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Standard Terminology of Adhesives¹

This standard is issued under the fixed designation D907; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This terminology standard is a compilation of definitions used in the science and technology of the adhesives industry. Terms that are generally understood or adequately defined in other readily available sources are not included.

1.2 Any changes in this standard since 1988 are documented as follows:

1.2.1 Appendix X1 gives a history of revisions made since 1988. Table X1.1 lists the terms that are affected as: (1) Terms Added, (2) Terms Revised, and (3) Terms Deleted.

1.2.1.1 In Table X1.1, the year of publication in Volume 15.06 is shown in parentheses following the term.

1.2.2 In the text of the standard, the year of publication is shown following each definition. Also, the following codes are included after the year of publication to describe the type change that was made: (A) Addition, (R) Revision, or (E) Edited.

1.2.3 Deletions are shown in Appendix X1, suitably footnoted. The deleted terms do not appear in the text of the standard.

1.2.4 Any special circumstances not covered by 1.2.2 and 1.2.3 are documented in Table X1.1, suitably footnoted.

2. Referenced Documents

2.1 *ASTM Standards*:²

D618 Practice for Conditioning Plastics for Testing

D2849 Methods of Testing Urethane Foam Polyol Raw Materials³

D2507 Terminology of Rheological Properties of Gelled Rocket Propellants

D2990 Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics

D3983 Test Method for Measuring Strength and Shear Modulus of Nonrigid Adhesives by the Thick-Adherend Tensile-Lap Specimen

D4027 Test Method for Measuring Shear Properties of Structural Adhesives by the Modified-Rail Test

D4317 Specification for Polyvinyl Acetate-Based Emulsion Adhesives

D4499 Test Method for Heat Stability of Hot-Melt Adhesives

D4680 Test Method for Creep and Time to Failure of Adhesives in Static Shear by Compression Loading (Wood-to-Wood)

D5266 Practice for Estimating the Percentage of Wood Failure in Adhesive Bonded Joints

E6 Terminology Relating to Methods of Mechanical Testing

3. Terminology

acceptance test, *n*—a test, or series of tests conducted by the procuring agency, or an agent thereof, upon receipt to determine whether an individual lot of materials conforms to the purchase order or contract or to determine the degree of uniformity of the material supplied by the vendor, or both. (Compare **preproduction test** and **qualification test**.)

acid number, *n*—the quantity of base, expressed in milligrams of potassium hydroxide, that is required to titrate acidic constituents present in 1 g of sample. (1992) (A) **D2849, D20**

adhere, *v*—to cause two surfaces to be held together by adhesion.

adherend, *n*—a body held to another body by an adhesive.

adherend preparation, *n*—see **surface preparation**.

adhesion, *n*—the state in which two surfaces are held together by interphase forces.

mechanical adhesion, *n*—adhesion between surfaces in which the adhesive holds the parts together by interlocking action.

specific adhesion, *n*—adhesion between surfaces which are held together by intermolecular forces of a chemical or physical nature. (2000) (R)

¹ This terminology is under the jurisdiction of ASTM Committee D14 on Adhesives and is the direct responsibility of Subcommittee D14.04 on Terminology.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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

adhesion failure, *n*—rupture of an adhesive bond in which the separation appears visually to be at the adhesive/adherend interface.

adhesion promoter, *n*—a substance used to improve bonding of the adhesive to the substrate. (Compare coupling agent and primer.)

DISCUSSION—The adhesion promoter may be added to an adhesive formulation or applied to the substrate.

adhesive, *n*—a substance capable of holding materials together by surface attachment. (See also **glue**, **gum**, **mucilage**, **paste**, **resin**, and **sizing**.)

