Designation: D1968 – 15

An American National Standard

Standard Terminology Relating to Paper and Paper Products[1]

This standard is issued under the fixed designation D1968; 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.

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D528 Test Method for Machine Direction of Paper and Paperboard (Withdrawn 2010)[3]

D548 Test Method for Water-Soluble Acidity or Alkalinity of Paper (Withdrawn 2009)[3]

D585 Practice for Sampling and Accepting a Single Lot of Paper, Paperboard, Fiberboard, and Related Product (Withdrawn 2010)[3]

D586 Test Method for Ash in Pulp, Paper, and Paper Products (Withdrawn 2009)[3]

D589 Test Method for Opacity of Paper (15° Diffuse Illuminant ***A***, 89 % Reflectance Backing and Paper Backing) (Withdrawn 2010)[3]

D643 Test Method for Folding Endurance of Paper by the Schopper Tester (Withdrawn 2010)[3]

D645/D645M Test Method for Thickness of Paper and Paperboard (Withdrawn 2010)[3]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D774/D774M Test Method for Bursting Strength of Paper (Withdrawn 2010)[3]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Test Methods for Hydrogen Ion Concentration (pH) of Paper Extracts (Hot-Extraction and Cold-Extraction Procedures) (Withdrawn 2010)[3]

D828 Test Method for Tensile Properties of Paper and Paperboard Using Constant-Rate-of-Elongation Apparatus (Withdrawn 2009)[3]

D829 Test Methods for Wet Tensile Breaking Strength of Paper and Paper Products (Withdrawn 2009)[3]

D918 Test Method for Blocking Resistance of Paper and Paperboard (Withdrawn 2011)[3]

D919 Test Method for Copper Number of Paper and Paperboard (Withdrawn 2009)[3]

D984 Test Methods for Reducible Sulfur in Paper (Withdrawn 2010)[3]

D985 Test Method for Brightness of Pulp, Paper, and Paperboard (Directional Reflectance at 457 nm) (Withdrawn 2010)[3]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D2019 Test Method for Dirt in Paper and Paperboard (Withdrawn 2010)[3]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]

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[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).

Current edition approved Oct. 1, 2015. Published December 2015. Originally approved in 1990. Last previous edition approved in 2007 as D1968 – 02a (2007)$^{\epsilon 1}$ which was withdrawn in May 2010 and reinstated in October 2015. DOI: 10.1520/D1968-15.

[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**.)

manifold paper, *n*—a lightweight paper used primarily for copies by interleaving with carbon paper. **D3208**

DISCUSSION—A typical manifold paper may be glazed, and have a cockle finish.

maximum life expectancy, LE-1000, *n—for paper*, a paper is expected to be usable for 1000 years. **D3208, D3290, D3301, D3458, D5634, D6043**

maximum life expectancy paper, LE-1000, *n—for paper*, a paper expected to be usable for 1000 years when stored under prescribed conditions. **D3208, D3290, D3301, D3458, D5634, D6043**

mechanical pulp, *n*—fibrous material obtained by treating wood or other plant material with a predominantly mechanical process, such as stone groundwood (SGW), pressurized groundwood (PGW), refiner mechanical pulp (RMP), and thermomechanical pulp (TMP). (See **chemical pulp** and **semichemical pulp**.) **D3208, D3290, D3301, D3453, D5634, D6043**

medium life expectancy, LE-50, *n—for paper*, a paper is expected to be usable for 50 years. **D3208, D3290, D3301, D3453, D5634, D6043**

medium life expectancy paper, LE-50, *n—for paper*, a paper expected to be usable for 50 years when stored under prescribed conditions. **D3208, D3290, D3301, D3458, D5634, D6043**

mill broke, *n*—any paper generated in a paper mill prior to the completion of a specific paper manufacturing process which is unsuitable for subsequent applications but can be reused in the paper manufacturer process.

neutral sized paper, *n*—paper that has been manufactured using a procedure or process at a pH value of 7 (with a normal range of 6.5 to 7.5) that results in paper that has resistance to aqueous liquid penetration. See **sizing**. **D3208, D3290, D3301, D3458, D5634, D6043**

off grade, *adj*—not meeting predetermined specifications.

office copies, *n— (also quick copies, imaged copies)*, reproductions made by direct or indirect electrostatic printing, ink jet printing, thermographic processing or similar processes, as contrasted with conventional printing, such as letterpress or offset.

