



Standard Practice for Preparing Small Plate Test Specimens of Thermoplastics by Injection Moulding¹

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1. Scope

1.1 In this part of this practice, the two-cavity ISO molds, Types D1 and D2, are defined for injection molding small plates 60 by 60 mm, with the preferred thicknesses of 1 mm (Type D1) and 2 mm (Type D2), which can be used for a variety of tests (see Annex A1). The molds may additionally be equipped by inserts for studying the action of weld lines (see Annex A2).

1.2 This practice is identical to ISO 294-3.

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

1.4 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

D 5935 Practice for Plastics—Acquisition and Presentation of Comparable Single-Point Data²

D 5938 Guide Describing the General Principles for Determination of Tensile Properties of Plastics²

D 5939 Practice for Preparing Multipurpose Test Specimens and Bars of Thermoplastics by Injection Molding²

2.2 ISO Standards:³

ISO 294-3 Injection Moulding of Test Specimens of Thermoplastic Materials—Part 3: Plates (ISO Moulds Type D)

ISO 294-1 Plastics—Injection Moulding of Test Specimens of Thermoplastics—Part 1: General Principles, Multipurpose-Test Specimens (ISO Mould Type A) and Bars (ISO Mould Type B)

ISO 294-4 Plastics—Injection Moulding of Test Specimens of Thermoplastics—Part 4: Determination of Moulding Shrinkage

ISO 6603-1:1985 Plastics—Determination of Multiaxial

Impact Behaviour of Rigid Plastics—Part 1: Falling Dart Method

ISO 6603-2:1989 Plastics—Determination of Multiaxial Impact Behaviour of Rigid Plastics—Part 2: Instrumented Puncture Test

3. Terminology

3.1 *Definitions*—See Practice D 5939, Section 3.

4.

5. Apparatus

5.1 ISO Molds, Type D:

5.1.1 Plates 60 by 60 mm shall be molded in the Type D two-cavity ISO molds; see Fig. 1. The small plates molded by Type D shall have dimensions as given in Fig. 2.

5.1.2 The main construction details of the Type D ISO molds shall conform to Fig. 1 and Fig. 2 and to the following requirements:

5.1.2.1 See Practice D 5939, 4.1.3.1.

5.1.2.2 Not relevant;

5.1.2.3 See Practice D 5939, 4.1.3.3 and 4.1.3.5.

5.1.2.4 Not relevant;

5.1.2.5 See Practice D 5939, 4.1.3.6.

5.1.2.6 See Practice D 5939, 4.1.3.7, but relating to ISO 6603; the essential dimensions in mm are as follows (see Fig. 2):

Length of the plate, 60 to 62

Width of the plate, 60 to 62

Thickness of the plate, Type D2, 2.0 to 2.1

Thickness of the plate, Type D1, 1.0 to 1.1

5.1.2.7 See Practice D 5939, 4.1.3.8 through 4.1.3.10.

5.1.2.8 Fig. 2 shows the position of a pressure sensor, P, within the cavity, which is mandatory for the measurement of molding shrinkage only; see ISO 294-4. However, it may be suitable for controlling the injection period using any ISO mold; see Practice D 5939, 4.1.3.11. The pressure sensor shall be coplanar with the mold surface in order to prevent disturbance from flow.

5.1.2.9 See Practice D 5939, 4.1.3.12 through 4.1.3.15.

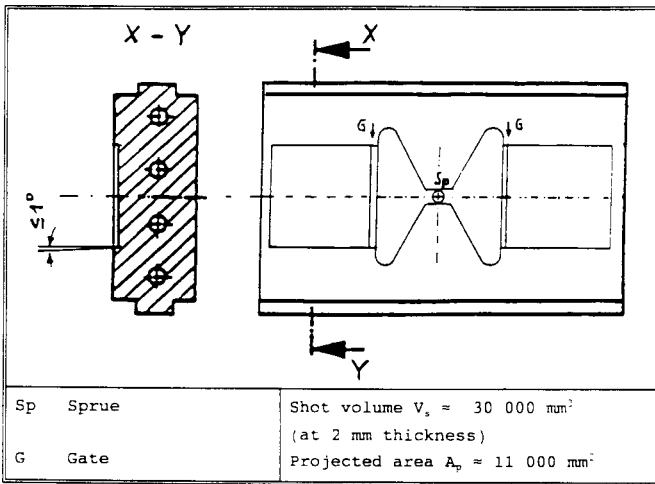
NOTE 1—Gates with strongly reduced thickness have a great influence on the orientation of the material within the plate up to large distances from the gate. Therefore, the thickness step at the gate has been chosen at a minimum value to facilitate measuring the molding shrinkage mechanically; see ISO 294-4.

¹ This practice is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.61 on USA Technical Advisory Group for ISO/TC 61 on Plastics.

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² *Annual Book of ASTM Standards*, Vol 08.03.

³ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.



NOTE 1— l_C = distance between the cutting lines for separating the plates from the runner (see Note 3 and Note 4).

FIG. 1 Cavity Plates of Type D ISO Molds

NOTE 2—The thickness and length of the gate strongly influence the process of the freezing of the melt flow into the cavity and thus the molding shrinkage; see ISO 294-4. The dimensions of the gate are therefore defined with low tolerances.

NOTE 3—The indicated value of the gate length, l_G , allows separating the plates from the runner by stamping or sawing using a fixed distance, l_C , between the cutting lines (see Fig. 1), even for materials with different shrinkages.

NOTE 4—The distance, l_C , between cutting lines for separating the plates from the runner (see Fig. 1) is $l_C = 2(l_G + 1^*)$ (see Fig. 2). Taking

this distance at 80 mm gives the advantage that the cutting machine can be used commonly for taking bars 80 by 10 by 4 mm from the central parts of the multipurpose test specimens; see Practice D 5939, 4.1.3.12.

5.2 Injection Molding Machine:

5.2.1 See Practice D 5939, 4.4, with the following exception in 4.4.4 on clamping force:

5.2.1.1 The recommended minimum clamping force, F_M , for the Type D ISO molds is $F_M/kN \geq 11 \times p_{max}/MPa$, for example, $F_M \geq 880 \text{ kN}$ for $p_{max} = 80 \text{ MPa}$.

6. Procedure

6.1 *Conditioning of Materials*—See Practice D 5939, 6.1.

6.2 *Injection Molding*—See Practice D 5939, 6.2, but with the following change in 5.2.2: For Types D1 and D2 ISO molds, the suitable ranges of injection velocity are recommended to be selected such that the injection times, t_I , are comparable to that used for the Type A ISO mold.

7. Report

7.1 Include the following items in the test report:

7.1.1 Reference to this part of this practice;

7.1.2 See Practice D 5939, 7.1.2 through 7.1.8.

8. Precision

8.1 See Practice D 5939, Section 6.

9.

10. Keywords

10.1 injection molding; plastics; plates; thermoplastic materials

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