

Specification for

Coal tar creosote for wood preservation

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The preparation of this British Standard was entrusted to Technical Committee B/515, Wood preservation, upon which the following bodies were represented:

- British Telecommunications plc
- British Wood Preserving and Damp-proofing Association
- Chemical Industries Association
- Creosote Council
- Department of the Environment (Building Research Establishment)
- Timber Research and Development Association
- Timber Trade Federation
- Wood Panel Industries Federation

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

- Association of Consulting Scientists
- ITRI Ltd.
- Ministry of Defence

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Foreword

This revision of BS 144 has been prepared under the direction of Technical Committee B/515, Wood preservation.

This British Standard was first published in 1921, with revisions in 1954, 1973 and 1990. The 1990 revision brought all types of creosote under one standard (low viscosity creosote not requiring heat for application had previously been covered by BS 3051). The 1990 revision specified three types of creosote to cover all applications; it also incorporated the provisions of BS 913, which was withdrawn. This revision reflects the subsequent advances in technology and particular attention has been paid to environmental issues.

Four types of creosote are specified in this revision, together with methods for determining conformity to the specifications. Methods of application previously specified in BS 144 : Part 2 : 1990 are now given in an informative annex.

Materials conforming to this specification and used as a wood preservative require Government approval under the Control of Pesticides Regulations 1986 (SI 1510) before they can be sold, supplied, stored, advertised or used in the United Kingdom.

This revision supersedes BS 144 : Part 1 : 1990 and BS 144 : Part 2 : 1990, which are withdrawn.

CAUTION. Attention is drawn to the Health and Safety at Work etc. Act 1974, and the need for ensuring that the methods specified in this British Standard are carried out with suitable precautions.

The procedures described in this British Standard are intended to be carried out by appropriately qualified and experienced persons or other suitably trained and/or supervised personnel. Normal safety precautions should be taken throughout performing the methods.

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 20, an inside back cover and a back cover.

Specification

1 Scope

This British Standard specifies requirements for four 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 creosote of type 1. Type 2 creosote 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 treatment of timber by immersion and brushing.

Type 4 creosote is intended for treatment of timber by pressure impregnation at temperatures $> 100\text{ }^{\circ}\text{C}$. This creosote excludes the lower boiling fractions allowable in the other three creosote types and is especially suitable where volatility leading to odour is a problem.

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

2 References

2.1 Normative references

This British Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on page 20. For dated references, only the edition cited applies; any subsequent amendments to or revisions of the cited publication apply to this British Standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

2.2 Informative references

This British Standard refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this Standard are listed on the inside back cover, but reference should be made to the latest editions.

3 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.

4 General requirements

4.1 When tested in accordance with the methods listed in table 1, the creosote, when manufactured, shall be in accordance with the limiting requirements given in that table. Samples for the assessment of conformity to these requirements shall be taken in accordance with BS EN 1014-1.

4.2 Requirements for creosote in use within treatment plants shall be as in table 1 except for:

water content (max.):	3.0 % (V/V);
insoluble matter content (max.):	0.6 % (m/m).

5 Methods of treatment of timber

Guidance on methods of treatment of timber for use with these preparations is given in annex I.

Table 1. Requirements for creosote types 1, 2, 3 and 4

Property	Type 1		Type 2		Type 3		Type 4		Test method
Liquidity Temperature (°C) at which the product is completely liquid, after: 2 h 4 h	32 —		32 —		— 0		50		Annex A
Density (kg/m³) at: 55 °C 38 °C 20 °C	Min. — 1003 —	Max. — 1108 —	Min. — 1003 —	Max. — 1108 —	Min. — — 910	Max. — — 1120	Min. 1003 — —	Max. 1144 — —	Annex B
Distillation Recovery of dehydrated creosote (% (<i>m/m</i>)) at: 205 °C 230 °C 270 °C 315 °C 355 °C	— — — — 60	6 40 — 78 —	— 5 — 40 73	5 30 — 78 90	— — 30 40 65	15 40 — 90 —	— — — — 65	— — — 18 95	Annex C
Extractable phenols content (ml/100 g of dehydrated creosote) in the distillate up to 315 °C (as obtained in annex D): Types 1, 2 and 4, density range 1003 kg/m³ to 1045 kg/m³ Types 1, 2 and 4, density range 1046 kg/m³ to 1144 kg/m³ Type 3	Min. 5 0 —	Max. 20 20 —	Min. 5 0 —	Max. 20 20 —	Min. — — 1	Max. — — 20	Min. 5 0 —	Max. 18 18 —	Annex D
Flash point (°C, Pensky-Martens closed tester)	61	—	61	—	61	—	61	—	BS EN 22719
Viscosity (mm²/s), kinematic at 40 °C	—	—	4	20	—	—	—	—	Annex E
Water content (% (V/V))	—	1.5	—	1.5	—	1.5	—	1.5	Annex F
Insoluble matter content (% (<i>m/m</i>))	—	0.4	—	0.4	—	0.4	—	0.4	Annex G
Naphthalene content (% (<i>m/m</i>))	—	—	—	15	—	—	—	—	Annex H
Benzo[a]pyrene content (mg/kg)	—	500	—	500	—	50	—	500	DD ENV 1014-3
Water extractable phenols content (% (<i>m/m</i>))	—	3	—	3	—	3	—	3	BS EN 1014-4

Annexes

Annex A (normative)

Method for the determination of liquidity

A.1 Principle

The sample is maintained at the specified temperature (50 °C, 32 °C or 0 °C) for 2 h or 4 h and then examined for the presence of separated solid matter.

