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Packaging code —

Section 16: Adhesives for packaging

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Committees responsible for this British Standard

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- British Adhesives and Sealants Association
- British Fibreboard Packaging Association
- British Paper and Board Industry Federation (PIF)
- Chemical Industries Association PIRA
- Soap and Detergent Industry Association
- Transparent Cellulose Wrapping Committee

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Foreword

This Section of BS 1133 has been prepared under the direction of the Packaging and Freight Containers Standards Committee. It is a revision of BS 1133-16, which is withdrawn.

BS 1133 was originally issued in December 1943, primarily to give guidance on the packaging of Service and other Government supplies. In practice, however, the code was used not only by Government departments and contractors but also by civilian packers and, accordingly, it was amended to suit peace-time requirements. The Parts were later issued separately and new Sections were added as new materials and methods were developed.

Various Sections of the code have been revised and the most recent revision of Section 16 was in 1968.

This revision of Section 16 updates the guidance material to reflect changes in use of the different types of adhesive and incorporates a guide to packaging end uses indicating the most suitable adhesives.

The packaging code now consists of the following Sections all of which are published separately with the exception of Sections 1 to 3 which are published in one volume.

- *Section 1 to 3 Introduction to packaging;*
- *Section 4: Mechanical aids in package handling;*
- *Section 5: Protection against spoilage of packages and their contents by micro-organisms, insects, mites and rodents;*
- *Section 6: Temporary protection of metal surfaces against corrosion during transportation and storage;*
- *Section 7: Paper and board wrappers, bags and containers;*
- *Section 7: Subsection 7.1 Wrapping papers;*
- *Section 7: Subsection 7.2 Bags and envelopes;*
- *Section 7: Subsection 7.3 Cartons and boxes;*
- *Section 7: Chapter 7.5 Fibreboard cases;*
- *Section 8: Wooden containers;*
- *Section 9: Textile bags, sacks and wrappings;*
- *Section 10: Metal containers;*
- *Section 12: Methods of protection against shock (excluding cushioning devices);*
- *Section 13: Twines and cords for packaging;*
- *Section 14: Adhesive closing and sealing tapes;*
- *Section 15: Tensional strapping;*
- *Section 16: Adhesives for packaging;*
- *Section 17: Wicker and veneer baskets;*
- *Section 18: Glass containers and closures;*
- *Section 18: Subsection 1 Terminology;*
- *Section 19: Use of desiccants in packaging;*
- *Section 21: Regenerated cellulose film, plastics films, aluminium foil and flexible laminates;*
- *Section 22: Packaging in plastics containers.*

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 22, an inside back cover and 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.

1 Scope

This Section of BS 1133 gives guidance on the most common adhesives used for the conversion of packaging materials and the assembly, sealing and labelling of packages. Each type of adhesive is classified by source, principal characteristics and application, followed by more extensive information on properties, uses and health and safety considerations.

A guide to packaging end uses is included as Appendix A listing the most suitable adhesives for each application.

A list of British Standards relating to adhesives which may be of relevance to packaging is given in Appendix B.

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

2 General

2.1 Adhesive types

Adhesives described in this standard may be divided into the following groups:

- bituminous
- inorganic
- protein
- rubber based (natural and synthetic)
- synthetic resins
- thermoplastic adhesives (supplied in solid form)
- vegetable
- miscellaneous (adhesive mixtures)

The characteristics of these types differ but each has its field of use for packaging purposes.

Table 1 provides a basic guide to the characteristics and uses of these types of adhesive but each type is described in more detail in clauses 4 to 11.

2.2 Choice of adhesive

The choice and application of the correct adhesive for a particular purpose are of the utmost importance and selection should be made only with the aid of technical advice.

It is not practicable in this code to make detailed recommendations as to the best adhesives for a particular use. In selecting an adhesive the following factors should be considered:

- a) whether the resulting joint will be sufficiently strong for the required purpose, and, under the conditions of storage, permanent;
- b) the technique of application to be employed;
- c) convenience and economy in use, taking account of possible health and safety hazards (see 3.1);

- d) the possible long-term interaction of the adhesive with other components of the completed pack, e.g. effect on inks, corrosive effects and the effect of plasticizer migration.

Whenever possible the selection should be checked by practical tests, including field trials where appropriate.

Appendix A lists a number of packaging end uses identifying the most suitable types of adhesive for each, from which the selection should be made in the light of the factors given in this subclause.

2.3 British Standards relating to adhesives

Appendix B contains a list of British Standards relating to adhesives which may be of interest in connection with packaging.

3 Safety precautions

3.1 Handling, storage and disposal hazards

Special precautions may be necessary or desirable when handling, storing or disposing of certain types of adhesive (for example, because of flammability, toxicity or dermatitis risk).

