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Standard Terminology Relating to Tire Cord, Bead Wire, Hose Reinforcing Wire, and Fabrics¹

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1. Scope

1.1 This terminology is the compilation of all definitions developed by Subcommittee D13.19 on Tire Cords and Fabrics.

1.2 The terminology, mostly definitions, is unique to the tire cord fabric industry. Meanings of the same terms used outside the tire cord fabric industry can be found in other compilations or in dictionaries of general usage.

1.3 In addition to being a specialized dictionary, this terminology is also a tool for managing the Subcommittee's terminology. This includes finding, eliminating, and preventing redundancies, that is, where two or more terms relating to the same concept are defined in different words.

2. Referenced Documents

2.1 *ASTM Standards*:²

D123 [Terminology Relating to Textiles](#)

D885 [Test Methods for Tire Cords, Tire Cord Fabrics, and Industrial Filament Yarns Made from Manufactured Organic-Base Fibers](#)

D1871 [Test Method for Adhesion Between Tire Bead Wire and Rubber](#)

D2229 [Test Method for Adhesion Between Steel Tire Cords and Rubber](#)

D2692 [Test Method for Air Wicking of Tire Fabrics, Tire Cord Fabrics, Tire Cord, and Yarns](#)

D2969 [Test Methods for Steel Tire Cords](#)

D2970/D2970M [Test Methods for Testing Tire Cords, Tire Cord Fabrics, and Industrial Yarns Made From Glass Filaments](#)

D4393 [Test Method for Strap Peel Adhesion of Reinforcing Cords or Fabrics to Rubber Compounds](#)

D4776 [Test Method for Adhesion of Tire Cords and Other Reinforcing Cords to Rubber Compounds by H-Test Procedure](#)

D4974 [Test Method for Hot Air Thermal Shrinkage of Yarn and Cord Using a Thermal Shrinkage Oven](#)

D4975 [Test Methods for Single-Filament Tire Bead Wire Made from Steel](#)

D5591 [Test Method for Thermal Shrinkage Force of Yarn and Cord With a Thermal Shrinkage Force Tester](#)

D6320 [Test Methods for Single Filament Hose Reinforcing Wire Made from Steel](#) ~~Test Methods for Single Filament Hose Reinforcing Wire Made from Steel~~

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3. Terminology

adhesion, *n*—*in tire fabrics*, the force required to separate a textile material from rubber or other elastomer by a definite prescribed method. **D1871, D2229, D4393, D4776**

adhesion, *n*—the property denoting the ability of a material to resist delamination or separation into two or more layers. **D6477**

adhesive treated tire cord, *n*—a tire cord whose adhesion to rubber or other elastomer has been improved by the application of a dip followed by rapid drying and (normally) additional heat treatment. **D5591**

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. **D2692**

breaking force, *n*—the maximum force applied to a material carried to rupture.

DISCUSSION—Materials that are brittle usually rupture at the maximum force. Materials that are ductile are usually capable of withstanding the maximum force without rupturing. For many years, it has been the usual practice in the tire industry and related industries to use the term *breaking*

¹ This terminology 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.

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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.

strength to characterize yarn and cord of a specified size and type without consideration of their unit size. Numerically, *breaking strength* is equal to breaking force for the same specimen. The average of the breaking forces observed on two or more specimens of a specific sample is referred to as the sample breaking strength, which is the property used in engineering calculations for a specific textile material. *Tensile strength* and *breaking tenacity* are derived or calculated values for materials that include consideration of the unit size of the materials. These terms can be used to compare intrinsic strengths of yarns and cords of different sizes or different materials. The term *tensile strength*, in MPA (psi), is not synonymous with either *breaking force* or *breaking strength*, in N (lbf), or *breaking tenacity*, in mN/tex (gf/den). D885, D2970/D2970M, D4975, D6320

breaking strength, *n*—a strength expressed in terms of breaking force.

DISCUSSION— Breaking strength is particularly significant as the characteristic of a sample as distinct from a specimen, and is usually expressed as newtons (N) or pounds-force (lbf). See discussion for *breaking force*.
(D885)

breaking tenacity, *n*—the tenacity at the breaking force.

DISCUSSION—See discussion for *breaking force*.

D885, D2970/D2970M

catenary length, *n*—the difference between the length of the shortest and the longest component in a plied yarn or cables cord after twisting.

D2970/D2970M

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

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. **D2692, D4393**

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

DISCUSSION—Cord, as used in these test methods, is used for the manufacture of pneumatic tires or other industrial fabrics. The direction of twist used to combine the single or plied yarn elements into a cord construction is in the direction opposite to that used in the yarns. Frequently, tire and other reinforcing cords consist of a single yarn strand having little or no twist. These cords as well as single monofilaments, are used synonymously with twisted and plied cords in this test method.

D885, D4776, D5591

cord twist, *n*—the amount of twist in a cord made from two or more single or plied yarns.

DISCUSSION—Cord twist is based on the initial length of a cord specimen. Cord twist is expressed as the number of turns divided by the length of the untwisted cord.

D885, D2970/D2970M

core, *n*—a filament or strand that serves as an extended axis about which other elements can be wound.

D2969

curing, *n*—see the preferred term **vulcanization**.

D1871, D4393, D4776

dip, *n*—a chemical composition that is applied to a textile cord or fabric to improve its adhesion to rubber or other elastomer.

D885, D2970/D2970M

dip pick-up, *n*—the amount of dip or dip components present in a textile cord or fabric after processing, expressed as a percentage of the mass of the oven-dried dip-free material.

D885, D2970/D2970M

direction of lay, *n*—the helical disposition of the components of a strand or cord.

DISCUSSION—The strand or cord has an “S” or left hand lay if, when held vertically, the spirals around the central axis of the strand or cord conform in the direction of slope to the central portion of the letter “S”; and “Z”, or righthand lay, if the spirals conform in direction of slope to the central portion of the letter “Z”.

D2969

direction of twist, *n*—see **direction of lay**.

D2969

elongation, *n*—the ratio of the extension of a material to the length of the material prior to stretching.

DISCUSSION—Elongation may be measured at any specified force or at rupture.

D885, D6320

fabric, *n*— *in textiles*, a planar structure consisting of yarns or fibers.

DISCUSSION—In tire cord, fabrics are produced with tire cord warp yarns interlaced with widely spaced filling yarns. **D885, D2970/D2970M**

fabric dip, *n*—for *tire fabrics*, a chemical composition which is applied to a textile cord or fabric to improve its adhesion to rubber compounds.

D4393

filament, *n*—*in steel cord*, the individual element in a steel strand or cord source.

D6477

flare, *n*—the spreading of the filament ends or the strand ends at the cut end of a steel tire cord, expressed as the unraveled length.

D2969

greige cord, *n*— *in tire cords*, a cord that has not been adhesive treated, heat treated, or otherwise treated before use (see *cord*).

D4974, D5591

greige tire cord, *n*—a tire cord that has not been dip treated or heat treated before use (see *tire cord*).

D5591

growth, *n*—the increase one or more dimensions of an object or a material.