



Designation: D16 – 14

Standard Terminology for Paint, Related Coatings, Materials, and Applications¹

This standard is issued under the fixed designation D16; 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 This standard consists of technical terms used in standards under the jurisdiction of ASTM Committee D01 (on Paint and Related Coatings, Materials, and Applications), and of definitions suitable for use in these standards.

NOTE 1—When any definition in this standard is quoted or published out of the context of this standard, editorially insert the following delimiting statement “for paints and related coatings, materials, and applications” after the dash following the term (in the absence of an existing delimiting statement). This will limit the field of application of the term and definition to that approved by this committee.

1.2 In this terminology standard, definitions used in other ASTM standards are indicated by following the definition with the designation of that standard. In some cases, a relevant D01 subcommittee is also listed. Definitions influenced by those used by other organizations are indicated by the acronym of the organization. Primary terms are given in bold, while narrower and unapproved terms are given in italics.

1.3 There are several specialized terminology standards under the jurisdiction of Committee D01, as follows: **D804**, **D1695**, **D6440**, **D6488**, and **D7188**. Few definitions from those standards are included in Terminology D16. Therefore, in searches for definitions of paints and coatings terms, these standards should be included where appropriate.

2. Referenced Documents

2.1 ASTM Standards:²

- D804 Terminology Relating to Fine Chemicals, Including Tall Oil and Related Products**
- D968 Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive**
- D1475 Test Method For Density of Liquid Coatings, Inks, and Related Products**

¹This terminology is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.16 on Terminology.

Current edition approved Dec. 1, 2014. Published February 2015. Originally approved in 1911. Last previous edition approved in 2012 as D16 – 12. DOI: 10.1520/D0016-14.

²For 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.

D1653 Test Methods for Water Vapor Transmission of Organic Coating Films

D1695 Terminology of Cellulose and Cellulose Derivatives

D1729 Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials

D1736 Test Method for Efflorescence of Interior Wall Paints (Withdrawn 1997)³

D1848 Classification for Reporting Paint Film Failures Characteristic of Exterior Latex Paints (Withdrawn 2003)³

D2794 Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

D3450 Test Method for Washability Properties of Interior Architectural Coatings

D4062 Test Method for Leveling of Paints by Draw-Down Method

D4209 Practice for Determining Volatile and Nonvolatile Content of Cellulosics, Emulsions, Resin Solutions, Shellac, and Varnishes

D4366 Test Methods for Hardness of Organic Coatings by Pendulum Damping Tests

D4958 Test Method for Comparison of the Brush Drag of Latex Paints

D5146 Guide to Testing Solvent-Borne Architectural Coatings

D5178 Test Method for Mar Resistance of Organic Coatings

D6440 Terminology Relating to Hydrocarbon Resins

D6488 Terminology Relating to Print Problems

D7188 Terminology for Printing Inks, Materials, and Processes

E284 Terminology of Appearance

2.2 EPA Documents:⁴

450/3-83-013R Glossary for Air Pollution Control of Industrial Coating Operations

Method 24, 40 CFR Part 60, Appendix A Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings

³The last approved version of this historical standard is referenced on www.astm.org.

⁴Available from United States Environmental Protection Association (EPA), Ariel Rios Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20460, <http://www.epa.gov>.

*A Summary of Changes section appears at the end of this standard

3. Terminology

3.1 For definitions of terms having to do with appearance, see Terminology E284.

3.2 Definitions:

abrasion resistance, *n*—(for coatings) the ability of a coating to resist being worn away and to maintain its original appearance and structure when subjected to rubbing, scraping, or wear. **D968, D01.23**

acid number, *n*—(for coatings) the number of milligrams of potassium hydroxide (KOH) required to neutralize the free acids in 1 g of an oil, resin, varnish, or other substance; generally reported on the nonvolatile content.

acid value—see **acid number**.

acrylic resin—under **resin, synthetic**, see *acrylic resin*.

additive, *n*—a substance added in small quantities to another substance, usually to improve specific properties (for example, a drier, mildewcide, etc.).

adhesion promoter, *n*—a material built into a binder or added to a paint to form primary bonds to either the substrate or the previously applied coating, with the specific aim of improving the dry or wet adhesion, or both. **D01.23**

alkyd resin—under **resin, synthetic**, see *alkyd resin*.

architectural coating, *n*—organic coating intended for on-site application to interior or exterior surfaces of residential, commercial, institutional, or industrial buildings, in contrast to industrial coatings. **D5146, D01.42**

Discussion—They are protective and decorative finishes applied at ambient temperatures. Often called Trade Sales Coatings.

associative thickener, *n*—water-soluble polymers containing hydrophobic groups that are capable of nonspecific hydrophobic association similar to surfactants that elevate viscosity presumably by association between thickener particles or thickener and dispersed particles that may be present in the aqueous system such as latex particles rather than through high molecular weight or chain stiffness of the thickener molecules themselves.

autodeposition, *n*—a single-step immersion metal finishing process in which an organic coating is applied by means of unique surface chemical reactions carried out in an aqueous latex dispersion, also referred to as chemiphoresis. Components within the bath give rise to chemical reactions that slightly solubilize the metallic surface and lead to destabilization, deposition, and coalescence of the dispersed latex particles at that surface.

