



Designation: D 2692 – 04

## Standard Test Method for Air Wicking of Tire Fabrics, Tire Cord Fabrics, Tire Cord, and Yarns<sup>1</sup>

This standard is issued under the fixed designation D 2692; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers the determination of longitudinal air permeability for tire fabrics, tire cord fabrics, tire cords, or yarns embedded in cured rubber compound. This test method is designed to demonstrate the effectiveness of fabric treatments intended to prevent air permeability. This test method is applicable to fabrics made from all types of fibers with all types of rubber compound.

1.2 This test method is written in SI units. The inch pound units which are provided are not necessarily exact equivalents of the SI units. Either system of units may be used in this test method.

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.* See the Note in 11.1.

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

D 123 Terminology Relating to Textiles

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

D 6477 Terminology Relating to Tire Cord, Bead Wire, Hose Reinforcing Wire, and Fabrics

### 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 D 6477.

3.1.1.1 The following terms are relevant to this standard: air wicking, chafer fabric, test panel, in air wicking test, tire cord, tire cord fabric, tire fabric, vulcanization, wickproof, in tire fabric, tire cord fabric, tire cord, or yarn.

3.1.2 For definitions of other terms related to textiles, refer to Terminology D 123.

3.1.2.1 The following terms are relevant to this standard: skein and yarn.

### 4. Summary of Test Method

4.1 Fabric specimens are embedded in a rubber compound and air pressure is applied to freshly exposed yarn ends. Detergent solution is applied to the opposite end of the yarns which have also been freshly exposed. Air wicking is indicated by continuous formation of air bubbles in the detergent solution due to air passing along the axis of a yarn.

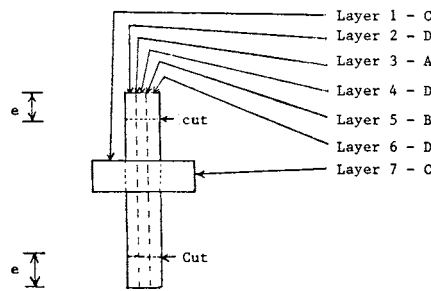
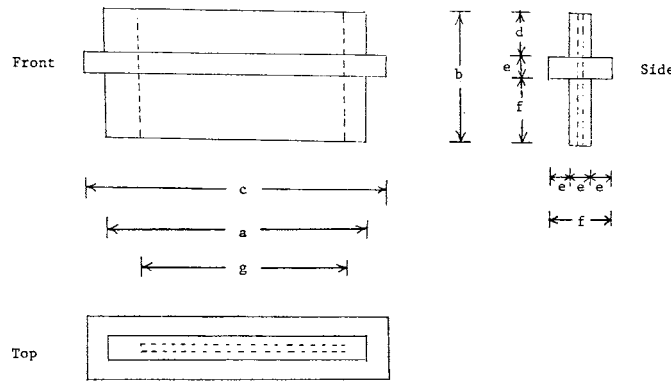
### 5. Significance and Use

5.1 This test method is considered satisfactory for the acceptance testing of commercial shipments of tire fabrics since this test method has been used extensively in the trade for acceptance testing. This test method is also considered satisfactory for quality control.

5.1.1 In case of a dispute arising from differences in reported test results when using this test method for acceptance testing of commercial shipments, the purchaser and the supplier should conduct comparative tests to determine if there is a statistical bias between their laboratories. Competent statistical assistance is recommended for the investigation of bias. As a minimum, the two parties should take a group of test specimens that are as homogeneous as possible and that are from a lot of material of the type in question. The test specimens should then be randomly assigned in equal numbers to each laboratory for testing. The average results from the two laboratories may be compared using appropriate statistical analysis and an acceptable probability level chosen by the two parties before the testing is begun. If a bias is found, either its cause must be found and corrected or the purchaser and the supplier must agree to interpret future test results with consideration to the known bias.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D13 on Textiles and is the direct responsibility of Subcommittee D13.19 on Tire Cord and Fabrics. Current edition approved Oct. 1, 2004. Published October 2004. Originally approved in 1968. Last previous edition approved in 1998 as D 2692 – 98.

<sup>2</sup> 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.



DIMENSIONS

	a	b	c	d	e	f	g
Inches	3.0	1.5	3.5	0.5	0.25	0.75	2.25
Millimetres	76	38	89	12.6	6.4	19	57

NOTE 1—Lower case letters refer to dimensions. Capital letters refer to pieces prepared as outlined in 10.2.

FIG. 1 Test Panel

5.2 This test method is applicable for testing the air permeability of any fabric that is embedded in a rubber compound, but is particularly useful when testing chafer fabrics to be used in a tubeless tire construction. In tubeless tires, chafer fabric yarns that are not wick proof represent potential channels for air to pass through, and thus, this test method provides a prediction of chafer permeability.

5.3 Evaluation of air wicking in other fabric and cord components in such products as tires, rubber brake diaphragms, and pneumatic hoses, is useful.

## 6. Apparatus and Materials

6.1 *Test Panel Mold*—A fixed dimension mold designed to produce a test panel of dimensions and shape shown in Fig. 1.<sup>3</sup>

6.2 *Test Chamber*—An air chamber and test panel holder similar to the device shown in Fig. 2.<sup>3</sup>

6.3 *Rubber Compound*—The test compound in Table 1 shall be used as standard unless otherwise agreed upon between the purchaser and the supplier.

6.4 *Air Supply*—Compressed air, to be controlled at a test pressure agreed upon between the purchaser and the supplier.

Commercially available compressed air or dry nitrogen gas is preferred since these products are clean and dry.

6.5 *Vulcanization Press*—For vulcanizing the test panel in the test panel mold. See Practice D 3182.

6.6 *Detergent Solution*—Mix 10 g of nonionic detergent with 100 g of tap water. An ethoxylated alkyl phenol, having 10 to 30 mol of ethylene oxide, is the recommended nonionic detergent.<sup>4</sup>

## 7. Sampling Tire Fabric

7.1 *Lot Sample*—Tire fabrics are shipped in continuous lengths of several hundred metres each, and testing frequency will be as agreed upon between the purchaser and the supplier. In the absence of an applicable material specification for sampling frequency, consider each roll to be a sampling unit for tire fabric.

7.2 *Laboratory Samples*—For acceptance testing, take from each roll a full-width swatch, 1 m (1 yd) long, after first discarding a minimum of 1 m of fabric from the very outside of the roll.

7.3 *Test Specimen*—Cut two fabric specimens from each laboratory sample, each being 38 by 57 mm (1.5 by 2.25 in.). Space the specimens from a laboratory sample along a diagonal line so that each specimen will contain different warp ends and

<sup>3</sup> The Burlington Diffusion Tester and Test Piece Mold covered by U.S. Patent 3,034,336 has been found satisfactory. Blueprints for the fabrication of the tester and mold may be obtained from Manager of Process Technology, Highland Industries Inc., 215 Drummond Street, Kernersville, NC 27284.

<sup>4</sup> Common laundry detergent has been found satisfactory for this purpose.