



Designation: ~~D3056–14 (Reapproved 2018)~~ D3056 – 23

Standard Test Method for Gel Time of Solventless Varnishes¹

This standard is issued under the fixed designation D3056; 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 U.S. Department of Defense.

1. Scope*

1.1 This test method covers the determination of the gel time of a solventless varnish mixed with a catalyst, if required, and exposed to elevated temperature. There are two methods presented here. New equipment for Method A is no longer available.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* For a specific precaution statement, see Section 6.

NOTE 1—Although this standard and IEC 60455–2 differ in approach or detail, data obtained using either are technically equivalent.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

[ASTM D3056-23](#)

<https://standards.iteh.ai/catalog/standards/sist/e60bedfc-5dec-4763-b5ff-34d4ced1090a/astm-d3056-23>

2.1 *ASTM Standards:*²

[D1711 Terminology Relating to Electrical Insulation](#)

2.2 *IEC Standard:*³

[IEC 60455–2 Resin Based Reactive Compounds Used for Electrical Insulation—Part 2: Methods of Test](#)

3. Terminology

3.1 *Definitions:*

3.1.1 *gel time, n—of solventless varnish*, the time required at a specified temperature for a solventless varnish to be transformed from a liquid state to a gel as measured with a suitable gel time apparatus.

3.1.2 See Terminology [D1711](#) for definitions of other terms relating to electrical insulation.

¹ This test method is under the jurisdiction of ASTM Committee [D09](#) on Electrical and Electronic Insulating Materials and is the direct responsibility of Subcommittee [D09.01](#) on Electrical Insulating Products.

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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>.

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

4. Significance and Use

4.1 Gel time is important in determining batch uniformity and some processing characteristics. It is indicative of pot life and shelf life.

5. Apparatus (Method A)

5.1 *Gel Time Apparatus*.⁴

5.2 *Power Supply*, 110 V ac variable.

5.3 *Balance*, with accuracy to the nearest 0.01 g.

5.4 *Temperature Controller*, capable of maintaining to $\pm 1^\circ\text{C}$; $\pm 1^\circ\text{C}$.

5.5 *Magnetic Stirrer*, with a magnetized stirring bar coated with a tetrafluoroethylene.

6. Safety Precautions

6.1 It is unsafe to use varnish at temperatures above the flash point without adequate ventilation, especially if the possibility exists that flames or sparks are present. Store varnish in sealed containers.

7. Procedure (Method A)

7.1 Set up the gel time apparatus as described in the instruction manual supplied by the manufacturer.

7.2 Fill the bath with water or a silicone liquid to completely immerse the test specimen of solventless varnish when the test tube is placed in the bath. Water is useful up to $\pm 100^\circ\text{C}$; 100°C . Silicone liquids must be used above $\pm 100^\circ\text{C}$; 100°C but are suitable for use at lower temperatures.

NOTE 2—The silicone liquid will be DC-200 or equivalent.

[ASTM D3056-23](https://standards.iteh.ai/catalog/standards/sist/e60bedfc-5dec-4763-b5ff-34d4ced1090a/astm-d3056-23)

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7.3 Place the bath on the magnetic stirrer, and insert the stirring bar into the bath. Connect the heating coil to the temperature controller. Start the cold water on the bath condenser.

7.4 Adjust the bath to the desired temperature.

7.5 If the varnish requires the addition of catalyst, weigh $\pm 100 \pm 1$ g $100 \text{ g} \pm 1 \text{ g}$ of solventless varnish into a ± 150 mL 150 mL beaker and record the mass to the nearest 0.01 g 0.01 g .

7.6 Weigh the desired amount of catalyst to an accuracy of $\pm 1\%$ into the ± 100 g 100 g of solventless varnish and mix thoroughly.

7.7 Weigh 9.5 to 10.5 g 9.5 g to 10.5 g of catalyzed solventless varnish into a ± 16 by 150 mm 16 mm by 150 mm test tube.

7.8 Insert the glass test rod from the gel time apparatus in the test tube.

7.9 Quickly place the test tube in the bath, connect the glass test rod to the meter, center and start the timer. The timer must be started within 10 s after the test tube is placed in the bath.

⁴ The sole source of supply of the apparatus known to the committee at this time is originally used in Method A was the Sunshine Gel Time Meter, Catalog No. 22, manufactured by Sunshine Scientific Instruments, 1810 Grant Ave., Philadelphia, PA 19115. Meter. However, the meter and its components were no longer produced as of early 2017. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,⁴ which you may attend.