

Glossary of

Terms used in the adhesives industry

UDC 001.4:665.93

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Adhesives Standards Policy Committee (ADC/-) to Technical Committee ADC/9, upon which the following bodies were represented:

- British Adhesives and Sealants Association
- British Plastics Federation
- British Railways Board
- Chemical Industries Association
- Electronic Engineering Association
- Ministry of Defence
- PIRA
- SATRA Footwear Technology Centre
- Society of Motor Manufacturers and Traders Limited

This British Standard, having been prepared under the direction of the Adhesives Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 31 July 1989

© BSI 10-1999

First published October 1981
First revision July 1989

The following BSI references relate to the work on this standard:
Committee reference ADC/9
Draft for comment 87/55455 DC

ISBN 0 580 17131 0

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
0.1 Scope	1
0.2 References	1
Section 1. Terms relating to components of adhesives	1
1.1 Main functional components	1
1.1.1 General terms	1
1.1.2 Specific materials	2
1.2 Minor components	8
Section 2. Terms relating to adherends	9
Section 3. Terms relating to finished adhesives	10
3.1 Classification of adhesives	10
3.1.1 Adhesives classified by physical nature	10
3.1.2 Adhesives classified by method of application	11
3.1.3 Adhesives classified by mode of setting	11
3.1.4 Miscellaneous types of adhesive	12
3.2 Properties of adhesives	13
3.2.1 Rheological properties	13
3.2.2 Other properties	15
Section 4. Terms relating to the bonding process	16
4.1 General terms	16
4.2 Bonding conditions	18
4.3 Bonding equipment	18
4.4 Adhesive properties and behaviour during bonding process	19
4.5 Assemblies during the bonding process	20
Section 5. Terms relating to properties and testing of bonded assemblies	21
5.1 General terms	21
5.2 Properties of assemblies	22
Section 6. Terms relating to pressure-sensitive adhesive tapes	24
Alphabetical index	26
Figure 1 — Knife-on-roller coater	29
Figure 2 — Knife-on-blanket coater	29
Figure 3 — Gravure roller coater	30
Figure 4 — Curtain coater	30
Figure 5 — Forward roller coaters	31
Figure 6 — Reverse roller coater	32
Figure 7 — Types of bonded joints	33
Figure 8 — Modes of application of forces to bonded joints	34
Publications referred to	Inside back cover

Foreword

This revision of this British Standard has been prepared under the direction of the Adhesives Standards Policy Committee. BS 6138, providing a standard glossary of terms used in the adhesives industry, was first published in 1981. Several amendments have now been made to clarify the meanings of definitions and to align the definitions with those found in other British Standards. Several new terms and definitions have been added to reflect the needs expressed by users of the glossary, and to include new types of adhesive which have come into widespread use since the standard was first published. The definitions that have not been amended have been confirmed. With the publication of this edition, the 1981 edition is withdrawn.

The glossary is written for both experts and non-experts as a guide to the choice of preferred terms. Where more than one term is in use for a concept it has usually been possible to indicate without difficulty which of them is preferable, but for some an arbitrary choice has been made. In the glossary each definition is given once only, all the terms used for a particular concept being placed alongside the definition. Preferred terms are printed in bold type and are followed by any synonyms also printed in bold type. In some cases, where two or more terms have the same meaning but one is preferred, it is printed in bold type; the others are printed in ordinary type and, if deprecated, they are so marked.

The list of terms defined has been classified so that, as far as possible, related concepts are grouped together. The terms in the classified list are numbered, and an alphabetical index which includes all the terms in the glossary (preferred, non-preferred or deprecated) is provided. The numbering of the terms reflects the classification. Each number comprises 5 digits, the first of which indicates the section in which the term belongs and the second and third indicate the subdivisions of the sections. The last two digits identify the individual terms.

This glossary comprises approximately 400 terms peculiar to, or in general use in, the adhesives industry covering both adhesives and adhesive tapes; those terms which would be included in a general technical dictionary should not be sought here.

Whilst every attempt has been made to check definitions for the same terms in existing British Standards and obtain agreement on the terms included, and on their definitions, some controversial definitions may have been given and some terms may have been omitted. The usual procedure of the BSI is to revise standards when the need appears. It is hoped that users of the glossary will inform the Institution of any changes they consider desirable.

Use of the glossary. The glossary can be used as a dictionary or as a source of information about related concepts in the adhesives industry or to provide a term for a concept.