DISCUSSION—Adhesive is the general term and includes among others cement, glue, mucilage, and paste. These terms are loosely used interchangeably. Various descriptive adjectives are applied to the term adhesive to indicate certain characteristics as follows:

- (1) Physical form, that is, liquid adhesive, tape adhesive
- (2) Chemical type, that is, silicate adhesive, resin adhesive
- (3) Materials bonded, that is, paper adhesive, metal-plastic adhesive
- (4) Conditions of use, that is, hot-setting adhesive

adhesive, assembly, *n*—see **assembly adhesive**.

adhesive, bulk, *n*—see **bulk adhesive**.

adhesive, casein, *n*—see **casein adhesive**.

adhesive, cellular, *n*—see **cellular adhesive**.

adhesive, cold-setting, *n*—see **cold-setting adhesive**.

adhesive, contact, *n*—see **contact adhesive**.

adhesive, foamed, *n*—see **foamed adhesive**.

adhesive, gap-filling, *n*—see **gap-filling adhesive**.

adhesive, heat activated, *n*—see **heat activated adhesive**.

adhesive, hot-melt, *n*—see **hot-melt adhesive**.

adhesive, hot-setting, *n*—see **hot-setting adhesive**.

adhesive, intermediate-temperature-setting, *n*—see **intermediate-temperature-setting adhesive**.

adhesive, mastic, *n*—see **mastic adhesive**.

adhesive, multiple-layer, *n*—see **multiple-layer adhesive**.

adhesive, polyvinyl acetate emulsion, *n*—see **polyvinyl acetate emulsion adhesive**.

adhesive, pressure-sensitive, *n*—see **pressure-sensitive adhesive**.

adhesive, room-temperature-setting, *n*—see **room-temperature-setting adhesive**.

adhesive, separate application, *n*—see **separate-application adhesive**.

adhesive, solvent, *n*—see **solvent adhesive**.

adhesive, solvent-activated, *n*—see **solvent-activated adhesive**.

adhesive, structural, *n*—see **structural adhesive**.

adhesive, warm-setting, *n*—see **warm-setting adhesive**.

adhesive, urea-formaldehyde, *n*—see **urea-formaldehyde adhesive**.

adhesive, anaerobic, *n*—see **anaerobic adhesive**.

adhesive dispersion, *n*—see **dispersion**. (Compare to **emulsion**.)

adhesive joint, *n*—location at which two adherends are held together with adhesive.

adhesive-joint failure, *n*—the locus of fracture occurring in an adhesively-bonded joint resulting in a loss of load-carrying capability. (See also **adhesion failure** and **cohesion failure**.) (1995) (A)

substrate failure, *n*—in characterizing the locus of an adhesive-joint failure, the fracture occurring within the substrate. (See *cohesion failure*.)

aggressive tack, *n*—see *aggressive tack* under **tack**.

aging time, *n*—see **joint conditioning time**.

amylaceous, *adj*—pertaining to, or of the nature of, starch; starchy.

anaerobic adhesive, *n*—an adhesive that is kept in the uncured state by oxygen, as in air, and that cures in the absence of oxygen when exposed to metal ions, especially copper or iron. (1990) (A)

apparent viscosity, *n*—in non-Newtonian behavior, the ratio of the shearing stress to the rate of shear of a fluid, given at the corresponding shearing stress.

assembly, *n*—see **adhesive assembly**.

assembly adhesive, *n*—an adhesive that can be used for bonding parts together, such as in the manufacture of a boat, airplane, furniture, and the like.

DISCUSSION—The term assembly adhesive is commonly used in the wood industry to distinguish such adhesives (formerly called “joint glues”) from those used in making plywood (sometimes called “veneer glues”). It is applied to adhesives used in fabricating finished structures or goods, or subassemblies thereof, as differentiated from adhesives used in the production of sheet materials for sale as such, for example, plywood or laminates.

assembly (for adhesives), n—a group of materials or parts, including adhesive, placed together for bonding or which has been bonded together.

assembly time, n—the time interval between applying the adhesive on the substrate and the application of pressure, or heat, or both, to the assembly. (See also **closed assembly time** and **open assembly time**.) (1990) (R)

DISCUSSION—For assemblies involving multiple layers or parts, the assembly begins with applying the adhesive on the first substrate.