Discussion—The deposition rate of the latex is controlled by the rate of surface solubilization. The process does not require any pretreatments such as phosphating, needs no external energy input, and gives rise to deposition wherever the solution wets the substrate. Irregularly shaped parts can be uniformly coated.

baking finish, *n*—a paint or varnish that requires baking at temperatures above 150°F (65°C) for the development of desired properties.

baking temperature, *n*—a temperature above 150°F (65°C).

batch, *n*—the total quantity of a material produced in a single final mixing operation after all production processes are complete, or just prior to filling.

bituminous varnish—under **varnish**, see *bituminous varnish*.

bleeding, *n*—the diffusion of coloring matter through a coating from the substrate; also, the discoloration arising from such diffusion. In the case of printing ink, the spreading or running of a pigment color by the action of a solvent such as water or alcohol.

blister, *n*—a dome-shaped defect caused by the formation of a gas or liquid under a coating film which results in a localized loss of adhesion and lifting of the coating, that is, film, from the substrate.

blistering, *vi*—to raise a bubble or blister formed by trapped gasses or trapped liquid under a cured coating or film.

Discussion—There are coatings that permit gasses to pass through the coating without causing a blister.

blistering resistance, *n*—the ability of a coating to resist the formation in the film of dome-shaped, liquid- or gas-filled projections resulting from local loss of adhesion and lifting of the film from the previously applied coating or the substrate.

blocking, *n*—for coatings other than powder coatings, the sticking of a coated surface to an adjacent surface when the two surfaces have been in contact for an extended period of time. **D01.42**

brush-drag, *n*—resistance encountered when applying a coating by brush, directly related to the high-shear viscosity of the coating. **D4958, D01.42**

bulking value, *n*—solid volume of a unit weight of material, usually expressed as gallons per pound. For practical purposes this is 0.120 divided by the specific gravity.

caulking compound, *n*—a soft, plastic material, consisting of pigment and vehicle, used for sealing joints in buildings and other structures where normal structural movement may occur.

Discussion—Caulking compound retains its plasticity for an extended period after application. It is available in forms suitable for application by gun and knife and in extruded preformed shapes.

cellulose lacquer—see **lacquer**.

chalking resistance, *n*—the ability of a pigmented coating to resist the formation of a friable powder on its surface caused by the disintegration of the binding medium by degradative weather factors.

checking resistance, *n*—the ability of a coating to resist slight breaks in the film that do not penetrate to the previously applied coating or to the substrate. The breaks should be called cracks if penetration extends to the previously applied coating or to the substrate. See **cracking resistance**.

chipping resistance, *n*—the ability of a coating or layers of coatings to resist removal, usually in small pieces, resulting from impact by hard objects or from wear during service.

coating, *n*—(1) a liquid, liquefiable, or mastic composition that is converted by evaporation, cross-linking, or cooling to a solid or semisolid protective, decorative, or functional adherent layer after application; (2) the solid or semisolid layer resulting from application of the composition above.

DISCUSSION—Liquefiable can involve melting or suspending. Coatings include, but are not limited to, paints, varnishes, sealers, and stains.

color of an object, *n*—the aspect of the appearance of an object dependent upon the spectral composition of the incident light, the spectral reflectance or transmittance of the object, and the spectral response of the observer.

hue, *n*—the attribute of color perception by means of which a color is judged to be red, orange, yellow, green, blue, purple, or intermediate between adjacent pairs of these, considered in a close ring, red and purple being an adjacent pair. (White, gray and black colors possess no hue). **E284**

DISCUSSION—The short end of the spectrum is violet, with purple by definition being a nonspectral combination of red and violet. The practice of replacing violet by purple in the roster of object colors is apparently a practical accommodation to color-order requirements, as described in the Munsell system. See Practice D1729.

lightness, *n*—(1) the attribute by which a perceived color is judged to be equivalent to a member of a series of grays ranging from black to white; (2) the attribute of color perception by which a non-self-luminous body is judged to reflect more or less light. **E284**

saturation—attribute of a visual sensation that permits a judgment to be made of the proportion of pure chromatic color in the total sensation. **E284**

contrast ratio, *n*—ratio of the reflectance of a dry paint film over a black substrate of 5 % or less reflectance, to the reflectance of the same paint, equivalently applied and dried, over a substrate of 80 % reflectance.

coverage, coverage rate, covering power—ambiguous terms that are used in some instances to refer to hiding power and in others to mean spreading rate. The precise terms **hiding power** and **spreading rate** are preferred.

cracking resistance, *n*—the ability of a coating to resist breaks of the film where the breaks extend through to the surface painted and the previously applied coating or the substrate is visible. The use of a minimum magnification of 10 diameters is recommended in cases where it is difficult to differentiate between cracking and checking. See **checking resistance**.

crawling, *n*—defect in which the wet film recedes from localized areas of the substrate (usually caused by insufficient wetting) leaving those areas uncoated. **D1848, D01.42**

curtaining—see **sag or sagging**.

density, *n*—the mass per unit volume of a substrate at a specified temperature and pressure; usually expressed in g/mL, kg/L, g/cm³, g/L, kg/m³ or lb/gal. See **specific gravity**. **D01.23, D01.24**

DISCUSSION—(1) g/mL = kg/L = g/cm³; g/L = kg/m³. (2) Density (lb/gal) = Density (g/mL) × 8.345405 ... (3) The temperature should be 25°C for best conformance with Test Method D1475. For liquids and

solids, which are the usual concerns of Committee D01, the pressure need not be specified. (4) Density of water at 25°C = 0.997044 g/mL = 8.32 lb/gal.

dirt—(for coatings) see **soil**.

dirt resistance, *n*—(for coatings) the ability of a coating to resist soiling by foreign material, other than microorganisms, deposited on or embedded in the dried coating.

distinctness-of-image gloss, *n*—the sharpness with which image outlines are reflected by the surface of an object.

dope, *n*—a composition, usually a cellulosic lacquer, for application on textiles and leathers.

drier, *n*—an additive that accelerates the drying of an oil, paint, printing ink, or varnish.

