variables for Percent Nonconforming

2.4 **Federal Standards:**⁶

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

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

Standard 595A CHG Not 1, Color Volume 1

2.5 **IFAI (Industrial Fabrics Association International)**⁷

CPAI-84

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: atmosphere for testing textiles, insect screening, louver cloth, mesh.

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

4. Classification

4.1 Vinyl-coated glass yarn insect screening is produced in two basic classes and mesh to afford required strength and insect protection using yarns as directed in Specification **D3374**. These two classes are as follows:

4.1.1 **Class 1**—Insect screening woven from vinyl-coated glass yarn having a nominal thickness of 0.292 mm (0.0115 in.).

4.1.2 **Class 2**—Insect screening woven from vinyl-coated glass yarn having a nominal thickness of 0.330 mm (0.013 in.).

4.2 The mesh, width, and colors are listed in **Table 1**.

⁴ Available from American Association of Textile Chemists and Colorists, P. O. Box 12215, Research Triangle Park, NC 27709.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁶ Available from General Services Administrations, Specification and Consumer Information Distribution Section (WFSIS), Washington Navy Yard, Bldg. 197, Washington, DC 20407.

⁷ Available from Industrial Fabrics Association International, 350 Endicott Bldg., St. Paul, MN 55101.

TABLE 1 Generally Available Mesh, Widths, and Colors

Product	Class	Nominal Yarn Diameter, µm (in.)	Standard Construction Warp by Fill Mesh/25.4 mm (Mesh/1 in.)	Standard Widths		Colors
				mm	in.	
Insect screening	1	292 (0.011)	18 × 16	610, 762, 813, 914, 1067, 1219, 1524, 1829, 2134	24, 30, 32, 36, 42, 48, 60, 72, 84	gray, charcoal
	2	330 (0.013)	18 × 14	914, 1219, 1524, 1829, 2134, 2438, 2743	36, 48, 60, 72, 84, 96, 108	gray, charcoal
	2	330 (0.013)	18 × 14	914, 1219, 1829, 2134	36, 48, 72, 84	aqua
	2	330 (0.013)	20 × 20	914, 1219, 1524, 1829, 2134	36, 48, 60, 72, 84	gray, charcoal
Louver cloth	2	330 (0.013)	Less than 12 × 12	152, 203, 305, 610, 914, 1219	6, 8, 12, 24, 36, 48	gray, charcoal

TABLE 1 Generally Available Mesh, Widths, and Colors

Product	Class	Nominal Yarn Diameter, µm [in.]	Standard Construction Warp by Fill Mesh/25.4 mm [Mesh/1 in.]	Standard Widths		Colors
				mm	in.	
Insect screening	1	292 [0.011]	18 × 16	610, 762, 813, 914, 1067, 1219, 1524, 1829, 2134	24, 30, 32, 36, 42, 48, 60, 72, 84	gray, charcoal
	2	330 [0.013]	18 × 14	914, 1219, 1524, 1829, 2134, 2438, 2743	36, 48, 60, 72, 84, 96, 108	gray, charcoal
	2	330 [0.013]	18 × 14	914, 1219, 1829, 2134	36, 48, 72, 84	aqua
	2	330 [0.013]	20 × 20	914, 1219, 1524, 1829, 2134	36, 48, 60, 72, 84	gray, charcoal
Louver cloth	2	330 [0.013]	Less than 12 × 12	152, 203, 305, 610, 914, 1219	6, 8, 12, 24, 36, 48	gray, charcoal

4.2.1 For vinyl-coated glass yarn insect screening not listed in **Table 1**, the mesh, width, and colors shall be agreed upon between the purchaser and supplier.

5. Sampling and Test Specimens

5.1 *Sampling*—On a continual basis, samples are selected randomly from each mesh and tested to insure compliance, unless otherwise agreed upon between the purchaser and the supplier.

5.2 *Test Specimens*—For insect screening or louver cloth appearance, width, and length testing, a roll shall serve as the test specimen. For other properties, take the test specimen(s) from the roll. No specimen shall be taken closer than 25 mm (1 in.) from the edge or 0.9 m (1 yd) from the end of the roll.

REQUIREMENTS

6. General Requirements

6.1 *Material:*

6.1.1 *Workmanship*—Insect screening or louver cloth shall be made utilizing input yarns that meet the requirements specified in Specification **D3374**. Products may contain a maximum of one defect in the filling direction affecting less than 50 lineal mm (2 lineal in.). Examples of defects are listed in **Table 2**.

6.1.2 *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.

6.1.2.1 *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.

6.1.3 *Color*—The maximum and minimum shades limits shall be defined by color designations listed in Federal Standard 595A as agreed upon between the purchaser and supplier.

6.1.3.1 The color designated grey shall fall between No. 36492 and No. 36173 as listed in Federal Standard 595A.

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

6.1.5 *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 insect screening or louver cloth shall not exceed 15 per standard 30 m (100 ft) roll, and no more than one splice shall occur in any 930 cm² (1 ft²) of product.

6.2 *Put-Up*—Vinyl-coated glass yarn insect screening and louver cloth shall be put-up on rolls that may be placed in containers whose dimensions shall be agreed upon between the purchaser and the supplier.

