BRITISH STANDARD

BS 3690-3: 1990

Bitumens for building and civil engineering —

Part 3: Specification for mixtures of bitumen with pitch, tar and Trinidad lake asphalt

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Road Engineering Standards Policy Committee (RDB/-) to Technical Committee RDB/26, upon which the following bodies were represented:

Association of British Roofing Felt Manufacturers
Bitumen Roof Coatings Manufacturers Association
British Aggregate Construction Materials Industries
British Tar Industry Association
County Surveyors' Society
Department of the Environment
Property Services Agency
Department of Transport
Department of Transport (Transport and Road Research Laboratory)
Flat Roofing Contractors Advisory Board
Institute of Asphalt Technology
Institute of Petroleum
Institution of Civil Engineers
Institution of Highways and Transportation
Mastic Asphalt Council and Employers Federation
Refined Bitumen Association Ltd.
Road Emulsion Association Ltd.
Road Surface Dressing Association
Society of Chemical Industry

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Foreword

This Part of this British Standard has been prepared under the direction of the Road Engineering Standards Policy Committee.

It is a partial revision of BS 3690-3:1983 which is now withdrawn. All types of bitumen for building and civil engineering are covered in BS 3690 as follows.

BS 3690, *Bitumens for building and civil engineering.*

— *Part 1: Specification for bitumens for roads and other paved areas;*

— *Part 2: Specification for bitumens for industrial purposes;*

— *Part 3: Specification for mixtures of bitumen with pitch, tar and Trinidad lake asphalt.*

Part 3 is based on normal practice in the UK and relates only to the climate, conditions and application techniques encountered here. It specifies the properties known to be important and the relevant test methods. Many combinations of bitumen with tar, pitch or refined lake asphalt are possible but the coverage of this standard has been limited to the more commonly available mixtures that are used as binders for roadways and footways. A limited number of lake asphalt-bitumen mixtures are described. This type of mixture is used in building mastics and the range specified in this standard will be extended if experience shows this is desirable.

A system of grades and nomenclature has been adopted based on the mid-point of the permissible penetration or viscosity range as appropriate. It is considered that this makes specifying and ordering easier.

This edition introduces technical changes to bring the standard up-to-date but it does not reflect a full review of the standard, which will be undertaken in due course. The main changes from the previous edition are clarification of the title to exclude polymer blends which will be covered separately and the updating of definitions and test method references.

It is not the function of this standard to specify which of the bitumen mixtures should be used for individual applications. Appropriate British Standards are BS 594, BS 1446, BS 1447 and BS 4987.

Other useful publications are:

Road Note 39 Recommendations for road surface dressing (Transport and Road Research Laboratory, Department of the Environment and Department of Transport);

Specification for Highway works (Department of Transport).

This Part of this British Standard requires the use of substances and procedures 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.

Acknowledgement is made to the Standardization of Tar Products Test Committee (STPTC) for permission to use STPTC PT3-79 which appears in Appendix C.

It is intended to produce a Part 4 to BS 3690 which will be a specification for modified bitumens including their testing.

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. In particular, attention is drawn to the Health and Safety at work, etc. Act 1974.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, 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 Part of this standard specifies classification, composition and properties of pitch-bitumen mixtures, tar-bitumen mixtures and lake asphalt-bitumen mixtures that are suitable for use in road and industrial applications in the UK.

Each mixture is classified into a number of grades for each of which the appropriate designation and properties are specified.

Advice on handling and packaging, and on sampling and testing is given in Appendix A and Appendix B.

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 Part of this standard, the following definitions apply.

