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Standard Terminology Relating to Paper and Paper Products[1]

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This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 The terms in this standard are related to paper and paper products.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D528 Test Method for Machine Direction of Paper and Paperboard (Withdrawn 2010)[3]

D548 Test Method for Water-Soluble Acidity or Alkalinity of Paper (Withdrawn 2009)[3]

D585 Practice for Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, and Related Product (Withdrawn 2010)[3]

D586 Test Method for Ash in Pulp, Paper, and Paper Products (Withdrawn 2009)[3]

D589 Test Method for Opacity of Paper (15° Diffuse Illuminant *A*, 89 % Reflectance Backing and Paper Backing) (Withdrawn 2010)[3]

D643 Test Method for Folding Endurance of Paper by the Schopper Tester (Withdrawn 2010)[3]

D645/D645M Test Method for Thickness of Paper and Paperboard (Withdrawn 2010)[3]

D646 Test Method for Mass Per Unit Area of Paper and Paperboard of Aramid Papers (Basis Weight)

D727 Test Method for Kerosine Number of Roofing and Flooring Felt by the Vacuum Method

D774/D774M Test Method for Bursting Strength of Paper (Withdrawn 2010)[3]

D778 Test Methods for Hydrogen Ion Concentration (pH) of Paper Extracts (Hot-Extraction and Cold-Extraction Procedures) (Withdrawn 2010)[3]

D828 Test Method for Tensile Properties of Paper and Paperboard Using Constant-Rate-of-Elongation Apparatus (Withdrawn 2009)[3]

D829 Test Methods for Wet Tensile Breaking Strength of Paper and Paper Products (Withdrawn 2009)[3]

D918 Test Method for Blocking Resistance of Paper and Paperboard (Withdrawn 2011)[3]

D919 Test Method for Copper Number of Paper and Paperboard (Withdrawn 2009)[3]

D984 Test Methods for Reducible Sulfur in Paper (Withdrawn 2010)[3]

D985 Test Method for Brightness of Pulp, Paper, and Paperboard (Directional Reflectance at 457 nm) (Withdrawn 2010)[3]

D996 Terminology of Packaging and Distribution Environments

D2019 Test Method for Dirt in Paper and Paperboard (Withdrawn 2010)[3]

D2175 Test Method for Book Bulk and Book Bulking Number of Paper (Withdrawn 2010)[3]

D2176 Test Method for Folding Endurance of Paper by the M.I.T. Tester (Withdrawn 2010)[3]

D2482 Test Method for Surface Strength of Paper (Wax Pick Method) (Withdrawn 2010)[3]

D3208 Specification for Manifold Papers for Permanent Records (Withdrawn 2010)[3]

D3290 Specification for Bond and Ledger Papers for Permanent Records (Withdrawn 2010)[3]

D3301 Specification for File Folders for Storage of Permanent Records (Withdrawn 2010)[3]

D3453 Specification for Flexible Cellular Materials—Urethane for Furniture and Automotive Cushioning, Bedding, and Similar Applications

D3458 Specification for Copies from Office Copying Machines for Permanent Records (Withdrawn 2010)[3]

D4431 Specification for Paper Towels for Industrial and Institutional Use (Withdrawn 2000)[3]

[1] This terminology is under the jurisdiction of ASTM Committee D10 on Packaging and is the direct responsibility of Subcommittee D10.11 on Terminology (Definitions).

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

D4917 Test Method for Coefficient of Static and Kinetic Friction of Uncoated Writing and Printing Paper by Use of the Horizontal Plane Method (Withdrawn 2010)[3]
D4918 Test Method for Coefficient of Static Friction of Uncoated Writing and Printing Paper by Use of the Inclined Plane Method (Withdrawn 2010)[3]
D4949 Test Method for Determination of D-C Resistivity of Writing Paper (Keithley Method) (Withdrawn 2011)[3]
D4987 Test Method for Tensile Breaking Strength of Perforations in One-Part Continuous Forms Paper (Withdrawn 2010)[3]
D5039 Test Methods for Identification of Wire Side of Paper (Withdrawn 2009)[3]
D5342 Test Method for Resistance to Bending of Paper and Paperboard (Taber-Type Tester in Basic Configuration) (Withdrawn 2010)[3]
D5625 Test Method for Measuring Length, Width, and Squareness of Sheeted Paper and Paper Products (Withdrawn 2009)[3]
D5626 Test Methods for U.S. Postal Service Optical Measurements for Small Areas (Withdrawn 2011)[3]
D5634 Guide for Selection of Permanent and Durable Offset and Book Papers (Withdrawn 2010)[3]
D5650 Test Method for Resistance to Bending of Paper of Low Bending Stiffness (Taber-Type Tester in 0 to 10 Taber Stiffness Unit Configuration) (Withdrawn 2010)[3]
D5663 Guide for Validating Recycled Content in Packaging Paper and Paperboard
D5725 Test Method for Surface Wettability and Absorbency of Sheeted Materials Using an Automated Contact Angle Tester (Withdrawn 2010)[3]
D5803 Test Method for Tensile Strength at Zero-Span ("Wet Zero-Span Tensile") (Withdrawn 2009)[3]
D5804 Test Methods for Zero-Span Tensile Strength ("Dry Zero-Span Tensile") (Withdrawn 2009)[3]
D6043 Guide for Selection of Permanent and Durable Artist's Paper (Withdrawn 2010)[3]

