



Standard Test Method for Adhesion Between Steel Tire Cords and Rubber¹

This standard is issued under the fixed designation D2229; 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 force required to pull a steel cord from a block of vulcanized rubber.

1.2 Although designed primarily for steel cord, this test method may be applied with modifications to wire used in rubber products.

1.3 This test method can also be used for evaluating rubber compound performance with respect to adhesion to steel cord.

1.4 The values stated in SI units are to be regarded as the standard. No other units of measurement are included in this standard.

1.5 *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

D76 Specification for Tensile Testing Machines for Textiles

D123 Terminology Relating to Textiles

D1566 Terminology Relating to Rubber

D2904 Practice for Interlaboratory Testing of a Textile Test Method that Produces Normally Distributed Data (Withdrawn 2008)³

D6477 Terminology Relating to Tire Cord, Bead Wire, Hose Reinforcing Wire, and Fabrics

E105 Practice for Probability Sampling of Materials

E122 Practice for Calculating Sample Size to Estimate, With Specified Precision, the Average for a Characteristic of a Lot or Process

¹ This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.19 on Industrial Fibers and Metallic Reinforcements.

Current edition approved May 15, 2014. Published June 2014. Originally approved in 1963. Last previous edition approved in 2010 as D2229 – 10. DOI: 10.1520/D2229-10R14.

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 The last approved version of this historical standard is referenced on www.astm.org.

3. Terminology

3.1 Definitions

3.1.1 For definitions of terms relating to tire cord, bead wire, hose wire, and tire cord fabrics, refer to Terminology D6477.

3.1.1.1 The following terms are relevant to this standard: adhesion, rubber compound, and steel cord.

3.1.2 For definitions of terms relating to rubber, refer to Terminology D1566.

3.1.3 For definitions of other terms related to textiles, refer to Terminology D123.

4. Summary of Test Method

4.1 The steel cords are vulcanized into a block of rubber and the force necessary to pull the cords linearly out of the rubber is measured.

5. Significance and Use

5.1 This test method is considered satisfactory for the acceptance testing of commercial shipments of steel tire cord because current estimates of between-laboratory precision for single materials are considered acceptable and the method has been used extensively in the trade for acceptance testing.

5.1.1 If there are differences or practical significances between reported test results for two laboratories (or more), comparative tests should be performed to determine if there is a statistical bias between them, using competent statistical assistance. As a minimum, the test samples should be used that are as homogenous as possible, that are drawn from the material from which the disparate test results were obtained, and that are randomly assigned in equal numbers to each laboratory for testing. Other materials with established test values may be used for this purpose. The test results from the two laboratories should be compared using a statistical test for unpaired data, at a probability level chosen prior to the testing series. If a bias is found, either its cause must be found and corrected, or future test results must be adjusted in consideration of the known bias.

5.2 The mold described in this test method is primarily designed for quality acceptance testing for steel cord where the sample size for each cord is 4 or a multiple thereof, but any mold/cavity combination which will provide the required test block dimensions (Figs. 1 and 2) is acceptable.