

Standard Test Method for Determination of Extrudability of Cartridge Adhesives¹

This standard is issued under the fixed designation D 5267; 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 measures the amount of force necessary to extrude an adhesive from a cartridge at a given temperature.

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

1.3 *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 907 Terminology of Adhesives²

3. Terminology

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

4. Significance and Use

4.1 Cartridge adhesives are typically used at job sites in a wide variety of temperature ranges. These products may be exposed to cold temperatures, where one of the limiting application factors is whether the product can be extruded from the cartridge.

4.2 The test method quantitatively measures the force necessary to extrude a cartridge adhesive at a given temperature. This provides the formulator with results that can assist in formulation development and the end user with information for use in selecting a product for general usage.

4.3 By measuring (the ease of) extrusion from the cartridge, the test method can also be used as a quality control tool to measure the shelf life stability of a product.

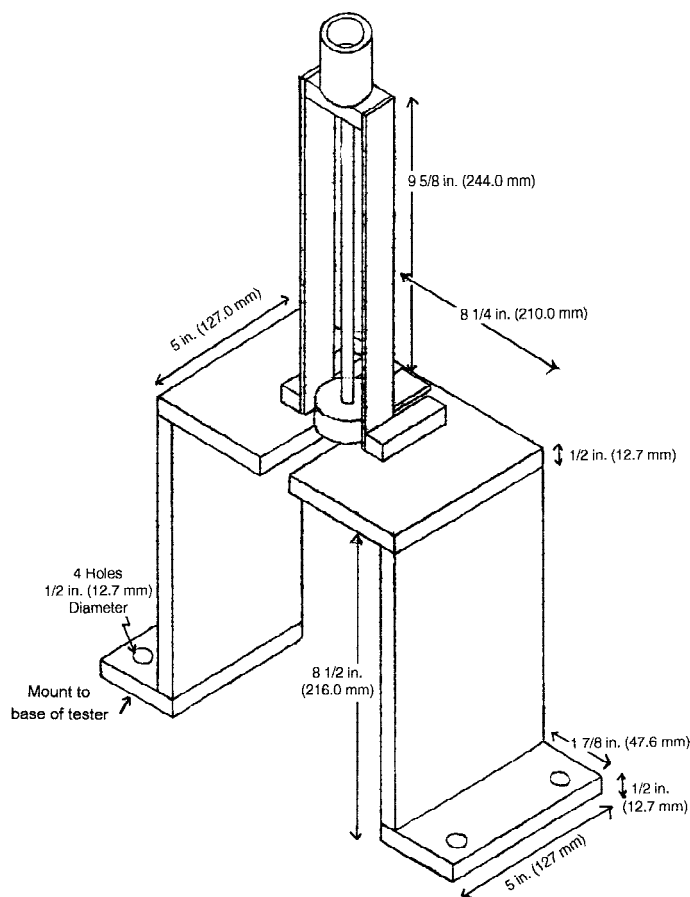


FIG. 1 Test Fixture for Measuring Extrusion from Cartridge

5. Apparatus

5.1 The test fixture is shown in Fig. 1. Details are shown in Figs. 2-4.³ Make the framework from aluminum. Make the rod and plunger combination from steel.

5.2 The test fixture is designed to be fitted onto a test machine capable of measuring compressive strength.

¹ This test method is under the jurisdiction of ASTM Committee D-14 on Adhesives and is the direct responsibility of Subcommittee D14.10 on Working Properties.

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² *Annual Book of ASTM Standards*, Vol 15.06.

³ The apparatus is also available from Browning Technology, Inc., 1256 Stanley Ave., Dayton, OH 45404.