3. Terminology

3.1 *Definitions:*

acid-sized paper, *n*—paper that has been manufactured using a procedure or process at pH values below 7 (usually 4.0 to 6.5) that results in paper that has resistance to aqueous liquid penetration. See **sizing**. **D3208, D3290, D3301, D3458, D5634, D6043**

alkaline-filled paper, *n*—a paper containing an alkaline filler such as calcium carbonate; having a pH value in excess of 7 (extract pH usually in the range from 7.5 to 10.0), and containing a reserve buffering capacity that can neutralize acidic materials formed in the paper or acidic gases sorbed from the atmosphere. **D3208, D3290, D3301, D3458, D5634, D6043**

alkaline reserve, *n*—the level, expressed as moles per kilogram or percent by weight of paper, of alkaline materials (such as calcium carbonate) capable of neutralizing either acidic degradation products formed in paper during its use and storage, or acidic gases sorbed by the paper from the atmosphere.

alkaline-sized paper, *n*—paper that has been manufactured using a procedure or process at a pH value above 7 (usually 7.5 to 10.0) that results in paper that has resistance to aqueous liquid penetration. See **sizing**. **D3208, D3290, D3301, D3458, D5634, D6043**

ash, *n—in wood, pulp, or paper; general term,* the residue after the ignition of a specimen of wood, pulp, or paper at a specified temperature for a specified time so as to remove combustible and volatile components. **D586**

base paper, *n*—the fiber network existent prior to the application of any material onto the surface of that fiber network. **D3208, D3290, D3301, D3458**

DISCUSSION—An example is paper, internally sized, in preparation for a coating or surface sizing operation.

bending moment, *n— of paper*, the work (force multiplied by the distance over which it is applied) required to deflect the test piece under specified conditions. **D5342, D5650**

bleached, *adj*—having been subjected to the process of bleaching. **D3301, D3453, D5634, D6043, D3208, D3290**

bleaching, *n*—a process involving a chemical or biological treatment of pulp, primarily to increase whiteness and brightness; such a process may alter or remove noncellulosic materials, such as but not limited to lignin, resin, and colorants.

blocking, *n—of paper or paperboard*, undesired cohesion or adhesion that interferes with the satisfactory and efficient use of the material. **D918**

blocking resistance, *n— of paper or paperboard*, the capacity of a given paper or paperboard to resist blocking. See **blocking**. **D918**

bond paper, *n*—one of many grades of paper covering a wide range of quality, from grades requiring superior permanence, strength and durability to applications where permanence and durability are less important, but in all cases requiring good printing properties, color fidelity, erasability, and cleanliness. **D3290**

book bulk, *n*—the overall thickness of a given number of sheets. See **thickness**. **D2175**

book paper, *n*—a general term for a group of uncoated or coated papers (exclusive of newsprint) suitable for the graphic arts. **D5634**

DISCUSSION—Grammage of book papers is usually in the range from 44 to 148 g/m^2 (basis weight 30 to 100 lb, 25 x 38 in. – 500 sheets). They are characterized by a wide variety of surface finishes (for example, antique, eggshell, machine, English, dull, matte, supercalendered, glossy, etc.), with good formation, printability and cleanliness.

breaking length, *n—of pulp and paper*, a calculated value expressed as the length of a strip of paper, usually stated in metres, which would break of its own weight when suspended vertically; calculated from the tensile strength and the basis weight of the sheet. **D828**

brightness, *n—in paper and paperboard,* reflectance of an infinitely thick stack of material measured for blue light with centroid wavelength of 457 nm under specified spectral and geometric conditions. **D828**

bulking number, *n— of paper,* the number of sheets required to produce a stack of 25 mm thickness (approximately 1 in.). See **thickness**. **D2175**

bursting strength—*of paper or paperboard*, the maximum liquid pressure required to produce rupture of the material when the pressure is increased at a controlled rate through a rubber diaphragm to a constrained circular area of the material. **D774/D774M**

bursting strength "points", *n—in paper*, a unit of measure for bursting strength, measured in pounds per square inch, that should be considered colloquial and directly interchangeable with "pounds per square inch". See **bursting strength**. **D774/D774M**

caliper, *n—of paper and paperboard,* see **thickness**.