A-stage, n—an early stage in the preparation of certain thermosetting resins, in which the material is still soluble in certain liquids, and fusible.

autohesion, n—adhesion developed by interdiffusion of the molecules of two surfaces of the same material and consequent obliteration of the interface between them. (Sometimes called “autoadhesion.”) (Compare **blocking**.) (1990) (A)

bag molding, n—a method of molding or bonding involving the application of fluid pressure, usually by means of air, steam, water, or vacuum, to a flexible cover which, sometimes in conjunction with the rigid die, completely encloses the material to be bonded.

batch, n—the manufactured unit or a blend of two or more units of the same formulation and processing. (Compare **manufactured unit**.)

binder, n—*in adhesive compounds*, a component of an adhesive composition that is primarily responsible for its mechanical strength and adhesion. (2005) (R)

blister, n—an elevation of the surface of varied contour and dimensions, with a void beneath it. (2005) (R)

blocked curing-agent, n—a curing or hardening agent temporarily rendered unreactive, which can be reactivated as desired by physical or chemical means.

blocking, n—an undesired adhesion between touching layers of a material, such as occurs under moderate pressure during storage or use.

bond, n—the attachment between an adhesive and an adherend.

edge joint, n—*in wood bonding*, a type of laminate joint made by bonding adherends edge-to-edge with grain directions parallel to form wider stock.

face joint, n—*in wood bonding*, a type of laminate joint made by bonding adherends face-to-face with grain directions parallel to form thicker stock.

laminate joint, n—*in wood bonding*, a joint made by bonding layers of adherends face-to-face or edge-to-edge to form thicker or wider stock.

bond, v—to join adherends by means of an adhesive.

bondline, n—the layer of adhesive which attaches two adherends. (See **interphase**.) (2005) (R)

bond strength, n—the unit load applied to tension, compression, flexure, peel, impact, cleavage, or shear, required to break an adhesive assembly with failure occurring in or near the plane of the bond. (See also **adhesion** and **bond**.)

DISCUSSION—The term adherence is frequently used in place of bond strength.

dry strength, n—the strength of an adhesive joint determined immediately after drying under specified conditions or after a period of conditioning in a standard laboratory atmosphere.

wet strength, n—the strength of an adhesive joint determined immediately after removal from a liquid in which it has been immersed under specified conditions of time, temperature, and pressure.

DISCUSSION—The term is commonly used alone to designate strength after immersion in water. In latex adhesives the term is also used to describe the joint strength when the adherends are brought together with the adhesive still in the wet state.

B-stage, n—an intermediate stage in the reaction of certain thermosetting resins in which the material swells when in contact with certain liquids and softens when heated, but may not entirely dissolve or fuse.

built-up laminated wood, n—see *built-up laminated wood* under **wood laminate**.

bulk adherend, n—*as related to interphase*, the adherend, unaltered by the adhesive. (Compare to **bulk adhesive**.) (1988) (A)

bulk adhesive, n—*as related to interphase*, the adhesive, unaltered by the adherend. (Compare to **bulk adherend**.) (1988) (A)

casein adhesive, n—an aqueous colloidal dispersion of casein that may be prepared with or without heat, may contain modifiers, inhibitors, and secondary binders to provide specific adhesive properties, and includes a subclass, usually identified as *casein glue*, that is based on a dry blend of casein, lime, and sodium salts, mixed with water and prepared without heat. (1989) (A)

catalyst, n—a substance that initiates or changes the rate of chemical reaction, but is not consumed or changed by the reaction. (See also **hardener**.) (Compare **inhibitor**.)

(1990) (R)

caul, n—a sheet of material employed singly or in pairs in hot or cold pressing of assemblies being bonded.

DISCUSSION—A caul is used to protect either the faces of the assembly or the press platens, or both, against marring and staining to prevent sticking; to facilitate press loading; to impart a desired surface texture or finish; and to provide uniform pressure distribution.

