



Designation: **D3850—12 D3850 – 19**

Standard Test Method for Rapid Thermal Degradation of Solid Electrical Insulating Materials By Thermogravimetric Method (TGA)¹

This standard is issued under the fixed designation D3850; 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—Scope*

1.1 This test method outlines a procedure for obtaining thermogravimetric (TGA) data on solid polymeric materials intended for use as electrical insulating materials.

1.2 Do not use this standard to quantify an estimate of the long-term thermal capability for any electrical insulating material. If a relationship exists between TGA and the long-term thermal capabilities of a material, then that fact must be established and made public, preferably by comparing data between a candidate and another material known to display similar failure modes.

1.3 The values stated in SI units are 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *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](#)

[D1600 Terminology for Abbreviated Terms Relating to Plastics](#)

[D1711 Terminology Relating to Electrical Insulation](#)

[D2307 Test Method for Thermal Endurance of Film-Insulated Round Magnet Wire](#)

[E220 Test Method for Calibration of Thermocouples By Comparison Techniques](#)

[E473 Terminology Relating to Thermal Analysis and Rheology](#)

[E1582 Test Method for Temperature Calibration of Thermogravimetric Analyzers](#)

3. Terminology

3.1 *Definitions*—Definitions are in accordance with Terminology [D883](#), Terminology [D1711](#), and Terminology [E473](#).

3.2 *Abbreviations*—Abbreviations are in accordance with Terminology [D1600](#), unless otherwise indicated.

4. Summary of Test Method

4.1 This thermogravimetric technique uses the record of the mass loss versus the temperature of the specimen during the time of exposure to a specified prescribed environment using a controlled time rate of heating.

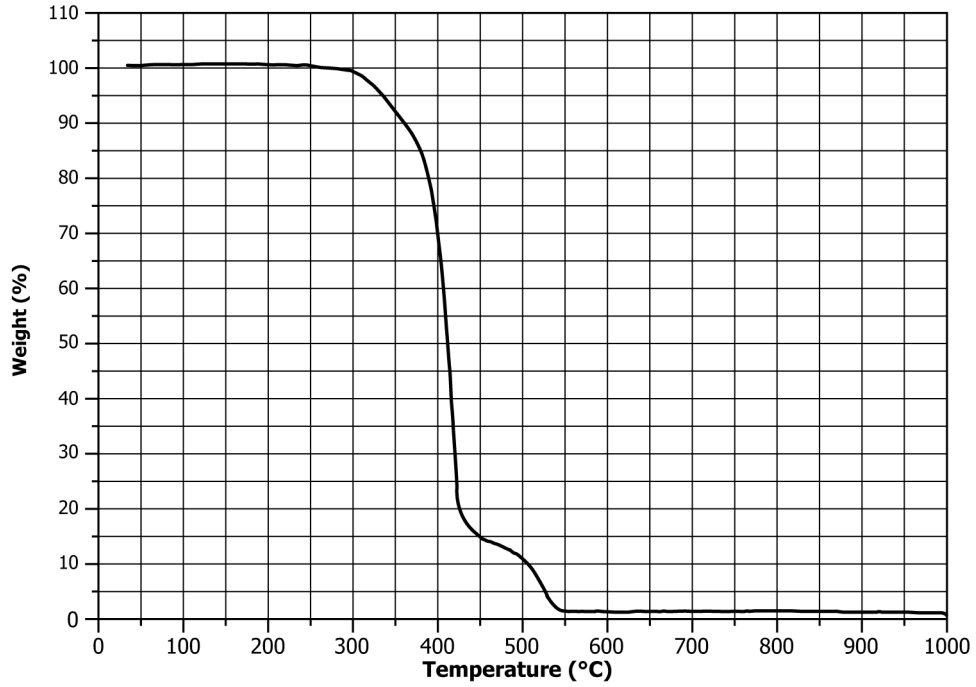
4.2 The record is a TGA curve, with percent of initial mass as the ordinate and temperature as the abscissa (see [Figs. 1 and 2](#)).

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 [D09.17](#) on Fire and Thermal Characteristics Properties.

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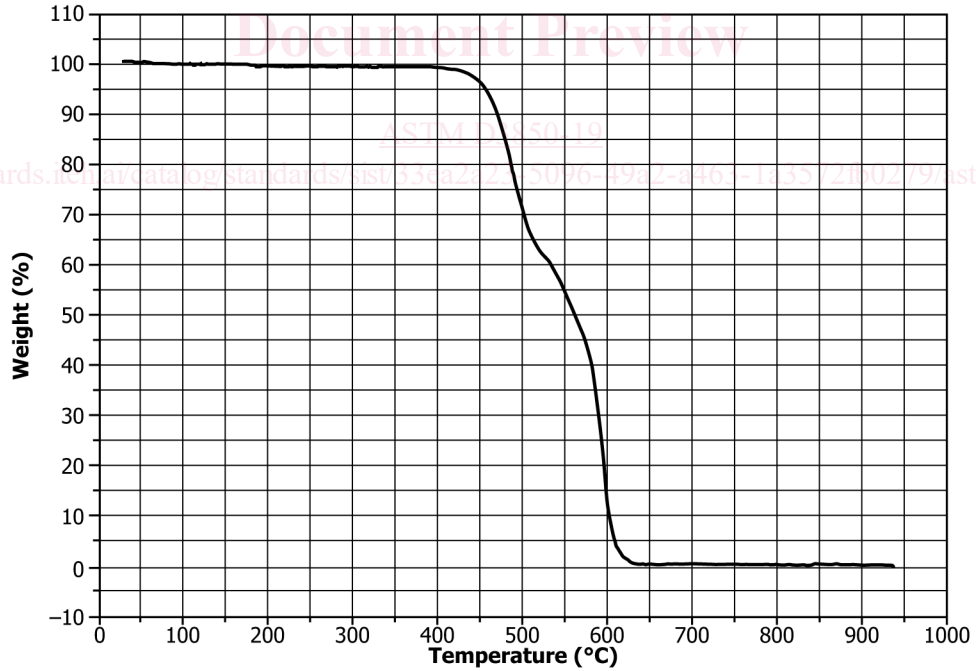
² For referenced ASTM standards, visit the ASTM website, [www.astm.org](#), or contact ASTM Customer Service at [service@astm.org](#). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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



Sample 8.54 mg Heating Rate 5°C/min Purging Gas Flow 0.8 mL/s

FIG. 1 Curve No. 1, Typical TGA for Polyester Film



Sample 5.93 mg Heating Rate 5°C/min Purging Gas Flow 0.8 mL/s

FIG. 2 Curve No. 2, Typical TGA for Polyimide Film