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Standard Test Method for TENSILE PROPERTIES OF PLASTICS AT HIGH SPEEDS¹

This standard is issued under the fixed designation D 2289; 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.

1. Scope

1.1 This test method covers the determination of the tensile properties of plastics over a broad range of testing speeds extending from conventional speeds (see Test Method D 638 and Test Methods D 882) to those at which stress-wave propagation effects may become important (see Note 1). This test method normally utilizes grip displacement as a means for measuring strain. Direct strain measurement requires use of optical, photographic or strain gage systems.

1.2 The values stated in SI units are to be regarded as the standard.

NOTE 1—When the speed of test approaches the velocity of sound in a material, the distribution of load throughout the length of the test specimen is not always uniform. This may result in nonuniform straining of the specimen.

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 whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Applicable Documents

2.1 ASTM Standards:

D 618 Methods of Conditioning Plastics and Electrical Insulating Materials for Testing²

D 638 Test Method for Tensile Properties of Plastics²

D 882 Test Methods for Tensile Properties of Thin Plastic Sheetings²

D 1822 Test Method for Tensile-Impact Energy to Break Plastics and Electrical Insulating Materials³

D 1898 Recommended Practice for Sampling of Plastics³

D 4066 Specification for Nylon Injection and Extrusion Materials (PA)⁴

3. Significance and Use

3.1 This test method is designed to provide the user with a measure of rate sensitivity of a material by generating tensile data over a broad, usually logarithmic, time scale. Data on the response of a material to increases in strain rate may indicate its susceptibility to failure or reduction in energy absorption. Results thus provide an indication of engineering performance in applications where the load-time scale is the same as that specified in this test method.

4. Apparatus

4.1 *Testing Machine*, usually hydraulic or pneumatic, of the uniform grip velocity type consisting of the following components:

4.1.1 *Fixed Member*—A fixed or essentially stationary member to which one grip can be attached.

4.1.2 *Movable Member*—A movable member to impel a second grip at a uniform velocity. A slack adapter shall be used in the case of piston type machines to allow the movable member to attain the desired test speed before impelling the grip.

4.1.3 *Grips*—Grips for holding the test specimen shall be constructed with faces as rigid as possible to minimize any effects of extension. The grips shall be aligned with the fixed and movable members. The axis of the test speci-

¹ This test method is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D 20.10 on Mechanical Properties.

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² Annual Book of ASTM Standards, Vol 08.01.

³ Annual Book of ASTM Standards, Vol 08.02.

⁴ Annual Book of ASTM Standards, Vol 08.03.