BRITISH STANDARD

BS 6949 : 1991

Specification for

Bitumen-based coatings for cold application, excluding use in contact with potable water

Revêtements bitumineux déposés à froid, non utilisables en contact avec l'eau potable — Spécifications

Kalt aufgebrachte bituminöse Beschichtungen, die für den Kontakt mit Trinkwasser nicht geeignet sind

BSI STANDARDS

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Pigments, Paints and Varnishes Standards Policy Committee (PVC/-) to Technical Committee PVC/27, upon which the following bodies were represented:

Aluminium Federation
Aluminium Finishing Association
Aluminium Window Association
British Railways Board
British Telecommunications plc
Consumer Policy Committee of BSI
Department of the Environment (Building Research Establishment)
European Resin Manufacturers' Association
Institute of Corrosion
Institute of Metal Finishing
Institution of Structural Engineers
Institution of Water and Environmental Management (IWEM)
London Regional Transport
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Oil and Colour Chemists' Association
Paint Research Association
Paintmakers' Association of Great Britain Ltd.
Society of Chemical Industry
Steel Window Association
Union of Construction, Allied Trades and Technicians
Zinc Development Association

This British Standard, having been prepared under the direction of the Pigments, Paints and Varnishes Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 31 October 1991

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Contents

Foreword

This British Standard was prepared under the direction of the Pigments, Paints and Varnishes Standards Policy Committee. It supersedes BS 6949 : 1988, which is withdrawn.

This edition introduces technical changes but it does not reflect a full review or revision of the standard, which will be undertaken in due course.

The main technical changes are:

(a) introduction of separate immersion periods for type 1 and type 2 materials;

(b) a change in the size of the panel used in the methods of test for protection against corrosion (see **B.4**).

NOTE. Differences in the text between this edition and BS 6949 : 1988 are indicated by a line in the margin.

This British Standard contains requirements for bitumen-based coatings unsuitable for use in contact with potable water.

Attention is drawn to BS 3416 : 1991 which covers only bitumen-based coatings suitable for use in contact with potable water and for approval by the UK Water Fittings Byelaws Scheme administered by the Water Research Centre.

This British Standard also takes account of recent developments in this type of paint enabling the use of mineral fillers and alternative solvents.

Two types of bitumen-based coating are included, each type having three classes relating to the solvent system used for the coating.

For guidance on the use of these materials reference should be made to appendix A, and to BS 5493 and BS 6150.

Product certification. Users of this British Standard are advised to consider the desirability of third party certification of product conformity with this British Standard based on testing and continuing surveillance, which may be coupled with assessment of a supplier's quality systems against the appropriate Part of BS 5750.

Enquiries as to the availability of third party certification schemes will be forwarded by BSI to the Association of Certification Bodies. If a third party certification scheme does not already exist, users should consider approaching an appropriate body from the list of Association members.

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

Specification

1 Scope

This British Standard specifies performance and marking requirements for a range of bitumen-based, solvent-borne coatings. It covers coatings for cold application by either brushing, spraying, rolling or dipping processes intended to give a coat for the corrosion protection and water-proofing of substrates including iron and steel.

Two types, each with three classes, are included. All of these are suitable only for applications where the coating will not be in contact with potable water (see BS 3416).

The level of gloss of the finished film is not specified in this British Standard.

NOTE 1. These bitumen coatings are neither intended to withstand hot conditions, as on boilers, smoke stacks, etc., for which special coatings should be obtained, nor to resist contamination with mineral oils or paint solvents, all of which conditions will cause softening of the film.

NOTE 2. Guidance on the use of bitumen-based coatings is given in appendix A, BS 5493 and BS 6150.

NOTE 3. The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this British Standard, the definitions given in BS 2015 apply together with the following.

2.1 bitumen. A viscous liquid, or a solid, consisting essentially of hydrocarbons and their derivatives, which is soluble in trichloroethylene and is substantially non-volatile and softens gradually when heated. It is black or brown in colour and possesses waterproofing and adhesive properties. It 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 matter.

NOTE. The international definition of bitumen relates its solubility to carbon disulphide but, in the United Kingdom, the safer material trichoroethylene is used as the test solvent as examination has shown no significant difference.

2.2 bitumen-based coating. A liquid mixture of bitumen in a carrier (solvent or solvent mixture), usually paraffinic hydrocarbons, chlorinated hydrocarbons and aromatic hydrocarbons, with or without fillers, to give a consistency suitable for brushing, spraying, rolling or dipping in accordance with the recommendations of the manufacturer. The coating may exhibit thixotropy.

3 Classification

3.1 Bitumen-based coatings shall be classified into two types.

(a) Type 1, without fillers.

