



Designation: D1668/D1668M – 97a (Reapproved 2021)

# Standard Specification for Glass Fabrics (Woven and Treated) for Roofing and Waterproofing<sup>1</sup>

This standard is issued under the fixed designation D1668/D1668M; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the U.S. Department of Defense.  
This specification replaces Federal Specification HH-C-466.*

## 1. Scope

1.1 This specification covers finished treated (coated) woven-glass fabrics coated with either asphalt, coal-tar pitch, or an organic resin compatible with the roofing, waterproofing, or other usage as specified by the purchaser.

1.2 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.

1.3 *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.*

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

D123 Terminology Relating to Textiles

D146/D146M Test Methods for Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing

D579/D579M Specification for Greige Woven Glass Fabrics

D1079 Terminology Relating to Roofing and Waterproofing

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

D3776/D3776M Test Methods for Mass Per Unit Area (Weight) of Fabric

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.04 on Felts, Fabrics and Bituminous Sheet Materials.

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<sup>2</sup> 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. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology D123 or D1079.

## 4. Classification of Fabric Treatments with Generally Applicable Usage

4.1 *Type I, Asphalt Treated*—Type I is suitable for use with all asphalts and asphalt-based compounds.

4.2 *Type II, Coal-Tar Pitch Treated*—Type II is suitable for use with all coal-tar pitches and coal-tar pitch-based compounds (**Note 1**).

4.3 *Type III, Organic Resin Treated*—The purchaser and supplier shall agree on an organic resin that is compatible with or is suitable for, or both, the plying liquid plying materials either specified or to be used. This organic resin shall not be water soluble.

**NOTE 1**—In some instances the purchaser may specify the use of Type I or II for systems using other than coal-tar bitumens or asphalt.

## 5. Materials and Manufacture

5.1 The untreated (greige) scrim (open basket weave) or leno (locked weave) fabrics shall conform to the requirements as specified in **Table 1**.

5.2 In the process of manufacture, the fibers of the untreated glass fabric shall be thoroughly and uniformly coated using equipment which, in combination, handles the fabric and uses a machine speed in a total process that will not injure or distort the weave of the fabric.

5.3 Glass fabric is usually woven in nominal widths of 0.91, 1.83, and 2.74 m [36, 72, and 108 in.] by the weaving mills. Extra warp (the length of the fabric) threads are included in 1.83 and 2.74-m [72 and 108-in.] wide fabrics to obtain incremental fabric roll widths of 0.91 m [36 in.]. These extra warp threads with a slitting space between each set (a set of two) of bunched warp threads create a duplicate or “dupe” selvage with a “brush” edge created by the cut fill threads instead of the usually wrapped fill threads seen in a smooth

**TABLE 1 Requirements of Untreated Woven Glass Fabrics Types**

Style <sup>A</sup>	Scrim <sup>B</sup>				Leno <sup>C</sup>	
	20 by 20	Thread Type	20 by 10	Thread Type	10 by 10	Thread Type
Average dry mass, g/m <sup>2</sup> [oz./yd <sup>2</sup> ]:	47 [1.4]		47 [1.4]		47 [1.4]	
Thread count per 25.4 mm [1 in.]:						
Warp Threads: <sup>D</sup>	20 ± 2	150 1/0	20 ± 2	150 1/0	20 ± 2	150 1/0
Filling Threads: <sup>E</sup>	20 ± 2	150 1/0	10 ± 1	75 1/0	10 ± 1	75 1/0

<sup>A</sup> “Style” (that is, 20 by 10) as stated as a caption in **Table 1** is a weave count of the threads (yarns) present in both the warp and the fill. “Style” is mentioned here for use as a quick, generic cross reference to the manufacturer’s own fabric numbers.

<sup>B</sup> A scrim-type fabric is an open weave (basket or screen) type pattern.

<sup>C</sup> The style called “leno” has the same thread count as the 20 by 10. The change in the weave pattern is due to the doubling of the 150 1/0 warp threads (yarns) to produce mesh openings double the size of the 20 by 20 weave pattern. As a greige goods, it is a very stable (locked) weave which continues after the application of the coating materials.

<sup>D</sup> Warp threads (yarns) run the length of the fabric. The warp thread count is measured across the width of the fabric and is expressed in number of threads per lineal inch or per lineal millimetre (mm).