DISCUSSION—Driers are usually metallic compositions and are available in both solid and liquid forms.

drying oil, *n*—an oil that possesses to a marked degree the property of readily taking up oxygen from the air and changing to a relatively hard, tough, elastic substance when exposed in a thin film to the air.

durability, *n*—a relative term indicating degree of permanency. It may be applied to individual protective, decorative, or functional properties, for example, "the durability of gloss," but if used in a general way, for example, "the excellent durability of a paint," implies the ability of the described coating to retain, to the indicated degree, all the properties required for the continued service of the coating.

edge-tracking, *n*—a residual, discernible pattern in a roller-applied coating, characterized by trails from either or both ends of the roller.

efflorescence, *n*—a condition that occurs when soluble salts in a dry coating or the substrate migrate to the surface due to the movement of water through the film, characterized by a (commonly) white, nonuniform powder or crystalline incrustation, not removable with neutral water but usually removed with dilute mineral acid. **D1736, D1848, D01.42**

DISCUSSION—The previously water-soluble salts become insoluble at the surface of the film due to reaction with carbon dioxide of the air.

emulsion paint—under **paint**, see **emulsion paint**.

enamel, *n*—a paint that is characterized by an ability to form an especially smooth film.

epoxy resins—under **resin, synthetic**, see **epoxy resins**.

erosion resistance, *n*—the ability of a coating to withstand being worn away by chalking or by the abrasive action of water or windborne particles of grit. The degree of resistance is measured by the amount of the coating retained. See **abrasion resistance**.

ester gum—under **resin, synthetic**, see **ester gum**.

extended pigments, *n*—organic pigments diluted with an extender (for example, alumina trihydrate, blanc fixe, or calcium carbonate).

facade paint, *n*—a decorative and protective coating for exterior masonry surfaces—usually for buildings and walls.

DISCUSSION—This is a term more commonly used in Europe.

filiform corrosion resistance, *n*—the ability of a coating to resist that type of corrosion of metal substrates characterized by a definite thread-like structure and directional growth that occurs under coatings.

filler, *n*—a pigmented composition for filling pores or irregularities in a surface preparatory to application of other finishes.

finish, *n*—(1) final coat in a paint system; at the termination of cure or drying; (2) sometimes refers to the entire coating system: the texture, color, and smoothness of a surface, and other properties affecting appearance.

fire-retardant, *adj*—a descriptive term which implies that the described product, under accepted methods of test, will significantly: (a) reduce the rate of flame spread on the surface of a material to which it has been applied, or (b) resist ignition when exposed to high temperatures, or (c) insulate a substrate to which it has been applied and prolong the time required to reach its ignition, melting, or structural-weakening temperature.

fire-retardant coating, *n*—a coating that will do one or more of the following: (1) reduce the flame spread on the substrate over which the coating is applied, sometimes at the sacrifice of the coating (see *intumescent coating*); (2) resist ignition of the substrate when exposed to high temperature; or (3) insulate the substrate to which the coating is applied and thereby prolong the time required to reach its ignition, melting or structural-weakening temperature.

flaking resistance, *n*—the ability of a coating to resist the actual detachment of film fragments either from the previously applied coating or the substrate. Flaking is generally preceded by cracking, checking, or blistering and is the result of loss of adhesion. Also known as scaling resistance.

flattening agent, *n*—a material added to paints, varnishes, and other coating materials to reduce the gloss of the dried film.

forced drying temperature, *n*—a temperature between room temperature and 150°F (65°C).

fossil resin, *n*—under **resin, natural**, see *fossil resin*.

gallon, U. S., *n*—a volume equal to 231 in.³ For paint, varnish, lacquer, and related products this is measured at 77°F (25°C).

glaze, *n*—a very thin coating of a paint product usually a semi-transparent coating tinted with Van Dyke brown, burnt sienna, or a similar pigment, applied on a previously painted surface to produce a decorative effect.

glazing compound, *n*—a dough-like material consisting of pigment and vehicle, used for sealing window glass in frames. It differs from putty in that it retains its plasticity for an extended period.

grain, *n*—an inch-pound unit of weight, equal to 0.002285 avoirdupois oz (0.0648 g).

grinding japan—see **japan, grinding**.

grit, *n*—coarse foreign particles in paint materials and coatings, often of irregular shape, that are hard, abrasive, and resistant to disintegration.

hiding power, *n*—the ability of a paint, or paint material as used, to hide or obscure (see *opacity*) a surface to which it has been uniformly applied.

