BS 6398:1983

Specification for

Bitumen damp-proof courses for masonry

UDC 699.822:691.16

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Elements and Components (of Diverse Materials) for Buildings Standards Committee (ECB/-) to Technical Committee ECB/44 upon which the following bodies were represented:

Associated Lead Manufacturers Limited
Association of British Roofing Felt Manufacturers
Association of Jute Spinners and Manufacturers
Autoclaved Aerated Concrete Products Association
Brick Development Association
British Board of Agrément
British Engineering Brick Association
British Lead Manufacturers' Association
British Plastics Federation
Copper Development Association
Department of the Environment (PSA)
Department of the Environment (Building Research Establishment)
Greater London Council
Mastic Asphalt Council and Employers Federation
North Wales Slate Quarries Association
Royal Institute of British Architects
Royal Institution of Chartered Surveyors
Society of Chemical Industry

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

British Ceramic Research Association
Coopted members

This British Standard, having been prepared under the direction of the Elements and Components (of Diverse Materials) for Buildings Standards Committee, was published under the authority of the Board of BSI and comes into effect on
30 September 1983

The following BSI references relate to the work on this standard:
Committee reference ECB/44
Draft for comment 81/10439 DC

ISBN 0 580 13401 6

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

Foreword

This British Standard has been prepared under the direction of the Elements and Components (of Diverse Materials) for Buildings Standards Committee. This standard supersedes the requirements of clause **4** of BS 743:1970 as amended in March 1978. The intention is to cover the different damp-proof course materials in BS 743 by publishing new British Standards or amending existing British Standards, after which BS 743 will be withdrawn.

Research is in progress to develop test methods as a basis for a future performance based specification for damp-proof courses (d.p.c.s). (See DD 86.) Until suitable performance criteria have been evolved it will not be possible to include high bond materials in standards for d.p.c.s. However, provisional recommendations are given in Appendix C.

For guidance on use of bitumen d.p.c.s see Appendix B. Further information is given in BS 5628-1 and CP 121-1.

Certification. Attention is drawn to the certification facilities described on the inside back cover of this standard.

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 and ii, pages 1 to 4, 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.

1 Scope

This British Standard specifies requirements for materials and assembly of bitumen damp-proof courses (d.p.c.s) and gives a classification of such d.p.c.s according to the type(s) of base material they contain. (See Table 1.)

The d.p.c.s covered by this standard are intended for use in masonry constructions.

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

2 Definitions

For the purposes of this standard the definitions given in BS 3589 apply together with the following.

nominal mass per unit area

a numerical designation of the mass per unit area of a material which is a convenient round number approximately equal to the actual mass per unit area expressed in kg/m^2

3 Classification

Bitumen damp-proof courses shall be classified as given in columns 1 and 2 of Table 1.

4 Base materials

4.1 Minimum mass. When measured as described in **A.3** the mass per unit area of the base material shall be not less than the value for the appropriate class of d.p.c. given in column 4 of Table 1.

4.2 Hessian. The hessian base shall consist of a single layer of plain woven jute cloth.

4.3 Fibre. The fibre base shall consist of one or more absorbent sheets of felt made from a mixture of animal and vegetable fibres.

The base for class B d.p.c.s shall be made of one sheet whilst the base for class E d.p.c.s shall be made of one or two sheets.

4.4 Asbestos. The asbestos base shall consist of an absorbent sheet containing not less than 80 % asbestos. The percentage of asbestos shall be determined by weighing the residue after ignition of the asbestos base at 450 °C for 2 h.

4.5 Lead. The lead sheeting shall be a continuous sheet or consist of sheets of lead joined together with soldered joints and shall extend the full width and length of the finished d.p.c.

5 Bituminous materials and fillers

5.1 Minimum mass. When measured as described in **A.2** the mass per unit area of bitumen shall be not less than the value for the appropriate class of d.p.c. given in column 5 of Table 1.

5.2 Saturating material. The saturating material shall consist of bitumen having a penetration within the range 60 to 230 inclusive at 25 °C when tested as described in BS 4691.

5.3 Coating material

5.3.1 ***General***

5.3.1.1 The coating material shall consist of oxidized bitumen stabilized by mineral filler (see **5.3.2**) and finished with a surfacing material (see **5.3.3**). The mass per unit area of mineral filler and surfacing material shall be within the range given for the appropriate class in column 6 of Table 1.

5.3.1.2 When measured as described in BS 4692 the softening point of the oxidized bitumen before adding the filler and surfacing material shall be within the range 80 °C to 120 °C.