(b) Type 2, with fillers.

3.2 Each type shall be further sub-classified as follows.

(a) Class A, using white spirit complying with BS 245 as the carrier.

(b) Class B, using either a solvent other than white spirit, or a solvent mixture with a flash point of or above 21 °C and below 32 °C as the carrier.

(c) Class C, using either a solvent other than white spirit, or a solvent mixture with a flash point of or above 32 °C as the carrier.

4 Sampling

Take and store in accordance with BS 3900 : Part A1 representative samples of not less than 1000 mL of the coating either at the filling stage or from one or more previously unopened containers. Condition the samples for at least 12 h at 23 ± 2 °C before carrying out any tests.

5 Flash point

When tested in accordance with **B.1**, coatings shall comply with the following requirements.

(a) Coatings of classes A and C shall not flash at a temperature below 32 °C.

(b) Coatings of class B shall not flash at a temperature below 21 °C.

6 Drying and over-coating times

6.1 Surface-dry time

When tested in accordance with **B.2.1**, films of coatings shall be surface dry:

(a) if type 1, in not more than 4 h;

(b) if type 2, in not more than 8 h.

6.2 Over-coating time

When tested in accordance with **B.2.2**, the film shall show no cissing, crawling, sinking, lifting or wrinkling during application or after 24 h drying time.

7 Finish

When tested in accordance with **B.3**, the film shall be smooth, opaque and free from sags or runs or other surface imperfections.

8 Protection against corrosion

8.1 Resistance to tap water immersion

8.1.1 When tested in accordance with **B.4.1.1**, the film shall remain completely adherent to the substrate.
Any blistering shall not exceed rating 2 (S3) in accordance with BS 3900 : Part H2.

8.1.2 When tested in accordance with **B.4.1.2**, the surface of exposed metal revealed shall show no visible rust or pitting.

8.2 Resistance to artificial sea water immersion

8.2.1 When tested in accordance with **B.4.2.1**, the film shall show no signs of breakdown. Any blistering shall not exceed rating 2 (S3) in accordance with BS 3900 : Part H2.

8.2.2 When tested in accordance with **B.4.2.2**, the surface of exposed metal revealed shall show no visible rust or pitting.

9 Bend resistance

When tested in accordance with **B.5**, the film shall show no signs of cracking or of becoming detached from the substrate.

10 Shelf life

The product, if stored in unopened containers for 12 months at a temperature not exceeding 30 °C shall meet the requirements of clauses **5** to **9**. No separation shall take place which cannot be removed by stirring.

NOTE. In the case of thixotropic coatings, sufficient time, as advised by the manufacturer, should be allowed after any stirring to redevelop the thixotropy.

11 Marking

Each container of bitumen-based coating shall be clearly labelled with the following information:

(a) the manufacturer's identification;

(b) the number of this British Standard and the appropriate type and class of the product, e.g. BS 6949 : 1991*, type 1, class A;

(c) the nominal content by mass or volume;

(d) the batch number from which the container was filled;

(e) the month and year in which the batch was manufactured and a statement to the effect that the bitumen-based coating has a shelf life of 12 months when stored in unopened containers at a temperature not exceeding 30 °C;

(f) a statement that it is unsuitable for use in contact with potable water;

(g) whether the coating is suitable for brushing, spraying, rolling or dipping.

*Marking BS 6949 : 1991 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of such a claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

Appendices

Appendix A. Guidance on the use of bitumen-based coatings for cold application

A.1 Safety instructions

Consult the safety instructions of the manufacturer before application and, especially, before spraying these materials.

NOTE. Attention is drawn to the Health and Safety Executive Guidance Note GS5 'Entry into Confined Spaces' regarding the safe working in confined spaces.

A.2 General properties

Like some other protective coatings referred to in BS 5493 and BS 6150, bitumen coatings are used to protect surfaces rather than to decorate them, their function being to exclude moisture or other corrosive agents. It is thus important that each coat is applied in a continuous manner, without holidays or 'misses'. Bitumen coatings have little power to inhibit corrosion. Hence, if ferrous surfaces are not adequately cleaned to be free from rust and mill-scale before these coatings are applied, under-rusting may occur with consequent failure of the film. They have good adhesion to most surfaces commonly found in building, e.g. ferrous metals, slightly etched galvanized iron and steel, concrete and brick, and will withstand moderate concentrations of acids and alkalis.

These bitumen coatings are neither intended to withstand hot conditions, as on boilers, smoke stacks, etc., for which special coatings should be obtained, nor to resist contamination with mineral oils or paint solvents, all of which conditions will cause softening of the film.