DISCUSSION—When expressed numerically, it is generally in terms of the number of square feet over which a gallon of paint, or pound of pigment, as used, can be uniformly spread to produce a specified contrast ratio (see **contrast ratio**). The term **covering power** has no specific relationship to hiding power, and actually has no precise meaning.

hue—under **color of an object**, see *hue*.

hydroxyl number, *n*—the number of milligrams of potassium hydroxide (KOH) equivalent to the hydroxyl content of 1 g of sample.

impact tester, *n*—a device for dropping a cylindrical weight from a variable height onto a coated metal test panel; the greater the height required to produce cracks in the coating, the greater its impact resistance. **D2794, D01.23**

industrial talc, *n*—a mineral product varying in composition from that approaching the theoretical formula of talc, $Mg_3Si_4O_{10}(OH)_2$, to mixtures of talc and other naturally associated minerals, some of which may be fibrous.

intumescent coating, *n*—a fire-retardant coating (which see) that when heated forms a foam produced by nonflammable gases, such as carbon dioxide and ammonia. This results in a thick, highly insulating layer of carbon (about fifty times as thick as the original coating) that serves to protect the coated substrate from fire.

japan, *n*—a varnish yielding a hard, glossy, dark-colored film. Japans are usually dried by baking at relatively high temperatures.

japan, *n*—a vehicle for japan colors; frequently contains shellac.

japan color, *n*—a paste containing pigment and a grinding japan vehicle used for lettering and decoration.

japan drier, *n*—a resin-base liquid drier.

lacquer, *n*—a coating composition that is based on synthetic thermoplastic film-forming material dissolved in organic solvent that dries primarily by solvent evaporation. Typical lacquers include those based on nitrocellulose, other cellulose derivatives, vinyl resins, acrylic resins, etc.

lake, *n*—a special type of pigment consisting essentially of an organic soluble coloring matter combined more or less definitely with an inorganic base or carrier. It is characterized generally by a bright color and a more or less pronounced translucency when made into an oil paint. Under this term are included two (and perhaps three) types of pigment: (a) the older original type composed of hydrate of alumina dyed with a solution of the natural organic color, (b) the more modern and far more extensive type made by precipitating from solution various coal-tar colors by means

of a metallic salt, tannin, or other suitable reagent, upon a base or carrier either previously prepared or coincidentally formed, and (c) a number combining both types in varying degree might be regarded as a third class.

lap, *n*—(for coatings) the region where one area of a coated surface merges into an adjacent freshly-coated area during application of a single coat to the entire surface.

DISCUSSION—The objective of the painter is to avoid showing the lap.

latex paint—under **paint**, see *latex paint*.

leveling, *n*—(1) the process whereby a film of liquid coating flows out after application so as to minimize any surface irregularities such as brush marks, orange peel, peaks, or craters, that have been produced by the mechanical process of application; (2) a measure or rating of the leveling ability of a coating. **D4062, D01.42**

lightness—under **color of an object**, see *lightness*.

maleic resin—under **resin, synthetic**, see *maleic resin*.

liquid, *n*—(flammability regulations) a substance that has a definite volume but no definite form, except such given by its container. It has a viscosity of 1×10^{-3} to 1×10^3 St (1×10^{-7} to 1×10^{-1} m² s⁻¹) at 104°F (40°C) or an equivalent viscosity at agreed upon temperature. (This does not include powders and granular materials.) Liquids are divided into two classes:

Class A, low viscosity—a liquid having a viscosity of 1×10^{-3} to 25.00 St (1×10^{-7} to 25.00×10^{-4} m² s⁻¹) at 104°F (40°C) or an equivalent viscosity at an agreed upon temperature.

Class B, high viscosity—a liquid having a viscosity of 25.01 to 1×10^3 St (25.01×10^{-4} to 1×10^{-1} m² s⁻¹) at 104°F (40°C) or an equivalent viscosity at an agreed upon temperature.

mar resistance, *n*—(1) ability of a coating to resist visual damage caused by light abrasion, impact, or pressure. (2) resistance of the surface of the coating to permanent deformation resulting from the application of a dynamic mechanical force. **D5178, CED, D01.23**

mass color, *n*—the color, when viewed by reflected light, of a pigment-vehicle mixture of such thickness as to obscure completely the background. Sometimes called over-tone or mass-tone.

mass-tone—see **mass color**.

melamine resin—under **resin, synthetic**, see *melamine resin*.

metal marking resistance, *n*—the ability of a coating to withstand streaking or marking when a metal object is rubbed against or dragged across the surface of the coating.

MFFT, *n*—abbreviation of minimum film forming temperature.

mildew (fungus) resistance, *n*—the ability of a coating to resist fungus growth that can cause discoloration and ultimate decomposition of a coating's binding medium.

mildewstat, *n*—a chemical agent that inhibits the growth of mildew.

mohair paint roller cover, *n*—a cover in which the paint applying material is woven of short-pile velour that contains wool or angora goat hair.

mottling, *vt*—the presence in the surface of a film, of irregularly shaped, randomly distributed areas that vary in color, gloss, or sheen, causing the film to be non-uniform in appearance, also known as **blotching**. **D1848, D01.42**

mud-cracking, *n*—an irregular broken network of cracks in the film, which occurs due to volatile loss while drying or curing. **D1848, D01.42**

natural resin—see **resin, natural**.

natural spreading rate, *n*—the spreading rate that occurs when a coating is applied in a manner natural to the operator's technique, perceptions, and expectations, as they relate to coating tools, substrate, and characteristics of the coating itself.

DISCUSSION—Such a spreading rate can vary widely with the same paint applied under similar conditions by different operators, but a series of paints applied by different operators under the same conditions will tend to have approximately the same rank order.

nondrying oil, *n*—an oil that does not of itself possess to a perceptible degree the power to take up oxygen from the air and lose its liquid characteristics.

nonvolatile content, *n*—the portion of a coating that does not evaporate during drying or curing under specified conditions, comprising the binder and, if present, the pigment. (The percent volatile content is obtained by subtracting the nonvolatile content from 100.)

nonvolatile vehicle, *n*—the liquid portion of a paint excepting its volatile thinner and water.