7. Physical Requirements

7.1 *Appearance*—Unless otherwise agreed upon between the purchaser and the supplier, a roll shall be defective if it contains two or more defects as described in **6.1.1**.

7.2 *Mesh*—The standard average mesh shall be approximately even-spaced as specified in **Table 1** ±0.5 mesh per 25 mm (1 in.). There are no tolerance requirements within 13 mm (0.5 in.) of the selvage.

7.3 *Roll Length*—Each roll of insect screening or louver cloth complying with Specification **D3656** shall contain 30 linear m (100 linear ft) ±0.6 m (±2.1 ft).

TABLE 2 Examples of Defects^{A,B}

Bias or bowed filling: —For widths ≤ 1220 mm (48 in.) ≥ 13 mm (0.5 in.) For widths ≤ 1220 mm [48 in.] ≥ 13 mm [0.5 in.] —For widths > 1220 mm (48 in.) ≥ 25 mm (1.0 in.) For widths > 1220 mm [48 in.] ≥ 25 mm [1.0 in.]	Slack or tight selvage ^{A,B} Slack or tight selvage ^{A,B} Splice—more than one in a 300 mm ² (1 ft ²) area ^B Splice—more than one in a 300 mm ² [1 ft ²] area ^B
Broken or missing strand (end or pick), ^{A,B}	Splice more than 25 mm (1 in.) in length ^B
Broken or missing strand (end or pick), ^{A,B}	Splice more than 25 mm [1 in.] in length ^B
Damaged selvage extending into the body of the screening ^B	Splice not well made and showing tails ^B
Heavy strand ^{A,B}	Spot, stain, or streak ^{A,B}
Jerked-in filling, slough-off, or kinky filling ^{A,B}	Thin strand ^{A,B}
Color bands ^B	Tight strand (end or pick) ^{A,B} Uncoated yarns ^B

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

^B At normal inspection distance approximately 900-mm (3 ft) [3 ft].

7.4 *Width*—The standard average roll width shall be as specified in **Table 1** +7 or –0 mm (+0.25[+0.25 in. or –0 in.]-in.).

7.5 *Mass per Unit Area*—The minimum average mass per unit area for each class shall be as specified in **Table 3**.

7.6 *Flame Resistance*—There shall be no propagation of flame along any specimen for longer than 10 s after removal of the flame source and no single specimen may propagate flame along its entire length in any time increment.

7.7 *Fabric Stability*—The yarns shall be bonded at each contact point. The fabric stability of the finished product shall be determined in accordance with Test Method **D4912** and meet the requirements as specified in **Table 3**.

7.8 *Bursting Strength*—The minimum average bursting strength of the finished product in its original state and after 480 h of exposure to color stability after accelerated weathering as directed in Section **19** shall be as specified in **Table 3**.

7.9 *Stiffness Index*—The minimum and maximum average stiffness values are referenced in **Table 4**.

7.10 *Color Stability after Accelerated Weathering*—The change from the original color of the standard gray and charcoal, after 480 h of accelerated weathering exposure shall be no greater than step 3, and after 960 h of accelerated weathering exposure shall be no greater than step 2, on the AATCC Gray Scale for evaluating change in color.

NOTE 1—Use of other types of weathering apparatus may give weathering characteristics that are not equivalent to the preferred apparatus.

7.10.1 Exposure periods and acceptable changes in color other than the standard gray and charcoal shall be as agreed upon between the purchaser and the supplier.

7.11 For vinyl-coated glass yarn insect screening and louver cloth not listed in **Table 1**, the physical properties shall be agreed upon between the purchaser and the supplier except as noted in **6.2**.

TEST METHODS

8. Conditioning

8.1 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 **D1776**, unless otherwise specified.

NOTE 2—In any event, 24 h is considered ample exposure time to bring the samples to moisture equilibrium.

9. Put-Up

9.1 Verify that the rolls and shipping containers conform to the inspection agreement in the purchaser’s plant.

TABLE 3 Minimum Sample Average Mass and Strength Properties

Property	Insect Screening		Louver Cloth	
	Class 1	Class 2		Class 2
	18 × 16 Mesh-Mesh/ 25.4 mm [1 in.]	18 × 14 Mesh-Mesh/ 25.4 mm [1 in.]	20 × 20 Mesh-Mesh/ 25.4 mm [1 in.]	8 × 8 Mesh-Mesh/ 25.4 mm [1 in.]
Mass per unit area, —g/m ² (oz/yd ²)	402 (3.0)	446 (4.3)	476 (5.2)	68 (2.0)
Mass per unit area, g/m ² [oz/yd ²]	102 [3.0]	146 [4.3]	176 [5.2]	68 [2.0]
Fabric Stability, —50 mm, N (2 in., lbf)				
Fabric Stability, 50 mm, N [2 in., lbf]				
—Warp	–36 (8)	–44 (10)	–53 (12)	22 (5)
—Warp	36 [8]	44 [10]	53 [12]	22 [5]
—Fill	–27 (6)	–36 (8)	–44 (10)	22 (5)
—Fill	27 [6]	36 [8]	44 [10]	22 [5]
Minimum average bursting strength				
—before and after 480-h exposure ^A	448 (65)	690 (100)		
—kPa (psi)				
—before and after 480-h exposure ^A	448 [65]	690 [100]		
—kPa [psi]				

^A After 480-h exposure as directed in Section **17**.