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

2.2
pitch

the black or dark brown solid or semi-solid residue remaining after the partial evaporation or fractional distillation of crude tars produced wholly or substantially as a by-product in the carbonization of coal at temperatures exceeding 600 °C (see also **2.3**)

2.3
refined tar

road tar as defined in BS 76

2.4
pitch-bitumen mixture

a binder consisting of a homogeneous mixture containing specified proportions by mass of penetration grade bitumen and pitch

2.5
tar-bitumen mixture

a binder consisting of a homogeneous mixture containing specified proportions by mass of penetration grade bitumen and refined tar

2.6
refined lake asphalt

a naturally occurring mixture of bitumen and finely divided mineral matter which is found in well-defined surface deposits and from which unwanted components such as water and vegetable matter have been removed

2.7
lake asphalt-bitumen mixture

a homogeneous mixture of refined Trinidad lake asphalt and bitumen, with or without the addition of flux oil, used in the manufacture of asphalts and other coated materials

3 Classification

The mixtures specified in this Part of this standard shall be designated by numbers representing the mid-point of the penetration or viscosity range as appropriate. Pitch-bitumen mixtures, penetration grade tar-bitumen mixtures and lake asphalt-bitumen mixtures shall have the suffix “pen” whereas lower viscosity tar-bitumen mixtures shall have the suffix “secs”.

4 Pitch-bitumen mixtures

Pitch-bitumen mixtures shall be homogeneous mixtures containing 20 % to 25 % by mass of pitch with the remainder being penetration grade bitumen complying with BS 3690-1. The bitumen shall have a penetration value not greater than 150, and the softening point of the pitch when determined in accordance with Appendix C shall be between 55 °C and 80 °C.

The mixtures shall comply with the requirements given for the appropriate grade in Table 1 when tested by the methods shown in that table.

5 Tar-bitumen mixtures

5.1 Tar-bitumen mixtures for surface dressing

5.1.1 *Composition.* Tar-bitumen mixtures for surface dressing shall be homogeneous mixtures containing 30 % to 55 % by mass of refined tar, with the remainder being penetration grade bitumen complying with BS 3690-1. The refined tar component of the mixtures shall contain not less than 25 % by mass of pitch with a softening point of 80 °C when determined in accordance with Appendix C, or a correspondingly greater amount of pitch with a softening point below 80 °C or lesser amounts of pitch with a softening point above 80 °C.

The mixtures shall comply with the requirements given for the appropriate grade in Table 2 when tested by the methods shown in that table.

5.1.2 *Storage stability*. The mixtures shall transform completely, without stirring, into a mobile, uniform liquid with no separation of solid matter when heated to a temperature of 140 °C. After cooling, the mixtures shall have a uniform appearance and no visible layer of oil shall form on the surface after it has remained without agitation for 24 h at 15 °C to 20 °C in a sealed container.

5.2 Tar-bitumen mixtures for coated macadam. Tar-bitumen mixtures for coated macadam shall be homogeneous mixtures containing 10 ± 3 % by mass of refined tar, with the remainder being penetration grade bitumen complying with BS 3690-1.

The mixtures shall comply with the requirements given for the appropriate grade in Table 3 when tested by the methods shown in that table.

6 Lake asphalt-bitumen mixtures

Lake asphalt-bitumen mixtures shall be homogeneous mixtures containing approximately equal proportions by mass of refined lake asphalt complying with the requirements given in Table 4 and penetration grade bitumen complying with BS 3690-1.

The mixtures shall comply with the requirements given for the appropriate grade in Table 5 when tested by the methods shown in that table.

7 Sampling

Samples shall be taken in accordance with Appendix B.

Table 1 — Properties of pitch-bitumen mixtures

Property		Test method	Identical with	Grade	
				50 pen	70 pen
Penetration at 25 °C		BS 2000-49	ASTM D5 IP 49	50 ± 10	70 ± 10
Softening Point °C	(min.) (max.)	BS 2000-58	IP 58	47 58	44 54
Loss on heating for 5 h at 163 °C		BS 2000-45	IP 45		
a) Loss by mass %	(max.)			1.0	1.0
b) Drop in penetration %	(max.)			30	30
Solubility in trichloroethylene % by mass	(min.)	BS 2000-47	IP 47	95.0	96.0
Stability index	(max.)	BS 598-3		1.2	1.2

Table 2 — Properties of tar-bitumen mixtures for surface dressing

Property	Test method	Technically identical with	Grade	
			100 secs	200 secs
Viscosity (STV[a]) at 40 °C 10 mm cup	BS 76	STPTC RT2-79	100 ± 20	200 ± 40
Segas test evt[b] increase °C	BS 76	STPTC RT10-79	10 to 20	6 to 16
Storage stability	See **5.1.2**		See **5.1.2**	See **5.1.2**

[a] Standard tar viscometer. The determination of viscosity shall be carried out in accordance with **B.1** a) of BS 76:1974.

