Designation: D 6004 – 96

Standard Test Method for Determining Adhesive Shear Strength of Carpet Adhesives[1]

This standard is issued under the fixed designation D 6004; 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 test method describes a procedure to measure shear strength development for adhesives used to bond carpet.

1.2 This test method provides a quantitative means of measuring and recording shear strength of the adhesive when it is applied to the desired substrate.

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *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:*

D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing[2]

D 907 Terminology of Adhesives[3]

3. Terminology

3.1 *Definitions*—Many of the terms in this test method are defined in Terminology D 907.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *shear strength, n*—the maximum average stress when a force is applied parallel to the joint.

3.2.1.1 *Discussion*—In most adhesive test methods, the shear strength is actually the maximum average stress at failure of the specimen, not necessarily the true maximum stress in the material.

4. Significance and Use

4.1 In selecting or developing a carpet adhesive, it is critical to have knowledge regarding how well the adhesive will bond to the desired substrate. Shear loading is commonly used because it closely duplicates the common mode of failure for such adhesives.

4.2 The test method provides a means of measuring quantitatively the shear strength development and at which strength level the adhesive will fail.

5. Apparatus

5.1 *Applicator trowel*, with a notch pattern of ⅛ in. (3.2 mm) wide, 3⁄32 in. (2.4 mm) deep, ⅛ in. (3.2 mm) flat.

5.2 *Three 10-lb (4.54-kg) Weights.*

5.3 *Three 2-in. (51 mm) × 3-in. (76 mm) Pieces of Hardboard*, used to distribute weight.

5.4 Test machine capable of at least a 100-lb load.

5.5 *Convection Oven*, capable of maintaining a temperature of 122 ± 2°F (50 ± 1°C).

6. Materials

6.1 *Adhesive*—Any appropriate adhesive for carpet installation.

6.2 *Carpet*—Polypropylene backed.

6.3 *Tempered Hardboard.*

7. Conditioning

7.1 Condition the carpet, hardboard and adhesive to be tested 24 h at 73.4 ± 3.6°F (23 ± 2°C) and 50 % ± 5 % relative humidity prior to testing.

8. Sample Preparation

8.1 Cut the carpet into three 2-in. (51-mm) × 5-in. (127-mm) pieces.

8.2 Cut one piece of hardboard into a 10-in. (254-mm) × 5-in. (127-mm) section.

9. Procedure

9.1 Hold the trowel at a 45° angle and spread the adhesive lengthwise over the entire tempered surface of the board.

9.2 Wait 10 min and place three pieces of carpet perpendicular to the trowel pattern, each covering a 6-in.^{2} (2 in. × 3 in.) area of the adhesive (Fig. 1).

9.3 Place a 2-in. × 3-in. piece of hardboard on top of the carpet bonded to the hardboard (Fig. 2).

9.4 Place a 10-lb weight on each of the 2-in. × 3-in. piece of hardboard for 1 min.

9.5 Remove the weight and the 2-in. × 3-in. piece of hardboard from the test panel.

9.6 Allow the test panel to dry 24 h at standard conditions.

9.7 Place the test panel in a 50°C (122°F) oven for 72 h.

9.8 Remove the test panel from the oven and allow it to cool

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[1] This test method is under the jurisdiction of ASTM Committee D-14 on Adhesives and is the direct responsibility of Subcommittee D14.70 on Construction Adhesives.

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[2] *Annual Book of ASTM Standards*, Vol 08.01.

[3] *Annual Book of ASTM Standards*, Vol 15.06.

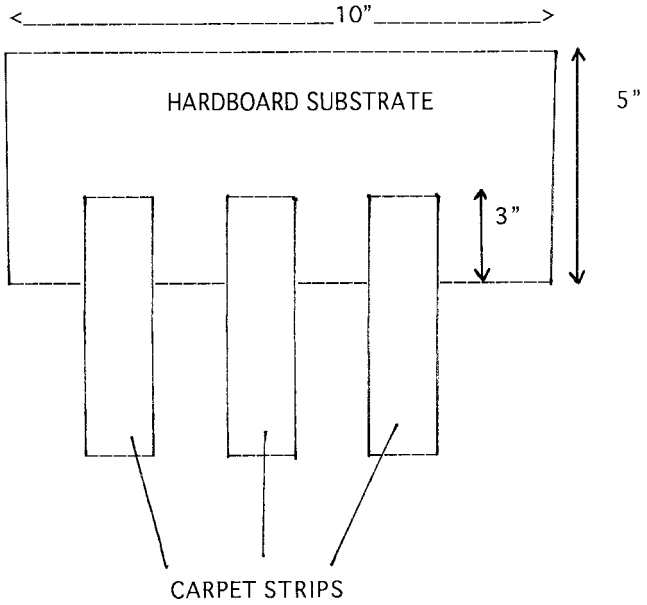

FIG. 1 Shear Strength Carpet Assembly Pattern

at standard conditions for 3 h.

9.9 Test the specimens in tension shear using a universal testing machine, aligning the upper and lower jaws as perpendicular as possible. Set the test speed at 1 in./min. The test area will be 6 in.^{2}.

9.10 Record the three values in pounds.

10. Calculation

10.1 Calculate the shear strength of the individual specimens as follows:

$$S = \frac{SV}{6} \quad (1)$$

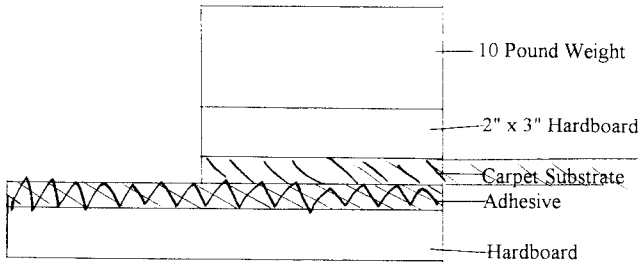

FIG. 2 Shear Strength Carpet Assembly (Sideview) Dead Weight Configuration

where:
S = shear strength, and
SV = shear value reading from the universal test machine.

10.2 Calculate the average shear strength of the individual specimens as follows:

$$S_{AVE} = \frac{\Sigma S}{3} \quad (2)$$

where:
S_{AVE} = the average of the three shear strength values.

11. Report

11.1 Report the following information:
11.1.1 The type of carpet adhesive used.
11.1.2 The type of carpet.
11.1.3 The type of substrates used if other than hardboard.
11.1.4 The tension shear strength in psi.

12. Precision and Bias

12.1 No precision and bias exists for this test method as the necessary resources have not been forthcoming.

13. Keywords

13.1 adhesion; carpet; tension shear strength