To find

- a) *the definition for a term*, look up the term in the alphabetical index at the end of the book. The index will refer to the number of the term in the glossary. The definition, the term and any synonyms appear by the number;
- b) *information about related terms*, look up the term in the alphabetical index to find its number in the glossary. When the term has been located in the glossary, the related concepts are to be found in the same section.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 34, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0.1 Scope

This British Standard defines terms used in the adhesives industry and terms relating to adhesives in those industries that use adhesives.

0.2 References

The titles of the publications referred to in this glossary are listed on the inside back cover.

Section 1. Terms relating to components of adhesives

1.1 Main functional components

1.1.1 General terms

No.	Term	Definition
11101	binder	The component of an adhesive composition that is primarily responsible for the forces that hold the adherends together.
11102	matrix	The part of an adhesive that surrounds or engulfs embedded filler or reinforcing particles and filaments.
11103	plastics	A group of materials, arbitrarily defined, but based on synthetic or modified natural polymers, which, at some stage of manufacture, can be formed to shape by flow, aided in many cases by heat and pressure.
11104	resin	a) A solid, semi-solid or liquid, usually organic, material that has an indefinite and often high molecular mass and, when solid, usually has a softening or melting range and gives a conchoidal fracture. NOTE Bitumens, pitches, gums and waxes are excluded by convention. b) A polymeric material, commonly uncompounded, used in the plastics industry.
11105	monomer	A chemical compound, usually of low molecular mass, that may be converted into a polymer by combining with itself or with other chemical compounds.
11106	polymer	A substance, composed of very large molecules which consist essentially of recurring structural units. The nature of these structural units and the average number per polymer molecule influence the physical and mechanical properties of the polymer.
11107	copolymer	A polymer consisting of molecules composed of more than one kind of monomer.
11108	elastomer	A solid polymer or copolymer that can return rapidly to the approximate shape from which it has been substantially distorted by a weak applied stress, on release of that stress.
11109	thermoplastic (n.); thermoplast (n.)	A polymer or copolymer capable of being softened by heating and hardened by cooling; these phenomena are repeatable. NOTE Many thermoplastic materials may become thermoset by appropriate treatment to induce crosslinking, e.g. by the addition of a suitable chemical crosslinking agent or by irradiation.
11110	thermoset (n.)	A polymer or copolymer that is cured by crosslinking, e.g. by heat, and which does not soften significantly on heating to temperatures below its decomposition temperature.

No.	Term	Definition
11111	A-stage (of a resin)	An early stage in the reaction of certain thermosetting resins at which the material is still fusible and still soluble.
11112	B-stage (of a resin)	An intermediate pseudo-stable stage of reaction of a crosslinking system that is fusible and partially soluble. NOTE B-stage is converted to the infusible crosslinked state by the application of heat and, usually, pressure.
11113	C-stage (of a resin)	The final stage in the reaction of certain thermosetting resins at which the material is insoluble and infusible.
11114	batch	The manufactured unit or a blend of two or more units of the same formulation and processing that is homogeneous.

1.1.2 Specific materials

a) *Animal origin*

11201	casein	Protein precipitated from skimmed milk by the action of rennet or acid. When compounded with other reactants it is used as an adhesive for wood and packaging applications.
11202	collagen	The natural protein of skin, bone and connective tissue from which gelatine and animal glue are obtained.
11203	gelatine	The soluble protein derived from collagen.

b) *Vegetable origin*

11204	cellulose esters	Products of the esterification of certain of the hydroxyl groups of the cellulose macromolecule with organic or mineral acids: cellulose esters are soluble in organic solvents such as esters or ketones, and thus form the basis of some solvent-borne adhesives. NOTE Examples of cellulose esters are cellulose acetate, cellulose acetobutyrate, cellulose acetopropionate, cellulose nitrate.
11205	cellulose ethers	Products of the etherification of certain of the hydroxyl groups of the cellulose macromolecule: the ethers are soluble in, or solubilized by, water and simple alcohols and find use as the basis of water soluble adhesives for paper and as thickening agents in water-borne adhesives. NOTE Examples of cellulose ethers are carboxymethyl cellulose, ethyl cellulose, methyl cellulose.
11206	cellulose gum	A water-soluble cellulose derivative used as a substitute for gum arabic (see 11207).
11207	gum arabic	The dried exudation from the stem and branches of <i>Acacia senegal</i> Willdenow and other species of <i>Acacia</i> . High purity varieties are known as "gum acacia".
11208	gum tragacanth	The dried mucilaginous exudation from <i>Astragalus gummifer</i> and other species of <i>Astragalus</i> (<i>Leguminosae</i>), and which is partly soluble in water. NOTE Gum tragacanth is used as a modifier and stabilizer in water- (or occasionally alcohol-) borne adhesives.
11209	rosin; colophony	A resin obtained as residue in the distillation of crude turpentine from the sap of the pine tree (gum rosin) or from an extract of the stumps and other parts of the tree (wood rosin). NOTE Hydrogenated and polymerized grades are available.