[b] Equiviscous temperature.

Table 3 — Properties of tar-bitumen mixtures for coated macadam

Property		Test method	Identical with	Grade	
				100 pen	200 pen
Penetration at 25 °C		BS 2000-49	ASTM D5 IP 49	100 ± 20	200 ± 30
Softening point °C	(min.) (max.)	BS 2000-58	IP 58	41 51	33 42

Table 4 — Properties of refined lake asphalt

Property		Test method	Identical with	Requirements
Penetration at 25 °C		BS 2000-49	ASTM D5 IP 49	2 ± 2
Softening point °C	(min.) (max.)	BS 2000-58	IP 58	93 99
Loss on heating for 5 h at 163 °C % by mass	(max.)	BS 2000-45	IP 45	2.0
Solubility in trichloroethylene % by mass	(min.) (max.)	BS 2000-47	IP 47	52 55
Ash content % by mass	(min.) (max.)	BS 2000-223	IP 223	35 39
Density at 25 °C g/mL	(min.) (max.)	BS 4699	ISO 3838	1.39 1.44

Table 5 — Properties of lake asphalt-bitumen mixtures[a]

Property		Test method	Identical with	Grade		
				35 pen	50 pen	70 pen
Penetration at 25 °C		BS 2000-49	ASTM D5 IP 49	35 ± 7	50 ± 10	70 ± 10
Softening point °C	(min.) (max.)	BS 2000-58	IP 58	52 64	47 58	44 54
Loss on heating for 5 h at 163 °C			IP 45			
a) Loss by mass %	(max.)	BS 2000-45		0.5	0.5	0.5
b) Drop in penetration %	(max.)			20	20	20
Solubility in trichloroethylene			IP 47			
% by mass	(min.) (max.)	BS 2000-47		75 79	75 79	75 79
Ash content						
% by mass	(min.) (max.)	BS 2000-223	IP 223	16 19	16 19	16 19

[a] All the above properties apply to the mixture of refined lake asphalt (bitumen and mineral matter) and penetration grade bitumen.

Appendix A Handling and packaging

Pitch-bitumen and tar-bitumen mixtures are normally supplied hot in bulk either by road tanker or rail car. Lake asphalt is normally supplied in drums. Supplier's recommendations should be sought with regard to appropriate handling procedures. Reference should also be made to the latest versions of "Standard methods for testing tar and its products"[1], and the "Institute of Petroleum Model code of Safe Practice, Part 11, Bitumen Safety Code"[2]. Both of these publications include specific information on safe handling procedures for the mixtures.

Excessive or prolonged heating of bitumen mixtures, particularly of tar-bitumen mixtures for surface dressing, can lead to loss of volatile components and consequent non-compliance with the specification.

Appendix B Sampling and testing

B.1 Sampling locations

B.1.1 General. If it is desired to sample for the purpose of establishing compliance with this standard, samples of the bitumen mixtures should be taken as follows.

B.1.2 Pitch-bitumen and tar-bitumen mixtures. Samples should be taken from whichever of the following locations is appropriate:

a) from the tanker or rail car in the case of bulk delivery by road or rail, immediately before discharge;

b) from the storage tank (or the feed pipe to the mixer) of a manufacturer of asphalts, macadams or other coated materials, immediately before mixing;

c) from the tank or the spray-bar of a binder distributor used for surface dressing, immediately before spraying.

