

Standard Test Method to Determine Melting Temperature of Synthetic Fibers¹

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1. Scope

1.1 Either of two test methods are used to determine the melting temperature of thermoplastic fibers, yarns, or threads.

1.2 Method 1 can be used to determine melting temperatures for blends of multiple fiber material types. Method 2 can only be used to determine the melting temperature of a single fiber material type.

1.2.1 Method 1, Differential Scanning Calorimetry (DSC), measures changes in heat capacity and will detect the glass transition, the crystalline melting and endothermic thermal degradation.

1.2.2 Method 2, a visual determination of melting, determines any change that visually appears as a transition from a solid to a liquid state.

1.2.3 Due to the differences in what each test method measures, the results from Method 1 and Method 2 cannot be compared.

1.3 The values stated in either SI units or other units are to be regarded separately. The values stated in each system are not exact equivalents; therefore, each system shall be used independently without combining values.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[D123 Terminology Relating to Textiles](#)

[D276 Test Methods for Identification of Fibers in Textiles](#)

[D1776 Practice for Conditioning and Testing Textiles](#)

[D2257 Test Method for Extractable Matter in Textiles](#)

¹ This test method is under the jurisdiction of ASTM Committee [D13](#) on Textiles and is the direct responsibility of Subcommittee [D13.51](#) on Conditioning, Chemical and Thermal 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.

[D2258 Practice for Sampling Yarn for Testing](#)

[D3333 Practice for Sampling Manufactured Staple Fibers, Sliver, or Tow for Testing](#)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *melting temperature, n* —the temperature or range of temperatures at which a substance is observed to transition to a liquid-like state.

3.1.2 For all other terminology related to textiles, see Terminology [D123](#).

4. Summary of Test Method

4.1 *Method 1:*

4.1.1 A specimen of fiber and a reference sample are positioned into the designated heating blocks of a Differential Scanning Calorimetry (DSC) instrument.

4.1.2 Use the DSC data to determine the fiber specimen melting temperature.

4.2 *Method 2:*

4.2.1 A specimen of fiber is positioned in a melting temperature device.

4.2.2 The temperature of the device is raised until the fiber specimen reaches its melting temperature as determined by visual observation.

5. Significance and Use

5.1 Either of these two test methods is used to determine the temperature at which a synthetic fiber specimen changes from a solid to a liquid-like state.

5.1.1 Synthetic fibers may be either amorphous or semi-crystalline thermoplastics or thermosets. Synthetic fibers may change from the solid to a liquid-like state on heating because of the glass transition of amorphous polymers, the melting of crystalline regions of semi-crystalline polymers, or at the onset of degradation. Thermoplastic fibers consist of crystalline and amorphous regions and may be manufactured with a range of molecular weights. The amorphous and crystalline fiber structure and variable molecular weight can lead to a melting temperature range instead of a discrete melting point (see [Table X1.1](#)).

5.2 This test method is considered satisfactory for acceptance testing of commercial shipments.