chemical pulp, *n*—fibrous material obtained by a predominantly chemical treatment of wood or other plant material; principal processes are sulfate (also known as kraft), sulfite, and soda. (see **mechanical pulp** and **semichemical pulp**)

coated paper, *n*—paper which has been coated on one or both sides with a minimum coat weight of 2.5 lb/3300-ft^2 (3.7 g/m^2) of coating material per side. see **coating**. **D3458**

coating, *n—of paper,* the layer of pigment and adhesive applied to the surface of paper or paperboard to create a new surface. **D5634**

DISCUSSION—Paper is coated to improve smoothness and the efficiency of printing. Although the kind and amount of coating are important, the purchaser is concerned with performance, that is, smoothness, resistance to pick, printability, etc.

cockle, *n—of paper*, a defective, puckered condition of a paper sheet as a result of non-uniform hygro-expansion which can be related to any non-uniformity in the sheet, including mass distribution and drying stresses.

cockle finish, *n— of paper*, an intentional rough, puckered surface, typically obtained by rewetting and drying of a paper sheet without physical restraint.

coefficient of kinetic or sliding friction, *n—of paper,* the ratio of the force required to sustain the uniform relative movement of the surfaces, to the normal force. **D4917, D4918**

coefficient of static or starting friction, *n—of paper,* the ratio of the force resisting initial motion of the surfaces, to the normal force. **D4917, D4918**

contact angle, *n— for paper wettability,* the angle formed by a paper substrate and the tangent to the surface of the liquid drop at the point of contact with the substrate when measured under specified conditions. **D5725**

contaminant, *n*—a general term applicable to various extraneous and undesirable materials in pulp or other papermaking raw materials.

DISCUSSION—The term contaminant may in some instances refer to materials such as adhesives, wet strength resins, inks, dirt, coatings, toners, asphalt, plastics, rubber, and so forth.

continuous form, *n*—a quantity of paper made up of numerous connected individual perforated sheets, folded to form a pack. **D4987**

copper number—the weight in grams of copper reduced from the cupric to the cuprous state by exposure to 100 g of paper, paperboard, or pulp as determined by a specified method; indicates the relative number of reducing groups in the pulp or paper and is used as a measure of its chemical quality and stability. **D919**

cotton linters, *n*—the short fibers adhering to cottonseed after the operation of ginning (seed removal and cleaning); cut from the seed in a series of passes through cutting blades and referred to as "first-cut linters," "second-cut linters," "mill run," and so forth; used primarily in the manufacture of cotton fiber content paper and cellulose derivatives.

critical wax strength number, *n—in paper surface strength,* the average highest numerical designation of wax that does not disturb the surface of the paper whose surface strength is tested by the wax pick method under specified conditions. See **pick**. **D2482**

cross direction—the direction of the paper or paperboard at right angles to the machine direction. Sometimes referred to as CD, CMD (cross machine direction), and across machine direction. **D528**

degradation, *n*—change of a chemical compound to a less complex compound (dictionary definition).

dirt, *n—general term*, any undesirable, extraneous, or contamination material visible in transmitted or reflected light in or on pulp, paper, or paperboard.

dirt, *n—quantitative term*, any undesirable, extraneous, or contaminating material in or on pulp, paper or paperboard, that has marked contrasting color to the rest of the sheet when viewed at more than one angle by reflected light, and that has an equivalent black area of 0.04 mm^2 or more. See **dirt**, *equivalent black area of a dirt speck* (**EBA**).

dirt, *n—equivalent black area of a dirt speck (***EBA***)*, the area of the black spot on the white background of the TAPPI Standard Dirt Chart that makes the same visual impression on its background as does the dirt speck on the particular background in which it is embedded. **D2019**

DISCUSSION—It follows that the estimated equivalent black area of a gray or colored speck would be smaller than its actual area in inverse proportion to the intensity of its color contrast with its background. The equivalent area of a black spot in a dark brown paper would be considerably smaller than its actual area, and rightly so, since its presence would not be as pronounced as it would be if it were embedded in a white sheet.

double fold, *n— of paper*, one complete oscillation of the paper test specimen, during which it is folded first forward, then backward about the same base. **D643**

durability, *n—of paper*, the capacity of paper or paperboard to resist the effects of wear in performance situations. **D3208, D3290, D3301, D3458, D5634, D6043**

DISCUSSION—**Durability** should not be used interchangeably with **permanence**. For example, paper money should be durable, but maximum permanence is not essential.