No.	Term	Definition
11210	terpene resin	Pale thermoplastic polyterpene hydrocarbons obtained by the acid catalyzed polymerization of the bicyclic monoterpene β -pinene (or occasionally α -pinene) products of the distillation of sulphate wood turpentine. NOTE Terpene resin is principally used in adhesives as a tackifier [see solvent-borne adhesive (31102)].
11211	oleo-resinous materials	Materials composed of vegetable drying oils in conjunction with resins that may be either natural or synthetic. NOTE Oleo-resinous materials are used occasionally as adhesives for labels and transfers.
11212	dammar resin	Resin obtained from species of <i>Shorea</i> , <i>Hopea</i> , <i>Balnocarpus</i> , and which is soluble in certain organic solvents. NOTE Dammar resin is used as a tackifier and modifier of pressure-sensitive adhesives.
11213	rubber (natural)	A solid material with elastic properties, made from latex from living plants, usually <i>Hevea brasiliensis</i> , used in the manufacture of rubber products.
11214	cashew nut liquid	The liquid (steam distillate) obtained from the nut of the cashew tree, <i>Anacordia occidentale</i> , which is mainly composed of natural phenols. NOTE The uses of cashew nut liquid are as follows. a) An intermediate polymer cashew nut phenolic resin can be formed which reacts with paraformaldehyde to give slightly flexible products. b) As an adhesive, in particular for abrasive grits and sand. c) As a tackifier (see 12018).
11215	carnauba wax	A naturally occurring wax from the leaves of the Brazilian wax palm (<i>Copernicia cerifera</i>) which is frequently used as a constituent of release agents (see 20008).
11216	soya bean protein	A protein derived from soya bean seeds. When compounded with other reactants, it is used as an adhesive, mostly in plywood.
11217	cyclized rubber	An isomeric derivative of natural rubber produced by a variety of chemical treatments. The products are resinous and are used as rubber-to-metal adhesives.
11218	rubber hydrochloride	The derivative of natural rubber products produced by the action of hydrogen chloride.
11219	chlorinated rubber	A white powder or fibrous product obtained by the controlled chlorination of natural rubber. NOTE Chlorinated rubber is used as a compounding ingredient in adhesives.
11220	dextrin(e)	Modified starch prepared from starch by heat treatment in the dry state with or without the addition of small quantities of chemical agents. NOTE Dextrine is used in certain water-borne adhesives.
11221	starch	Vegetable carbohydrate occurring in the granular form in certain plants and corresponding to a polymer composed almost exclusively of anhydroalpha-D-glucose groups.
11222	starch ether	Modified starch in which the hydroxyl groups of the starch have been totally or partially etherified.
11223	starch ester	Modified starch in which the hydroxyl groups of the starch have been totally or partially esterified.

No.	Term	Definition
c) <i>Mineral origin</i>		
11224	bitumen; asphalt	A very viscous liquid or solid, consisting essentially of hydrocarbons and their derivatives, that are soluble in carbon disulphide. It is substantially non-volatile and softens gradually when heated. NOTE Bitumen is black or brown in colour and possesses waterproofing and adhesive properties. Bitumen is obtained by refinery processes from petroleum, and is also found as a natural deposit or as a component of naturally occurring asphalt, in which it is associated with mineral water.
11225	chlorinated PVC	A granular material produced by the chlorination of polyvinyl chloride. It is soluble in a wide range of organic solvents. NOTE Chlorinated PVC is used in adhesives for bonding plastics, particularly for bonding unplasticized polyvinyl chloride.
11226	coumarone/indene resin	A type of thermoplastic resin obtained by the acid catalysed polymerization of coal-tar petroleum fractions rich in coumarone and indene. NOTE Coumarone/indene resin is frequently used as a tackifier.
11227	wax	A range of low molecular mass solid aliphatic hydrocarbons such as paraffin wax or microcrystalline wax commonly used in hot melt adhesives.
11228	acrylonitrile-butadiene rubber [nitrile rubber (NBR)]; nitrile-butadiene	A range of synthetic rubbers made by the copolymerization of butadiene and acrylonitrile. They have oil, solvent and plasticizer-resistant properties depending on their acrylonitrile content. NOTE Acrylonitrile-butadiene rubber may be carboxylated to modify its properties.
11229	styrene-butadiene rubber (SBR);	A range of general purpose synthetic rubbers or resins made by the copolymerization of butadiene and styrene. When suitably compounded they form the base for a wide range of solvent-borne adhesives. SBR is also available as latices which are constituents of many adhesives. NOTE Styrene-butadiene rubber may be carboxylated to modify its properties.
11230	polyacrylonitrile-butadiene-styrene (ABS)	A range of synthetic rubbers or resins made by the copolymerization of butadiene, acrylonitrile and styrene. They have oil, solvent and plasticizer-resistant properties depending on their acrylonitrile content.
11231	chloroprene rubber (CR), polychloroprene	A range of synthetic rubbers based on polymerized chloroprene, widely used in the formulation of contact adhesives.
11232	polyolefin	A thermoplastic material produced by the polymerization or copolymerization of olefins, e.g. ethylene, propylene.
11233	polyisobutylene (PIB)	A product of the polymerization of isobutylene (2-methylpropene) having the basic main chain repeat unit $-(CH_3)_2CH-$. NOTE Polyisobutylene is sometimes used as the basis of solvent-borne adhesives giving films with pressure sensitive or self-sealing properties, and as a modifier.
11234	polyethylene (PE)	A polymer of ethylene, having the main chain repeat unit $-(CH_2CH_2)-$, used in hot melt adhesive formulations.

