

Specification for

Bitumen-based filling compounds for electrical purposes

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The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Adhesive Tape Manufacturers' Association	Institute of Petroleum
British Calibration Service	Ministry of Defence, Procurement Executive
British Electro-Ceramic Manufacturers' Association	Radio and Electronic Components Manufacturers' Federation
British Plastics Federation	Refined Bitumen Association
British Tar Industries Association	Telecommunication Engineering and Manufacturing Association
Glass Textile Association	

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Foreword

In this revision of BS 1858, the methods of test continue to be based as far as possible on the “Standard methods for testing petroleum and its products”, published by the Institute of Petroleum¹⁾. A number of these methods are published as British Standards, which are revised with the minimum of delay when the Institute’s methods are revised. In order that this British Standard does not diverge from any revised methods of test, the relevant British Standard is quoted where applicable.

The technical requirements are substantially the same as those of the previous edition, but some changes have been made to cater for up-to-date techniques. The requirements for the mineral matter (ash) of Class VI compounds have been amended and the method of test has been altered to give a more quantitative equivalence of the filler used.

This British Standard calls for the use of substances that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage. Certain tests call for the use of asbestos in the construction of apparatus. Due regard should be given to current legislation governing the use of asbestos and alternative materials should be used if possible.

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 14, 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⁾ 61 New Cavendish Street, London W1.

1 Scope

This British Standard specifies requirements for bitumen-based compounds, suitable for use as filling compounds, which are subjected to electrical stress in service. Oils and oil-resisting compounds, cold pouring compounds and those designed for special purposes are not covered by this standard.

NOTE 1 Compliance of a filling compound with the provisions of this standard does not necessarily indicate that it is suitable for a particular purpose intended by the purchaser. When there is any doubt as to the type of compound to be used for any electrical purpose, the supplier of the compound should be consulted.

NOTE 2 The titles of the British Standards referred to in this standard are listed on the inside back cover.

2 Classification

The classes of compounds covered by this British Standard are listed in Table 1.

Table 1 — Classification

Description	Class	Limits of softening point ^a	
		Min.	Max.
Bitumen-based compound	I	—	40 °C
	II	Over 40 °C	70 °C
	III	Over 70 °C	90 °C
	IV	Over 90 °C	120 °C
	V	Over 120 °C	—
Natural asphalt-based or bitumen-based compounds, or both, containing mineral matter	VI	^b	

^a See Clause 5.

^b There is no specified requirement. Any requirement should be the subject of a purchase contract.

3 General requirements

The compound shall be stable and shall neither froth nor emit excessive fumes when heated to a temperature 85 °C above the softening point (see Clause 5).

Under normal conditions of use there shall be no formation of gas pockets, cavities or cracks in the compound on cooling.

At the temperature reached during installation and under the conditions of service, the compound shall have no injurious effect on copper, brass, iron, lead or aluminium. This stipulation applies also to fibrous materials provided that they themselves will withstand such temperatures.

The compound shall be capable of being remelted repeatedly, without significant separation of the constituents, provided that a temperature of 20 °C above the pouring temperature is not exceeded and that local overheating is avoided. Compounds, especially those of high softening point, shall not be maintained at these temperatures for longer than is necessary.

NOTE References to removal of water in various test methods are applicable only when samples of compound have been contaminated.

4 Solubility

The solubility of compounds of Classes I, II, III, IV and V shall be determined by the method given in BS 2000-47 and that of Class VI compound by the method described in Appendix A. The insoluble content, including the proportion of mineral matter permitted by Clause 11, shall not exceed the appropriate value given below.

Class of compound	Insoluble content
I, II, III, IV, V	0.5 %
VI	60 %

5 Softening point

The softening point shall be determined by the “ring and ball” method described in BS 2000-58.²⁾

The softening point of Class I compound shall not exceed 40 °C and the softening points of all classes shall not vary from the agreed values by more than the amounts given in Table 2.

Table 2 — Tolerance on softening point

Class of compound	Tolerance
	°C
I	± 5 ^a
II	± 3
III	± 3
IV	± 5
V	± 5
VI	± 3

^a Except when too fluid to test for softening point.

6 Penetration

The penetration value of compounds of Classes II, III, IV, V and VI shall be not less³⁾ than the appropriate value given in Table 3, and the tolerance on penetration shall be in accordance with that given in Table 4. The test for penetration of the compound shall be carried out as described in BS 2000-49.

²⁾ There is no specified requirement. Any requirement should be the subject of a purchase contract.

³⁾ Absolute values are not specified in this standard and should be the subject of a purchase contract.

Table 3 — Penetration at 25 °C

Class of compound	Penetration (minimum)
II	20
III	20
IV	10
V	7
VI	7

Table 4 — Tolerance on penetration

Penetration value	Tolerance
Up to 10	± 2
11 to 80	± 4
81 and above	± 10

7 Viscosity of Class I compound

The viscosity of Class I compound shall be determined in accordance with BS 2000-72 and shall not vary from a specified value⁴⁾ by more than 25 % of that value.

8 Pouring point of compounds of Classes II to VI

The pouring point of compounds of Classes II, III, IV, V and VI shall be determined in accordance with the method of Appendix B⁴⁾. The tolerance on pouring point shall be ± 5 °C.

NOTE The pouring point may be regarded as approximating to the temperature to which the compound should be heated for pouring in actual practice and should not be exceeded by more than 20 °C. When the pouring point is not known, the pouring temperature may be taken as being approximately 85 °C above the softening point of the compound (see Clause 5) for Classes I, II, III, IV and V bitumen-based compounds, though this empirical rule may not hold for certain Class VI compounds.

9 Electric strength (proof) test

Two samples of the compound shall be tested as described in Appendix C. If one sample fails to withstand for one minute without puncture the appropriate voltage given in Table 5, at the stated temperature, a third sample shall be tested. The compound shall meet the requirements of this Clause if the results of two out of three tests are satisfactory.

Table 5 — Electric strength (proof) test requirements

Class of compound	Test temperature	Test voltage (r.m.s)
	°C	kV
I	60 ± 1	15
II	60 ± 1	20
III	60 ± 1	20
IV	90 ± 1	20
V	90 ± 1	20
VI	60 ± 1	15
with softening point above 70 °C		
VI	60 ± 1	12
with softening point below 70 °C		

10 Flash point (open)

The flash point of a compound of any class, when determined by one of the methods described in BS 2000-35 or BS 4689, shall be not less than 200 °C.

In cases of dispute, the method given in BS 2000-35 shall be employed.

11 Mineral matter (ash)

The amount of mineral matter in a compound of Classes I, II, III, IV and V shall be determined by the method of ashing described in BS 4450. The mineral matter in a compound of Class VI shall be determined by the method given in Appendix D. The amount of mineral matter shall not exceed the appropriate value given in Table 6.

Table 6 — Mineral matter

Class of compound	Mineral matter
I, II, III, IV, V	Not more than 0.5 %
VI	As agreed between the purchaser and the supplier, but not exceeding 60 %

12 Acidity: neutralization value

If the neutralization value for any class of compound is required to be specified then this shall not exceed 10 mg KOH/g and shall be determined in accordance with the indicator method described in BS 2000-213.

NOTE In the absence of any requirement to the contrary in the purchase contract, it is preferable that the neutralization value should not exceed 4 mg KOH/g.

⁴⁾ The value of the property is not specified in this standard. This should be the subject of a purchase contract.