



Designation: D 1916 – 93 (Reapproved 1997)

Standard Test Method for Penetration of Adhesives¹

This standard is issued under the fixed designation D 1916; 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 covers the determination of the penetration under pressure of adhesives used in systems where at least one of the adherends is porous.

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:*
D 907 Terminology of Adhesives²

3. Terminology

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

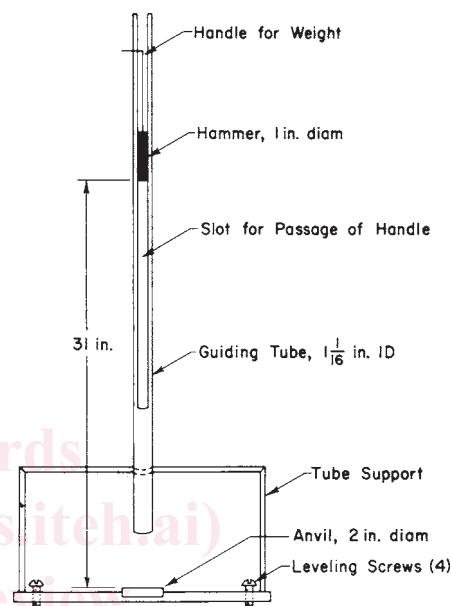
3.1.1 *adhesive penetration, n*—the entering of an adhesive into a porous adherend.

4. Significance and Use

4.1 This test method is useful in selecting adhesive systems for a particular application, and in modifying adhesive systems to obtain maximum performance without excessive penetration of the adhesive into the substrate of the adherends. It is particularly adaptable to use with starch or starch-base adhesives commonly used in the paper converting industry. Further development may well result in its usefulness with other types of adhesives.

5. Apparatus

5.1 *Penetration Tester*, as shown in Fig. 1, constructed so as to allow a section of round steel bar stock 25 mm (1 in.) in diameter and weighing 700 g (the hammer), to fall freely through a distance of 0.8 m (31 in.) upon a steel disk (the anvil) 6 mm ($\frac{1}{4}$ in.) thick and 51 mm (2 in.) in diameter, in such a manner as to strike the anvil at right angles. Dimensions of the guiding tube and of the section of bar stock, as shown in Fig.



Metric Equivalents				
in.	1	1 $\frac{1}{16}$	2	31
mm	25	27	51	787 (0.8 m)

FIG. 1 Penetration Tester

1, permit free fall of the bar stock without undue sideways movement. Cut the bottom end of the bar stock at right angles to the longitudinal axis, within 0.051-mm (0.002-in.) tolerance, and finish to 32 microfinish.

5.2 *Filter Paper*, coarse, rapid-filtering type, cut into 51-mm (2-in.) disks.

5.3 *Syringe*, hypodermic, 1-mL capacity, without needle.

5.4 *Densitometer*.³

5.5 *Compensating Planimeter*, unit range 0.01 in.² (6.5 mm²).

6. Reagent

6.1 *Staining Reagent*, suitable for the adhesive being tested. For adhesives containing starch, an iodine solution containing 2.0 g of potassium iodide and 0.20 g of iodine in 3 L of distilled

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 A MacBeth-Ansco Color Densitometer, Model 12, has been found satisfactory for this purpose.