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An American National Standard

Standard Test Methods for Deformation of Plastics Under Load¹

AMERICAN SOCIETY FOR TESTING AND MATERIALS
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This standard is issued under the fixed designation D 621; 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.

These test methods have been approved for use by agencies of the Department of Defense to replace Method 1101 of Federal Test Method Standard 406, and for Listing in the DoD Index of Specifications and Standards.

^{ε1} NOTE—The safety hazards caveat and the Precision and Bias section were added editorially in March 1988. The Referenced Documents section was also added, causing the renumbering of subsequent sections.

1. Scope

1.1 These test methods cover the determination of the deformation under compression of nonmetallic sheet and molded plastic materials, of all classes and all commercial thicknesses, intended for structural and insulating purposes. Two test methods are included, as follows:

Test Method A—For rigid plastics.

Test Method B—For nonrigid plastics.

1.2 The word deformation is used herein in the broad sense to cover (1) dimensional change due almost entirely to flow, and (2) dimensional change due to a combination of flow and shrinkage caused by loss of water or other volatile matter. The word flow as used in these test methods may describe either plastic or elastic deformation or combinations thereof.

NOTE 1—The values stated in SI units are to be regarded as the standard.

NOTE 2—Methyl methacrylate and polystyrene are examples of materials that deform almost entirely by flow. Cellulose acetate, cellulose acetate butyrate, phenolic laminated fiber, and vulcanized fiber are examples of materials that deform by a combination of flow and shrinkage.

1.3 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems 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:

D 374 Test Methods for Thickness of Solid Electrical Insulation²

D 575 Test Methods for Rubber Properties in Compression³

¹ These test methods are under the jurisdiction of ASTM Committee D-20 on Plastics and are the direct responsibility of Subcommittee D20.30 on Thermal Properties (Section D20.30.07).

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² Annual Book of ASTM Standards, Vol 08.01.

³ Annual Book of ASTM Standards, Vol 09.01.

D618 Methods of Conditioning Plastics and Electrical Insulating Materials for Testing²

3. Significance and Use

3.1 Data obtained by Test Method A give a measure of the ability of a rigid plastic in assemblies of conductors and insulators that are held together by bolts, rivets, or similar fastening devices, to withstand compression without yielding and loosening the assembly with time. Test Method A also gives a measure of the rigidity of plastics at service temperatures and consequently can be used as an identification test for procurement purposes.

3.2 Data obtained by Test Method B give a measure of the ability of a nonrigid plastic to return to its original dimensions with time after having been deformed. Test Method B determines the extent to which the plastic will follow associated parts in applications requiring elastic properties.

TEST METHOD A—RIGID PLASTICS

4. Nature of Test

4.1 The principle of Test Method A is essentially that of the parallel plate plastometer, namely, a constant-force system whereby a test specimen is conditioned, if necessary, and is then placed between the parallel plates of a constant-force device and the thickness observed over a required period at the stipulated temperature or temperatures.

5. Apparatus

5.1 *Testing Machine*—A machine capable of exerting a constant force of 113 kg (250 lb), 227 kg (500 lb), and 454 kg (1000 lb) $\pm 1\%$ between the parallel anvils of the machine, which shall be arranged so that they can be brought into contact with the test specimen before the load is applied. A machine suitable for this test is shown in Fig. 1. A recommended method for calibrating such a device is given in the Appendix. One of the anvils of the machine shall preferably be self-aligning and shall, in order that the load may be applied evenly over the face of the specimen, be arranged so that the specimen is accurately centered and the resultant of the load is through its center. The machine shall also be equipped with a dial gage or the equivalent capable of measuring the relative movement of the faces to 0.025 mm (0.001 in.) or less. A thermometer of the total immersion type shall be suspended in such a manner that the bulb is