
British Standard

Wood preservation using coal tar creosotes

Part 1. Specification for preservative

Préservation du bois par des produits à base de créosotes
Partie 1. Produits de préservation du bois — Spécifications

Holzschutz mittels Steinkohlenkreosot
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Foreword

This Part of BS 144 has been prepared under the direction of the Wood Preservation Standards Policy Committee. It forms Part 1 of a two Part revision of three British Standards, relating to wood preservation with coal tar creosotes: BS 144 : 1973 'Specification for coal tar creosote for the preservation of timber'; BS 913 : 1973 'Specification for wood preservation by means of pressure creosoting' and BS 3051 : 1972 'Specification for coal tar creosotes for wood preservation (other than creosotes to BS 144)'. In BS 144 : 1973 and BS 3051 : 1972 the specification for the product, methods of treatment and test methods were combined for a number of types of product. BS 144 was the original British Standard specification for coal tar creosote manufactured for the preservation of timber. Parts 1 and 2 of this revision of BS 144 supersede BS 144 : 1973, BS 913 : 1973 and BS 3051 : 1972 which are withdrawn.

This revision of BS 144 has been divided into two Parts:

- Part 1. Specification for preservative
- Part 2. Methods for timber treatment

The specifications for three types of creosote together with relevant methods of test are given in this Part and the treatment procedures are given in Part 2.

BS 144 : 1973 covered two types of creosote for different application temperatures and BS 3051 : 1972 covered two types of lower viscosity, not requiring heat for application. In this Part of BS 144 the four types are replaced by three. Additional requirements for viscosity and naphthalene content for type 2 creosote have been introduced.

Caution. This Part of BS 144 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.

Particular care and the use of protective clothing are necessary. Special precautions are required for disposal of creosote.

Products conforming to the specifications require Government approval under the Control of Pesticides Regulations 1986 (SI 1510) before they can be sold, supplied, stored, advertised or used in the UK.

NOTE 1. Attention is also drawn to the leaflet *The safe use of wood preservatives — A basic policy statement* issued by the British Wood Preserving Association.

NOTE 2. Further information on the use of coal tar creosote may be found in BS 1282, BS 5268 : Part 5 and BS 5589.

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

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Specification

1 Scope

This Part of BS 144 specifies requirements for three types of coal tar creosote for wood preservation.

Type 1 creosote is intended for treatment of timber by pressure impregnation.

Type 2 creosote is also intended for pressure impregnation but has a more closely defined distillation range and a more restricted residue content than type 1 creosote. It is especially suitable for treatment of poles for overhead power and telecommunication lines, and for structural timbers where bleeding in service could present a problem.

Type 3 creosote is intended for the treatment of timber by immersion, spraying or brushing.

NOTE 1. Creosote of types 1, 2 and 3 may also be used for the hot-and-cold open-tank process.

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

2 Composition

All types of creosote shall consist of blends of distillates of coal tar and shall be free from petroleum oils or oils not derived from coal tar.

3 General requirements

When tested in accordance with the methods listed in table 1, the creosote shall be in accordance with the limiting requirements given in that table. Samples for the assessment of these requirements shall be taken in accordance with appendix A.

NOTE. Requirements in respect of water content and insoluble matter are modified in relation to material in use within treatment plants (see BS 144 : Part 2).

Table 1. Requirements for creosote types 1, 2 and 3

Property	Type 1		Type 2		Type 3		Test method
Liquidity. Temperature at which the product is completely liquid, after 2 h, °C 4 h, °C	32 —		32 —		— 0		Appendix B
Density, at 38 °C, kg/m ³ 20 °C, kg/m ³	Min. 1003 —	Max. 1108 —	Min. 1003 —	Max. 1108 —	Min. — 910	Max. — 1120	Appendix C
Distillation. Recovery of dehydrated creosote at 205 °C, % (m/m) 230 °C, % (m/m) 270 °C, % (m/m) 315 °C, % (m/m) 355 °C, % (m/m)	— — — — 60	6 40 — 78 —	— 5 — 40 73	5 30 — 78 90	— — 20 40 65	35 55 — 85 —	Appendix D
Extractable phenols content contained in the distillate up to 315 °C (as obtained in appendix D), mL/100 g of dehydrated creosote Types 1 and 2 density range 1003 to 1045, kg/m ³ Types 1 and 2 density range 1046 to 1108, kg/m ³ Type 3	5 0 —	20 20 —	5 0 —	20 20 —	— — 1	— — 20	Appendix E
Extractable phenols boiling up to 220 °C, mL/100 g of dehydrated creosote	—	—	—	—	—	4	Appendix F
Flash point, Pensky- Martens closed tester, °C	66	—	66	—	66	—	BS 2000 : Part 34
Viscosity, kinematic at 40 °C, mm ² /s	—	—	4	14	—	—	Appendix G
Water content, % (V/V)	—	1.5	—	1.5	—	1.5	Appendix H
Insoluble matter content, % (m/m)	—	0.4	—	0.4	—	0.4	Appendix J
Saturated hydrocarbon content, % (m/m)	—	15	—	15	—	25	Appendix K
Naphthalene content, % (m/m)	—	—	8	25	—	—	Appendix L
NOTE. A dash in a column means that no requirement is specified.							

