Designation: D 2692 – 98

Standard Test Method for Air Wicking of Tire Fabrics, Tire Cord Fabrics, Tire Cord, and Yarns[1]

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 (ε) 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:*

D 123 Terminology Relating to Textiles[2]

D 3182 Practice for Rubber—Materials, Equipment, and Procedures for Mixing Standard Compounds and Preparing Standard Vulcanized Sheets[3]

3. Terminology

3.1 *Definitions:*

3.1.1 *air wicking, n—in tires,* the passage of air longitudinally along or through yarns in a fabric that has been encased and cured in rubber or other elastomer, that is, air permeability in the plane of the fabric.

3.1.2 *chafer fabric, n*—a woven fabric, usually coated with unvulcanized rubber, which is laid around the bead of a tire before vulcanization.

3.1.2.1 *Discussion*—Chafer fabric is used to reinforce the outer layer of rubber on the tire bead to provide an abrasion-resistant surface in contact with the wheel rim. In the case of tubeless tires, the chafer fabric is usually made wickproof to prevent air leaking from the inflated tire.

3.1.3 *skein, n*—a continuous strand of yarn, wound on a hand or motorized reel.

3.1.4 *tire cord, n*—a twisted or formed structure composed of one or more single or plied filaments, strands, or yarns of organic polymer or inorganic material.

3.1.4.1 *Discussion*—The direction of twist used to combine the single or plied yarn elements into a cord structure is in a direction opposite to that used in the yarn.

3.1.5 *tire cord fabric, n*—a fabric consisting of tire cord warp with widely spaced (usually 1 to 5 picks/in. or 4 to 20 picks/dm) of single yarn filling.

3.1.6 *tire fabric, n*—a textile fabric, other than tire cord fabric, which is used as a reinforcement in tires.

3.1.7 *vulcanization, n*—an irreversible process, usually accomplished through the application of heat, during which a rubber compound through a change in its chemical structure (for example, cross-linking), becomes less plastic and more resistant to swelling by organic liquids while elastic properties are conferred, improved, or extended over a greater range of temperatures.

3.1.8 *yarn, n*—a generic term for a continuous strand of textile fibers, filaments, or material in a form suitable for knitting, weaving, or otherwise intertwining to form a textile fabric.

3.1.9 For definitions of other textile terms used in this test method, refer to Terminology D 123.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *test panel, n—in air wicking tests,* the composite structure of a rubber compound and fabric which is used to test the fabric for air wicking.

3.2.2 *wickproof, adj—in tire fabric, tire cord fabric, tire cord, or yarn,* a term used to describe a fabric or yarn that shows no air wicking by this prescribed test.

[1] This test method is under the jurisdiction of ASTM Committee D-13 on Textiles and is the direct responsibility of Subcommittee D13.19 on Tire Cord and Fabrics.

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[2] *Annual Book of ASTM Standards,* Vol 07.01.

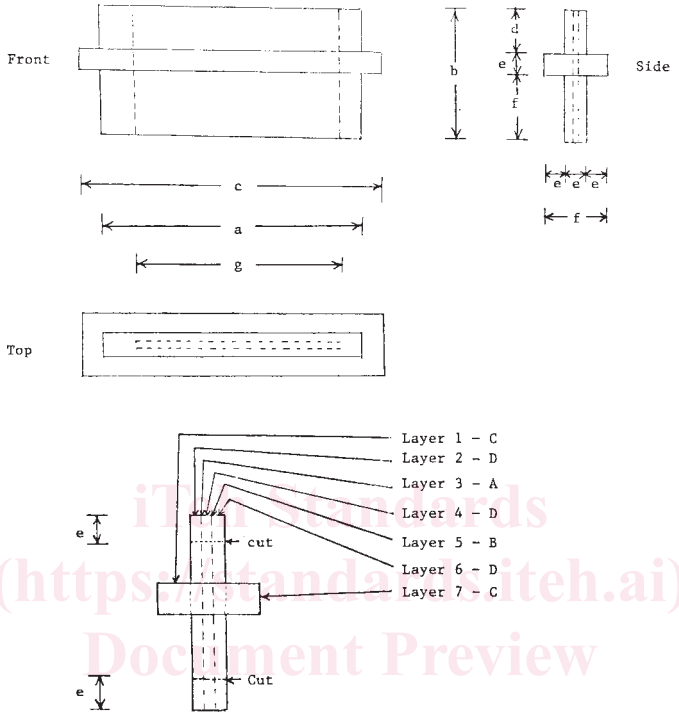
[3] *Annual Book of ASTM Standards,* Vol 09.01.

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.

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.

5.2 This test method is applicable for testing the air permeability of any fabric that is embedded in a rubber compound,



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. 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

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.[4]

6.2 *Test Chamber*—An air chamber and test panel holder similar to the device shown in Fig. 2.[4]

[4] 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.