The procedures involved in handling the binder for surface dressing may lead to some loss of volatile components from the tar-bitumen mixtures without necessarily impairing the performance of the surface dressing. Where a sample of a tar-bitumen mixture for surface dressing that has been taken from one of the locations listed in **B.1.2** c) has a viscosity (STV) at 40 °C that is as given in Table 6, experience has shown that the original viscosity of the mixture complied with the requirements of this Part of this standard.

Table 6 — Viscosity limits

Property	Grade	
	100 secs	200 secs
Viscosity (STV) at 40 °C	100^{+30}_{-10}	200^{+50}_{-40}

B.1.3 Refined lake asphalt. Samples should be broken from the material in the package.

B.1.4 Lake asphalt-bitumen mixtures. Samples should be taken from the tank used for blending the refined lake asphalt and bitumen or from the feed pipe of the tank to the mixer, immediately after the refined lake asphalt and bitumen have been thoroughly mixed together.

B.2 Sampling procedure. When sampling bitumen mixtures the purchaser should obtain a sample of not less than 5 kg which should represent the material delivered by the supplier. The sample should be immediately divided into three approximately equal sub-samples which should be placed in clean and dry metal containers capable of being securely closed. Each sub-sample should be clearly labelled with the names of the supplier and purchaser, details of the type and grade of bitumen mixture, time and date of sampling and identification of the sampling location.

The purchaser should use only one of the sub-samples for his own tests, the remaining two sub-samples should be retained by him to be used in case of dispute.

NOTE 1 It is recommended that routine checking of bitumen mixtures should be based mainly on the penetration test for those mixtures given in Table 1, Table 3 and Table 5, the viscosity test for mixtures given in Table 2 and the penetration and softening point tests in the case of refined lake asphalt. The other specified properties are relevant but experience indicates that checking these properties on a routine basis is only necessary when there are reasons to suspect the quality of the material.

NOTE 2 To ensure valid comparison between the test results of purchaser and supplier, it is essential that the purchaser should test the material within 7 days after sampling.

Appendix C Method for the determination of the softening point of pitch (ring and ball method)

NOTE This method is technically identical with STPTC PT3-79. Editorial changes have been made to bring the method into line with the rest of this Part of this standard. STPTC PT3-79 supersedes PT3-67 which currently appears in BS 76. It is intended that this test be carried out in accordance with the general principles and apparatus requirements laid down in the STPTC handbook.

[1] Obtainable from the Standardization of Tar Products Test Committee, Wingerworth, Chesterfield, Derbyshire S42 6JS.

[2] Obtainable from the Institute of Petroleum, 61 New Cavendish Street, London W1M 8AR.

C.1 Principle. To determine the softening point of pitches having expected softening points equal to or greater than 30 °C using ring and ball apparatus. The test assembly is prepared with a disc of the test sample cast in a horizontal brass ring upon which rests a steel ball. The test assembly is heated at a specified rate in a glycerol- or water-bath until the test sample becomes sufficiently soft to allow the steel ball enveloped in the pitch to fall to a specified level.

NOTE There are no special hazards involved in this method, but see foreword.

C.2 Reagents

C.2.1 *Glycerol,* for use with samples having an expected softening point greater than 85 °C.

C.2.2 *Distilled water,* or equivalent, which has been freshly boiled and cooled, for use with pitches having an expected softening point within the range 30 °C to 85 °C.

C.3 Apparatus

C.3.1 *Stainless steel dish,* or similar, of approximately 55 mm diameter and 35 mm depth.

C.3.2 *Oven,* capable of being maintained at a temperature 50 °C above the expected ring and ball softening point of the sample.

C.3.3 *Grinder,* capable of coarsely grinding the sample to particles approximately 3 mm in size.

