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Designation: D 647 – 88a

AMERICAN SOCIETY FOR TESTING AND MATERIALS
1916 Race St., Philadelphia, Pa. 19103

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Standard Practice for Design of Molds for Test Specimens of Plastic Molding Materials¹

This standard is issued under the fixed designation D 647; 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 Department of Defense. Consult the DoD Index of Specifications and Standards for the specific year of issue which has been adopted by the Department of Defense.

1. Scope

1.1 This practice covers the design of molds for test specimens of plastic materials. Designs are shown for compression molds (Figs. 1-4), a transfer mold (Fig. 5) for use in producing bar, disk, and tensile test specimens in thermosetting plastic materials primarily, and an injection mold (Fig. 5) for use in producing bar, disk, and tensile test specimens in either thermoplastic or thermosetting materials. The plastic and mold temperatures, pressure and cycle timing used for the molding material should conform to the appropriate molding practice, if available, or to the material specification. If such information is not available, the recommendations of the material supplier should be followed.

1.2 Designs shown have been found suitable for a broad range of plastics but may not be optimum for any given material. Only the specimen dimensions are actually standardized.²

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

1.4 *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 256 Test Methods for Impact Resistance of Plastics and Electrical Insulating Materials³
- D 570 Test Method for Water Absorption of Plastics³
- D 638 Test Method for Tensile Properties of Plastics³
- D 651 Test Method for Tensile Strength of Molded Electrical Insulating Materials⁴
- D 648 Test Method for Deflection Temperature of Plastics Under Flexural Load³

¹ This practice is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.09 on Specimen Preparations.

Current edition approved Nov. 25, 1988. Published January 1989. Originally published as D 647 – 41. Last previous edition D 647 – 88.

² Blueprints of detailed drawings for the construction of the molds shown in Figs. 1, 3, 4, and 6 are available at a nominal cost from ASTM Headquarters. Request PCN 12-406470-10, 30, 60, and 70.

³ Annual Book of ASTM Standards, Vol 08.01.

⁴ Annual Book of ASTM Standards, Vol 10.01.

D 790 Test Methods for Flexural Properties of Plastics and Electrical Insulating Materials³

D 955 Method for Measuring Shrinkage From Mold Dimensions of Molded Plastics³

3. Significance and Use

3.1 A material is subjected during the molding process to a complex interaction of many variables. Standardization of the mold design can assist in the control of some of these variables by controlling the uniformity of the specimen geometries. A standardized mold design does not necessarily equate to uniform and equivalent test specimens because of processing variables and the effect of these variables on property results.

4. Compression Molds for Bar Test Specimens

4.1 Compression molds for bar test specimens 12.7 mm (1/2 in.) in width by 127 mm (5 in.) or 64 mm (2 1/2 in.) in length, and 12.7 (1/2 in.), 6.4 mm (1/4 in.), or 3.2 mm (1/8 in.) in thickness may be the single-bar, single-cavity, positive mold shown in Fig. 1.²

5. Compression Molds for Disk Test Specimens

5.1 Compression molds for the disk test specimens 51 mm (2 in.) or 102 mm (4 in.) in diameter may be of the design shown in Fig. 2.

6. Compression Molds for Tension Test Specimens

6.1 Compression molds for the test specimen for determining the tensile strength of molded electrical insulating materials (Note 1) shall be of the design shown in Fig. 3.²

NOTE 1—See Test Method D 651 for additional information.

6.2 Compression molds for the test specimen for determining the tensile properties of plastics (Note 2) shall be of the design shown in Fig. 4.²

NOTE 2—See Test Method D 638 for additional information.

7. Mold for Injection Molding of Test Specimens

7.1 *Layout*—A four-cavity mold has been designed as a suitable means of preparing frequently used test specimens with most injection molding machines of 55-g or greater capacity. The arrangement shown in Fig. 5 can be adapted to most mold bases 22.5 by 30.0 cm and larger.

7.1.1 The cavities for the 3.2 by 12.7 by 127-mm (1/8 by 1/2 by 5-in.) bar, the 6.4 by 12.7 by 127-mm (1/4 by 1/2 by 5-in.) bar, and the tension specimen are parted on the diagonal. This eliminates side draft in the test area and provides for