A.3 Precautions

Provide adequate ventilation, particularly of closed vessels, while the material is being applied and until it is thoroughly dry. The use of air-fed masks for personal ventilation is recommended. When painting the interiors of tanks, use a forced air supply to disperse the solvent and prevent residual solvent condensing on the coating and washing it off. Avoid naked lights in or near the tanks or cisterns during these periods. Use appropriate barrier creams and protective clothing to prevent skin sensitization.
Skin should be thoroughly washed and clothing removed and cleaned as soon as possible after the work has been completed.

A.4 Durability

The durability of bitumen coatings depends mainly upon (a) the thickness of the film and (b) the degree of exposure. It is important to apply the products liberally in a number of coats, as thick films give proportionately greater protection than thin ones, and to ensure that all areas of a surface are covered.

The degree of exposure largely controls the rate of deterioration of the film surface. Bitumen is sensitive to sunlight and other strong light, which quickly cause complete loss of gloss, followed later by a form of chalking. This is, however, confined to the surface and provided that the film is of adequate thickness it will continue to give protection. In situations protected from such attack, the gloss is maintained longer.

Crazing sometimes occurs with bitumen coatings but bitumen-coated ferrous metals are seldom subject to early corrosion from this cause.

A.5 Thinning

Where thinning is necessary, e.g. as a first coat on very porous surfaces, only white spirit should be used in the case of class A coatings. For class B and C coatings, only the manufacturer's recommended thinners should be used. In all cases thinning should be kept to a minimum for the type of use required.

A.6 Primer

In order to prevent under-rusting on ferrous metals, a system of rust-inhibiting primer and bitumen coating is often advocated. Reference should be made to the bitumen-coating manufacturer. It is important to allow adequate time for the hardening of primers prior to the application of bitumen-based coatings.

A.7 Preparation of surfaces

Establish that the substrate and the bitumen-based coating are compatible and prepare the substrate according to its type as follows.

(a) *Bare non-porous surfaces.* All dirt, including loosely adhering rust and mill-scale, and grease should be removed.

(b) *Surfaces previously covered with bitumen coating.* All dirt, grease and loosely adhering bitumen coat should be removed by washing or other suitable means. Any bare patches of metal should be spot-primed with bitumen coating before the general coating is applied.

(c) *Porous surfaces.* All dirt and dust should be removed by thorough brushing and any loosely adhering flakes of material should be detached. Washing of porous surfaces is not usually satisfactory unless adequate time is given for the water to evaporate.

(d) *Other surfaces.* Reference should be made to the manufacturer of the bitumen-based coatings.

A.8 Painting

All surfaces should be allowed to dry following the preparation. Painting during humid weather, or in other conditions giving rise to condensation, should be avoided. Further details of the establishment of conditions and appropriate applications of coatings are given in (a) to (e) and in BS 6150.

(a) *Application to non-porous surfaces.* A full coat should be applied by the appropriate method taking care to obtain a uniform and continuous film at the recommended spreading rate. Particular care should be taken to coat thoroughly all recesses, edges, joints, intersections of members, rivet and bolt heads and nuts.

No subsequent coat should be applied until the previous coat has dried thoroughly.

(b) *Systems of bitumen-based coatings and corrosion-inhibitive primer on bare steel.* One or more coats of primer should be applied followed by at least two coats of bitumen-based coating. The primer coat for iron and steel may be a lead-based primer complying with BS 2523, type A (red lead), type B (reduced red lead), type C (white lead/red lead), a calcium plumbate paint complying with BS 3698 or another corrosion-inhibiting primer.

NOTE. The final coat of bitumen-based coating may, with advantage, be one which contains leafing aluminium as an additive to minimize the effect of sunlight, (see **A.4**).

(c) *Systems of bitumen-based coatings on cementitious surfaces.* These surfaces should be sealed with a thinned coating of type 1 bitumen-based coating, (see **A.5**). If the original surface has a high degree of porosity a second thinned seal coating should be used. Two subsequent coats of non-thinned bitumen-based coating are usually necessary, all coatings to be applied after ensuring the previous coating is thoroughly dry. The spreading rate of the material should be adjusted so as to give a satisfactory final film. If the original surface has a high degree of porosity, an additional thinned priming coat should be used.

If the surface is rough, as with some concrete surfaces, or irregular or jointed, as with brickwork, the method and coating should be agreed with the manufacturer.

(d) *Use of bitumen-based coatings with other systems.* Bitumen-based coatings are unsuitable where it is desired to finish the work with many other types of paint, since bleeding of the bitumen through the top coat and crazing of the finish is likely to result. Where it is necessary to apply an oil paint over a bitumen coating these faults may be mitigated by the use of a barrier coat of a preparation made especially for this purpose.