C.3.4 *Knife.*

C.3.5 *Tongs.*

C.3.6 *Vacuum desiccator.*

C.3.7 *Ring and ball apparatus,* see Figure 1 (a) comprising the following.

a) *Two brass tapered rings,* see Figure 1 (b), with the following dimensions:

1) depth 6.4 ± 0.1 mm;

2) internal diameter at bottom 15.9 ± 0.1 mm;

3) internal diameter at top 17.5 ± 0.1 mm;

4) external diameter above shoulder 20.6 ± 0.1 mm;

5) external diameter below shoulder 18.5 ± 0.1 mm.

b) *Two steel balls,* 9.53 mm diameter and each weighing 3.5 ± 0.05 g.

c) *Two ball centring guides,* see Figure 1 (c).

d) *Bath,* in the form of a heat-resistant glass squat-form beaker of 800 mL capacity.

e) *Thermometers,* of the following ranges as appropriate and complying with the appropriate requirements of Table 7:

1) range 0 °C to 120 °C for pitches expected to give results between 30 °C and 120 °C;

2) range 50 °C to 210 °C for pitches expected to give a result greater than 120 °C.

f) *Ring support,* see Figure 1 (d), consisting of two brass plates, the upper carrying two rings.The support is attached to a brass plate which rests on top of the beaker and has a central hole through which the thermometer is located. The depth of the pitch ring below the shoulder is the same as the thickness of the ring support plate. The lower plate is approximately 25 mm wide and approximately 75 mm long, fixed so that its upper surface is 25 ± 0.5 mm below the surface of the ring support plate and its lower surface is not less than 13 mm above the base of the beaker.

g) *Bunsen burner,* fitted with a governer if the gas supply is liable to fluctuate.

h) *Tripod and draught screen.* The apparatus is supported on a tripod on a square of open mesh wire gauze and the whole assembly is protected from draughts by means of an appropriately dimensioned screen.

i) *Moulding plate,* see Figure 1 (e).

C.4 Procedure

C.4.1 Melting of sample. Place 50 g of the ground sample in the dish and place in the oven set at approximately 50 °C above the expected ring and ball softening point of the pitch. At the same time place the rings in the oven. Leave both the pitch and rings in the oven for 2 h at this temperature. Remove both the pitch and rings. Invert the heated rings and place one within each of the sets of guide pins on the moulding plate, having treated it to prevent adhesion of the pitch and immediately pour the molten pitch in a steady stream into the rings.

The molten pitch after 2 h in the oven should have a smooth shiny surface with no skin on top. If the surface of the molten pitch is covered with froth, this suggests that there is moisture present in the sample. In this case discard the melt and stand a freshly ground sample in a vacuum dessicator for 24 h, prior to using it to prepare a further molten sample.

The quantity of pitch used for each ring shall be such that, after a cooling period of 20 min a slight excess of pitch remains above the level of the ring. At the end of the cooling period remove this excess with a knife without applying heat. Fill the two rings from a single melting and test them together.

While the sample is being melted, prepare the apparatus.

C.4.2 Apparatus. Measure approximately 600 mL of the appropriate heating liquid into the beaker at a temperature at least 45 °C below the expected softening point of the pitch. The liquid level shall be at least 50 mm above the top of the rings. Fit the filled rings into the support and place the assembly centrally in the beaker. Insert the appropriate thermometer so that it lies along the axis of the beaker and so that the bottom of the bulb is level with the bottom of the rings and central with the central hole of the supporting plate.

Set the ball centring guides on top of each ring. Place the steel balls in the liquid in the beaker but not in position in the centring guides.

Set up the apparatus on the tripod so that the ring support plate is horizontal and allow to stand for 15 min. Using tongs, place the balls in the centring guides on the upper surface of the pitch in the rings.

C.4.3 Determination. Place the Bunsen burner under and midway between the centre and the edge of the beaker and on a diameter at right-angles to that which includes the rings and the thermometer. Heat so that the temperature is raised 5 °C/min. Maintain this rate with ± 0.5 °C over each 1 min period after the first 3 min. It shall not be merely the average of the period of the test.

Reject any test in which the heating does not comply with these requirements.

Record the temperature at which the pitch surrounding each steel ball touches the lower plate of the support and report the mean of the two figures to the nearest 0.2 °C.