Appendices

Appendix A. Sampling

Caution. All personnel concerned with sampling and testing should be fully acquainted with the safety precautions relating to creosote (see caution in the foreword).

A.1 Sampling procedure

Carry out the sampling in accordance with BS 5309 : Part 3.

NOTE 1. Attention is drawn to BS 5309 : Part 1.

NOTE 2. It may be necessary to warm the creosote prior to sampling to dissolve any crystalline solids.

A.2 Laboratory sample

Submit a sample of the creosote measuring not less than 1 L for test. Place the sample in a clean, dry airtight container which may be a glass bottle or a can, but which is not closed with a rubber stopper. Allow an ullage of about 5 % in the sample container. In the laboratory examine the sample for the presence of free water and crystalline solids, and report the presence or absence of these. Report if the creosote contains crystalline solids and if it has been sampled after heating and mixing. If it is necessary to seal the sample container, take care to avoid the risk of contaminating the contents in any way.

A.3 Preliminary treatment of the laboratory sample

Mix the laboratory sample thoroughly immediately before any portion is withdrawn. If it shows signs of containing precipitated solids, immerse the container in a water-bath at a temperature just high enough to dissolve these solids, and take portions for test from the warmed, mixed sample.

Appendix B. Method for the determination of liquidity

B.1 Principle

The sample is maintained at the specified temperature (either at 32 °C or at 0 °C) for 2 h or 4 h and then examined for the presence of separated solid matter.

B.2 Apparatus

Ordinary laboratory apparatus and the following are required.

B.2.1 Conical flask. Capacity 100 mL.

B.2.2 Thermometer. A partial immersion thermometer of range -0.5 °C to 40.5 °C graduated at each 0.1 °C and accurate to ± 0.2 °C.

NOTE. Thermometer A40C/100 complying with BS 593 is suitable.

B.2.3 Constant temperature baths. Depending on the type of creosote being tested, baths capable of maintaining temperatures of 38 ± 0.1 °C, 32 ± 0.1 °C, 10 ± 0.1 °C or 0 ± 0.1 °C.

B.3 Procedure

Pour about 50 mL of the laboratory sample (see appendix A) into the conical flask. Fit the thermometer by means of a cork into the neck of the flask, with the bulb of the thermometer immersed in the creosote. Place the flask in the appropriate constant temperature bath, i.e. 38 ± 0.1 °C for types 1 and 2 and 10 ± 0.1 °C for type 3.

Ensure that the surface of the creosote is below that of the water in the bath. Swirl the flask until the creosote reaches the appropriate temperature. Leave the flask in the bath for 2 h, then withdraw the flask and examine the surface of the creosote for the presence of solid matter. Rotate the flask slowly with the side of the flask in a horizontal position and examine the inside surface of the flask for the presence of solid matter.

When the sample is free from solid matter, place the flask in the second bath maintained at 32 ± 0.1 °C for types 1 and 2 creosote and 0 ± 0.1 °C for type 3 creosote.

Re-examine the sample for solids, as before, when the contents have reached the bath temperature and again after having maintained the sample at that temperature for 2 h for types 1 and 2 or, in the case of type 3, after 4 h.

B.4 Expression of results

The sample is deemed to pass the liquidity test if it remains completely liquid for the specified period at the specified temperature.

The sample is deemed to fail the liquidity test if any solid matter is observed either after cooling to the specified temperature or at any time up to the end of the specified period at that temperature.

B.5 Precision

Precision data are not yet available.

Appendix C. Method for the determination of density

C.1 Principle

Density is determined by means of a density hydrometer.

C.2 Apparatus

Ordinary laboratory apparatus and the following are required.

C.2.1 Hydrometer. A density hydrometer, complying with series L50 of BS 718, calibrated for the determination of density at 20 °C in g/mL, for use in liquids of low surface tension, and constructed of soda-lime glass.

NOTE. Hydrometers calibrated in kg/m³ are also available in the series L50 of BS 718 and may be used. If such a hydrometer is used, read it to the nearest 1 kg/m³ (see C.3), multiply the corrections described in C.4 by 1000, and omit the factor 1000 from the equation in C.4.2.

Examine the hydrometer before use to see that it is clean and dry and that there has been no displacement of the paper scale during use. Any displacement of the paper can be detected by reference to the means provided for this purpose, for example, a horizontal line etched on the stem and the corresponding datum marked on the paper scale, thus $\succ \prec$. If the scale has been displaced, recertification of the hydrometer is necessary.

C.2.2 Hydrometer vessel. A cylindrical glass vessel, free from local irregularities producing distortion and several millimetres greater in diameter than the hydrometer bulb diameter.

NOTE. A 1 L measuring cylinder complying with BS 604 is suitable.

C.2.3 Thermometer. A partial immersion thermometer of range -0.5 °C to 40.5 °C, graduated at each 0.1 °C and accurate to ± 0.2 °C.