DISCUSSION—A caul may be made of any suitable material such as aluminum, stainless steel, hardboard, fiberboard, or plastic; the length and width dimensions being generally the same as those of the plates of the press where it is used.

cellular adhesive—see **foamed adhesive**.

cement, n—see Discussion under **adhesive**.

cement, v—see **bond**.

cleavage, n—*in an adhesively bonded joint*, a separation in the joint caused by wedge or other crack-opening type action. (1994) (A)

cleavage-peel strength, n—the force per unit width of bondline required to produce progressive separation by wedge or other crack-opening type action of two adherends where one or both undergo significant bending. (1994) (A)

cleavage strength, n—the force per unit width of bond line required to produce progressive separation by wedge or other crack-opening type action of two adherends.

closed assembly time, n—the time between the assembling of adhesive-coated surfaces and the application of heat and/or pressure to set the adhesive.

cohesion, n—the state in which the constituents of a mass of material are held together by chemical and physical forces. (1992) (R)

cohesion failure; cohesive failure, n—rupture of a bonded assembly in which the separation appears visually to be in the adhesive or the adherend.

cohesive blocking, n—see **blocking**.

cold flow—see **creep**.

cold pressing, n—a bonding operation in which an assembly is subjected to pressure without the application of heat.

cold-setting adhesive, n—an adhesive that sets without the application of heat.

colophony, n—see **rosin**.

condensation, n—a chemical reaction in which two or more molecules combine with the separation of water or some other simple substance. (See also **polymerization**.)

DISCUSSION—The process is called polycondensation if a polymer is formed.

conditioning time, n—see **joint conditioning time**. (See also **curing time** and **setting time**.)

consistency, n—that property of a liquid adhesive by virtue of which it tends to resist deformation. (See also **viscosity** and **viscosity coefficient**.)

DISCUSSION—Consistency is not a fundamental property but is comprised of viscosity, plasticity, and other phenomena.

contact adhesive, n—adhesive that is applied to both adherends and after a specified open assembly time will instantly develop a bond when a firm but not sustained pressure is applied. (2005) (R)

contact bond adhesive, n—Synonym for **contact adhesive**.

copolymer, n—see **polymer**.

copolymerization, n—see **polymerization**.

coupling agent, n—a substance having functional groups that are capable of reacting with the surfaces of two different substances, thereby chemically bridging them.

cracking, n—a fracture at or under the surface. (2005) (R)

creep, n—*in an adhesive*, the time-dependent deformation usually resulting from sustained stress (sometimes called cold flow). (2005) (R)

creep strain, n—the total strain, at any given time, produced by the applied stress during a creep test. (1992) (A) **D2990, D20; D4680, D14**

cross laminate, n—see *cross laminate* under **laminate, n**.

crosslink, v—to form chemical bonds between molecules to produce a three-dimensional network. (1991) (A)

C-stage, n—the final stage in the reaction of thermosetting resins, in which the material is practically insoluble and infusible.

cure, v—to develop the strength properties of an adhesive by chemical reaction.

curing agent, n—a substance or mixture of substances that controls a curing reaction. (2005) (R)

curing temperature, n—the temperature to which an adhesive or an assembly is subjected to cure the adhesive.

curing time, n—the period of time during which an assembly is subjected to heat or pressure, or both, to cure the adhesive. (See also **joint-conditioning time, setting time**.)

DISCUSSION—Further cure may take place after removal of the assembly from the conditions of heat or pressure, or both.

delamination, n—the separation of layers in a laminate because of failure of the adhesive, either in the adhesive itself or at the interface between the adhesive and the adherend.

delamination, v—the separation of layers in a laminate of failure in or near the adhesive joint. (2008) (A)

diluent, n—a liquid additive, whose function is to reduce the concentration of solids or viscosity, or both, of an adhesive. (2006) (R)

dispersion, n—a two-phase system in which one phase is suspended in a liquid.

doctor blade, n—A scraper mechanism that regulates the dimensional thickness of adhesive on the spreader rolls or on the surface being coated. (*Synonyms*: **doctor knife; doctor bar**.)

doctor roll, n—a revolving roller mechanism resulting in a wiping action for regulating the adhesive supplied to the spreader roll.

doctor roller—see **doctor roll**.

double spread, *n*—see *double spread* under **spread**.

double spread adhesive, *n*—an application of adhesive to both adherends or as two layers on one adherend.

dry, *v*—to change the physical state of an adhesive on an adherend or between adherends by the loss of solvent constituents by evaporation or absorption, or both.

dry bond adhesive, *n*—Synonym for **contact adhesive**.

drying temperature, *n*—the temperature to which an adhesive or an assembly is subjected to dry the adhesive.

