



Designation: D7029 – 17

Standard Test Method for Determination of Reactivity of Unsaturated Polyesters and Vinyl Esters at 180.0°F (82.2°C)¹

This standard is issued under the fixed designation D7029; 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 standard provides a standardized test method for determining the gelation and exotherm curve of unsaturated polyester and vinyl ester resins. This method provides guidance for measurement of the “Standard 180°F (82.2°C) Exotherm Curve” along with information on potential variances of the measurement for some special resins. This test method provides information concerning the reactivity of unsaturated polyester and vinyl ester resins as they go through polymerization after mixing with the initiator.

NOTE 1—There is no known ISO equivalent to this standard, although ISO 584 is similar.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems has the potential to result in nonconformance with the 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 and health practices and determine the applicability of regulatory limitations prior to use.*

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

2.1 ASTM Standards:²

D883 Terminology Relating to Plastics

¹ This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.18 on Reinforced Thermosetting Plastics.

Current edition approved July 15, 2017. Published August 2017. Originally approved in 2004. Last previous edition approved in 2009 as D7029 - 09. DOI: 10.1520/D7029-17.

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.

2.2 Society of Plastics Industry, Inc.:

Handbook of Reinforced Plastics “Procedure for Running Exotherm Curves Using the Block Test Method”

2.3 ISO Standard:

ISO 584 Reinforced Plastics Based on Unsaturated Polyester Resins—Determination of Reactivity at 80°C³

3. Terminology

3.1 *Definitions*—For definitions of terms that appear in this practice relating to plastics, refer to Terminology D883.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *gel time*—the period of time in minutes and seconds required for the recording pyrometer to go from a temperature below (usually 10 to 30°F or 5.5 to 16°C) bath temperature to 10°F (5.55°C) above the bath temperature, typically 150°F (65.5°C) to 190°F (78.8°C) for a bath at 180°F (82.2°C).

3.2.2 *cure time*—the period of time in minutes and seconds required for the recording pyrometer to go from a temperature below (usually 10 to 30°F or 5.5 to 16°C) bath temperature to the maximum temperature reading, typically 150°F (65.5°C) to the maximum temperature for a bath at 180°F (82.2°C).

3.2.3 *interval time*—the period of time in minutes and seconds required for the recording pyrometer to go from 10°F (5.5°C) above the bath temperature to the maximum temperature reading, typically 190°F (78.8°C) to the maximum temperature. Thus, interval time is cure time minus gel time.

3.2.4 *peak exotherm*—the maximum temperature reached during the testing.

3.2.5 *recording pyrometer*—a broad class of temperature measuring devices including thermocouples with the ability for continuous temperature recording.

3.2.6 *initiator*—a compound that generates free radicals to start the free radical polymerization of the unsaturated polyester and vinyl ester resins.

3.2.6.1 *Discussion*—An initiator is typically a single peroxide, but there are instances in which a combination of initiators is used.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

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