Designation: C 686 – 90 (Reapproved 1995)ε1

Standard Test Method for Parting Strength of Mineral Fiber Batt- and Blanket-Type Insulation[1]

This standard is issued under the fixed designation C 686; 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.

ε1 NOTE—Safety caveat and Keywords were added in March 1995.

1. Scope

1.1 This test method covers evaluation of strength in tension on mineral fiber batt- and blanket-type insulation products. It is useful for determining the comparative tensile properties of these products, specimens of which cannot be held by the more conventional clamp-type grips. This is a quality control method, and the results should not be used for design purposes. It is not normally used for board-type products.

1.2 *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:*

C 167 Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations[2]

E 171 Specification for Standard Atmospheres for Conditioning and Testing Materials[3]

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method[4]

3. Significance and Use

3.1 Tensile strength is a fundamental property associated with mineral fiber manufacture since it is influenced by the type of fiber, the deposition of fiber, the type and the amount of bonding agent, and the method of curing the resin to form a bonded insulation product. The test is an indication of product integrity and the ability of the product to be successfully handled and applied in the field.

4. Apparatus

4.1 *Constant Rate of Traverse Tension Test Unit* of 50-lbf (223-N) capacity calibrated in increments of 0.1 lbf (0.4 N) and having a moving head speed of 12 in. (305 mm)/min or equivalent (see Fig. 1).

4.2 *Post-Type Grips* with 1-in. (25.4-mm) diameter rods (see Fig. 2).

4.3 *Die* for cutting specimens (see Fig. 3). The O-ring specimen dimensions are 3 by 4.75 in. (76 by 120.6 mm) in outside diameter, and 1 by 2.75 in. (25 by 69.8 mm) in inside diameter (see Fig. 4).

4.4 *Balance* to weigh to an accuracy of 0.01 g.

5. Test Specimen

5.1 The test specimen shall consist of the entire O-ring cut from the full thickness of the product to be tested.

5.2 Specimens shall not be cut from a product that varies in thickness ±5 % from normal when tested in accordance with Test Method C 167.

5.3 No specimen shall be tested that exhibits any obvious damage in the insulation or that shows delamination within the insulation thickness.

6. Conditioning

6.1 Condition the specimens for 1 h in a room maintained at atmospheric conditions of 73.4 ± 1.8°F (23 ± 1°C) and 50 ± 2 % relative humidity in accordance with Specification E 171.

7. Procedure

7.1 Weigh each specimen to the nearest 0.01 g and record the weight.

7.2 Attach the post-type grips to the tension test unit and align the grips in the vertical plane.

7.3 Adjust the speed of the moving head to 12 in. (305 mm)/min.

7.4 Set the stops of the moving head until the grips are approximately ¼ in. (6.3 mm) apart in the starting position.

7.5 Place the specimen on the post-type grip (higher density side first if it is evident that such exists) so that both posts are within the oblong hole of the specimen. The high density side of the specimen shall be in contact with the post shield.

7.6 Apply the load; read and record the maximum load to failure to the nearest 0.1 lbf (0.4 N).

7.7 Test ten specimens each cut in the machine and cross-machine directions. If the machine direction is not readily

[1] This test method is under the jurisdiction of ASTM Committee C-16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.32 on Mechanical Properties.

Current edition approved Jan. 26, 1990. Published March 1990. Originally published as C 686 – 71 T. Last previous edition C 686 – 76 (1985).

[2] *Annual Book of ASTM Standards*, Vol 04.06.

[3] *Annual Book of ASTM Standards*, Vol 15.09.

[4] *Annual Book of ASTM Standards*, Vol 14.02.

FIG. 1 Tension Test Unit

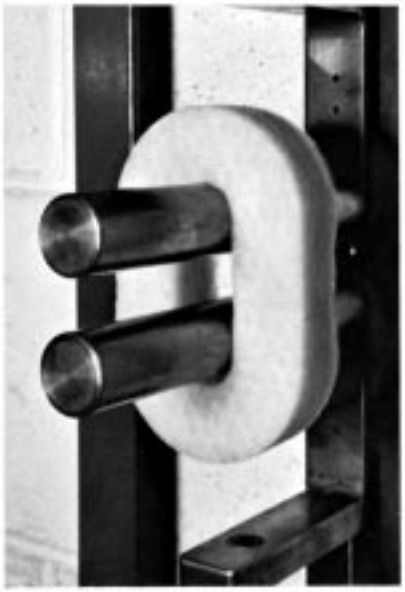

FIG. 2 Post-Type Grips

determinable, refer to the longest dimension of the sample to be tested as lengthwise and call the shortest dimension crosswise.

8. Calculation

8.1 Calculate the parting strength, *S*, in grams per gram as follows:

$$S = (L \times 453.59)/W \quad (1)$$

where:
L = breaking load, lbf, and
W = weight of specimen, g.

FIG. 3 Specimen Die Cutter

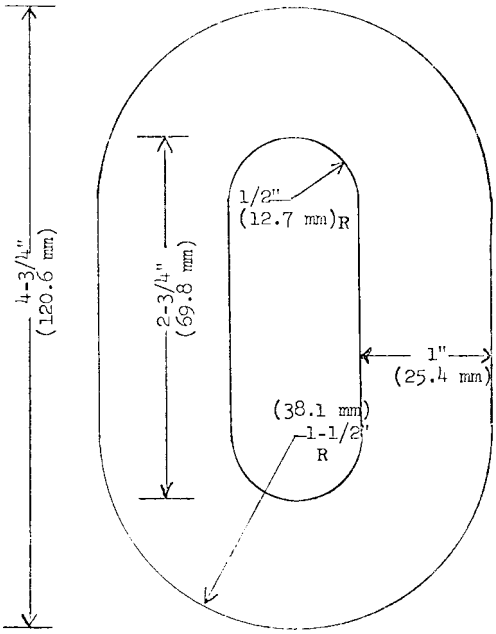

FIG. 4 Test Specimen

9. Report

9.1 The report shall include the following:

9.1.1 Thickness and density of the product being reported in accordance with Test Method C 167,

9.1.2 Weight and load at failure of each specimen,

9.1.3 Calculated parting strength for each specimen,

9.1.4 Total number of specimens tested in both the machine and cross-machine direction, and

9.1.5 Average of the parting strength in the machine and cross-machine direction.

10. Precision and Bias [5]

10.1 *Precision*—An interlaboratory round robin involving

[5] Supporting data are available from ASTM Headquarters. Request RR:C-16-1013.

four laboratories and three specimens was conducted in 1988. Specimens were tested in both machine and crossmachine directions. The three mineral fiber samples were typical of current production. Table 1 gives the results of the round robin which were analyzed using Practice E 691 guidelines.

10.2 *Bias*—Since there are no reference materials available for this test method, it is not possible to estimate bias.

11. Keywords

11.1 insulation; physical strength; tensile strength

TABLE 1 Interlaboratory Precision[A]

Material	Machine Direction				Cross-Machine Direction			
	Parting Strength, lb/g	*S*	*CV*,%	*LSD*	Parting Strength, lb/g	*S*	*CV*,%	*LSD*
A	0.670	0.032	4.77	0.506	0.539	0.042	7.79	0.579
B	1.468	0.064	4.36	0.715	1.367	0.104	7.61	0.912
C	0.383	0.024	6.27	0.438	0.285	0.007	2.46	2.236

[A] The symbols used represent the following:
S = standard deviation,
CV = percent coefficient of variation ($S \times 100$/mean), and
LSD = least significant difference between two individual test results based on a 95 % confidence level = $2\sqrt{2}S$.