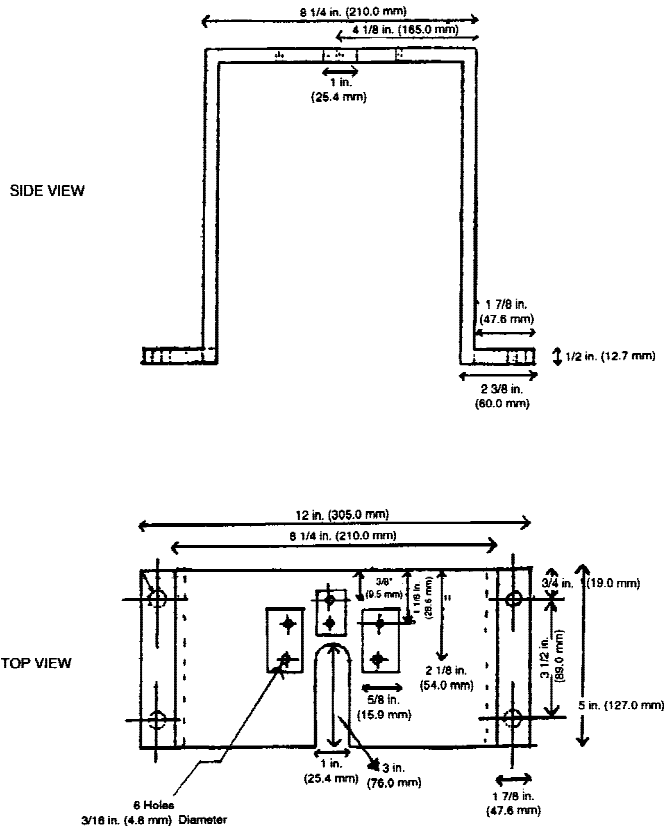


FIG. 2 Base Support for Test Fixture

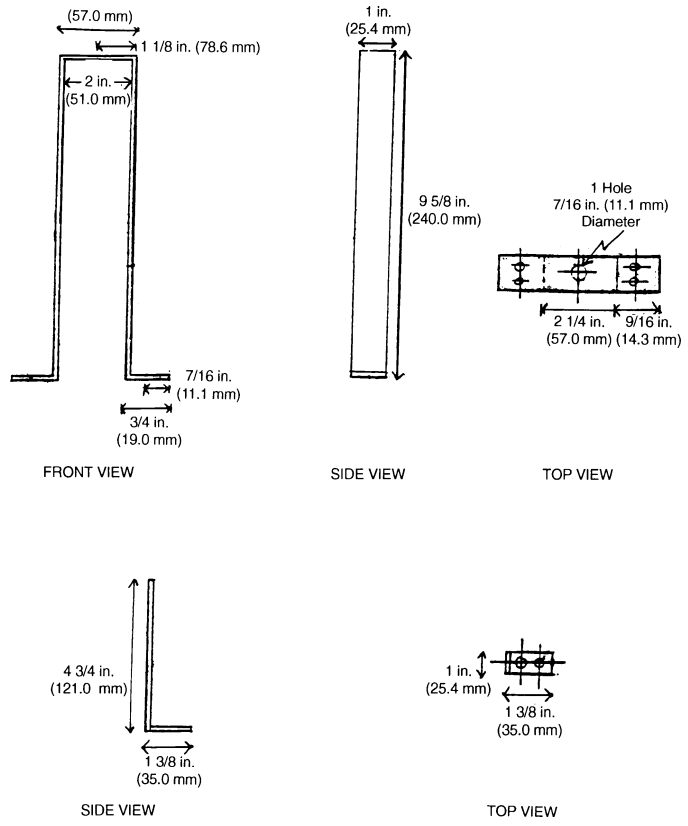


FIG. 3 Cartridge Brace and Rear Support Assembly

6. Conditioning

6.1 Before measuring extrudability, condition the cartridge filled with adhesive until it reaches the desired constant temperature.

7. Procedure

7.1 Mount the test fixture to the test machine for stability.

7.2 After conditioning the cartridge, cut off enough of the tip, perpendicular to the cartridge, to ensure an inside diameter of 1/4 in. (6.3 mm). If the cartridge has a foil or plastic liner, puncture it completely to allow passage of the material through the orifice. Record the temperature of the adhesive by inserting a thermometer or suitable thermocouple into the cartridge.

7.3 Set the crosshead speed to 5.0 in. (127.0 mm) per min or another acceptable rate.

7.4 Activate the machine to begin extrusion of the adhesive from the cartridge, measure the maximum force necessary to begin the extrusion process as well as the force necessary to maintain continued extrusion of the adhesive. The first value is the force needed to release the plunger from the cartridge. The second value is the force needed to extrude the adhesive from the cartridge continuously.