drying time, *n*—the period of time during which an adhesive or an assembly is allowed to dry, with or without the application of heat or pressure, or both.

dry strength, *n*—see **bond strength**.

dry tack, *n*—see *dry tack* under **tack**.

durability, *n*—*as related to adhesive joints*, the endurance of joint strength relative to the required service conditions. (1990) (A)

DISCUSSION—Service conditions may include water and other chemicals, temperature, stress, radiation, microorganisms, and other environmental factors.

edge joint, *n*—*in wood bonding*, a joint made by bonding adherends edge to edge (with grain directions parallel) to form wider stock. (1992) (A)

elastomer, *n*—a macromolecular material that can withstand large strains on short time scales without permanent plastic deformation. (2006) (R)

emulsion, *n*—a heterogeneous system in which an immiscible liquid is distributed in fine drops in another liquid.

DISCUSSION—The *internal phase* is sometimes described as the *disperse phase*.

D2507, F07; D4317, D14

extender, *n*—substance added to an adhesive to reduce the amount of the primary binder required per unit area.

failure, *n*—see **adhesive-joint failure**, **adhesion failure**, **cohesion failure** and **substrate failure**.

fiber-reinforced plastic (FRP), *n*—a plastic that contains fibers in various forms such as cloth, mat, strands, or chopped to enhance properties.

fiber tear, *n*—*in an FRP adhesively bonded joint*, failure occurring exclusively within the fiber reinforced plastic matrix, characterized by the appearance of reinforcing fibers on both ruptured surfaces. (Also called *fiber tear failure*.) (1994) (A)

fiber-tear failure, *n*—*in an FRP adhesively bonded joint*—see **fiber tear**. (1994) (A)

filler, *n*—a solid material added to an adhesive to modify its strength, permanence, working properties, or other qualities, or to lower cost. (2006) (R)

filler sheet, *n*—sheet of deformable or resilient material which, when placed between the assembly to be bonded and the pressure applicator, or when distributed within a stack of assemblies, aids in providing uniform application of pressure over the area to be bonded.

fillet, *n*—that portion of an adhesive which fills the corner or angle formed where two adherends are joined. n-d907-12

finger joint, *n*—a joint formed by bonding two precut members shaped like fingers. (See Fig. 1.) (1990) (A)

flow, *n*—movement of an adhesive during the bonding process before the adhesive is set.

foamed adhesive, *n*—an adhesive whose apparent density has been decreased by the presence of numerous gas-filled cells throughout its mass.

gap-filling adhesive, *n*—an adhesive capable of forming and maintaining a bond between surfaces that are not close-fitting.

DISCUSSION—Close-fitting is relative to a given material and industry; for example, standards in construction differ from standards in electronics. Some adhesives will bond by bridging without completely filling the gap, others by filling the gap completely. (1990) (A); (1994) (R)

gel, *n*—a semisolid system consisting of a network of solid aggregates in which liquid is held.

gelation, *n*—formation of a gel.

glue—see **adhesive**.

glue (archaic), *n*—a hard gelatin obtained from hides, tendons, cartilage, bones, etc., of animals, and also an adhesive prepared from this substance by heating with water.

glue, *v*—see **bond**, *v*.

glue-laminated wood, *n*—see *glue-laminated wood* under **wood laminate**.

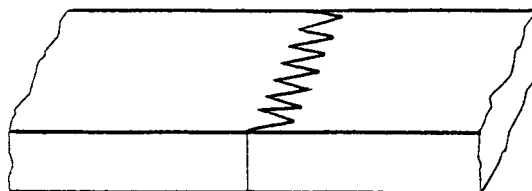


FIG. 1 Finger Joint

glue line, n—Synonym for **bondline**.

GLULAM, n—Synonym for **structural-glued-laminated timber**. (1993) (A)

gum, n—any of a class of colloidal substances, exuded by or prepared from plants, sticky when moist, composed of complex carbohydrates and organic acids, which are soluble or swell in water. (See also **adhesive, glue, n,** and **resin**.)

