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Standard Recommended Practice for MEASURING TIME-TO-FAILURE BY RUPTURE OF PLASTICS UNDER TENSION IN VARIOUS ENVIRONMENTS¹

This Standard is issued under the fixed designation D 2648; 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.

1. Scope

1.1 This recommended practice² covers a procedure for measuring the time-to-failure by rupture of plastics in specific environments and under a constant tensile load.

1.2 Environmental stress-rupture tests should be limited to suitable combinations of loads and temperature in each environment to attain reasonable failure times.

2. Summary

2.1 The recommended practice consists of applying a range of fixed loads in tension to specimens in specific environments at constant temperature and measuring the time-to-failure.

3. Significance

3.1 Experimental data from stress-rupture life tests are of importance in comparing the ability of materials to support continuously applied loads for long periods of time. Various environments acting on the surface of the stressed specimen are known to reduce drastically the time a specimen can support a load continuously.

4. Apparatus

4.1 *Testing Machine*, capable of applying *only* a constant tensile load, such as by dead weight, on the specimen. The stress on the specimen should be known within 5 percent.

4.2 *Grips*—The grips and gripping technique should be designed to minimize eccentric loading of the specimen. It is recommended that a swivel or universal joint be used with each grip.

5. Reagents

5.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.³ Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean distilled water or water of equal purity.

5.3 *Specified Reagents*—Should this recommended practice be referenced in a material specification, the specific reagent to be used shall be as stipulated in the specification.

5.4 *Standard Reagents*—A list of standard reagents is also available in ASTM Method D 543, Test for Resistance of Plastics to Chemical Reagents.⁴

¹ This recommended practice is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D-20.50 on Permanence Properties.

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² See Carey, R. H., "Creep and Stress Rupture Behavior of Polyethylene Resins," *Industrial and Engineering Chemistry*, IECHEA, Vol. 50, 1958, pp. 1045-1048.

³ "Reagent Chemicals, American Chemical Society Specifications," Am. Chemical Soc., Washington, D.C. For suggestions on the testing of reagents not listed by the American Chemical Society, see "Reagent Chemicals and Standards," by Joseph Rosin, D. Van Nostrand Co., Inc., New York, N.Y., and the "United States Pharmacopoeia."

⁴ *Annual Book of ASTM Standards*, Part 35.