No.	Term	Definition
11235	chlorosulphonated polyethylene (CSM)	A material prepared by the simultaneous chlorination and chlorosulphonation of polyethylene in solution with gaseous chlorine and sulphur dioxide. NOTE Chlorosulphonated polyethylene is used as a surface coating and in those applications where synthetic rubber is typically used.
11236	silicone polymer (SI)	A polymer in which the molecules consist of main chains of alternate silicon and oxygen atoms with side groups containing carbon.
11237	polysulphide	Polymers, usually liquids, containing disulphide linkages together with repeated bis(ethylene oxy)methane groups. These groups are most commonly terminated with thiol and hydroxyl groups.
11238	polyurethane	A polymer derived from the reaction of a polyisocyanate with a polyhydroxyl compound normally of polyester or polyether structure.
11239	acrylic	A general term used to describe a large family of polymers and copolymers where at least one principal structural unit is derived from acrylic or methacrylic acids or their esters, $\text{CH}_2 = \text{CH} \text{ COOR}$, $\text{CH}_2 = \underset{\text{CH}_3}{\text{C}} - \text{COOR}$. NOTE Polymers of this class find outlets as constituents of many types of solvent-borne adhesives and emulsion adhesives, particularly where resistance to plasticizer migration is required.
11240	cyanoacrylate monomer	A highly specialized type of acrylic monomer, esters of cyanoacrylic acid having the general formula $\text{CH}_2 = \underset{\text{CN}}{\text{C}} - \text{COOR}$. NOTE Cyanoacrylate monomers are capable of polymerizing rapidly in the form of thin enclosed films and are used as the active entity in certain close-setting polymerizing adhesives.
11241	polyamide (PA)	The polymeric reaction product usually of dicarboxylic acids and diamines having the repeating linkage $\text{---}(\text{R} - \underset{\text{H}}{\text{N}} - \underset{\text{O}}{\text{C}} \text{---})$. NOTE There are "unreactive" and "reactive" types of polyamides. The former are made from dimer acids and diamines and are solids used as hot-melt adhesives. The latter are usually made from dimer acids and polyamines and contain free amine groups. They are usually liquids and are used in two-part adhesives. They are referred to as "polyaminoamides".
11242	ester gum	Resinous esters of rosin acids with polyhydric alcohols such as glycerol or pentaerythritol. NOTE Ester gums are sometimes used in tackifiers (see 12018).
11243	polyester	Polymeric reaction product of alcohols and carboxylic acids having the repeating linkage $(\text{---} \text{R} - \underset{\text{O}}{\text{C}} \text{---})$. The polyester may be of the saturated or unsaturated type depending on the dicarboxylic acid used. NOTE The unsaturated polyesters are used in conjunction with a liquid unsaturated monomer (e.g. styrene) as the basis of two-part adhesives that require a catalyst system. The saturated polyesters are widely used as hot-melt adhesives.