elastic limit, *n— of paper and paperboard*, the value of paper or paperboard tensile force above which the ratio of the rate of change in the tensile force to the rate of change in length is no longer constant. See **elongation** and **tensile strength**. **D828**

elastic region, *n— of paper and paperboard*, the region of tensile force-elongation behavior of a specific paper or paperboard where the ratio of the rate of change in the tensile force to the rate of change in length is constant. See **elongation** and **tensile strength**. **D828**

elongation, *n—of paper and paperboard*, See **stretch**. **D828**

fiber, *n*—a thread-like body or filament many times longer than its diameter. For paper, fibers usually are of vegetable origin but may be derived from animal, mineral, or synthetic sources for special types of paper products.

filler, *n—for paper or paperboard*, a material, generally nonfibrous and inorganic, added to the fiber furnish.

filler, *n—for paperboard*, the inner ply or plies of a multi-ply sheet.

fold number, *n*—See **folding number**. **D643, D2176**

folder stock, *n*—a paperboard used for the manufacture of folders for filing purposes. **D3301**

DISCUSSION—It is usually made of wood pulp and reclaimed paperstock, although some grades are made from rope or jute stock. It may be surface sized to provide better wearing qualities. It is characterized by high values for tearing resistance, stiffness, and folding endurance.

folding endurance, *n— of paper*, the average of the logarithms to the base 10 of the individual folding numbers. See **folding number**. **D643, D2176**

folding number, *n*—the number of double folds required to cause failure of a paper test specimen when it is subjected to a prescribed folding procedure. **D643, D2176**

furnish, *n*—in any papermaking process, all of the materials added prior to sheet formation

glazed manifold, *n*—a manifold paper having a high gloss, or polish, formed on the surface of the paper by methods such as friction glazing, calendering, plating, etc. **D3208**

grain, *n*—the machine direction of paper.

DISCUSSION—The machine direction of most machine-made papers is generally the direction of highest stiffness and highest tensile strength properties. The higher strength properties result from the combined effects of higher fiber orientation, wet-straining, and drying restraint in the machine direction. The direction of maximum stiffness can significantly affect how well a paper feeds in equipment such as offset presses, photocopiers, or computer printers. For this reason, the manufacturers of such equipment generally recommend the use of either "grain long paper" or "grain short paper." By altering the paper manufacturing process to change fiber orientation, wet-straining, or drying restraint, it may be possible to produce a paper that has a direction of maximum stiffness that is not in the machine direction.

grain long paper, *n*—paper in which the machine direction parallels the longest sheet dimension.

grain short paper, *n*—paper in which the machine direction parallels the shortest sheet dimension.

groundwood pulp, *n*—a type of mechanical pulp produced by grinding wood logs against a rotating stone.

handsheet, *n*—a sheet of fibrous material produced by a specified procedure, generally in a laboratory. **D5803**

high life expectancy, LE-100, *n—of paper*, a paper is expected to be usable for 100 years. **D3208, D3290, D3301, D3453, D5634, D6043**

high life expectancy paper, LE-100, *n—for paper*, a paper expected to be usable for 100 years when stored under prescribed conditions. **D3208, D3290, D3301, D3458, D5634, D6043**

high referral, *adj— in paper*, descriptive of any grade of paper designed for use in situations involving frequent handling. **D3208, D3290, D3458**

high usage, *adj— in paper folders*, descriptive of any grade of folder designed for use in situations where folders are handled frequently. **D3301**

ledger paper, *n*—a paper characterized by strength, high tearing resistance, erasability, water resistance, ink receptivity, uniformity of surface, and smoothness. **D3290**

DISCUSSION—Originally, ledger paper was used especially for pen and ink records. Most ledger papers are surface sized, frequently subjected to appreciable wear, and must have a high degree of permanence and durability.

life expectancy (LE), *n— for paper*, length of time a product can be expected to maintain its functional (that is, physical, chemical, appearance, and so forth) characteristics when stored under prescribed conditions.

life expectancy designation, *n—for paper*, a rating in years for the life expectancy of paper, when stored under prescribed conditions. **D3208, D3290, D3301, D3458, D5634, D6043**

lignin, *n*—an amorphous, noncarbohydrate polymer of high molecular weight, primarily composed of aromatic organic molecules, which is found within and between the cell walls of most plants.

lot, *n—of paper or paperboard*, a quantity of paper or paperboard of a single type, grade, grammage, thickness, and composition about which it is desired to make a judgment (usually as to conformance to specification) by examining or testing a small fraction called the sample. **D585**

machine direction, *n*—the direction of a paper or paperboard corresponding or parallel to the direction of flow of the stock along the paper machine; sometimes referred to as MD or along machine direction. (See **cross direction**.)