8. Report

8.1 Report the following information:

8.1.1 Complete identification of the adhesive, including type, source, date of test, etc.

8.1.2 Complete identification of the cartridge, including type, composition, liner used, plunger design, source, size, etc.

8.1.3 Temperature of adhesive.

8.1.4 Crosshead speed used for extrusion.

8.1.5 Force (in psi) used initially to extrude the adhesive from the cartridge and the average to maintain a constant flow of adhesive.

9. Precision and Bias

9.1 *Precision:*

9.1.1 Table 1 presents round robin data generated from three laboratories. Three different cartridge adhesives were used to generate the data at two temperatures. The extrudability values were based on the average of three separate cartridge values.

9.1.2 Repeatability at a given test site for the samples yielded coefficients of variation from 2 to 18 % for Laboratory 1, 1 to 10 % for Laboratory 2, and 2 to 13 % for Laboratory 3, with most values in the range of 2 to 11 %.

9.1.3 No statement of reproducibility from site to site is available at this time.

9.2 *Bias*—Bias is the difference between the true force necessary to extrude an adhesive from a cartridge and the force measured by a repeatable method. Bias arises from the consistency of the adhesive packaged in the cartridge, the method by which the plunger is assembled into the cartridge, and inside diameter variations that may exist when the cartridge tip is cut.

10. Keywords

10.1 adhesive; cartridge; extrusion

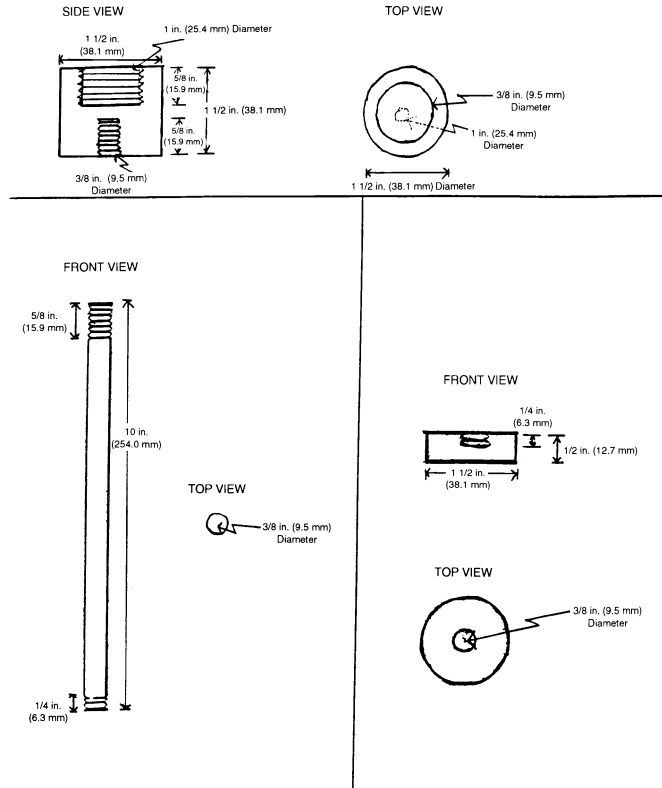


FIG. 4 Rod and Follower Plate Assembly

TABLE 1 Cartridge Extrudability (in psi) for Cartridge Adhesives—Round Robin Results

	Laboratory 1 ^A	Laboratory 2 ^B	Laboratory 3 ^C
Room Temperature, 73 ± 2°F (23 ± 1°C)			
Adhesion A	67 ± 3	58 ± 1	41 ± 1
Adhesion B	118 ± 15	41 ± 1	34 ± 1
Adhesion C	70 ± 13	31 ± 3	20 ± 1
Low Temperature			
Adhesion A	70 ± 10 ^D	67 ± 2 ^E	53 ± 2 ^F
Adhesion B	178 ± 8	49 ± 3	43 ± 3
Adhesion C	128 ± 2	88 ± 1	133 ± 17

^A Tested on an Instron 1120 machine.

^B Tested on an Instron 1125 machine.

^C Tested on a Thwing-Albert machine.

^D Tested at 50 ± 2°F (10 ± 1°C).

^E Tested at 45 ± 2°F (7 ± 1°C).

^F Tested at 42 ± 2°F (5 ± 1°C).

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