



Designation: D543 – 20

Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents¹

This standard is issued under the fixed designation D543; 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 These practices cover the evaluation of all plastic materials including cast, hot-molded, cold-molded, laminated resinous products, and sheet materials for resistance to chemical reagents.

1.2 Three procedures are presented, two under practice A (Immersion Test), and one under practice B (Mechanical Stress and Reagent Exposure under Standardized Conditions of Applied Strain). These practices include provisions for reporting changes in weight, dimensions, appearance, color, strength, and other mechanical properties. Standard reagents are specified to establish results on a comparable basis without precluding the use of other chemical reagents pertinent to specific chemical resistance requirements. Provisions are made for various exposure times, stress conditions, and exposure to reagents at elevated temperatures. The type of conditioning (immersion or wet patch) depends upon the end-use of the material. If the material is used as a container or transfer line, immersion of the specimens is used. If the material will only see short exposures or will be used in proximity and reagent will splash or spill on the material, the wet patch method of applying reagent to the material is used.

NOTE 1—Practice B for evaluating environmental stress cracking resistance differs from Practice [D7474](#), which seeks to measure residual stresses in molded sulfone plastic parts with the use of calibrated chemical reagents. Practice B differs from Test Method [D1693](#), which seeks to quantify the susceptibility of ethylene plastics to environmental stress-cracking subjected to specific conditions, by measuring the proportion of specimens that crack in a given time.

1.3 The effect of chemical reagents on properties shall be determined by making measurements on standard specimens for such tests before and after immersion or stress, or both, if so tested.

1.4 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

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. Specific hazards statements are given in Section 7.*

NOTE 2—ISO 175 and ISO 22088 Part 3 address the same subject matter as Practices A and B of this standard, but differ in technical content and the results cannot be directly compared.

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

[D13](#) Specification for Spirits of Turpentine

[D396](#) Specification for Fuel Oils

[D618](#) Practice for Conditioning Plastics for Testing

[D883](#) Terminology Relating to Plastics

[D1040](#) Specification for Uninhibited Mineral Insulating Oil for Use in Transformers and in Oil Circuit Breakers (Withdrawn 1980)³

[D1693](#) Test Method for Environmental Stress-Cracking of Ethylene Plastics

[D2244](#) Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

[D5947](#) Test Methods for Physical Dimensions of Solid Plastics Specimens

[D7474](#) Practice for Determining Residual Stresses in Extruded or Molded Sulfone Plastic (SP) Parts by Immersion in Various Chemical Reagents

¹ These practices are under the jurisdiction of ASTM Committee [D20](#) on Plastics and are 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 The last approved version of this historical standard is referenced on www.astm.org.

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