OEM coatings, *n*—original equipment manufacturers coatings, which include automotive, marine, furniture, appliance, as well as many other miscellaneous consumer and industrial applications.

oil color, *n*—an oil paint containing a high concentration of colored pigment, commonly used for tinting paint.

oil paint—under **paint**, see *oil paint*.

oil varnish—under **varnish**, see *oil varnish*.

opacity, *n*—the degree of obstruction to the transmission of visible light.

In this sense "opacity" is a relative term, it being considered that given a film sufficiently thin, in paint technology at least, there is no absolutely opaque substance.

open time, *n*—length of time a coating remains wet enough to allow for brushing-in at the laps; also called wet edge time.

over-tone—see **mass color**.

paint vb—to apply a thin layer of a coating to a substrate by brush, spray, roller, immersion, or any other suitable means.

paint n, general—a pigmented coating. See **coating**.

paint n, specific—a classification sometimes employed to distinguish pigmented drying oil coatings ("paints") from synthetic enamels and lacquers.

emulsion paint—a paint, the vehicle of which is an emulsion of binder in water. The binder may be oil, oleoresinous varnish, resin, or other emulsifiable binder.

latex paint—a paint containing a stable aqueous dispersion of synthetic resin, produced by emulsion polymerization, as the principal constituent of the binder. Modifying resins may also be present.

oil paint—a paint that contains drying oil or oil varnish as the basic vehicle ingredient.

paste paint—a paint in which the pigment is sufficiently concentrated to permit a substantial reduction with vehicle before use.

water paint—a paint, the vehicle of which is a water emulsion, water dispersion, or ingredients that react chemically with water.

paint brush, *n*—a paint application tool consisting of a flexible brushing part composed of long filamentary material (brushing material) bound to a handle.

DISCUSSION—Typical types include designs for varnish, enamel, sash and wall painting. They are manufactured in a range of shapes and sizes.

paint brush bristle, *n*—hair of the swine (for example: pig, hog, boar), used in brushing material.

paint brush ferrule, *n*—outer band that joins the brushing material to the handle.

paint brush filament, *n*—a synthetic polymer extrusion used in brushing material.

paint brush head, *n*—brush without the handle.

paint brush length clear, *n*—also called “length out,” the exposed length of the brushing material from the ferrule to the tip end.

paint brush thickness, *n*—measurement of the brushing material across the narrow opening of the ferrule.

paint pad, *n*—a paint application tool consisting of short filamentary material usually bonded to a flat, resilient backing connected to a handle designed to apply paint by a wiping action.

paint roller, *n*—a complete paint application tool consisting of a roller frame and a roller cover designed to apply paint by a rolling action.

paint roller core, *n*—a structural tube that forms the base of the roller cover to which paint applying material is attached.

paint roller cover, *n*—a tubular sleeve consisting of a paint applying material secured to a core.

paint roller cover pile height, *n*—also called “nap length,” the length of the roller cover paint applying material from pile backing to pile face.

paint roller frame, *n*—a frame and handle assembly designed to hold a roller cover.

paste paint—under **paint**, see **paste paint**.

pendulum hardness tester, *n*—a device for measuring the hardness of a dry film, based on the damping time required for a specified decrease in oscillation (swing) amplitude; the shorter the damping time the lower the hardness. **D4366, D01.23**

penta resin—under **resin, synthetic**, see **penta resin**.

phenolic resin—under **resin, synthetic**, see **phenolic resin**.

picking, *n*—a rolling up in the lap (see **lap**) when the previously applied paint film is in a semisolid (gel-like) state of drying, causing a tacky resistance to the brush or roller and resulting in an unsightly nonuniform appearance in the final dried film.

picture framing, *n*—a perimeter thickness or color difference (usually darker) relative to the rest of the painted surface.

DISCUSSION—This problem could be due to various mechanisms:

(a) **architectural paints**—the greater shear of a brush used around the perimeter of a wall or ceiling compared to the lower shear of a roller used on the rest of the wall or ceiling;

(b) **industrial finishes**—the flow of a finish during baking resulting in the build-up of the coating on the edge of the substrate;

(c) **roofing**—a rectangular pattern of ridges in a membrane over insulation or deck joints.

pigment, *n*—fine solid particles used in the preparation of paint or printing ink and substantially insoluble in the vehicle. Asphaltic materials are not pigments except when they contain substances substantially insoluble in the vehicle in which they are used.

pigment volume, *n*—the percent by volume of pigment in the nonvolatile portion of a paint or printing ink, as calculated from bulking value and composition data. The letters PV are commonly used as an abbreviation.

pinholes, *n*—small pore-like flaws in a coating that extend entirely through the applied film and have the general appearance of pin pricks when viewed by reflected light.

pinholing, *n*—the presence of a series of fine holes or voids in a film. **D1848, D01.42**

plasticizer, *n*—a substance added to paint, varnish, or lacquer to impart flexibility.

polyurea coating, *n*—a fast curing, two component coating, with a repeating urea group (nitrogen-carbon double bond oxygen-nitrogen). Film formation is accomplished through an addition reaction between an isocyanate terminated resin and an amine terminated resin.

primer, *n*—the first of two or more coats of a paint, varnish, or lacquer system.

printing ink, *n*—a colored or pigmented liquid or paste composition that dries to a solid film after application as a thin layer by printing machinery.

print resistance, *n*—(coatings) the ability of a coating to resist taking on the imprint due to the pressure of another surface placed against it.

putty, *n*—a dough-like material consisting of pigment and vehicle, used for sealing glass in frames, and for filling imperfections in wood or metal surfaces. See **glazing compound**.

resin, natural, *n*—a solid organic substance, originating in the secretion of certain plants or insects, which is thermoplastic, flammable, nonconductive of electricity; breaks with a conchoidal fracture (when hard); and dissolves in certain specific organic solvents but not water.

fossil resin—a natural resin of ancient origin usually found in the earth.

resin, synthetic, *n*—a synthetic substance physically similar to natural resin.

acrylic resin—a synthetic resin made from derivatives of acrylic acid.

alkyd resin—a synthetic resin made from polyhydric alcohols and polybasic acids; generally modified with resins, fatty oils or fatty acids.

epoxy resins, *n*—a class of polymeric materials characterized by the presence of more than one three-membered ring known as the epoxy, epoxide, oxirane, or ethoxyline group.