<sup>E</sup> Fill (woof) are the threads (yarns) that run at right angles (perpendicular) to the warp yarns of the fabric. The fill thread count is measured across the length of the fabric and is expressed in number of threads per lineal inch or per lineal millimetre (mm).

selvedge. This type of fabric selvedge edge is, and has been, an acceptable fabric design (pattern) in both the weaving and construction industry.

5.4 Brush edge of the “dupe” selvedge is not to be included in the measurement of the finished roll width.

5.5 The purchaser may specify widths of more than or less than 0.91 m [36 in.]. These widths can be furnished at the manufacturer’s option.

## 6. Physical Properties

6.1 *Coated Fabric*—The coated fabric shall conform to the requirements as specified in **Table 2**. The coated fabric shall not flake at 0 °C [32 °F] when flexed 180° over 25 mm [1 in.] outside diameter mandrel and then immediately reversed.

6.2 *Finished Fabric*—The finished fabric shall be capable of retaining its original shape and shall consist of a right angle weave set pattern without bunching either the warp or fill threads when unrolled during normal handling. There shall be no sticking at temperatures of 10 °C [50 °F] and above unless such stickiness is required or specified, or both, by the purchaser.

6.3 *Finished Roll*—The finished roll shall present a neat square edge with no loose warp threads. The fabric terminations shall be sealed using tape or the like and without the use of staples or heat.

## 7. Workmanship, Finish, and Appearance

7.1 *Mesh of Fabric*—The fabric mesh shall be open an 85 % minimum average of the maximum mass of the roll with an allowable factor of ± 10 %. This openness of the fabric weave is to permit a positive flow-through of the successive moppings or applications of the liquid plying materials.

7.2 *Finish of the Fabric*—The fabric finish shall be uniformly free of tears, cracks, folds, and ragged or untrue edges. If a release compound is used to prevent sticking in the rolls, it must be barely visible and not of a composition or amount that will interfere with adhesion or composition of the liquid plying materials.

7.3 *Selvage*—The selvage of the fabric shall have a minimum number of warp threads (yarns) to comprise a width of 6 mm [¼ in.] and a maximum of 13 mm [½ in.].

## 8. Sampling and Test Methods

8.1 *Sampling*—Sampling shall be in accordance with Test Methods **D146/D146M**, paragraph 3.1.

8.2 *Strength of Fabric*—Strength testing shall be in accordance with Test Methods **D146/D146M**, paragraph 13.2, modified to prevent the glass fabric from slipping from the jaws of the tension testing machine. The modification is to insert a thin strip of soft gasket rubber between the fabric and the four jaws of the machine before clamping into position.

**TABLE 2 Physical Requirements for Finished Glass Fabric**

	Type I		Type II		Type III	
	Min	Max	Min	Max	Min	Max
Width of roll (unless otherwise specified), mm [in.]	901.0 [35.5]	952.0 [37.5]	901.0 [35.5]	952.0 [37.5]	901.0 [35.5]	952.0 [37.5]
Length of roll (unless otherwise specified), linear m [yd]	45.3 [49.5]	46.2 [50.5]	45.3 [49.5]	46.2 [50.5]	45.3 [49.5]	46.2 [50.5]
Net fabric weight of roll, g/m <sup>2</sup> [lb./100 yd <sup>2</sup> ]	64.5 [13.0]	99.2 [20.0]	69.4 [14.0]	104.2 [21.0]	49.6 [10.0]	84.3 [17.0]
Total average area coverage per roll without a lap factor of 10 % is 41.8 m <sup>2</sup> [450 ft <sup>2</sup> ]	40.86 [439.31]	44.03 [473.44]	40.86 [439.31]	44.03 [473.44]	40.86 [439.31]	44.03 [473.44]
Average net mass %, kg/m <sup>2</sup> [oz./yd <sup>2</sup> ]	68 [2.0]	102 [3.0]	68 [2.0]	102 [3.0]	54 [1.6]	88 [2.6]
Moisture present in finished fabric, maximum mass % <sup>A</sup>		1		1		1
Tensile strength at 21 °C ± 2 °C [70 °F ± 3.6 °F] measured in both directions, kN/m [lbf/in.]	13.1 [75]		13.1 [75]		13.1 [75]	

<sup>A</sup> At time of manufacture. Products with higher moisture content at time of installation may cause hot materials to foam, creating interply voids that may result in blisters.