

Specification for

Tars for road purposes

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- Asphalt and Coated Macadam Association*
- Association of Consulting Engineers
- British Quarrying and Slag Federation*
- British Tar Industry Association*
- Cement and Concrete Association
- Concrete Society (Design and Development Divisional Committee)
- Contractors' Plant Association
- County Surveyors' Society*
- Department of the Environment*
- Department of the Environment. Transport and Road Research Laboratory*
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- Ministry of Defence, Army Department
- Refined Bitumen Association Limited
- Road Emulsion Association Limited
- Road Surface Dressing Association*
- Sand and Gravel Association Limited*
- Society of Chemical Industry*
- Individual experts

The 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:

This British Standard having been approved by the Road Engineering Industry Standards Committee, was published under the authority of the Executive Board on 31 December 1974

- British Steel Industry
- London Chamber of Commerce (Inc.)
- Low Temperature Coal Distillers Association
- Standardization of Tar Products Tests Committee

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Foreword

This British Standard was last fully revised in 1964. The principle of distinguishing between two types of road tar was then retained, but it was noted that either type might be used for many purposes.

This revision is intended to be more specific, and to give more information of direct value to the user of road tar. There are still two types but these are more clearly defined as binders for surface dressing and binders for coated macadam respectively. The two types S and C correspond approximately to the type A and type B tars respectively of the earlier editions of the standard.

Some tests, such as for naphthalene and phenol, have been omitted because their continued inclusion does not seem to be justified, whilst, in the interests of rationalization, the number of viscosity grades has been reduced. The distillation tests have been retained but the retention of these tests will be reconsidered in due course, this revision being regarded as an interim stage in passing from a composition specification to a performance specification. It should be noted that the density at 20 °C is quoted instead of specific gravity at 15.5 °C/15.5 °C. This change is in line with current practice.

Although there are no specification requirements for insoluble content in toluene, trichloroethylene or dichloromethane (methylene chloride) this information will be required by the purchaser for the analysis of coated macadams. In addition information should also be given on the density of the binder at 20 °C to enable the user to make mass/volume conversions when necessary.

Two new performance tests have been introduced. The SEGAS test for surface dressing tars allows an assessment to be made of the hardening a tar will experience on the road. This helps rule out any binder that may take too long to set, or which may embrittle prematurely. The Beckton tray test is intended to assess the degree of hardening of coated macadam tars during commercial mixing at the specified temperatures, or, in the case of the 58 °C evt coating tar, at the temperature most likely to be used to meet other special conditions.

By agreement with the Standardization of Tar Products Tests Committee, hereinafter referred to as STPTC, the methods of testing and the descriptions of apparatus contained in the appendices have been reproduced, with editorial modifications, from their publication "Standard methods for testing tar and its products", Sixth Edition 1967¹⁾. Tests approved since that date are also included in the 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.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 26, 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⁾ These methods are intended to be carried out in accordance with the general principles and apparatus requirements laid down in the STPTC publication mentioned.

1 Scope

This British Standard specifies the essential properties of a number of viscosity grades of two types of road tar as given below. These types differ mainly in their setting properties as controlled by the content of flux oil and its volatility.

- a) Surface dressing tars, designated as the S series in Table 1, are intended to set more rapidly than coated macadam tars.
- b) Coated macadam tars, designated as the C series in Table 2, are less volatile and their behaviour at a coating plant as well as on the road is indicated by the table.

Appendix K gives a list of publications and is intended as a guide to the selection of the appropriate viscosities of road tar used for various purposes.

2 References

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

3 Definitions

For the purposes of this British Standard the following definitions apply:

3.1

tar

a viscous liquid, black in colour, having adhesive and waterproofing properties, obtained by the destructive distillation of coal, wood, etc. Where no specific source is stated it is implied that the tar is obtained from coal

3.2

crude tar

tar which has not been subjected to change by distillation or other treatment

3.3

road tar

tar for use in road work prepared entirely from crude tars produced wholly or substantially as a by-product in the carbonization of coal at above 600 °C in externally heated retorts or coke ovens

3.4

equiviscous temperature (evt)

the temperature in degrees Celsius at which a tar has a viscosity of 50 s as determined on the standard tar viscometer (10 mm orifice)

3.5

repeatability

a measure of the precision of the test results obtained by one operator using one set of apparatus. In this standard repeatability r is the difference between duplicate results on the same sample that would be equalled or exceeded, in the long run, in only one case in twenty in the normal and correct operation of the test method

3.6

reproducibility

a measure of the precision of test results obtained by different operators using different sets of the specified apparatus. In this standard reproducibility R is defined as the difference between a single result by one operator at one laboratory and a single result on the same sample by another operator at another laboratory that would be equalled or exceeded, in the long run, in only one case in twenty

4 Properties

The tar shall be road tar as defined in 3.3. The type and viscosity grade shall be specified by the purchaser; surface dressing tars shall comply with the appropriate column of Table 1 and coated macadam tars with the appropriate column of Table 2.