If, for the two balls, the temperatures differ by more than 1 °C, discard the result and repeat the test. If, for any reason, the test has to be repeated, carry out the whole procedure given in **C.4.1** and **C.4.2** again with a fresh 50 g sample of the pitch.

C.5 Expression of results

C.5.1 Softening point. Give the softening point as the mean of the two temperatures recorded as described in **C.4.3** and express the result to the nearest 0.2 °C.

C.5.2 Repeatability and reproducibility. Duplicate results (each the mean of two figures) by the same operator shall be accepted if they do not differ by more than 0.5 °C up to 85 °C and by more than 2.0 °C above that temperature. Single results (the mean of the two figures) submitted by each of two laboratories shall be accepted if they do not differ by more than 2.8 °C up to 85 °C and by more than 3.8 °C above that temperature.

NOTE These figures were obtained in tests using a less well-defined pitch melting technique and before the introduction of the use of the ball centring guide. The precision now obtained from this method of determination is expected to be better than the figures given. Further information on the use of these precision figures may be obtained from BS 4306.

C.6 Test report. Report the following information:

a) sample description and reference number;

b) test method;

c) the softening point of the pitch to the nearest 0.2 °C;

d) any abnormalities in the sample or the procedure likely to affect the result.

Table 7 — STPTC thermometer specifications

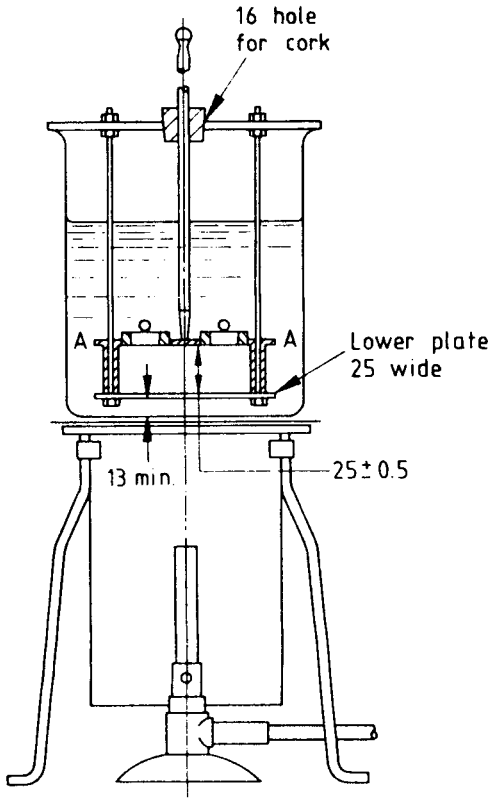
STPTC schedule mark	Range	Graduation	Longer lines at each[a]	Fully figured at each[b]	Maximum overall length	Minimum length of main scale	Maximum error	Limit of accuracy, NPL test[c]	Maximum use before first stability check
	°C	degree	degree	degree	cm	cm	degree	degree	h
T3d	0 to 120	0.5	1 and 5	10	43	24	± 0.6	± 0.1	2 000
T9d	50 to 210	0.5	1 and 5	10	43	24	± 0.8	± 0.1	500

NOTE In 1967 the specified maximum distance from the bottom of the bulb to the top of the contraction chamber was increased from 30 mm to 35 mm. The schedule numbers of such thermometers carry the suffix d. Thermometers with schedule numbers carrying the earlier suffix c may be used in place of the latest version.

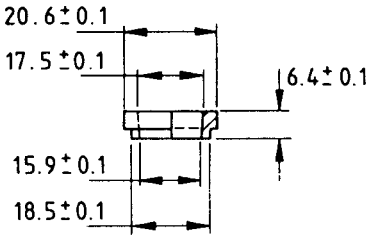
[a] In this column, the lines corresponding to the second number shall be slightly longer than those corresponding to the first number.

[b] The figuring of thermometers which are to be figured at each 2 degrees shall apply to the even number degrees.

