



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

This standard is issued under the fixed designation D 1668; 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 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 within this document are in inch-pound units with the metre equivalent in parentheses. The values given in parentheses are for information only.

## 2. Referenced Documents

### 2.1 ASTM Standards:

- D 123 Terminology Relating to Textiles<sup>2</sup>
- D 146 Test Methods for Sampling and Testing Bitumen-Saturated Felts and Woven Fabrics for Roofing and Waterproofing<sup>3</sup>
- D 579 Specification for Greige Woven Glass Fabrics<sup>2</sup>
- D 1079 Terminology Relating to Roofing, Waterproofing, and Bituminous Materials<sup>3</sup>
- D 3775 Test Method for Fabric Count of Woven Fabric<sup>4</sup>
- D 3776 Test Methods for Mass per Unit Area (Weight) of Woven Fabric<sup>4</sup>

## 3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology D 123 or D 1079.

## 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 Types 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 36, 72 and 108 in. (0.91, 1.83 and 2.74 m) by the weaving mills. Extra warp (the length of the fabric) threads are included in 72 and 108-in. (1.83 and 2.74-m) wide fabrics to obtain incremental fabric roll widths of 36 in. (0.91m). These extra warp threads with a slitting space between each set (a set of two) of bunched warp threads create a duplicate or “dupe” selvedge with a “brush” edge created by the cut fill threads instead of the usually wrapped fill threads seen in a smooth 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 36 in. (0.91 m). 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 32°F (0°C) when flexed 180° over 1 in. (25 mm) 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

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D-8 on Roofing, Waterproofing and Bituminous Materials and is the direct responsibility of Subcommittee D08.04 on Felts and Fabrics.

Current edition approved July 10, 1997. Published March 1998. Originally published as D 1668 – 59 T. Last previous edition D 1668 – 97.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 07.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.04.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 07.02.

**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, oz/yd <sup>2</sup> (g/m <sup>2</sup> ):	1.4 (47)		1.4 (47)		1.4 (470)	
Thread count per 1 in. (25.4 mm):						
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).

**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), in. (mm)	35.5 (901.0)	37.5 (952.0)	35.5 (901.0)	37.5 (952.0)	35.5 (901.0)	37.5 (952.0)
Length of roll (unless otherwise specified), linear yds (m)	49.5 (45.3)	50.5 (46.2)	49.5 (45.3)	50.5 (46.2)	49.5 (45.3)	50.5 (46.2)
Net fabric weight of roll, lb/50 yd <sup>2</sup> (kg/41.8 m <sup>2</sup> )	13.0 (64.5)	20.0 (99.2)	14.0 (69.4)	21.0 (104.2)	10.0 (49.6)	17.0 (84.3)
Total average area coverage per roll without a lap factor of 10 % is 450 ft <sup>2</sup> (41.8 m <sup>2</sup> )	439.31 (40.86)	473.44 (44.03)	439.31 (40.86)	473.44 (44.03)	439.31 (40.86)	473.44 (44.03)
Average net mass %, oz/yd <sup>2</sup> (kg/m <sup>2</sup> )	2.0 (68)	3.0 (102)	2.0 (68)	3.0 (102)	1.6 (54)	2.6 (88)
Moisture present in finished fabric, maximum mass % <sup>A</sup>		1		1		1
Tensile strength at 70°F ± 3.6°F (21°C ± 2°C) measured in both directions, lbf/in. (kN/m)	75 (13.1)		75 (13.1)		75 (13.1)	

<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.

weave set pattern without bunching either the warp or fill threads when unrolled during normal handling. There shall be no sticking at temperatures of 50°F (10°C) 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, 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 ¼ in. (6 mm) and a maximum of ½ in. (13 mm).

## 8. Sampling and Test Methods

**8.1 Sampling**—Sampling shall be in accordance with Test Methods D 146, paragraph 3.1.

**8.2 Strength of Fabric**—Strength testing shall be in accordance with Test Methods D 146, 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.

**8.3 Thread Count**—Determine the thread count in accordance with Test Method D 3775.

**8.4 Organic Resin Mass**—Determine the net mass of organic resin treatment of Type III fabric in accordance with Specification D 579.

**8.5** The average net mass is determined by Test Method D 3776.

## 9. Inspection

**9.1 Inspection**—Inspection shall be in accordance with the requirements of this specification.

**9.2 Inspection Alternatives**—Alternative inspection requirements shall be determined by and as agreed upon between the purchaser and the supplier.

## 10. Rejection and Resubmittal

**10.1 Failure to Conform**—Failure to conform to any of the requirements as stated in this specification constitutes grounds for rejection.

**10.2 Rejection Redress**—The supplier shall have the right to inspect the rejected materials. The supplier and the purchaser shall agree to the quantity of rolls deemed unacceptable. The supplier shall then have the right to submit the same number of

new rolls as replacement.

## 11. Packaging and Package Marking

11.1 *Packaging Standards*—Unless otherwise agreed upon between the supplier and purchaser, each product package shall be plainly marked with the supplier's name, the roll dimensions, the quantity, the style of fabric, the treatment type, and ASTM designation; if applicable, the brand name would also be included.

11.2 *Cores and Wrappings*—Unless otherwise agreed upon by the supplier and the purchaser, the finished fabric shall be as follows:

11.2.1 Wound on paper cores having a minimum  $\frac{1}{16}$ -in. (1.6-mm) wall with a maximum  $\frac{1}{8}$ -in. (3.2-mm) wall. Each paper core shall have a minimum  $1\frac{3}{4}$ -in. (44.5-mm) inside diameter to a maximum 3-in. (76.2-mm) inside diameter with a total core length to fully accommodate the width of the fabric; total length of the core is not to exceed the sum of fabric width plus 2 in. (50.8 mm), and

11.2.2 Banded with paper tape and/or wrapped in a manner that completely encircles and protects the roll to prevent any slippage and unrolling.

### 11.3 *Fabric Continuity Within the Roll:*

11.3.1 No roll is to contain more than two pieces. The total length of fabric in such a roll is to be at least 18 in. (450 mm) greater than the normal roll length. The box shall be marked "SPLICED."

11.3.2 All splices created during the weaving process shall be marked as in 11.3.1.

11.3.3 Any fill voids and areas of damaged warp threads are to be cut out of the roll, still maintaining the requirements of 11.3.1.

11.3.4 No roll lot (shipment) shall contain more than a 5 % quantity of spliced rolls.

11.3.5 All cartons and packages within a carton, or which are otherwise separately packaged, are to be clearly marked as "SPLICED" with the number of spliced rolls contained therein.

## 12. Keywords

12.1 glass fabrics: woven, treated, scrim, leno and greige; roofing; waterproofing

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