offset paper, *n*—an uncoated or coated paper designed for use in offset lithography. **D5634**

DISCUSSION—The kind, type, and combinations of pulps used in the maufacture of offset papers depend on the sheet qualities desired. Important qualities are good internal bonding, high surface strength, good dimensional stability, lack of curl, and freedom from fuzz and foreign surface material.

opacity, *n—of paper*, one hundred times the ratio of the light reflected by a paper specimen when the specimen is backed by a black body of 0.5 % reflectance or less to that when the specimen is backed by a thick stack of the same kind of paper. **D589**

package, *v*—to prepare goods for distribution by enclosing in a container or covering. (See Terminology D996.)

packaging, *n*—(See Terminology D996.)

paperboard—one of the two broad subdivisions of paper (general term), the other being paper (specific term). The distinction between paperboard and paper is not sharp but, broadly speaking, paperboard is heavier in basis weight, thicker and more rigid than paper. In general, all sheets 12 points (0.012 in., 3.0 mm) or more in thickness are classified as paperboard. There are a number of exceptions based upon traditional nomenclature. For example, blotting paper, felts, and drawing paper in excess of 12 points are classified as paper while corrugating medium, chipboard, and linerboard less than 12 points are classified as paperboard. Paperboard is made from a wide variety of furnishes on a number of types of machines, principally cylinder and fourdrinier. The board classes are: (*1*) containerboard, which is used for corrugated boxes; (*2*) boxboard, which is principally used to make cartons; and (*3*) all other paperboard. **D646**

paper acidity, *n*—the extent to which water-soluble materials in paper alter the hydrogen-hydroxyl ion equilibrium of reagent water causing an excess of hydrogen ions, as measured by titrating with a standardized solution of alkali under specified conditions. **D548, D778**

paper alkalinity, *n*—the extent to which water-soluble materials in paper alter the hydrogen-hydroxyl ion equilibrium of reagent water causing an excess of hydroxyl ions, as measured by titrating with a standardized solution of acid under specified conditions. **D548, D778**

paper manufacturing process, *n*—an operation that begins with the pulping of fibrous and nonfibrous raw materials and ends after the first slitter/winder, with the cutting and trimming of the reel into smaller rolls. In an operation in which the finished product is sheeted directly off the machine, the production of rough sheets constitutes the end of the process. In an operation that involves supercalendaring, the end of the process is at the slitter/winder following the supercalendar. In an operation that involves off-machine coating, the process ends at the slitter/winder following the coater or the supercalendar associated with the coater.

paper mill sludge, *n*—a slurry of solid residues from a paper mill's waste water treatment system containing fibers and other material.

paper product, *n*—any item manufactured from paper or paperboard.

DISCUSSION—Unless specific clarification is made within an ASTM definition, the use of the term "paper" shall mean paper or paperboard.

percentage elongation, *n— of paper*, a mathematical quantity used to express elongation (stretch) as a percentage increase in the length of a paper test specimen at rupture, in comparison to its length at the beginning of a tensile test carried to rupture under specified conditions. See **elongation**. **D828**

perforations, *n— in paper*, a line of slits scored in a sheet of paper so that it may be easily folded, refolded, and afterwards torn off with ease. **D4987**

DISCUSSION—In a continuous form, the perforations may be at the fold, or internal within the individual sheets of a form. Internal perforations may be either horizontal/parallel with the fold or vertical/perpendicular to the fold. Margin perforations fall under the latter description.

permanence, *n—of paper*, the tendency to resist changes in any or all of its properties with the passage of time. **D3208, D3290, D3301, D3458, D5634, D6043**

DISCUSSION—It is expected that the terms maximum, high, and medium permanence will eventually be replaced with maximum, high, and medium life expectancy, or with the LE designations LE-1000, LE-100, and LE-50.

pick, *n—in paper*, a defect that occurs in paper when its surface or the coating on its surface (or both) lifts from the paper's surface. **D2482**

pulping, *n*—the operation of altering a cellulosic raw material such as pulpwood, rags, straw, reclaimed paper, and so forth, into a form suitable for further processing into paper or paperboard; may vary from simple mechanical action to rather complex, chemical digestive sequences and combinations of the two. (See **chemical pulp, semichemical pulp,** and **mechanical pulp**.)

recovered material, *n*—materials and byproducts that have been separated, diverted, or removed from the solid waste stream, but not including those materials and byproducts generated from and reused within an original manufacturing process.

recovered paper material, *n*—paper materials that have been separated, diverted, or removed from the solid waste stream excluding the virgin content of mill broke, for the pupose of use, reuse, or recycling, whether or not such materials require subsequent separation and processing.