NOTE Although there are no specification requirements for insoluble content in toluene, trichloroethylene or dichloromethane (methylene chloride) this information will be required by the purchaser for the analysis of coated macadams (see Appendix H). In addition information will also be required on the density of the binder to enable the user to make mass/volume conversions when necessary (see Appendix J).

Table 1 — Properties of surface dressing road tars

Grade	S34	S38	S42	S46
Viscosity, equiviscous temperature (°C)	34 ± 1.5	38 ± 1.5	42 ± 1.5	46 ± 1.5
Water (maximum % by mass)	0.5	0.5	0.5	0.5
Distillation yield				
a) Oils below 200 °C	maximum % by mass 1.0	0.5	0.5	0.5
b) 200 °C to 270 °C	% by mass 4 – 13	3 – 10	2 – 8	2 – 7
c) 270 °C to 300 °C	% by mass 4 – 9	4 – 9	3 – 8	2 – 7
b) + c)	maximum % by mass 18	16	14	12
SPR ^a (°C R and B)	35 – 52	35 – 53	35 – 54	35 – 55
SEGAS test (°C evt increase)	20 ± 5	16 ± 5	12 ± 5	10 ± 4
Density ^a (g/ml) at 20 °C min.	1.110	1.115	1.120	1.125
max.	1.250	1.255	1.260	1.265
^a For tars produced at carbonization temperatures below 950 °C (low temperature tars), the softening point and density shall be as follows:				
	S34	S38	S42	S46
SPR (°C R and B)	30 – 52	30 – 53	30 – 54	30 – 55
Density (g/ml) at 20 °C min.	1.060	1.063	1.067	1.070
max.	1.250	1.255	1.260	1.265

Table 2 — Properties of coated macadam road tars

Grade	C30	C34	C38	C42	C46	C50	C54	C58
Viscosity, equiviscous temperature (°C)	30 ± 1.5	34 ± 1.5	38 ± 1.5	42 ± 1.5	46 ± 1.5	50 ± 1.5	54 ± 1.5	58 ± 1.5
Water (maximum % by mass)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Distillation yield								
a) Oils below 200 °C maximum % by mass	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
b) 200 °C to 270 °C % by mass	4 – 11	3 – 10	1 – 8	1 – 6	1 – 5	0 – 4	0 – 3	0 – 3
c) 270 °C to 300 °C % by mass	4 – 9	4 – 9	4 – 9	3 – 8	2 – 7	2 – 7	2 – 7	1 – 6
b) + c) maximum % by mass	16	15	13					
SPR (°C R and B)	35 – 46	35 – 46	35 – 47	35 – 48	35 – 49	35 – 50	52 max.	56 max.
Beckton tray test (maximum °C evt increase)								
at 80 °C	6	6	6	6	—	—	—	—
at 100 °C	—	—	—	—	8	8	8	—
at 140 °C	—	—	—	—	—	—	—	10
Density ^a (g/ml) at 20 °C min.	1.105	1.110	1.115	1.120	1.125	1.130	1.130	1.135
max.	1.245	1.250	1.255	1.260	1.265	1.270	1.275	1.275
^a For tars produced at carbonization temperatures below 950 °C (low temperature tars), the density shall be as follows:								
	C30	C34	C38	C42	C46	C50	C54	C58
Density (g/ml) at 20 °C min.	1.060	1.060	1.063	1.067	1.070	1.073	1.077	1.080
max.	1.245	1.250	1.255	1.260	1.265	1.270	1.275	1.275

5 Sampling

5.1 General. In practically all cases, samples of road tar are only required from bulk quantities of the material; in isolated cases small quantities in multiple containers may require sampling, and in these cases the general principles described in the appropriate clauses of BS 616 should be followed.

In sampling from bulk quantities of hot road tar it can be assumed that the material is essentially homogeneous except for the extreme top and bottom. Thus any sample taken with clean implements and placed in a clean, dry metal container will be representative of the bulk from which it is taken.

When a sample is taken from a bulk-delivery tanker, the material that the sample represents will be that particular delivery; but in the case of material in a purchaser's storage tank the sample will represent the contents of the tank, which will be a thorough mixture of the residue from a previous delivery and the new material provided the mixture has been circulated for at least 15 min.

