



Standard Test Method for Rubber From Natural Sources—Plasticity Retention Index (PRI)¹

This standard is issued under the fixed designation D 3194; 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 gives an indication of the oxidation resistance of raw natural rubber at a specified temperature. This resistance is indicated by the Plasticity Retention Index (PRI), a ratio expressed as a percentage of the aged plasticity to the original plasticity determined by means of a parallel plate plastometer. A low PRI value indicates a poor resistance to oxidation.

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

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

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2.1 ASTM Standards:

D 1485 Test Methods for Rubber from Natural Sources—Sampling and Sample Preparation

D 3040 Practice for Preparing Precision Statements for Standards Related to Rubber and Rubber Testing³

D 3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets

E 145 Specification for Gravity-Convection and Forced-Ventilation Ovens

¹ This method is under the jurisdiction of ASTM Committee D11 on Rubber and is the direct responsibility of Subcommittee D11.22 on Natural Rubber.

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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.

³ Withdrawn.

3. Summary of Test Method

3.1 A homogenized sample of raw rubber is prepared by a specified procedure to create a sheet from which six cylindrical pellets of specified dimensions are cut, three to be tested in original condition and three to be aged under specified conditions.

3.2 Plasticity on both the original and aged samples is measured as the median final thickness of each set of samples after a compressive force of $100\text{ N} \pm 1\text{ N}$ is applied for a specified time. The PRI is the ratio expressed as a percentage of the aged to the original plasticity.

4. Significance and Use

4.1 This test method may be used to evaluate the heat and/or oxidation stability (aging) of raw rubber under controlled conditions. High original and aged plasticity values usually correspond to good aging properties. The ratio of the aged to original plasticity values expressed as a percentage, the PRI, is used as an indication of aging.

5. Apparatus

5.1 *Parallel Plate Plastometer*⁴, with a 10 mm diameter platen. The platen temperature shall be $100 \pm 1^\circ\text{C}$ and the plastometer shall have a timer unit capable of giving a $15 \pm 1\text{ s}$ initial conditioning period during which the sample shall be compressed to $1 \pm 0.01\text{ mm}$ and a test period of $15 \pm 1\text{ s}$ under a compression force of $100\text{ N} \pm 1\text{ N}$. The plastometer shall also have a measuring device gauge reading to 0.01 mm. Calibration procedures recommended by the manufacturer of the plastometer should be followed.

5.2 *Punch*, that will die out cylindrical specimens approximately 13 mm in diameter from a prepared sheet of rubber.

⁴ The sole source of supply of the Wallace Rapid Plastimeter known to the committee at this time is Leverett A. Anderson Co., P.O. Box 5400, Akron, OH 44313. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee¹, which you may attend.