



## Standard Test Method for Vicat Softening Temperature of Plastics<sup>1</sup>

This standard is issued under the fixed designation D 1525; 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.

*This standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope \*

1.1 This test method covers determination of the temperature at which a specified needle penetration occurs when specimens are subjected to specified controlled test conditions.

1.2 This test method is not recommended for ethyl cellulose, nonrigid poly(vinyl chloride), poly(vinylidene chloride), or other materials having a wide Vicat softening range.

1.3 The values stated in SI units are to be regarded as the standard.

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.*

NOTE 1—This test method and ISO 306:1987(E) are technically equivalent, with the exception of the allowance for creep, prior to beginning the test, in this test method.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

D 618 Practice for Conditioning Plastics and Electrical Insulating Materials for Testing<sup>2</sup>

D 648 Test Method for Deflection Temperature of Plastics Under Flexural Load<sup>2</sup>

D 883 Terminology Relating to Plastics<sup>2</sup>

D 1898 Practice for Sampling of Plastics<sup>2</sup>

E 1 Specification for ASTM Thermometers<sup>3</sup>

E 77 Test Method for the Inspection and Verification of Thermometers<sup>3</sup>

E 220 Test Method for Calibration of Thermocouples by Comparison Techniques<sup>3</sup>

E 644 Test Methods for Testing Industrial Resistance Thermometers<sup>3</sup>

E 691 Practice for Conducting an Interlaboratory Study to

Determine the Precision of a Test Method<sup>4</sup>

E 1137 Specification for Industrial Platinum Resistance Thermometers<sup>3</sup>

#### 2.2 ISO Standards:<sup>5</sup>

ISO 291 Plastics—Standard Atmospheres for Conditioning and Testing

DIS 306 Plastics—Thermoplastic Material—Determination of Vicat Softening Temperature

### 3. Terminology

3.1 *Definitions*—Definitions of plastics used in this test method are in accordance with those defined in Terminology D 883, unless otherwise specified.

3.1.1 *Vicat softening temperature*—the temperature at which a flat-ended needle of 1-mm<sup>2</sup> circular cross section will penetrate a thermoplastic specimen to a depth of 1 mm under a specified load using a selected uniform rate of temperature rise.

### 4. Summary of Test Method

4.1 A flat-ended needle loaded with a specified mass is placed in direct contact with a test specimen. The mass applied can be one of two accepted loads, as follows:

Loading 1— $10 \pm 0.2$  N

Loading 2— $50 \pm 1.0$  N

The specimen and needle are heated at either of two permissible rates, as follows:

Rate A— $50 \pm 5^\circ\text{C/h}$

Rate B— $120 \pm 10^\circ\text{C/h}$

The temperature at which the needle has penetrated to a depth of  $1 \pm 0.01$  mm is recorded as the Vicat softening temperature.

### 5. Significance and Use

5.1 Data obtained by this test method may be used to compare the heat-softening qualities of thermoplastic materials.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.30 on Thermal Properties (Section D20.30.07).

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<sup>2</sup> Annual Book of ASTM Standards, Vol 08.01.

<sup>3</sup> Annual Book of ASTM Standards, Vol 14.03.

<sup>4</sup> Annual Book of ASTM Standards, Vol 14.02.

<sup>5</sup> Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

\*A Summary of Changes section appears at the end of this standard.