5.2 Methods of sampling

5.2.1 Sampling from a delivery tanker or storage tank. Several subsamples of the hot road tar shall be taken from below the surface of the tar using a clean, dry and heat-proof ladle or similar vessel. Sufficient subsamples shall be taken to provide a main sample of at least 10 litres.

5.2.2 Sampling from a pipeline. It is first essential to check that the road tar flowing in the pipeline is the actual material that requires sampling; this check shall be jointly carried out by both parties interested in the material being sampled. It is also essential to ensure that there is no contamination from residues in the pipeline at the point of sampling. A main sample of at least 10 litres shall then be collected by any suitable method.

NOTE Extreme care is required to ensure that the adopted procedure is as safe as possible.

5.3 Subdivision of the main sample. The main sample, while still hot, shall be subdivided into three approximately equal parts, taking care to avoid undue loss of volatile material. The three portions shall be poured into clean and dry metal containers capable of being securely closed to prevent any leakage of the contents.

Each of the three portions shall be clearly labelled with the names of the supplier and the purchaser, details of the grade of road tar, time and date of sampling, and any other relevant information needed for identification.

The three portions of the main sample shall be distributed as indicated below:

Portion 1; to the purchaser to be used for his tests.

Portion 2; to the supplier to be used for his tests if he so requests.

Portion 3; to be retained in safe custody.

6 Testing

The road tar shall be prepared and tested in accordance with Appendix A to Appendix J as required. The thermometers required by Appendix B, Appendix D, Appendix E, Appendix F and Appendix J shall be as given in Appendix L

7 Compliance with the specification

The purchaser's test result shall be compared with the appropriate limit(s) given in clause 4, Table 1 or Table 2. If the comparison indicates non-compliance the purchaser shall repeat the tests for which non-compliance is found and compare any differences in test results with the value for the repeatability of the test method.

Appendix A Preparation of sample for testing

A.1 Procedure

The procedure shall be as follows:

- 1) If the sample when received is cold, warm it until it is sufficiently fluid for pouring or mixing, avoiding any direct intense source of heat. For this purpose partially immerse the container in water at not more than about 30 °C higher than the expected equiviscous temperature (evt) of the material. Alternatively, a controlled temperature oven at a temperature not more than 30 °C above the expected evt may be used, provided that the container is insulated from the base if it is directly heated. The period of warming shall be the minimum required to secure the necessary degree of fluidity.
- 2) If the sample when received is hot, cool it without undue exposure to the air to a temperature about 30 °C higher than the expected evt of the material.
- 3) Strain the warm sample through a 600 µm test sieve complying with the requirements of BS 410. Make all tests on the strained material and, immediately before any portion is withdrawn for testing, mix the sample thoroughly; it should, therefore, be contained in a vessel large enough to permit adequate agitation.

NOTE While the tar is hot it is important that the container remain covered as far as is practicable, otherwise loss of oil is likely to take place with consequent change in the character of the sample.

A.2 Reporting

Report the presence of any foreign matter remaining on the sieve.

Appendix B Method for the determination of equiviscous temperature

(Technically identical with STPTC Methods RT 2-67 and RT 3-67)

B.1 General

Determine the evt in two stages as follows:

- a) Determine the viscosity of the tar in seconds by using the standard tar viscometer as described in this appendix. The range of viscosity for conversion to evt [see B.1b)] is limited to 33 s to 75 s and the temperature of test shall be such that the result of the test is within these limits. A convenient temperature is the multiple of 5 °C nearest to or 2.5 °C above the expected evt and consequently the multiple nearest to the grade temperature will usually give the required efflux time. If however the test is not in the range of 33 s to 75 s the test shall be repeated at the temperature which will give the required result. This temperature can be found by using Table 3.
- b) Find the evt by applying the correction shown against the viscosity in Table 3, to the test temperature. For example, if the viscosity is 55 s at a test temperature of 40 °C, the correction from Table 3 is ± 0.6° and the evt is 40.6 °C.

NOTE Figure 11 shows the approximate relationship between evt and efflux times at various test temperatures and also the relationship with the penetration values. This diagram can *not* be used for the calculation of evt.