5.3.1.3 When measured as described in BS 4692 the softening point of the finished coating material shall not exceed the softening point of the oxidized bitumen by more than 20 °C.

5.3.2 *Mineral filler.* The filler shall consist of mineral granules or other mineral matter. Not less than 99 % by mass of filler shall pass a 425 μm mesh sieve complying with BS 410 and not less than 50 % by mass shall pass a 212 μm mesh sieve complying with BS 410.

5.3.3 *Surfacing material.* The surfacing material shall consist of natural sand, mineral granules or other material which will prevent adhesion between layers of the finished d.p.c. material in the roll.

6 Assembly of damp-proof course

The base shall be impregnated completely with saturating material. Any surplus saturant shall be removed, after which the coating material shall be applied. When a lead sheet is included, this shall be laminated with the base and the two sheets shall be covered on both sides with coating material.

When measured as described in **A.1** the minimum mass per unit area of the assembled d.p.c. material shall be not less than the value for the appropriate class given in column 7 of Table 1.

7 Marking and packaging

The finished d.p.c. shall be packed in rolls, each roll containing not less than 8 m in length.

Each roll shall be labelled legibly with the number of this British Standard i.e. BS 6398:1983* together with the appropriate classification, i.e. A to F.

Table 1 — Classification and composition of bitumen damp-proof courses

1	2	3	4	5	6		7
Class	**Description**	**Nominal mass per unit area of base**	**Mass per unit area of base**	**Mass per unit area of bituminous material (see note 1)**	**Mass per unit area of filler and surfacing material (see note 1)**		**Mass per unit area of assembled d.p.c. material**
			kg/m^2	kg/m^2	kg/m^2	kg/m^2	kg/m^2
			min.	min.	min.	max.	min.
A	Hessian base	0.2	0.15	1.7 + x	1.1 + y	1.9 + x	3.8
B	Fibre base	0.4	0.34	1.6 + x	0.9 + y	1.5 + x	3.3
C	Asbestos base	0.6	0.53	1.7 + x	1.0 + y	1.8 + x	3.8
D	Hessian base laminated with lead	0.2 1.2	0.15 1.12	1.5 + x	1.0 + y	1.7 + x	4.4
E	Fibre base laminated with lead	0.4 (see note 2) 1.2	0.34 1.12	1.5 + x	0.8 + y	1.4 + x	4.4
F	Asbestos base laminated with lead	0.6 1.2	0.53 1.12	1.6 + x	0.9 + y	1.6 + x	4.9

NOTE 1 x is equal to 0.5 times the excess mass of d.p.c. material, y is equal to 0.3 times the excess mass of d.p.c. material. The excess mass of d.p.c. material is equal to the mass per unit area measured as described in **A.1** less the minimum mass per unit area given in column 7.

NOTE 2 The base for class E may consist of two sheets of nominal mass per unit area 0.20.

Appendix A Test methods

A.1 Determination of mass per unit area of assembled d.p.c. material. Cut a length of d.p.c. material of area approximately 0.80 m2 from a roll.

Using a steel rule measure the sample to the nearest 2 mm in width and the nearest 6 mm in length.

Weigh the sample to the nearest gram. Determine the mass per unit area in kg/m^2 to the nearest 0.01 kg/m^2.

A.2 Determination of soluble bitumen and mineral filler content

A.2.1 Cut two test pieces of area not less than 0.01 m^2 from the sample used in **A.1**. Measure the area of each test piece. Weigh each test piece to the nearest 0.01 g. Proceed as described in **A.2.2** to **A.2.4** for each test piece.

A.2.2 Immerse the test piece in 200 mL trichloroethylene[1)], complying with either types 1 or 2 as specified in BS 580, in a beaker and warm the beaker in a water bath. When the bitumen has dissolved, decant the solution through a tared fluted filter paper into a 500 mL measuring cylinder. Wash any filler and base remaining in the beaker to remove traces of bitumen. Wash the filter paper with warm solvent until clean.

A.2.3 Make up the solution in the cylinder to 500 mL, stopper and shake well. Transfer two 20 mL portions of solution by pipette into tared flat bottomed flasks. Evaporate the solvent using either of the methods described in **8.3** and **8.4** of BS 5284:1976.

Weigh the recovered bitumen to the nearest 0.01 g.

Determine the mass per unit area in kg/m^2 to the nearest 0.01 kg/m^2.

A.2.4 Transfer all the filler and base in the beaker to the tared filter paper used in **A.2.2**.

Remove pieces of base and lead and wash free of filler.

Dry the filter paper and contents for 30 min at 105 °C to 110 °C in a laboratory oven complying with BS 2648.

