



Designation: D6515 – 00 (Reapproved 2023)^{ε1}

Standard Test Method for Rubber Shaft Seals Determination of Recovery From Bending¹

This standard is issued under the fixed designation D6515; 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.

^{ε1} NOTE—Editorial changes were made in Sections 3, 7, and 8 in July 2023.

1. Scope

1.1 This test method covers a procedure to determine the recovery response of rubber after particular bending deformation, subsequent to aging in selected media at a specified temperature, and for a specified time period, thus providing a measure of the relative performance potential of compounds used in the manufacture of shaft seals.

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 concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D412 Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension

D471 Test Method for Rubber Property—Effect of Liquids

D1349 Practice for Rubber—Standard Conditions for Testing

D3183 Practice for Rubber—Preparation of Pieces for Test

¹ This test method is under the jurisdiction of ASTM Committee D11 on Rubber and Rubber-like Materials and is the direct responsibility of Subcommittee D11.37 on Coated Fabrics, Rubber Threads and Seals.

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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.

Purposes from Products

D4483 Practice for Evaluating Precision for Test Method Standards in the Rubber and Carbon Black Manufacturing Industries

3. Summary of Test Method

3.1 The ends of rectangular specimens of candidate shaft seal compounds are clipped together and the specimens exposed under specified conditions of time and temperature in a fluid environment that best simulates anticipated operating conditions. Upon completion of the exposure, the clamps are removed and the specimens are allowed to recover from bending. After a specified period of time, the distance between the ends of each specimen is measured and the amount of recovery calculated.

4. Significance and Use

4.1 Among the factors affecting shaft seal life are the ability to retain elasticity and compensate for shaft eccentricity, ability to recover from bending, and resistance to wear and the swelling effects of contact fluids. In-service testing of candidate materials is time consuming and therefore costly. Measurement of recovery from bending after exposure in fluids at elevated temperatures provides a means of quickly assessing the material's potential and acceptability for use. Comparative recovery data may then be screened and optimum performing compounds selected for further improvement or seal fabrication. It has been found that good to excellent correlation exists between a material's ability to recover from bending and sealing effectiveness.

4.2 This method is designed to measure the recovery of different rubber compounds after aging in any liquid medium, including hydraulic oils and water. This method can also be used to test rubber compounds after aging in air. Test liquids should be chosen based on the intended end use.

5. Apparatus

5.1 *Glass Test Tubes*, 300 mm by 38 mm (12 in. by 1½ in.)

5.2 *Specimen Hangers*.

5.3 *Binder Clips*.