Discussion—Epoxy resins refer to uncross-linked monomers or oligomers containing a three-membered ring consisting of an oxygen atom bonded to two carbon atoms. A common type of epoxy resin is a liquid or solid resin made from the reaction of epichlorohydrin and bisphenol A.

ester gum—a resin made from rosin or rosin acids and a polyhydric alcohol, such as glycerine or pentaerythritol.

maleic resin—a resin made from a natural resin and maleic anhydride or maleic acid.

melamine resin—a synthetic resin made from melamine and aldehyde.

penta resin—ester gum made from rosin and pentaerythritol.

phenolic resin—a synthetic resin made from phenols and aldehydes.

styrene resin—a synthetic resin made from vinyl benzene.

urea resin—a synthetic resin made from urea and an aldehyde.

vinyl resin—a synthetic resin made from vinyl compounds.

roller spatter resistance, *n*—the ability of a paint to resist the formation of various size droplets generated during paint roller application, which results in undesirable spots splashing on areas that are not being painted including the person applying the paint.

rust, *n*—(coatings) the reddish material, primarily hydrated iron oxide, formed on iron or its alloys resulting from exposure to humid atmosphere or chemical attack. See **white rust**.

rust resistance, *n*—(coatings) the ability of a coating to protect the substrate of iron or its alloys from rusting.

sag or sagging, *n*—nonuniform downward flow of a wet paint film that occurs between the times of application and setting, resulting in an uneven coating having a thick lower edge.

Discussion—The sags usually occur at a local, thick local area of a vertical film and may have the characteristic appearance of a draped curtain, hence the synonym “curtaining.”

saturation—under **color of an object**, see **saturation**.

scaling resistance, *n*—See **flaking resistance**.

sealer, *n*—a liquid composition to prevent excessive absorption of finish coats into porous surfaces; also a composition to prevent bleeding (see **size**).

semidrying oil, *n*—an oil that possesses the characteristics of a drying oil but to a lesser degree. There is no definite line of demarcation between drying and semidrying oils.

shade, *n*—a term descriptive of a lightness difference between surface colors, the other attributes of color being essentially constant.

Discussion—A lighter shade of a color is one that has higher lightness but approximately the same hue and saturation; and a darker shade is one that has a lower lightness. Primarily, the term “shade” is derived from shadow and designates a change in appearance analogous to that produced by a local reduction in illumination. It should, therefore, when strictly used, express only the change toward a darker color. Shade of a color has been defined by several authorities as the mixture of black with that color, thus establishing its opposite character to “tint,” but by extension of its relative sense it has been frequently and widely used to include lighter shades by use of the adjective “lighter” or “paler.” Although such expressions apparently involve a contradiction, it is clear that while we may have a shade of a color or darker color of the same sort, it is easy to conceive of another shade not quite so dark and therefore lighter.

sheepskin paint roller cover, *n*—a cover in which the paint applying material is wool fleece still attached to its tanned natural skin.

size, *n*—usually a liquid composition to prevent excessive absorption of all paints into plaster, old wall paint, and similar porous surfaces; also a liquid composition used as a first coat on metal to improve adhesion of succeeding coats (latter usage is limited to the metal decorating industry).

The terms **sealer** and **size** are almost synonymous, but usage has established certain differences. A **sealer** is ordinarily a thin varnish or clear lacquer and is usually applied on wood and metal surfaces. Ordinary painter’s **size** is a thin solution of glue, starch or other water-soluble substance and is usually applied on plaster surfaces, but **size** used in metal decorating is a thin varnish.

spar varnish—under **varnish**, see *spar varnish*.

spirit varnish—under **varnish**, see *spirit varnish*.

soil, *n*—of coatings, disfiguring foreign materials such as dirt, soot, or stain, other than microorganisms, deposited on or embedded in a dried film of applied coating material; also called **dirt**.

soilant, *n*—a discoloring substance with a dispersed color component that is not in solution, and therefore can cling to the surface of a coating without penetrating into the film.

D3450, D01.42

Discussion—A soilant differs from a stain in that the colorant of a stain is in solution and therefore can penetrate into the film.

solid, *n*—(flammability regulations) a substance that has a viscosity greater than 1×10^3 St (1×10^{-1} m²s⁻¹) at 104°F (40°C) or an equivalent viscosity at an agreed upon temperature. (This includes powders and granular materials.)

specific gravity, *n*—(1) ratio of the weight of a given volume of substance to the weight of an equal volume of water, (2) ratio of the density of a substance at a specified temperature to the density of water. See **density**. **D01.23, D01.24**

