Designation: D 3419 – 93

Standard Practice for In-Line Screw-Injection Molding Test Specimens From Thermosetting Compounds[1]

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1. Scope

1.1 This practice covers a general procedure for screw-injection molding thermosetting materials into test specimens for Izod or Charpy impact, flexure, tension, compression, water-absorption, heat-aging, electrical, modulus in tension or flexure, and heat-deflection temperature tests.

NOTE 1—The utility of this practice has been demonstrated for the molding of thermosetting molding compounds exhibiting lower-viscosity non-Newtonian flow.

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

1.3 *This standard does not purport to address all of the safety problems, 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.*

NOTE 2—There are no ISO standards covering the primary subject of this practice.

2. Referenced Documents

2.1 *ASTM Standards:*

D 883 Terminology Relating to Plastics[2]

D 958 Practice for Determining Temperatures of Standard ASTM Molds for Test Specimens of Plastics[2]

3. Terminology

3.1 *Definitions:*

3.1.1 *General*—Definitions of terms applying to this practice appear in Terminology D 883.

3.1.2 *injection molding*—the process of forming a material by forcing it, in a fluid state and under pressure, through a runner system (sprue, runner, and gate(s)) into the cavity of a closed mold.

3.1.3 *Discussion*—Screw-injection molding and reaction-injection molding are types of injection molding.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *breathing, v*—the operation of opening a mold or press for a very short period of time at an early stage in the process of cure.

3.2.2 *Discussion*—Breathing allows the escape of gas or vapor from the molding material and reduces the tendency of thick moldings to blister.

3.2.3 *cavity (of a mold), n*—the space within a mold to be filled to form the molded product.

4. Significance and Use

4.1 This practice is subject to the definition of injection molding given in 3.1.2 with the further provision that with in-line screw injection the plastic compound, heated in a chamber by conduction and friction, is fluxed by the action of a reciprocating screw and then is forced into a hot mold where it solidifies. Hereafter, in-line screw-injection molding will be referred to simply as injection molding.

4.2 The mold referenced in this practice provides for a set of five specimens. However, if only certain specimens are desired, the other cavities may be blocked by inserting gate blanks.

4.3 Typically, injection-molded test specimens are made with shorter cycles than those used for similar moldings made by compression, and the cycle is equal to or faster than that for transfer molding.

4.4 Breathing of the mold is not usually required to release trapped volatile material as the gas is free to flow from the vent end of the mold. This is particularly advantageous for heat-resistant compounds and reduces the tendency for molded specimens to blister at high exposure temperatures.

4.5 Injection molding is intended for low-viscosity compounds. One set of processing parameters cannot be specified for all types of thermosetting materials, nor for samples of the same material having different plasticities.

4.6 Materials containing fibrous fillers such as glass roving, chopped cloth, or cellulosic fibers can be injection molded, but their properties will be affected depending upon how much fiber breakdown occurs as the compound is worked by the screw and as it passes through the system of runners and gates. The orientation of the fibers in the molded specimen will also affect injection-molded properties.

4.7 Flow and knit lines in a molded piece are often sites of mechanical or electrical weakness. The fluxed material passing through the gate wrinkles and folds as it proceeds into the mold cavity. Knit lines may be found to some degree throughout the molded piece; these knit lines affect end-test results. Fibers and

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[2] *Annual Book of ASTM Standards*, Vol 08.01.