No.	Term	Definition
11244	polystyrene (PS)	A thermoplastic material produced by the polymerization of styrene. NOTE Polystyrene is used in solution in organic solvent as an adhesive for polystyrene and certain porous materials.
11245	polyvinyl acetal	A thermoplastic material derived from polyvinyl acetate in which ester groups have been replaced by hydroxyl groups and most of these hydroxyl groups converted to acetal groups by reaction with an aldehyde. NOTE The term “polyvinyl acetal” is used for the polymer made from acetaldehyde and generically for the other members of the series.
11246	polyvinyl acetate (PVAC)	A range of thermoplastic materials in either emulsion or resinous form produced by the polymerization of vinyl acetate as the sole or principal monomer. NOTE Polyvinyl acetate is used as a versatile adhesive for porous materials, particularly for wood and paper, and for general packaging work.
11247	polyvinyl alcohol (PVAL)	A thermoplastic material produced by the hydrolysis of polyvinyl acetate. Commercial polyvinyl alcohol usually contains some residual acetate groups. NOTE The uses of polyvinyl alcohol are as follows: a) as a water-soluble adhesive for porous materials and for use in contact with food; b) as an additive in other adhesives to improve adhesion and as a stabilizer, etc.; c) as a heat seal or moisture reactivation adhesive.
11248	polyvinyl butyral	A thermoplastic polymer made from polyvinyl alcohol and butyraldehyde. NOTE The main uses of polyvinyl butyral are as follows: a) as a constituent of two-polymer systems which provide high strength structural adhesives; b) as a main component of certain hot melt adhesives used in particular for laminated safety glass and packaging applications.
11249	polyvinyl chloride (PVC)	A range of thermoplastic materials produced by the polymerization of vinyl chloride. NOTE When compounded with suitable plasticizers, adhesion promoting materials, stabilizers, etc., certain types of PVC form plastisols which may be used as flexible hot setting adhesives. The uses of PVC are as follows. a) <i>Plastisols</i>. Gap-filling shock-absorbing adhesives; b) In solution in certain organic solvents they provide adhesives for PVC and vinyl copolymer materials.
11250	polyvinyl formal	A thermoplastic polymer made from polyvinyl alcohol and formaldehyde. NOTE The main use of polyvinyl formal is as a constituent of two polymer systems to provide high strength structural adhesives.

No.	Term	Definition
11251	vinyl resin	Resin based on the vinyl group or radical $\text{CH}_2 = \text{CH}-$. In combination with another group or radical R it may define a vinyl monomer $\text{CH}_2 = \text{CH} - \text{R}$, which can be converted, by addition reaction, to a polymer having the main chain repeat unit $-\text{CH}_2-\text{CH}-$ $\begin{array}{c} \\ \text{R} \end{array}$ NOTE Technological usage of vinyl resin is normally restricted to materials whose main chain repeat units are derived from vinyl chloride (where R is Cl), vinyl acetate (where R is $\text{CH}_3 \text{COO}-$) or the theoretical vinyl alcohol (where R would be OH). Strict polymer science nomenclature would include any polymer derived from a monomer of the above general type, e.g. polystyrene.
11252	resinoid	A thermosetting resin, either in the initial, temporary, fusible state or in the final, infusible state [see also novolak (11258) and thermoset (11110)].
11253	amino-resin; aminoplast; aminoplastic resin	A thermosetting synthetic resin derived from a condensation reaction of urea, thiourea, melamine or allied compounds (alone or in combination) with formaldehyde.
11254	epoxide resin epoxy resin	A synthetic resin containing epoxide groups. NOTE This is a class of thermosetting resin that may be used in adhesives for structural purposes especially when cross-linked with a hardener or catalyst such as, for example, amines or anhydrides.
11255	furane resin, (furan)	A thermosetting synthetic resin derived from the condensation of a phenolic compound and furfural.
11256	phenolic resin	A synthetic resin produced by the condensation of a phenol (e.g. phenol, cresol, xylenol, resorcinol or mixtures of these compounds) with an aldehyde or mixtures of aldehydes (formaldehyde, furfuraldehyde) [see also resol (11257) and novolak (11258)].
11257	resol	The result of reacting phenols and aldehydes normally under alkaline conditions with aldehyde in molar excess. The molecules contain reactive methylol groups which will condense together on the application of heat [see also novolak (11258)].
11258	novolak	The result of reacting phenols and aldehydes normally under acid conditions with phenols in molar excess. The molecules do not contain reactive methylol groups and cannot condense on the application of heat without the addition of hardening agents [see also resol (11257)].
11259	urea formaldehyde (UF)	See amino-resin (11253).
11260	melamine formaldehyde (MF)	See amino-resin (11253).
11261	phenol formaldehyde (PF)	See phenolic resin (11256).
11262	resorcinol formaldehyde	See phenolic resin (11256).