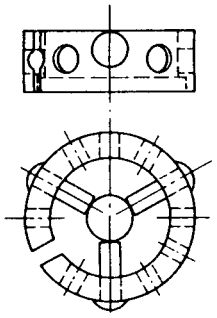
[c] The corrections to be applied shall not change between successive test points by more than five times the figure in this column, which shows the limit of accuracy of the test which the National Physical Laboratory will apply to each thermometer submitted for test.



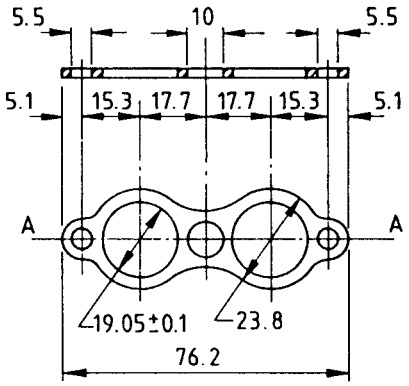
(a) Assembled apparatus



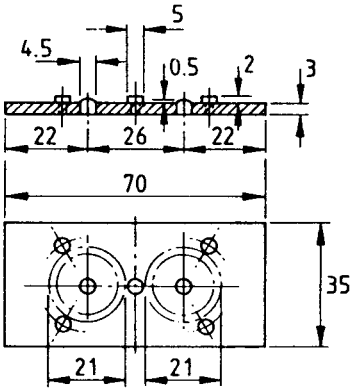
(b) Tapered ring



(c) Ball centring guide



(d) Ring support



(e) Moulding plate

NOTE All dimensions are in millimetres.

Figure 1 — Apparatus for ring and ball test

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Publications referred to

BS 76, *Specification for tars for road purposes.*

BS 594, *Hot rolled asphalt for roads and other paved areas*[3)].

BS 598, *Sampling and examination of bituminous mixtures for roads and other paved areas.*

BS 598-3, *Methods for design and physical testing.*

BS 1446, *Specification for mastic asphalt (natural rock asphalt fine aggregate) for roads and footways*[3)].

BS 1447, *Specification for mastic asphalt (limestone fine aggregate) for roads and footways*[3)].

BS 2000, *Methods of test for petroleum and its products.*

BS 2000-45, *Loss on heating of bitumen and flux oil.*

BS 2000-47, *Solubility of bituminous binders.*

BS 2000-49, *Penetration of bituminous materials.*

BS 2000-58, *Softening point of bitumen (ring and ball).*

BS 2000-223, *Ash from petroleum products containing mineral matter.*

BS 3690, *Bitumens for building and civil engineering.*

BS 3690-1, *Specification for bitumens for roads and other paved areas.*

BS 3690-2, *Specification for bitumens for industrial purposes*[3)].

BS 4306, *Method for determination and application of precision data in relation to methods of test for petroleum products.*

BS 4699, *Methods for determination of density or relative density of petroleum and petroleum products (pyknometer methods).*

BS 4987, *Coated macadam for roads and other paved areas*[3)].

ISO 3838, *Crude petroleum and liquid or solid petroleum products — Determination of density or relative density — Capillary — stoppered pyknometer and graduated bicapillary pycnometer methods.*

ASTM D5, *Standard test method for penetration of bituminous materials.*

IP 45, *Loss on heating bitumen and flux oil.*

IP 47, *Solubility of bituminous binders.*

IP 49, *Standard method of test for penetration of bituminous materials.*

IP 58, *Softening point of bitumen (ring and ball).*

IP 223, *Ash from petroleum products containing mineral matter.*

Institute of Petroleum Model Code of Safe Practice Part 11, Bitumen Safety Code.

Road Note 39 Recommendations for road surface dressing[3)].

Specification for Highway works[3)].

Standard methods for testing tar and its products (7th edition).

STPTC PT3-79 Pitch softening point: Ring and ball method.

STPTC RT2-79 Viscosity (efflux time in the standard tar viscometer).

STPTC RT10-79 Segas test and accelerated Segas test.

[3)] 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.

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