DISCUSSION—(1) Specific gravity measurements are generally made with the test substance and water at the same temperature, which should be 25°C for best conformance with Test Method D1475. This value multiplied by the density in g/mL of water at 25°C (0.997) is the specific gravity relative to water at 4°C and numerically equal to the density in g/mL of the test substance at 25°C, within normal test precision. (2) Conventionally abbreviated:

$$\text{Density}^{25} \text{ (g/mL)} = \text{Specific Gravity} \frac{25}{4} = \text{Specific Gravity} \frac{25}{25} \times 0.997 \quad (1)$$

$$\text{Density}^{25} \text{ (lb/gal)} = \text{Specific Gravity} \frac{25}{4} \times 8.345 \quad (2)$$

$$= \text{Specific Gravity} \frac{25}{25} \times 8.32$$

spreading rate, *n*—the area covered by a unit volume of coating material frequently expressed as square feet per gallon.

stain, *n*—a discoloration, arising from foreign materials, that penetrates into the coating.

stain, *n*—a penetrating composition that changes the color of a surface, usually transparent and leaving practically no surface film.

styrene resin—under **resin, synthetic**, see **styrene resin**.

substrate, *n*—the underlying material or surface to which other material such as an ink, paint, coating, or other treatment is applied.

DISCUSSION—The underlying material in our industry could be a number of objects. Some examples are: a bare, metallic surface like steel or aluminum, plastic or cementitious material, paper or paper board. Other treatments could be inorganic phosphate surface treatments, automotive primers, automotive color coats with or without aluminum flakes, or plastic adhesion promoters. In some cases, the underlying material could be a coating of the same material in a multicoat system.

surfacers, *n*—a pigmented composition for filling minor irregularities to obtain a smooth uniform surface preparatory to applying finish coats; usually applied over a primer and sandpapered for smoothness.

synthetic paint roller cover, *n*—a cover in which the paint applying material is man-made material.

synthetic resin—see **resin, synthetic**.

talc—see **industrial talc**.

temporary coating, *n*—a coating designed to protect or decorate a substrate for a limited time that can be readily removed either by mechanical or chemical means.

thinner, *n*—the portion of a paint, varnish, lacquer, or printing ink, or related product that volatilizes during the drying process.

tint, *n*—a color produced by the mixture of white pigment or paint in predominating amount with a colored pigment or paint, not white. The tint of a color is, therefore, much lighter and much less saturated than the color itself.

tint, *v*—(1) to mix a white paint with a colorant, or to mix a colored paint with a white colorant. (2) to adjust the color of a test specimen to be a closer color match to a standard.

E284

tinting strength, *n*—the power of coloring a standard paint or pigment.

toner, *n*—an organic pigment that does not contain inorganic pigment or inorganic carrying base.

undertone, *n*—the color of a thin layer of pigment-vehicle mixture applied on a white background.

urealkyd, *n*—a Type I, one-package pre-reacted resin made from a polyisocyanate and a polyhydric alcohol ester of vegetable oil acids.

DISCUSSION—The resin may be reacted to form a polymeric film with the aid of metallic soap driers in the absence of free isocyanate groups.

urea resin—under **resin, synthetic**, see **urea resin**.

urethane coatings, *n*—coatings based upon vehicles containing a minimum of 10 percent by weight (nonvolatile vehicle basis) of a polyisocyanate monomer reacted in such a manner as to yield polymers containing any ratio, proportion or combination of urethane linkages, active isocyanate groups, or polyisocyanate monomer. The reaction products may contain excess isocyanate groups available for further reaction at time of application or may contain essentially no free isocyanate as supplied.

Type I, one-package prereacted—urethane coatings characterized by the absence of any significant quantity of free isocyanate groups. They are usually the reaction product of a polyisocyanate and a polyhydric alcohol ester of vegetable oil acids and are hardened with the aid of metallic soap driers.

Type II, one-package moisture cured—urethane coatings characterized by the presence of free isocyanate groups and capable of conversion to useful films by the reaction of these isocyanate groups with ambient moisture.

Type III, one-package heat cured—urethane coatings that dry on cure by thermal release of blocking agents and regeneration of active isocyanate groups that subsequently react with substances containing active hydrogen groups.

Type IV, two-package catalyst—urethane coatings that comprise systems wherein one package contains a prepolymer or adduct having free isocyanate groups capable of forming useful films by combining with a relatively small quantity of catalyst, accelerator, or crosslinking agent such as a monomeric polyol or polyamine contained in a second package. This type has limited pot-life after the two components are mixed.

Type V, two-package polyol—urethane coatings that comprise systems wherein one package contains a prepolymer or

adduct or other polyisocyanate capable of forming useful films by combining with a substantial quantity of a second package containing a resin having active hydrogen groups with or without the benefit of catalyst. This type has limited pot-life after the two components are mixed.

Type VI, one-package nonreactive lacquer—urethane solution coatings characterized by the absence of any significant quantity of free isocyanate or other functional groups. Such coatings convert to solid films primarily by solvent evaporation.

varnish, *n*—a liquid composition that is converted to a transparent or translucent solid film after application as a thin layer.

bituminous varnish—a dark-colored varnish containing bituminous ingredients. The varnish may be either of the oil or spirit type.

oil varnish—a varnish that contains resin and drying oil as the basic film-forming ingredients and is converted to a solid film primarily by chemical reaction.

shellac varnish—a solution or “cut” of a specified type and grade of dry lac resin in a suitable alcohol. **D4209**

spar varnish—a varnish for exterior surfaces. The name originated from its use on spars of ships.

spirit varnish—a varnish that is converted to a solid film primarily by solvent evaporation.

vehicle, *n*—the liquid portion of a paint or printing ink. Anything that is dissolved in the liquid portion of a paint or printing ink is a part of the vehicle.

vernonia oil, *n*—a low-viscosity epoxidized drying oil from the seed of an African plant, *Vernonia galamensis*, containing three reactive epoxy groups and three carbon-carbon double bonds per triglyceride molecule and is characterized by its very low viscosity and melting point.

