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.

Designation: D3418 – 21

Standard Test Method for Transition Temperatures and Enthalpies of Fusion and Crystallization of Polymers by Differential Scanning Calorimetry[1]

This standard is issued under the fixed designation D3418; 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 determination of transition temperatures and enthalpies of fusion and crystallization of polymers by differential scanning calorimetry.

NOTE 1—True heats of fusion are to be determined in conjunction with structure investigation, and frequently, specialized crystallization techniques are needed.

1.2 This test method is applicable to polymers in granular form or to any fabricated shape from which it is possible to cut appropriate specimens.

1.3 The normal operating temperature range is from the cryogenic region to 600°C. Certain equipment allows the temperature range to be extended.

1.4 The values stated in SI units are the standard.

NOTE 2—This test method does not apply to all types of polymers as written (see 6.8).

1.5 *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.*

NOTE 3—This standard is similar but not equivalent to ISO 11357-1, -2, -3. The ISO procedures provide additional information not supplied by this test method.

1.6 *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]

E473 Terminology Relating to Thermal Analysis and Rheology

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

E967 Test Method for Temperature Calibration of Differential Scanning Calorimeters and Differential Thermal Analyzers

E968 Practice for Heat Flow Calibration of Differential Scanning Calorimeters

E1142 Terminology Relating to Thermophysical Properties

E1953 Practice for Description of Thermal Analysis and Rheology Apparatus

2.2 *ISO Standards:*[3]

ISO 11357-1 Plastics—Differential Scanning Calorimetry (DSC)—Part 1: General Principles

ISO 11357-2 Plastics—Differential Scanning Calorimetry (DSC)—Part 2: Determination of Glass Transition Temperature

ISO 11357-3 Plastics—Differential Scanning Calorimetry (DSC)—Part 3: Determination of Temperature and Enthalpy of Melting and Crystallization

3. Terminology

3.1 Specialized terms used in this test method are defined in Terminologies E473 and E1142.

4. Summary of Test Method

4.1 This test method consists of heating or cooling the test material at a controlled rate under a specified purge gas at a controlled flow rate and continuously monitoring with a suitable sensing device the difference in heat input between a

[1] 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).

Current edition approved Sept. 1, 2021. Published September 2021. Originally approved in 1975. Last previous edition approved in 2015 as D3418 - 15. DOI: 10.1520/D3418-21.

[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**

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. United States