DISCUSSION—Recovered paper material must be repulped or reintroduced into the paper manufacturing process before fiber derived from it can be claimed as recycled fiber.

recycle, *v*—a multiphased processing that includes removal, separation, and/or diversion, of materials from the solid waste stream; use of such materials as raw materials for the manufacture of new products; and the use of the new product.

recycled content paper, *n*—a paper product containing recycled fiber expressed as a percentage of total fiber weight, or a paper product containing recovered material (excluding wood residues and sawdust) expressed as a percentage of total product weight.

recycled fiber, *n— in paper*, fiber derived from recovered material, excluding wood residues and sawmilling residues, which has been repulped or reintroduced into the paper manufacturing process and made into a product or form usable in the manufacture of a product.

recycled fiber content, *n*—the percentage of recycled fiber, by total fiber weight, of a paper product.

recycled paper, *n*—a paper product whose fiber content consists totally of recycled fiber.

reducible sulfur—any form of sulfur or sulfur compounds in paper or paperboard that can be converted to hydrogen sulfide on treatment with a metal such as aluminum and an acid under the conditions of a specified test; it is a measure of the quantity of sulfur compounds in the paper or paperboard that may react with metals to cause tarnishing. **D984**

reflectance, *n— in optical measurement of paper*, the ratio of the reflected radiant of luminous flux to the incident flux, measured under specified conditions, expressed as a percentage. **D985**

resistance to bending, *n— in paper*, the force required to deflect a rectangular test piece of paper, clamped at one end, through a specified angle when the force is applied near the free end of the test piece, normal to the plane which includes the near edge of the test piece, the clamp, and the point or line of application of the force. **D5342, D5650**

DISCUSSION—Resistance to bending will vary if the angle, the width of the rectangular test piece, or the distance between the edge of the clamp and the application of the force are changed from those specified.

reusable, *adj*—capable of being used again or repeatedly.

sample, *n—of paper or paperboard*, a specified number of test units selected in accordance with a prescribed procedure to represent the lot. See **lot**. **D585**

saw milling residue, *n*—sawdust, chips, slabs, bark, and other debris generated during the processing of logs into finished lumber or lumber products.

semichemical pulp, *n*—fibrous material obtained by treating wood or other plant material with a combination of chemical and mechanical processes, such as chemimechanical pulp (CMP), chemithermomechanical pulp (CTMP), bleached chemithermomechanical pulp (BCTMP), and neutral sulfite semichemical pulp (NSSC). (See **chemical pulp** and **mechanical pulp**.)

sizing, *n*—the addition of materials to a papermaking furnish, or the application of materials to a surface or board, which results in a paper or board that exhibits some resistance to liquid penetration.

DISCUSSION—Internal sizing is provided by addition of materials to the furnish. Surface sizing is provided by application of sizing materials to the surface of the paper or board. Surface sizing may also enhance properties such as abrasion resistance, abrasiveness, creasabillity, finish, smoothness, surface bond strength, and printability. Surface sizing can also alter porosity and reduce surface fuzz.

solid waste—discarded solid materials, excluding recovered materials.

solid waste stream, *n*—discarded material moving from the point of discard to ultimate disposition.

squareness, *n—of paper dimensions*, the variation of the angle of the corner of a sheet of paper from 90°. **D5625**

stickies, *n*—particulate, generally non-fibrous, contaminants suspended in pulps of the type used in papermaking which

adhere to themselves, other components of the paper structure, components of the papermaking machinery, and in the case where the contaminants are incorporated into the finished paper or paper products, cause the unexpected and generally undesirable adherence one to another of units of the finished paper or paper product.

DISCUSSION—The suspended particulate contaminants are usually of low specific gravity and include, but are not limited to, residual materials such as adhesives and coating residues, films, tapes, rubber-like particles, inks, and hydrolysis products of synthetic sizing materials.

stiffness (or bending stiffness), *n—of paper or paperboard*, the degree to which paper or board resists bending when subjected to a bending force in its intended use, or when using a defined testing procedure. **D5342, D5650**

strength, *n—of paper*, the force at which paper ruptures.

stretch, *n—of paper*, the maximum tensile strain (elongation) developed in a paper test specimen prior to rupture in a tensile test that has been carried to rupture under the conditions specified. **D828**

surface resistivity, *n—of paper*, the resistance to electric current between electrodes placed on the same paper surface along the current path between the electrodes when a defined dc voltage is applied and the gap between the electrodes is specified.

