



Standard Test Method for Rubber Property—Elongation at Specific Stress¹

This standard is issued under the fixed designation D1456; 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 U.S. Department of Defense.

1. Scope

1.1 This test method covers determination of the elongation of soft vulcanized rubber compounds under a specified stress.

1.2 *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:²

D1349 Practice for Rubber—Standard Conditions for Testing

D3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets

D3183 Practice for Rubber—Preparation of Pieces for Test Purposes from Products

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *piece*—the portion of the sample that is prepared for testing.

3.1.2 *specific stress*—force divided by the cross-sectional area of the original specimen.

4. Summary of Test Method

4.1 The test method starts with a piece taken from the sample and includes: (1) the preparation of the specimen and (2) measurement of the elongation of the specimen subjected to a prescribed stress for a specified period of time. The stress is applied by suspension of a known mass which, under gravity, gives the desired stress.

5. Significance and Use

5.1 This test method is useful for determining the variability in material and the influence of parameters affecting the stress-strain properties of rubber vulcanizates, for example, temperature, relative humidity, preconditioning of rubber, and so forth. This test method is particularly useful for the evaluation of compounding materials used for reference purposes.

6. Apparatus

6.1 *Testing Machine*—Tests shall be made on a power-driven machine complying with the following requirements: The machine shall be capable of extending the specimen at a uniform speed of between 75 and 90 mm/s (15 and 18 ft/min) until the mass is freely suspended. It shall be equipped with a timing device that automatically starts the instant the mass is freely suspended by the specimen and signals the operator when the elongation is to be measured. The machine shall have a millimetre scale and an indicating device so that elongation measurements to the nearest millimetre can be made without parallax. A holder shall be attached to the lower grip so that masses may be added, preferably by an automatic device, to obtain the desired stress. The masses shall correspond to multiples of the force required for 0.01-mm thickness of the specimen and shall be accurate within the force required for 0.002-mm thickness of the specimen. The grips that hold the specimen in the tester shall be of a type that tightens automatically as the applied tension increases and exerts a uniform pressure across the gripping surfaces. A satisfactory tester, including die and thickness gage, is shown in Fig. 1.

6.2 *Die*—The die shall be capable of cutting straight specimens with parallel sides, approximately 150 mm (6 in.) long and within ± 0.02 mm (± 0.001 in.) of the specified width for the specimens (see 7.1) at any point along their length. A suitable die is shown in Fig. 2. This die consists of six strips of razor-blade steel, sharpened on one edge, and clamped in a rigid mounting. The blades are approximately 150 mm (6 in.) long, 19 mm (0.75 in.) wide, and 0.25 mm (0.010 in.) thick; they are clamped rigidly between metal spacers to produce the desired width of specimen and project approximately 3 mm (0.12 in.) above the spacers. The blades can easily be replaced when they become dull or nicked.

¹ This test method is under the jurisdiction of ASTM Committee D11 on Rubber and is the direct responsibility of Subcommittee D11.10 on Physical Testing.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.