B.2 Apparatus

The following apparatus is required:

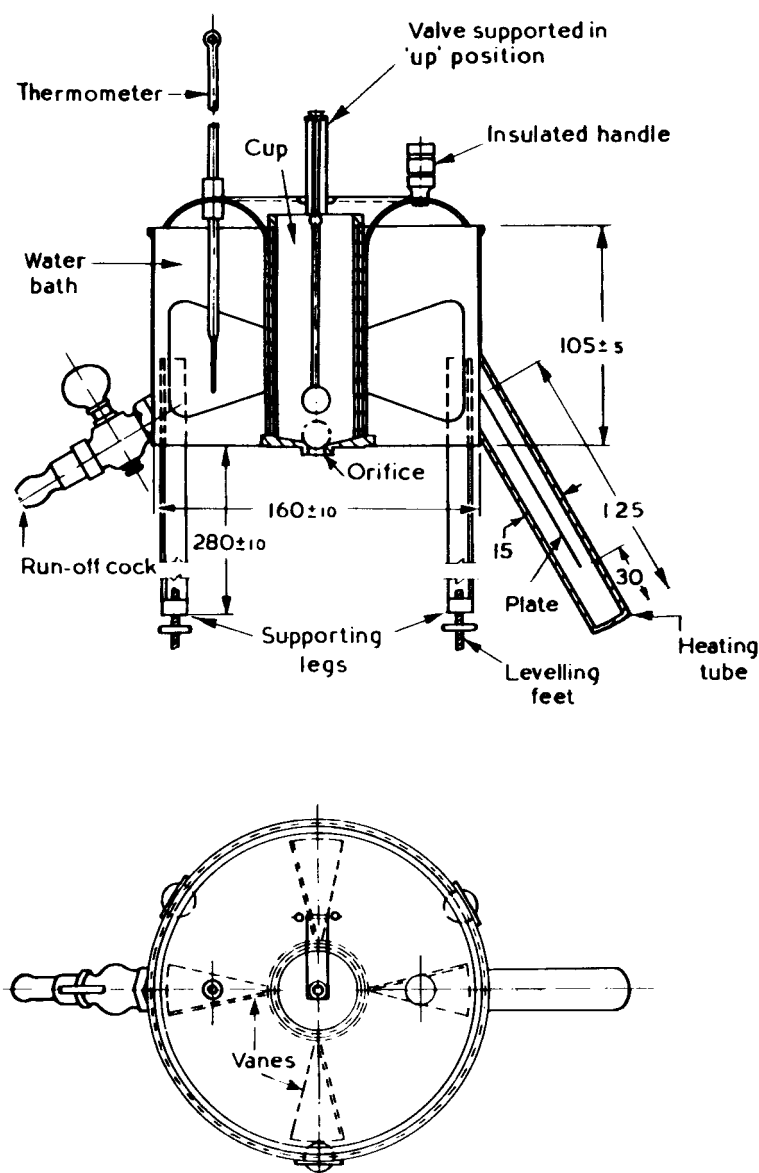
- a) *Standard tar viscometer* with 10 mm cup, as shown in Figure 1 to Figure 3 and specified below.
 - 1) *Tar cup*, as shown in Figure 3 consisting of a hard brass tube, fitted at the upper (open) end with an external brass collar serving to support the cup in the sleeve of the water bath. The bottom of the cup is made slightly conical and consists of a circular phosphor bronze plate screwed to the cylinder; it is provided centrally with a phosphor bronze (90/10 cast) extension which is drilled and polished internally to give an accurately cylindrical opening having dimensions within the following tolerances:

Diameter of opening	10 ± 0.025 mm
Length of jet	5 ± 0.025 mm
 - 2) *Valve*. The jet is closed by a valve, shown in Figure 3, which consists of a phosphor bronze sphere attached to a rod of nickel-copper alloy complying with the requirements of BS 3076 grade NA 13. The rod is provided with a level-indicating peg, and at the upper end with a hemisphere by which the valve can be rested in the valve support.

3) *Water bath*, a cylindrical vessel of a suitable metal which is provided with a small brass run-off cock and a side tube for heating. This tube is partitioned for part of its length by a flat plate extending from the wall of the bath to about 30 mm from the closed lower end. Both the cock and the side tube are brazed or soldered to the bath and, to ensure normal convection, it is essential that the internal joints be smooth and free from projecting metal. A stout brass tube, 105 mm in height and of such a bore as to provide an easy sliding fit for the cup, is brazed or soldered into a central hole in the bottom of the bath to form a sleeve for the cup. It is essential that the upper rim of the sleeve be in a plane at right angles to the longitudinal axis of the sleeve. Three equidistant legs of sufficient length to allow the receiver to stand beneath the orifice of the cup are riveted to the cylindrical wall of the bath. Levelling screws are provided at the lower extremities of the legs.

NOTE It is not intended that viscometers which are already in use and are not provided with levelling screws should no longer be regarded as standard instruments.

The water bath may be adapted for electrical heating, provided that care is taken to avoid the possibility of local overheating.



All dimensions are in millimetres

Figure 1 — Standard tar viscometer, assembled