



Designation: D 531 – 89 (Reapproved 1999)

Standard Test Method for Rubber Property—Pusey and Jones Indentation¹

This standard is issued under the fixed designation D 531; 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.

1. Scope

1.1 This test method covers the determination of the indentation of rubber or rubber-like materials by means of the Pusey and Jones type of plastometer. This apparatus is used to measure the depth of indentation of an indenter, under fixed force into the surface of a rubber specimen.

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

1.3 *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 1415 Test Method for Rubber Property—International Hardness²

D 4483 Practice for Determining Precision for Test Method Standards in the Rubber and Carbon Black Industries²

NOTE 1—The specific dated edition of the practice that prevails in this document is referenced in the Precision section.

3. Significance and Use

3.1 The Pusey and Jones indentation value is the depth of indentation, expressed in hundredths of a millimetre, of a ball 3.175 mm (0.1250 in.) in diameter under an expressed force of 9.8 N (2.2 lbf). This value may be used to compare the indentation resistance of rubber and rubber-like materials.

3.2 The indentation value obtained should not be confused with hardness as measured by Test Method D 1415, since in the latter test the rubber immediately adjacent to the indenter is precompressed.

4. Apparatus

4.1 *Plastometer*, an instrument consisting of an indenter, a mass for applying a fixed gravitational force on the indenter, and a suitable device for indicating the depth of indentation.

4.1.1 *Support*—The supporting frame shall be configured so that the indenter and mass may be independently raised or lowered vertically, permitting the indenter to rest on the surface of the test specimen and the mass to be applied subsequently to the indenter.

4.1.2 *Indenter*, consisting of a vertical steel shaft attached at the upper end to the spindle of the indicator gage and having at the lower end a steel ball. The steel ball shall be 3.175 ± 0.015 mm (0.1250 ± 0.0005 in.) in diameter and shall be made of highly polished, noncorrosive hard metal properly treated to resist wear.

4.1.3 *Mass*—The mass shall be 1000 ± 0.01 g.

4.1.4 *Depth Indicator*—A dial gage or other suitable device graduated in increments of 0.01 mm (0.0004 in.) and having a range of at least 3 mm shall indicate the movement of the indenter.

4.1.5 *Specimen Holder*, for the block described in 5.1 shall be provided consisting of a clamp made of two metal plates held together by two threaded bolts as shown in Fig. 1. The purpose of the clamp is to hold the specimens flat and free from slight movements that might introduce variations into the test. The top plate shall be provided with a hole and slot for the operation of the indenter.

5. Test Specimens

5.1 The standard specimen shall be a uniform molded rectangular block approximately 13 mm (0.5 in.) in thickness, 30 mm (1.2 in.) in width, and 75 mm (3 in.) in length. The top and bottom faces shall be as parallel as possible. This specimen shall be used in all cases when the apparatus is employed for reference standard purposes as distinguished from routine control testing of commercial articles.

5.2 In routine testing, specimens may be used that have dimensions other than those of the standard specimen, including manufactured products of such size and shape to support the apparatus or where it can be suitably mounted above them.

6. Procedure

6.1 *Measurement of Indentation*—Place the specimen on a firm base with the surface under test horizontal. Flat specimens may rest on a table having a truly level surface or on the secondary base mentioned in 4.1.1. Place curved specimens such as rubber-covered rolls so that the center line of the

¹ This test method is under the jurisdiction of ASTM Committee D-11 on Rubber and is the direct responsibility of Subcommittee D11.10 on Physical Testing.

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² *Annual Book of ASTM Standards*, Vol 09.01.