A.2 Apparatus

A.2.1 Conical flask, capacity 100 ml.

A.2.2 Thermometer, partial immersion thermometer of range -0.5 °C to 55 °C , graduated at each 0.1 °C and accurate to $\pm 0.2\text{ °C}$.

NOTE. A thermometer conforming to BS 593 is suitable.

A.2.3 Constant temperature baths. Depending on the type of creosote being tested, baths able to maintain temperatures of $(50 \pm 0.1)\text{ °C}$, $(32 \pm 0.1)\text{ °C}$ or $(0 \pm 0.1)\text{ °C}$.

A.3 Procedure

Pour about 50 ml of the laboratory sample (see BS EN 1014-1) 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.

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 or 4 h as appropriate, then withdraw the flask and examine the surface of the creosote for solid matter. Rotate the flask slowly, holding it horizontally, and examine the sides for solid matter.

When the sample is free from solid matter, place the flask in the second bath, maintained at $(32 \pm 0.1)\text{ °C}$ for types 1 and 2 creosote, $(0 \pm 0.1)\text{ °C}$ for type 3, and $(50 \pm 0.1)\text{ °C}$ for type 4. Re-examine the sample for solids when the contents have reached the bath temperature, and again after having maintained the sample at the bath temperature for 2 h for types 1, 2 and 4, or 4 h for type 3.

A.4 Acceptance criteria

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

The sample shall be 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.

Annex B (normative)

Method for the determination of density

B.1 Principle

Density is determined by means of a density hydrometer.

B.2 Apparatus

B.2.1 Hydrometer, conforming to series L50 of BS 718, calibrated for 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/m^3 are also available in series L50 of BS 718, and these may be used instead. If such a hydrometer is used, it should be read to the nearest kg/m^3 (see B.3); the corrections described in B.4 should be multiplied by 1000, and the factor 1000 from the equation in B.4.2 omitted.

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.

NOTE. Any displacement of the paper scale can be detected by reference to the means provided for this purpose: e.g., a horizontal line may be etched on the stem of the hydrometer and the corresponding datum marked on the paper scale. If the scale has been displaced, recertification of the hydrometer is necessary.

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

NOTE. A 1 l measuring cylinder conforming to BS 604 is suitable.

B.2.3 Partial immersion thermometer, of range -0.5 °C to 60 °C , graduated in 0.1 °C and accurate to $\pm 0.2\text{ °C}$.

NOTE. A thermometer conforming to BS 593 is suitable.

B.3 Procedure

Warm the laboratory sample (see BS EN 1014-1) to approximately 38 °C for types 1 and 2, 20 °C for type 3 and 55 °C for type 4 creosote. Fill the clean hydrometer vessel with the liquefied laboratory sample to a depth sufficient to allow the hydrometer to float.

NOTE. Pour the sample down the side of the vessel, to avoid formation of air bubbles.

Gently stir the sample, avoiding 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, i.e. when it rises or falls only to a small degree.

Lightly press the top of the hydrometer stem, to immerse it further by a few millimetres. Release the hydrometer. After a few oscillations, when the hydrometer is steady, note the reading.

Observe the meniscus. 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 the temperature of the creosote to the nearest 0.1 °C. If the bottom of the meniscus is not visible, take the reading at the level where the meniscus merges into the stem of the hydrometer.

B.4 Calculation

B.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).

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

B.4.2 Calculation of density

Calculate the density d , at the required temperature (55 °C, 38 °C or 20 °C), as follows:

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

where

- d is the density (kg/m³);
- R_t is the corrected hydrometer reading (see B.4.1);
- m is the multiplication factor (see note);
- a is the addition factor (see note).

NOTE. m and a are obtained from table B.1 for types 1 and 2, from table B.2 for type 3, and table B.3 for type 4 creosote.

B.5 Expression of results

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

Annex C (normative)

Method for the determination of distillation range

C.1 Principle

A sample of creosote is dehydrated and distilled, and the fractions collected at specified temperatures.

C.2 Apparatus

C.2.1 Distillation apparatus, described in BS 658. Assemble in accordance with BS 658, except as stated in a) to d).

- a) *Distillation flasks*:
 - 1) capacity 250 ml, untared;
 - 2) capacity 150 ml, tared, held in the vertical position by means of a clamp at the extreme upper end of the neck.
- b) *Condensers*, types 1 and 2.
- c) *Draught screen*, type 2, from which the shelf has been removed.
- d) *Crow receivers*, capacity 50 ml, tared.

C.2.2 Thermometer, with a range of – 2 °C to 400 °C, as described in BS 593.

C.2.3 Separating funnels, capacity 50 ml, as described in BS 2021.

C.2.4 Fortin's barometer.

C.3 Corrections

C.3.1 General

Apply the corrections described in C.3.2 and C.3.3 to the specified distillation temperatures before commencing the distillation.

C.3.2 Barometer readings

C.3.2.1 Read the barometer to obtain the atmospheric pressure in mbar or mmHg, and record the ambient temperature. Continue as described in either C.3.2.2 for mbar or C.3.2.3 for mmHg.

NOTE. If atmospheric pressure is measured in other units, the following conversion factors can be used:

$$1 \text{ mbar} = 100 \text{ N/m}^2 = 100 \text{ Pa};$$

$$1 \text{ mmHg} = 133.322 \text{ N/m}^2.$$

C.3.2.2 Correct the barometer readings for temperature as described in BS 658, and if the corrected reading differs from 1013 mbar, apply corrections to the specified distillation temperature by adding the value given in table C.1 for each millibar above 1013 mbar, or subtracting for each millibar below 1013 mbar.