DISCUSSION—Surface resistivity is expressed as ohms. It is the reciprocal of surface conductivity. The value is an important measure to indicate the level of static charge the paper can carry and is important for the successful functioning of non-impact copiers and printers. (Note: Some volume resistance is unavoidably included in the actual measurement.)

Taber stiffness unit, *n— of paper*, the common unit measure used with Taber instruments. **D5342, D5650**

DISCUSSION—Most Taber stiffness testers are calibrated in multiples of this unit. One Taber stiffness unit (gram-force centimetre) is equal to 0.098066 millinewton metres.

tag board, *n*—a paperboard used for shipping tags, file folders, printed forms, envelopes, etc. **D3301**

DISCUSSION—It is made from rope, jute, chemical wood pulp or mechanical wood pulp, or combinations of these. It usually has a manila color and a smooth finish. It is characterized by high values for folding endurance, bursting strength, tensile strength, tearing resistance and water finish.

tensile energy absorption (TEA), *n—of paper*, a mathematical quantity used to express the energy absorbed by a paper specimen prior to rupture in a tensile test carried to rupture under conditions specified. **D828**

tensile index, *n*—a mathematical quantity calculated by dividing the tensile strength of a sample by its mass per unit area, both terms expressed in SI units. See **tensile strength**. **D828**

tensile stiffness, *n— of paper*, a mathematical quantity expressing the ratio of the tensile force on paper to its tensile strain in the elastic region of the tensile force-elongation behavior of the material **D828**

tensile strength, *n— of paper*, the maximum tensile force developed per unit width of a paper test specimen prior to rupture in a tensile test which has been carried to rupture under conditions specified. **D828**

tensile work, *n— of paper*, a term having the same meaning as **tensile energy absorption** when used for paper. **D828**

test determination, *n*—(*a*) the process of carrying out the series of operations specified in a test method whereby one or more readings (observations) are made on a test specimen and the observations combined to obtain the value of a property of the test specimen, or (*b*) the value obtained by the process. **D585**

test result, *n*—the value obtained for a given property from one test unit, which may be a single observation or the combination of multiple observations, as required by a specific test method. See **test unit**.

test specimen, *n— of paper*, test unit, or portion of the test unit, upon which single or multiple test determinations are to be made. See **test unit**. **D585**

test unit, *n—of paper*, a unit or portion of the sample sufficient to obtain the test result(s) for the property or properties to be measured. **D585**

thickness, *n—of paper or paperboard*, the perpendicular distance between the two principal surfaces of the paper or paperboard as measured under the specified conditions. See **caliper**.

ties and slits, *n— in paper*, ties are areas of uncut paper between slits of cut paper within a perforation. **D4987**

virgin fiber, *n— in paper*, fiber that has been derived from sources other than paper or textile materials that have been recovered. **D5663**

volume resistivity, *n—of paper*, the resistance to electric current along a current path between electrodes placed on opposite sides of a sheet of paper when a defined dc voltage is applied and the thickness of the paper between the electodes is specified.

DISCUSSION—Volume resistivity is expressed as ohm-centimeters of ohm-inches. It is the reciprocal of volume conductivity.

wet tensile strength, *n— of paper*, tensile strength of water-saturated paper or paperboard measured under specified conditions. **D829**

wire side, *n—of paper*, the side of paper that was in contact with the sheet-forming wire on a paper machine that utilized a single wire (versus a twin-wire) forming section (also called the “bottom side”). **D5039**

wood residue, *n*—the scrap and waste wood resulting from the harvest of trees.

xerographic paper, *n*—a grade of paper suitable for copying by the electrostatic process. **D3458**

DISCUSSION—These papers are bond grade and are characterized by a smooth finish, heat stability, noncurling qualities, and brightness.

yield factor, *n— in papermaking*, either a proportion or percentage representing that portion of the input material

that is retained after paper stock preparation for inclusion in the paper manufacturing process. **D5663**

zero-span, *adj— in tensile testing*, having a grip separation of 0.00 mm (0.000 in.). **D5803, D5804**

zero–span tensile strength, *n—of paper*, the tensile strength of a sheet of fibrous material, measured with special jaws, at an apparent initial span of zero.