Appendix B. Methods of test for performance requirements

B.1 Flash point

Test the coating in accordance with the method described in BS 3900 : Part A8 or Part A13.

Record the results.

B.2 Drying and over-coating times

B.2.1 Surface-dry time

Apply a single coat of the coating as described in appendix C to a burnished nominal 150 mm × 100 mm steel panel. Test in accordance with BS 3900 : Part C2.

Record the results after 4 h, for type 1 coatings, or after 8 h, for type 2 coatings.

B.2.2 Over-coating time

Allow the coating obtained after the test of **B.2.1** to dry for 24 h with free access of air at 23 ± 2 °C and a relative humidity of 50 ± 5 %.

Over-coat with a second coat in accordance with **C.3.**

Inspect the film visually, by normal or corrected vision, during application and again after the over-coating has been allowed to dry for 24 h.

Record the observations.

B.3 Finish

Apply a single coat of the coating as described in appendix C to a burnished nominal 300 mm × 300 mm steel panel to give the appropriate dry film thickness for its type given in **C.2.**

Inspect the resultant film visually by normal or corrected vision.

Record the observations.

B.4 Protection against corrosion

B.4.1 Resistance to tap water immersion

B.4.1.1 Apply two coats as described in appendix C to a burnished nominal 150 mm × 100 mm steel panel. Then 72 h after application, test in accordance with Procedure A, Method 1 of BS 3900 : Part G5 : 1976 using tap water and an immersion period of 14 days.

Inspect the film visually by normal or corrected vision.

Record the observations.

B.4.1.2 Remove the film with a non-corrosive paint remover complying with BS 3761.

Inspect the surface of the exposed metal by normal or corrected vision.

Record the observations.

B.4.2 Resistance to artificial sea water immersion

B.4.2.1 Apply two coats as described in appendix C to a burnished nominal 150 mm × 100 mm steel panel. 72 h after application, test in accordance with Procedure A, Method 1 of BS 3900 : Part G5 : 1976. Use artificial sea water complying with **6.1** of BS 3900 : Part F4 : 1968, with an immersion period of 4 days for type 1 material and 14 days for type 2 material.

Inspect the film visually by normal or corrected vision.

Record the observations.

B.4.2.2 Remove the film with a non-corrosive paint remover complying with BS 3761. Inspect the surface of the exposed metal by normal or corrected vision.

Record the observations.

B.5 Bend resistance

Apply a single coat as described in appendix C to a burnished nominal 100 mm x 50 mm x 0.3 mm thick tinplate panel. Allow to dry for 7 days.

Test as described in BS 3900 : Part E1, using type 1 apparatus. For type 1 coatings use a 6 mm mandrel. For type 2 coatings use a 10 mm mandrel.

Inspect the film visually by normal or corrected vision.

Record the observations.

Appendix C. Preparation and coating of test panels

C.1 Material and dimensions

Use test panels of the material specified in BS 3900 : Part A3 and of the specified dimensions.

C.2 Preparation and coating

Prepare the test panels in accordance with BS 3900 : Part A3 and then coat by brushing, spraying, rolling or dipping as recommended by the manufacturer, to give a dry film thickness of 35 ± 5 µm for type 1 coatings or 75 ± 10 µm for type 2 coatings.

C.3 Drying of test panels

Dry the test panels in a vertical position at a temperature of 23 ± 2 °C and a relative humidity of 50 ± 5 % for the specified time.

Allow the first coat to dry for 24 h before application of the second coat.

For the tests required in clause **8** coat the backs and edges of the panels with a protective paint system.

Publication(s) referred to

BS 245	Specification for mineral solvents (white spirit and related hydrocarbon solvents) for paints and other purposes
BS 2015	Glossary of paint terms
BS 2523	Specification for lead-based priming paints
BS 3416	Specification for bitumen-based coatings for cold application, suitable for use in contact with potable water
BS 3698	Specification for calcium plumbate priming paints
BS 3761	Specification for solvent-based paint remover
BS 3900	Methods of test for paints Part A1 Sampling Part A3 Standard panels for paint testing Part A8 Test for flash/no flash (closed cup equilibrium method) Part A13 Test for flash/no flash (rapid equilibrium method) Part C2 Surface-drying test (ballotini method) Part E1 Bend test (cylindrical mandrel) Part F4 Resistance to continuous salt spray Part G5 Determination of resistance to liquids Part H2 Designation of degree of blistering
BS 5493	Code of practice for protective coating of iron and steel structures against corrosion
BS 6150	Code of practice for painting of buildings

Health and Safety Executive Guidance Notes GS5 — Entry into Confined Spaces (obtainable from HMSO)

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