Designation: D1337 – 10 (Reapproved 2016)

Standard Practice for Storage Life of Adhesives by Viscosity and Bond Strength[1]

This standard is issued under the fixed designation D1337; 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 practice describes a laboratory method by which the storage life of an adhesive may be measured using viscosity, adhesive strength, or a combination thereof.

1.2 The values stated in SI 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:*[2]

D618 Practice for Conditioning Plastics for Testing

D897 Test Method for Tensile Properties of Adhesive Bonds

D906 Test Method for Strength Properties of Adhesives in Plywood Type Construction in Shear by Tension Loading

D907 Terminology of Adhesives

D1002 Test Method for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal)

D1084 Test Methods for Viscosity of Adhesives

2.2 *Other Standard:*[3]

ISO 2555 Plastics—Resins in the liquid state or as emulsions or dispersions—Determination of apparent viscosity by the Brookfield Test method

3. Terminology

3.1 *Definitions*—Many terms in this practice are defined in Terminology D907.

4. Significance and Use

4.1 This practice may be used to determine the storage life of any adhesive where this information is required.

4.2 This practice is intended to determine whether the storage life conforms to the minimum specified storage life required of an adhesive by viscosity tests (Procedure A) or by bond strength tests (Procedure B), or by both. It does so by providing results before and after a set of standard conditions that simulate storage life. The determination of what the requirements for percentage of the original property retained or the minimum value for a property is found in the relevant material specification, or as agreed between manufacturer and user.

PROCEDURE A—VISCOSITY TEST

5. Apparatus

5.1 *Viscometer*—Use the apparatus as described in ISO 2555.

5.2 *Controlled-Temperature Chamber,* capable of maintaining temperature to ±3°C (±5°F), to provide temperature storage conditions.

6. Storage of Adhesive

6.1 Store the adhesive and all its components, if there are any, in their original and unopened containers when the container is approximately litre (or quart) size. When the adhesive is supplied in larger containers, the desired number of samples is withdrawn from the large container. In this latter case, the size, type of closure, and nature (such as glass, steel, or tin-coated steel) of the small storage container is agreed upon by the purchaser and the manufacturer.

6.2 For storage temperature, use any one of the standard temperatures specified in Practice D618. The time of storage is any time agreed upon by the purchaser and the manufacturer. If the effect of storage time is desired, it is suggested that at least three quantities of the adhesive be stored under the prescribed conditions, and tested at various intervals of time. Use a separate, unopened container at each such test.

7. Conditioning

7.1 Condition all containers after storage at 23 ± 3°C (73.4 ± 5°F) before opening. If the adhesive consists of two or more

[1] This practice is under the jurisdiction of ASTM Committee D14 on Adhesives and is the direct responsibility of Subcommittee D14.10 on Working Properties.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

components, blend the components in accordance with the instructions from the manufacturer, and again adjust the temperature to 23 ± 3°C, if required.

NOTE 1—Contact the adhesive manufacturer for recommendations when working with moisture sensitive materials or for details concerning specific viscosity measurements.

8. Procedure

8.1 Measure the viscosity on both the original adhesive as received, and on the adhesive after being subjected to storage. Test the adhesive in either its original container or after transferring into a more suitable container.

9. Report

9.1 Report the following information:

9.1.1 Complete identification of the adhesive, including type, source, manufacturer's code number, form, date of test, date of manufacture, and the mixing proportions followed in preparing the adhesive for use,

9.1.2 Conditions of storage, including temperature, length of storage, and type and size of container used,

9.1.3 Complete identification of the viscometer and details identified by Test Methods D1084.

9.1.4 Viscosity results on both the freshly received and stored adhesives, and

9.1.5 Pertinent observations, such as settling, discoloring, separating, caking, or gelling which might influence the usability of the adhesive.

PROCEDURE B—BOND STRENGTH TEST

10. Apparatus

10.1 *Testing Machine,* of suitable capacity, capable of maintaining a specified rate of loading, and equipped with self-aligning grips for holding the test specimens, as defined in the chosen Test Method D897, D906, or D1002.

10.2 *Controlled-Temperature Chamber,* capable of maintaining temperature to ±3°C (±5°F), to provide temperature storage conditions.

11. Storage of Adhesive

11.1 Store the adhesive as described in 6.1 and 6.2.

11.2 For storage temperature use any one of the standard temperatures specified in Practice D618. The time of storage shall be any time agreed upon by the purchaser and the manufacturer. If the effect of storage time is desired, it is suggested that at least three quantities of the adhesive be stored under the prescribed conditions and tested at various intervals of time. Use a separate, unopened container at each such test.

12. Conditioning

12.1 Condition as described in 7.1.

13. Preparation of Test Specimens

13.1 Prepare test panels or sheets for determining the bond strength of the adhesive in accordance with any of the ASTM test methods suitable for the purpose. For example, the lap-type shear specimens or the spool-type tension specimens such as those described in the following methods are acceptable for use: Test Method D897, Test Method D906, and Test Method D1002.

13.2 In preparing the test specimens, use the adhesive in accordance with the instructions of the manufacturer. Prepare test specimens for bond strength for both the original adhesive as received and for the adhesive which has been subjected to the storage test, using the same procedure and conditions of bonding.

14. Procedure

14.1 Conduct the bond strength test by means of the testing machine on samples of both the original adhesive as received and on the adhesive after being subjected to storage.

15. Report

15.1 Report the following information:

15.1.1 Complete identification of the adhesive, including type, source, manufacturer's code number, form, date of test, date of manufacture, and the mixing proportions followed in preparing the adhesive for use,

15.1.2 Complete identification of the adherends used, including the method of cleaning, the manner of applying the adhesive, the curing treatment, all other pertinent bonding conditions, and the methods used,

15.1.3 Conditions of storage of the adhesive, including temperature, length of storage, and the type and size of container used,

15.1.4 Bond strength results on both the freshly received and stored adhesive, and dates when the tests were performed, and

15.1.5 Pertinent observations, such as settling, discoloring, separating, caking, or gelling which might influence the usability of the adhesive.

16. Precision and Bias

16.1 The precision and bias of Procedure A of this practice for measurement viscosity is essentially as specified in Test Methods D1084, Method B. The precision and bias of Procedure B of this practice for measuring shear strength is essentially as specified in Test Methods D897, D906, and D1002.

17. Keywords

17.1 bond strength; storage life; viscosity