



Designation: D3045 – 18

Standard Practice for Heat Aging of Plastics Without Load¹

This standard is issued under the fixed designation D3045; 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 practice is intended to define the exposure conditions for evaluating the thermal endurance of plastics when exposed solely to hot air for extended periods of time. Only the procedure for heat exposure is specified. The effect of elevated temperature on any particular property is determined by selection of the appropriate test method and test specimens for that property.

1.2 This practice can be used as a guide to compare thermal aging characteristics of materials as measured by the change in some property of interest. The property of interest is measured at room temperature.

1.3 This practice recommends procedures for comparing the thermal aging characteristics of materials at a single temperature. Recommended procedures for determining the thermal aging characteristics of a material using a series of elevated temperatures for the purpose of estimating endurance time to a defined property change at a lower temperature are also described; the applicability of the Arrhenius relation for making predictions to other temperatures, is assumed in this case.

1.4 This practice does not predict thermal aging characteristics where interactions between stress, environment, temperature, and time control failure occur.

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 1—This standard and ISO-2578 address the same subject matter but differ in technical content.

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 Recom-*

mendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 *ASTM Standards:*²

D618 Practice for Conditioning Plastics for Testing

D883 Terminology Relating to Plastics

D5374 Test Methods for Forced-Convection Laboratory Ovens for Evaluation of Electrical Insulation

D5423 Specification for Forced-Convection Laboratory Ovens for Evaluation of Electrical Insulation

E145 Specification for Gravity-Convection and Forced-Ventilation Ovens

E456 Terminology Relating to Quality and Statistics

2.2 *ISO Standards:*³

ISO 2578 (1993) Determination of Time-Temperature Limits After Exposure to Prolonged Action of Heat

ISO 9080 (2012) Plastic Piping and Ducting Systems—Determination of the Long-Term Hydrostatic Strength of Thermoplastic Materials in Pipe Form by Extrapolation

3. Terminology

3.1 *General*—The terminology given in Terminology D883 and Terminology E456 is applicable to this practice. Terminology not in place is defined in 3.2.

3.2 *Definitions:*

3.2.1 *continuous use temperature (CUT)*—the temperature in degrees Celsius corresponding to a given thermal endurance time for a given failure criterion (typically 50 % reduction in property), derived from the Arrhenius relation of endurance time and temperature, determined by heat aging at several elevated temperatures. Several CUT values can exist, one for each property, endurance time and endurance criterion.

3.2.1.1 *Discussion*—In practice, the continuous use temperature for a plastic, involves other environmental considerations as discussed elsewhere in this standard, than thermal

¹ This practice is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.50 on Durability of Plastics.

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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