Discussion—It flows easily even at temperatures below 0°C and thus needs only a fraction of the volatile solvents usually used for other drying oils. Thus, it can be used as a reactive diluent for high solids alkyds and epoxy coating formulations.

vinyl resin—under **resin, synthetic**, see **vinyl resin**.

volatile thinner—see **thinner**.

volume percent solids, *n*—the portion of a coating that remains as part of the dry film expressed as percent by volume.

Discussion—This contrasts to another convention of expressing solids content by weight percent. Often a percent is given without specifying whether it is volume or weight. This is confusing and leads to errors in coating calculations.

water-based coating, *n*—deprecated term. Use the preferred term, **waterborne coating**.

Discussion—The term water-based is common usage but is inappropriate since the water evaporates. (Consider oil-based or alkyd-based in which “-based” indicates a film component). This term should be avoided in favor of **waterborne**.

waterborne coating, *n*—a coating in which the principal volatile constituent is water. See also **water-reducible coating**.

Discussion—For government regulatory purposes related to the analysis of coatings for VOC and water content, if the volatile constituent contains more than 5 % by weight of water, the coating is arbitrarily classified by the EPA as **waterborne**. For a full explanation refer to: EPA document 450/3-83-013R, “Glossary for Air Pollution Control of Industrial Coating Operations,” EPA, Method 24 (40 CFR PART 60, Appendix A), and ASTM Manual 4 “Determination of VOC Content of Paint, Coatings and Printing Inks.”⁵

water paint—under **paint**, see **water paint**.

water-reducible coating, *n*—a coating that can be reduced in viscosity by the addition of water. **D01.55**

Discussion—Although all waterborne coatings are water-reducible, the reverse is not true because there are industrial coatings that contain little or no water in their pre-application storage condition, but are reducible with either water or a suitable organic solvent. Thus prior to actual reduction with water, a coating of this type might not strictly be referred to as waterborne, and might never become such. Since the vast majority of water-reducible coatings are waterborne the latter term tends to be used inclusively, unless there is a specific need to make a distinction.

water vapor permeance (WVP), *n*—the steady state rate of water vapor movement through a free film induced by a vapor pressure difference (Δp) of one unit between the two surfaces of the film, where Δp is expressed in inches or millimetres of mercury. Thus: $WVP = WVT/\Delta p$. See **WVT**. **D1653, CED, D01.23**

Discussion—The unit of permeance is the “perm” or the “metric perm,” thus: perm (U.S., inch-pound unit) = grain per square foot per hour per inch of Hg ($\text{gr}/\text{ft}^2 \cdot \text{h} \cdot \text{in}$), metric perm (S.I. unit) = gram per square metre per day per millimetre of Hg ($\text{g}/\text{m}^2 \cdot \text{d} \cdot \text{mm}$).

Discussion—1 perm (U.S.) = 0.659 metric perms.
perm—see **water vapor permeance**, unit of.

water vapor transmission (WVT) rate, *n*—the steady state rate of water vapor movement through a free film under specific conditions of temperature and humidity at each surface; customarily expressed in grains per square foot per hour ($\text{gr}/\text{ft}^2 \cdot \text{h}$) or grams per square metre per day ($\text{g}/\text{m}^2 \cdot \text{d}$). **D1653, CED, D01.23**

Discussion—1 $\text{gr}/\text{ft}^2 \cdot \text{h} = 16.74 \text{ g}/\text{m}^2 \cdot \text{d}$.

Discussion—Coatings that are too brittle or otherwise unsatisfactory for handling as free films are sometimes tested on a porous support surface, although such a support can have an effect on test results.

weight percent solids, *n*—the portion of a coating that remains as part of the dry film expressed as weight.

Discussion—Another convention of expressing solids content is by volume percent.

wet adhesion, *n*—the ability of a coating film to adhere tightly to the substrate directly beneath it under wet conditions such as rain, dew, washing, etc.

wet edge, *n*—the edge of a wet, painted area that remains workable for continued painting.

Discussion—When painting large surfaces, it is generally necessary to join up to the edge of a paint film that has been left to dry for some period of time. When this can be done by blending this edge with free-working paint, without any lap mark between the drying and freshly painted area, the paint is said to present a wet edge.

⁵ ASTM International, MNL 4.

wet edge extender, *n*—high boiling liquids such as propylene glycol added to latex or water-based paints to reduce the evaporation rate and thereby extend the (open) time that they are wet enough to brush into.

DISCUSSION—These wet edge extenders are used to minimize lapping problems.

wet storage stain—(coatings) See **white rust**.

white rust, *n*—white corrosion products (zinc hydroxide and zinc oxide) on zinc-coated articles. They form when the parts are stored so close together that condensed moisture is

entrapped between them and the air circulation is inadequate to assist drying. Also called wet storage stain. See **rust**.

zinc-rich primer, *n*—a primer for ferrous metals, incorporating zinc dust at a concentration sufficient to make the dried film electrically conductive thus providing cathodic protection to the ferrous substrate.

4. Keywords

4.1 coating; paint; painting; printing ink; varnish

SUMMARY OF CHANGES

Committee D01 has identified the location of selected changes to this standard since the last issue (D16–12) that may impact the use of this standard. (Approved December 1, 2014.)

(1) Added new definition polyurea coating.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, Tel: (978) 646-2600; http://www.copyright.com/