NOTE. Thermometer A40C/100 complying with BS 593 is suitable.

C.3 Procedure

Warm the laboratory sample (see appendix A) to approximately 38 °C for types 1 and 2, and to approximately 20 °C for type 3. Fill the clean hydrometer vessel with the liquefied laboratory sample (see A.3) to a sufficient depth, so that the hydrometer will not touch the bottom of the vessel when it is completely immersed in the sample. To avoid the formation of air bubbles pour the sample down the side of the vessel. Stir the sample, again avoiding the formation of air bubbles. Hold the hydrometer by the top of the stem, insert it carefully into the sample and release it when approximately in the position of equilibrium, so that the hydrometer rises or falls only by a small amount.

Lightly press down the top of the hydrometer stem so that the stem is immersed a few millimetres more. Release the hydrometer. After a few oscillations, note the reading when the hydrometer is steady.

Observe the meniscus during this period. If the stem is clean the meniscus shape will remain unchanged during the hydrometer oscillations; if the meniscus shape changes clean the hydrometer and repeat the procedure.

Record the hydrometer reading to the nearest 0.001 g/mL and also the temperature of the creosote to the nearest 0.1 °C. Take the hydrometer reading for opaque creosotes at the level where the meniscus merges into the stem of the hydrometer.

C.4 Calculation

C.4.1 Correction of hydrometer reading

Calculate the corrected hydrometer reading, R_t , as follows:

$$R_t = R + C + 0.0007$$

where

R is the hydrometer reading;

C is the certification correction;

0.0007 is the meniscus height correction to be used for opaque creosotes only.

The value of R_t obtained is the corrected hydrometer reading for the sample at t °C, the temperature of the creosote in the test.

C.4.2 Calculation of density

Calculate the density, d , at the required temperature (20 °C or 38 °C) as follows:

$$d = 1000(R_t m + a)$$

where

d is the density (in kg/m³);

R_t is the corrected hydrometer reading (see C.4.1);

m is the multiplication factor (see note);

a is the addition factor (see note).

NOTE. m and a are obtained from table 2 for types 1 and 2, and from table 3 for type 3.

C.5 Expression of results

Express the density of the sample in kg/m³, to the nearest kg/m³, at the specified temperature.

C.6 Precision

Precision data are not yet available.

Table 2. Multiplication (*m*) and addition (*a*) factors for the conversion of corrected hydrometer reading at *t* °C to density at 38 °C (for types 1 and 2)

<i>t</i> °C	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
34	1.003 18 -0.006 67	1.003 09 -0.006 50	1.002 99 -0.006 34	1.002 90 -0.006 17	1.002 81 -0.006 00	1.002 71 -0.005 84	1.002 62 -0.005 67	1.002 53 -0.005 50	1.002 43 -0.005 33	1.002 34 -0.005 17
35	1.002 25 -0.005 00	1.002 15 -0.004 83	1.002 06 -0.004 66	1.001 97 -0.004 50	1.001 88 -0.004 33	1.001 78 -0.004 16	1.001 69 -0.004 00	1.001 60 -0.003 83	1.001 50 -0.003 66	1.001 41 -0.003 50
36	1.001 32 -0.003 33	1.001 22 -0.003 16	1.001 13 -0.003 00	1.001 04 -0.002 83	1.000 94 -0.002 66	1.000 85 -0.002 50	1.000 76 -0.002 33	1.000 67 -0.002 16	1.000 57 -0.002 00	1.000 48 -0.001 83
37	1.000 39 -0.001 66	1.000 30 -0.001 50	1.000 20 -0.001 33	1.000 11 -0.001 16	1.000 02 -0.001 00	0.999 92 -0.000 83	0.999 83 -0.000 67	0.999 74 -0.000 50	0.999 64 -0.000 33	0.999 55 -0.000 17
38	0.999 46 0.000 00	0.999 37 0.000 17	0.999 28 0.000 33	0.999 18 0.000 50	0.999 09 0.000 66	0.999 00 0.000 83	0.998 90 0.001 00	0.998 81 0.001 16	0.998 72 0.001 33	0.998 63 0.001 49
39	0.998 53 0.001 66	0.998 44 0.001 83	0.998 35 0.001 99	0.998 26 0.002 16	0.998 16 0.002 32	0.998 07 0.002 49	0.997 98 0.002 66	0.997 89 0.002 82	0.997 80 0.002 99	0.997 70 0.003 15
40	0.997 61 0.003 32	0.997 52 0.003 48	0.997 43 0.003 65	0.997 33 0.003 81	0.997 24 0.003 98	0.997 15 0.004 14	0.997 06 0.004 31	0.996 97 0.004 48	0.996 87 0.004 64	0.996 78 0.004 81
41	0.996 69 0.004 97	0.996 60 0.005 13	0.996 50 0.005 30	0.996 41 0.005 47	0.996 32 0.005 63	0.996 23 0.005 80	0.996 14 0.005 96	0.996 04 0.006 13	0.995 95 0.006 29	0.995 86 0.006 46

NOTE. The upper figure is the multiplication factor.