It should be noted that health and safety advice in this document is not exhaustive. Statutory indication of hazards is required on labels and fuller information on hazards and precautions in use should be obtainable from the manufacturers, suppliers, etc. who have a specific duty to make available information under section 6 of the Health and Safety at Work etc. Act 1974¹⁾. In cases of difficulty, the local office of the Health and Safety Executive or the relevant local authority can also be consulted on health and safety aspects of handling, storage and disposal. Some synthetic rubber adhesives are petroleum solvents which may be subject to licensing provisions when kept; the petroleum licensing authority should be consulted for advice in such cases. Some components of adhesives (e.g. isocyanate and solvents) have occupational exposure limits which should be met; further information can be found in HSE Guidance Note EH 40.

3.2 Application hazards

All adhesives have some degree of toxicity, therefore good hygiene should always be observed when handling adhesives. Specific hazards in use are referred to in clauses 4 to 11.

3.3 End use hazards

Some adhesives contain ingredients that are toxic and this will have to be borne in mind particularly in the choice of adhesives for packaging foodstuffs. Guidance from the manufacturers should be obtained on these points.

¹⁾ The British Adhesives and Sealants Association publish a booklet "Safe handling of adhesives in industry" available from adhesives suppliers and from BASA, 2A High Street, Hythe, Southampton SO4 6 XW.

Table 1 — Summary of the characteristics and uses of adhesives for packaging

Type	Source/manufactures	Principal characteristics	Typical applications
<i>Bituminous adhesives</i>			
Asphaltic bitumen	Residue from distillation of crude petroleum or as naturally occurring mineral bitumen	Thermoplastic, black in colour. Normally used hot but can be obtained as an emulsion Good water resistance. Low water vapour transmission rate	Board, paper and metal foil laminations
<i>Inorganic adhesives</i>			
Sodium silicate	Solution of sodium silicate in water, many types depending on ratio of silicon dioxide to sodium oxide. Additions of inorganic materials such as clay or whiting may be made	Alkaline, aqueous solution. Hard and brittle bond, poor water resistance, good resistance to heat or cold	Paper and board laminating, tube winding
<i>Protein adhesives</i>			
a) Animal glues	Made by hydrolysis of hide or bone. Normally defoamed for packaging applications May be compounded with plasticizers, humectants, gel depressants, etc.	Available in powder, jelly, or liquid form. Normally used in warm aqueous solution Gives immediate high tack and sets on cooling to a gel which forms a temporary bond strengthening as it dries further Poor water resistance	Wood gluing, tube winding, rigid box covering and gummed tape manufacture
b) Casein adhesives	Manufactured from milk by acid precipitation and then formulated with alkali and other solubilizing agents	Aqueous solution. Good water resistance but is soluble in mild alkali	Glass container labelling Tube winding
<i>Natural and synthetic rubber based adhesives</i>			
a) Natural latex adhesives	1) The natural latex exuding from the cut bark of the rubber tree; after preservation, stabilization and concentration it may be used in the natural form 2) The natural latex may also be compounded with resins, gums and/or vulcanizing agents	i) Water-borne dispersion containing ammonia. Versatile adhesive giving strong, flexible water resistant bonds. Can be used as a self-sealing adhesive ii) May or may not contain ammonia. Gives improved adhesion	Cold seal coatings. Self-sealing envelopes, cartons and trays Labelling of plastics containers. Carton forming

Table 1 — Summary of the characteristics and uses of adhesives for packaging

Type	Source/manufacture	Principal characteristics	Typical applications
b) Synthetic rubber adhesives	Polychloroprene polymers, acrylonitrile copolymers (nitrile) or styrene-butadiene copolymers (SBR ^a) supplied in organic solvent(s) or in latex form	Solutions are fast drying adhesives giving tough flexible permanent bonds. May be highly flammable. Latex adhesives are supplied in consistencies ranging from thin mobile fluid to highly viscous paste	Bonding flexible materials, rubber, fabrics, regenerated cellulose and plastics (excluding untreated polyolefin) films or other difficult surfaces
Synthetic resin adhesives a) Thermosetting resins 1) Phenol formaldehyde	Reaction of phenols with formaldehyde under controlled conditions	Generally supplied dispersed in water or water/methylated spirit mixture, but sometimes in other solvent. Dark coloured. Good water resistance, gap filling. Various types cure at room temperature or under heat, some need curing agents and some need heat only	Wood assembly operations
2) Urea/melamine formaldehyde	Reaction of urea/melamine with formaldehyde under controlled conditions	Liquid or powder form. Used with curing agents which are either mixed in (giving limited pot life) or may be applied separately. Not naturally gap filling, but such grades are available. Good water resistance. Colourless, curing hot or cold under acid conditions	Wood gluing. As a blend with starch adhesives in the manufacture of corrugated board and paper sacks with improved water resistance
3) Polyurethanes	Reaction of isocyanates with resins containing hydroxyl groups	One or two-part solvent borne adhesives. Good clarity after curing. Good heat, water and solvent resistance	Film lamination
^a Styrene-butadiene rubber.			