DISCUSSION—The term gum is sometimes used loosely to denote various materials that exhibit gummy characteristics under certain conditions, for example, gum balata, gum benzoin, and gum asphaltum. Gums are included by some in the category of natural resins.

hardener, n—Synonym for **curing agent**. (1991) (R)

heat activated adhesive, n—a type of adhesive preapplied to one or both adherends, that is rendered tacky by application of heat and forms a bond on cooling. (2006) (R)

hot-melt adhesive, n—a thermoplastic adhesive that is applied in a molten state and forms a bond upon cooling to a solid state.

honeymoon system, n—Synonym for **separate-application adhesive**. (2011) (A)

hot-setting adhesive, n—an adhesive that sets only with the application of heat.

impact strength, n—the kinetic energy per area absorbed by an adhesively-bonded joint when fractured by shock loading.

inhibitor, n—a substance used to suppress a chemical reaction.

initial tangent modulus, n—the slope of the stress-strain curve at the origin. (1992) (A) **D3983, D14; E6, E28**

intermediate-temperature-setting adhesive, n—an adhesive that sets in the temperature range from 31 to 99°C (87 to 211°F). (Synonym *warm-setting adhesive*.) (Compare **cold-setting adhesive, hot-setting adhesive,** and **room-temperature-setting adhesive**.)

interface, n—*in an adhesive joint*, a region of finite dimension extending from a point in the adherend where the local properties (chemical, physical, mechanical, and morphological) begin to change from the bulk properties of the adherend to a point in the adhesive where the local properties equal the bulk properties of the adhesive. (1990) (A); (1999) (R)

joint, n—(See also **adhesive joint, edge joint, finger joint, laminate joint, lap joint, scarf joint, starved joint,** and **bond, n**.)

joint aging time, n—Synonym for **joint conditioning time**.

joint-conditioning time—the time interval between the removal of the joint from the conditions of heat or pressure, or both, used to accomplish bonding and the attainment of approximately maximum bond strength. (Synonym *joint-aging time*.) (See also **curing time, drying time,** and **setting time**.)

laminate, n—product made by bonding together two or more layers of material or materials.

cross laminate, n—a laminate in which some of the layers of material are oriented at right angles to the remaining layers with respect to the grain or strongest direction in tension. (Compare **parallel laminate**.)

DISCUSSION—Balanced construction of the laminations above the center line of the thickness of the laminate is normally assumed.

parallel laminate, n—a laminate in which all the layers of material are oriented approximately parallel with respect to the grain or strongest direction in tension. (Compare **cross laminate**.)

laminate, v—to bond layers of material(s).

laminate joint, n—*in wood bonding*, a joint made by bonding layers of adherends face to face to form thicker stock. (1992) (A)

laminated veneer lumber (LVL), n—lumber made by laminating veneers in which the grain of all the veneers is essentially parallel to the lengthwise dimension.

laminated wood product, n—see under **wood laminates**.

lamination, n—1) the process of preparing a laminate. 2) any layer in a laminate. (Compare **laminate, n** and **wood laminate**.)

lap joint, n—a joint made by placing one adherend partly over another and bonding together the overlapped portions.

latex, n—a stable dispersion of polymeric substance in an essentially aqueous medium. (1998) (A) **D4317, D14**

layer, n—*as related to veneer and plywood*, a single veneer ply or two or more plies laminated with grain direction parallel. (1990) (A)

DISCUSSION—A parallel laminated layer is two or more plies laminated with grain direction parallel.

legging, n—See **stringiness**. (2008) (R)

manufactured unit, n—a quantity of finished adhesive or finished adhesive component, processed at one time. (Compare **batch**.)

DISCUSSION—The manufactured unit may be a batch or a part thereof.

mastic, n—see **mastic adhesive**.

mastic adhesive, n—a gap-filling adhesive applied as a paste or putty-like material. (Also called *mastic*.) (1992) (A)

matrix, n—the part of an adhesive which surrounds or engulfs embedded filler or reinforcing particles and filaments.

maturing temperature, n—the temperature, as a function of time and bonding condition, that produces desired characteristics in bonded components.

DISCUSSION—The term is specific for ceramic adhesives.

mechanical adhesion, n—see *mechanical adhesion* under **adhesion**.