Cool in a desiccator and weigh. Determine the mass per unit area in kg/m^2 to the nearest 0.01 kg/m^2.

NOTE The mass recorded will include any surfacing material which cannot be separated.

A.3 Determination of mass per unit area of base material. Roll or fold a sample of material of area not less than 0.8 m^2, as necessary, and place in the gauze container of a hot extractor. Extract with trichloroethylene[1)], complying with either types 1 or 2 as specified in BS 580, for 8 h.

Remove the base material (including any lead) and shake vigorously on a 150 μm mesh sieve complying with BS 410 until no more dust is present. Dry for 30 min at 105 °C to 110 °C in the laboratory oven (see **A.2.4**).

Cool in a desiccator and weigh. Separate any lead from the material. Weigh base material and lead and determine the mass per unit area of each in kg/m^2 to the nearest 0.01 kg/m^2.

Appendix B Recommended uses for bitumen damp-proof courses

Table 2 gives guidance on use of bitumen damp-proof courses.

[1)] For guidance on the safe use of trichloroethylene see Health and Safety Executive Guidance Note EH5, "Trichloroethylene: Health and Safety precautions".

Table 2 — Recommended uses for bitumen damp-proof courses

Condition within masonry	Recommendation	Remarks
1. High compressive stress	Not suitable	Compressive stress in excess of 2.50 N/mm^2, e.g. buildings higher than ten storeys
2. Medium compressive stress	Not suitable	Compressive stress in the range 0.50 N/mm^2 to 2.50 N/mm^2, e.g. four to ten-storey buildings
3. Low compressive stress	All classes suitable	Compressive stress in the range 0.10 N/mm^2 to 0.50 N/mm^2, e.g. buildings of up to four storeys
4. Minimal compressive stress with lateral load	All classes suitable	Compressive stress less than 0.10 N/mm^2, e.g. copings, parapet walls
5. Water movement upwards	All classes suitable	Upward movement of water is normally prevented just above ground level
6. Water movement downwards	All classes suitable	Downward movement of water needs to be prevented at many levels, e.g. parapets, chimneys and above lintels in cavity walls
7. Water movement horizontally	All classes suitable	Horizontal movement of water needs to be prevented where the outer leaf of a cavity wall is returned to close the cavity or where d.p.c.s in walls and d.p.c.s in abutting floors are at different levels
8. High shear stress	Only high bond strength d.p.c.s should be used (see Appendix C)	High shear stress occurs in retaining walls, etc.
9. High flexural stress	Only high bond strength d.p.c.s should be used (see Appendix C)	High flexural stress occurs in free standing walls, parapets, etc.
NOTE Class A d.p.c.s are also suitable for tanking basements (see CP 102).		

Appendix C Recommendations for high bond strength bitumen damp-proof courses

Pending further research, provisional recommendations for high-bond strength bitumen damp-proof courses are as follows:

a) Minimum mass per unit area of asbestos base = 0.34 kg/m^2

Minimum mass per unit area of bituminous material = $(0.56 + x)$ kg/m^2

Minimum mass per unit area of filler and surfacing = $(1.0 + y)$ kg/m^2

where

x is equal to 0.5 times the excess mass of d.p.c. material (see Table 1)

y is equal to 0.3 times the excess mass of d.p.c. material (see Table 1)

b) Minimum flexural bond strength = 1.2 N/mm^2 when measured using the method described in clause **2** of DD 86-1:1983.

Minimum short term shear strength = 0.75 N/mm^2 when measured using the method described in clause **3** of DD 86-1:1983.

Publications referred to

BS 410, *Specification for test sieves.*
BS 580, *Trichloroethylene.*
BS 743, *Materials for damp-proof courses. Metric units*[2)].
BS 2648, *Performance requirements for electrically-heated laboratory drying ovens.*
BS 3589, *Glossary of general building terms.*
BS 4691, *Method for determination of penetration of bituminous materials.*
BS 4692, *Method for determination of softening point of bitumen (ring and ball).*
BS 5284, *Sampling and testing mastic asphalt and pitchmastic used in building.*
BS 5628, *Code of practice for the structural use of masonry*[2)].
BS 5628-1, *Unreinforced masonry.*
CP 102, *Protection of buildings against water from the ground.*
CP 121, *Walling*[2)].
CP 121-1, *Brick and block masonry.*
DD 86, *Damp-proof courses.*
DD 86-1, *Methods of test for flexural bond strength and short term shear strength.*
Health and Safety Executive Guidance Note EH5, "Trichloroethylene: Health and Safety precautions", available from HMSO, 49 High Holborn, London WC1V 6HB.

[2)] Referred to in the foreword only.

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL