

Specification for primers for woodwork

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Committees responsible for this British Standard

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British Cement Association
 British Coatings Federation Ltd
 British Decorators Association
 Department for Education
 Department of the Environment, Transport and the Regions
 European Resin Manufacturer's Association
 Furniture Industry Research Association
 Ministry of Defence
 Oil & Colour Chemists Association
 Society of Chemical Industry
 Timber Research and Development Association
 Union of Construction, Allied Trades & Technicians

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Foreword

This British Standard has been prepared by Technical Committee STI/28.

This standard is designed to amalgamate BS 5082, BS 5358 and BS 7779, which are withdrawn.

This standard avoids the use of the lead-based reference primer specified in BS 5082 and BS 5358. It also includes a test for stain resistance to demonstrate the sealing properties of some primers, such as those primers that comply with BS 4756.

WARNING This British Standard calls for the use of substances and/or 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.

Product certification. Users of this British Standard are advised to consider the desirability of third party certification or product conformity with this British Standard, based on testing and continuing product surveillance. This may be coupled with the assessment of a supplier's quality systems against the appropriate standard in the BS EN ISO 9000 series.

Enquiries on the availability of third party certification schemes are forwarded by BSI to the Association of British Certification Bodies. If a third party certification scheme does not already exist, users should consider approaching a body from the list of Association Members.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 15 and a back cover.

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1 Scope

This standard specifies requirements for all primers used for softwood joinery as defined in BS EN 927-1. They are suitable, when overcoated with paint (all types) or stain finishing coats (type B only, see clause 4), for interior or exterior use.

NOTE Primers conforming to the requirements of this standard may be suitable for use on hardwoods, but the user is advised to consult the manufacturer in each individual circumstance.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 245:1992, *Specification for mineral solvents (white spirit and related hydrocarbon solvents) for paints and other purposes.*

BS 2015, *Glossary of paint and related terms.*

BS 3900-B18, *Methods of test for paints — Part B18: Determination of non-volatile matter of paints, varnishes and binders for paints and varnishes.*

BS 3900-D8, *Methods of test for paints — Part D8: Determination of colour and colour difference: principles.*

BS 3900-D9, *Methods of test for paints — Part D9: Determination of colour and colour difference: measurement.*

BS 3900-D10, *Methods of test for paints — Part D10: Determination of colour and colour difference: calculation.*

BS 3900-F6, *Methods of test for paints — Part F6: Notes for guidance on the conduct of natural weathering tests.*

BS 3900-G6, *Methods of test for paints — Part G6: Assessment of resistance to fungal growth.*

BS 3900-H2, *Methods of test for paints — Part H2: Designation of degree of blistering.*

BS 3900-H4, *Methods of test for paints — Part H4: Designation of degree of cracking.*

BS 3900-H5, *Methods of test for paints — Part H5: Designation of degree of flaking.*

BS 5235, *Specification for dial-type expansion thermometers.*

BS 7956:2000

BS 7664, *Specification for undercoat and finishing paints.*

BS EN 927-1, *Paints and varnishes — Coating materials and coating systems for exterior wood — Part 1: Classification and selection.*

BS EN 971-1, *Paints and varnishes — Terms and definitions for coating materials — Part 1: General terms.*

BS EN 21512, *Methods of test for paints — Sampling.*

BS EN ISO 2409, *Paints and varnishes — Cross-cut test.*

ASTM G53:1988, *Standard practice for operating light and water exposure apparatus (fluorescent UV condensation type) for exposure of non-metallic materials.*

3 Definitions

For the purposes of this British Standard, the definitions given in BS 2015 and BS EN 971-1 apply.

4 Classification

The primers specified in this standard shall be classified as follows.

Type A

Primers for general use under paints. These are not normally expected to prevent staining from knots or resinous timber without prior application of a sealer designed to block resin exudations and extractives.

Type B

Dual-purpose primers for overcoating with stain finishes or paints. These are not normally expected to prevent staining from knots or resinous timber without prior application of a sealer designed to block resin exudations and extractives.

Type C

Primers which can be used directly over knots, resinous timbers and timbers pretreated with preservatives, such as metallic naphthenates, known to discolour subsequently applied paint films.

5 Sampling

For the purposes of the tests specified, a representative sample of the primer measuring not less than 500 ml shall be taken and packed according to the method described in BS EN 21512. A container of glass or other non-corrodible material shall be used.

6 Composition

The primer shall be based on a solution or dispersion of polymeric material in a water or organic solvent carrier. The primer shall not contain materials which may migrate from it and cause discoloration when overcoated with solvent- or water-thinned finishes.

7 Performance requirements

7.1 Appearance

When the primer is applied to the planed surface of a European redwood or British-grown Scots pine panel of not less than 300 mm × 100 mm and then allowed to dry, the film shall be smooth, of uniform appearance and free from runs and sags. For type B primers, the grain of the wood shall be visible.

NOTE Apply the primer and allow to dry with the panel positioned vertically as recommended by the manufacturer.

7.2 Resistance to natural weathering

The primers, applied and tested in the manner described in annex A, shall not show at the end of the exposure period (see A.2.5 and A.2.6) any chalking, cracking or flaking and there shall be no evidence of wood splitting. Surface mould shall be not greater than 1 as defined in BS 3900-G6, and shall be 0 after gentle sponging with water. For type B primers, the colour change shall be not greater than $5\Delta E$ units.

7.3 Recoatability after natural weathering

When the test panels, prepared and exposed to natural weathering as described in annex A, are tested as described in annex B, none of the panels shall show signs of any defect either during recoating or after drying. At the end of the exposure period, none of the panels shall show blistering. There shall be no cracking of the timber or coating in areas remote from the water trap. Cracking from the water trap, flaking and adhesion shall be rated not greater than 1 as described in BS 3900-H2.

7.4 Blister resistance

When the primer is tested on pine heartwood by the method described in annex C, blistering shall be rated not greater than 1 as described in BS 3900-H2. Any cracking of the wood test panel shall be ignored.

7.5 Low temperature film formation

NOTE This clause is not applicable to products for which forced drying is to be used.

When the primer is tested by the method described in annex D, the primer film shall show no lateral penetration of the ink.

7.6 Stain resistance (primer type C only)

When the primer is tested by the method described in annex E, the finish shall show no signs of discoloration, cracking or checking over the knot.

8 Marking of containers

Each container shall be permanently and legibly marked with the following information:

- a) the manufacturer's name, trademark and product designation;
- b) the batch number and/or date of manufacture;
- c) the method of application and the recommended spreading rate expressed in square metres per litre (m²/l);
- d) the thinners to be used, if required;
- e) statutory health, safety and environmental information.

NOTE Reference to this British Standard is optional, but if reference is made, the following format should be used:

“This primer conforms to British Standard BS 7956:2000.”¹⁾

¹⁾ Marking BS 7956:2000 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third-party certification of conformity.

Annex A (normative) Test for resistance to natural weathering

A.1 Materials

A.1.1 Wood

The wood is European redwood or British-grown Scots pine that has been selected to be free from knots, shakes, resinous streaks, to be straight-grained and of normal growth (i.e. 3 to 8 annual rings per 10 mm). The inclination of the growth rings to the face is 0° to 45°.

NOTE Abnormal porosity may be detected qualitatively by the rapid absorption of a drop of propan-2-ol applied to a smooth surface; the drop should not be absorbed in less than 30 s by wood of normal porosity. The test should be carried out at not less than six widely separated places in the test panel.

The wood is conditioned at (20 ± 2) °C and relative humidity (65 ± 5) % (in accordance with ISO 554:1976) to an equilibrium moisture content of (13 ± 2) %.

A.1.2 Panels

The panels are cut from sawn boards planed all round and have dimensions of approximately 375 mm × 100 mm × 20 mm. The panels are planed to a smooth and uniform finish and are not sanded.

Any panels showing surface splitting are rejected. Where the presence of some minor defects in the test area is unavoidable, their positions are noted and their influence excluded during the assessment of coating performance.

A.1.3 Selection

The panels are carefully selected such that a sapwood test surface is provided on the convex side of the growth rings, with any heartwood confined to a band not exceeding 10 mm in depth when measured from the rear face.

If the presence of heartwood in selected timber cannot be detected by the difference in colour in the wood (heartwood is darker), it is checked for by the brush application of a test solution to both the end-grain and the faces of a small piece cut from the same length of wood. The test solution is prepared by dissolving Fast Red B salt in de-ionized water at a concentration of 5 g/l. The solution is freshly prepared and immediately ready for use. Heartwood, if present, is indicated by the development of a deep red colour, which usually shows within about 10 min.

NOTE Fast Red B has no reported carcinogenic or mutagenic effects and currently appears safe to use.

A.2 General

A.2.1 Procedure

Pre-treat the surface of the test panels by applying a liberal brush coat of a blue stain preventive solution consisting of a 1 % (*m/m*) solution of Dichlofluanid in white spirit which conforms to BS 245:1992. Filter the solution before use. Allow the panels to dry for 24 h at (20 ± 2) °C and relative humidity (65 ± 5) %.

WARNING Dichlofluanid is potentially hazardous. Refer to the appropriate safety data sheet when handling this product.

A.2.2 Application (primer types A and C)

Prepare three panels for each primer under test. Apply the primer to the test surface and edges using the technique specified by the manufacturer such that the recommended spreading rate is achieved. Leave the back of the panels and the end grains uncoated.

Allow the panels to dry in a vertical position, with free access of air, at (20 ± 2) °C and relative humidity (65 ± 5) % for four days.

A.2.3 Application (primer type B)

Prepare five panels for each primer under test. Apply the primer to the test surface and edges using the technique specified by the manufacturer such that the recommended spreading rate is achieved. Leave the back of the panels and the end grains uncoated.

Allow the panels to dry in a vertical position, with free access of air, at (20 ± 2) °C and relative humidity (65 ± 5) % for four days.

A.2.4 End sealing

Thoroughly seal the ends of each panel with at least two coats of a flexible, moisture-impermeable white paint, for example of long-oil alkyd type, and capable of withstanding two years of natural exposure without breakdown. Apply the sealer to all surfaces at the ends of the panels i.e. front, sides, end-grains and rear face, to a distance of 50 mm from one end and 25 mm from the other.

NOTE Differing widths of sealer are applied at the ends of the panels to allow additional scope for the exclusion of minor wood defects. The sealer can be brush- or dip- applied.

Allow the panels to dry for a further three days.

A.2.5 Exposure (primer types A and C)

Expose all three panels (see A.2.2) for a period of six months at an angle of 45° facing the equator. Arrange the panels with the long edge horizontal convex side of the growth rings outermost and the broad band of the sealant on the left hand side. Commence exposure in the period from the 1st of May to the 30th of September.

A.2.6 Exposure (primer type B)

Expose four of the five panels (see A.2.3) for a period of three months at an angle of 45° facing the equator. Arrange the panels with the long edge horizontal convex side of the growth rings outermost and the broad band of the sealant on the left hand side. Commence exposure in the period from the 1st of May to the 30th of September.

Retain the remaining panel under laboratory conditions of (20 ± 2) °C, relative humidity (65 ± 5) % and in darkened conditions as a control.

A.2.7 Examination

After the exposure period has ended, remove the test panels from exposure and condition for 24 h at (20 ± 2) °C and relative humidity (65 ± 5) %. Examine the primer film for defects and wood cracking using a magnification of $\times 10$.

Wash the surface of the panels by sponging with clean lukewarm water to remove surface deposits of atmospheric pollutants and allow the panels to dry. Assess all the panels for mould growth. For the panels coated with the type B primer, assess the colour change of the panels which have been exposed by comparison with the retained panel in accordance with BS 3900-D8, BS 3900-D9 and BS 3900-D10.

Annex B (normative)
Test for recoatability after natural weathering

B.1 Materials

B.1.1 Panels

For primer types A and C, two panels are selected for the overcoating trial. The remaining weathered primer panel is retained in the laboratory for reference. For type B primers, all four weathered primer panels are used. The weathered primer panels are reconditioned at (20 ± 2) °C and relative humidity (65 ± 5) %, until the moisture content of the wood has reached an equilibrium moisture content of (13 ± 2) %.

One further coat of sealer (A.2.4) is applied to the sealed ends of the panels. It is ensured that the sealer is contiguous with, but not overlapping, the test primer. The panels are allowed to dry for a period of (20 ± 4) h.

B.1.2 Finishing systems

Finishing systems comprise:

- a) an undercoat and white finishing paint (conforming to BS 7664);
- b) a semi-transparent exterior wood stain, classified as medium build in BS EN 927-1 and medium brown in colour.

B.2 Procedure

B.2.1 Overcoating (primer types A and C)

Apply one coat of undercoat to the weathered face and edges of the two panels. Leave these panels to dry for (20 ± 4) h before applying one coat of white finishing paint. Ensure that the finishing system is contiguous with, but not overlapping, the end sealer, and apply each coat at the manufacturer's recommended covering rate. Allow the two panels to dry at (20 ± 2) °C and relative humidity (65 ± 5) % for seven days.

B.2.2 Overcoating (primer type B)

Apply one coat of undercoat to the weathered face and edges of two of the panels. Leave these panels to dry for (20 ± 4) h before applying one coat of white finishing paint. Ensure that the finishing system is contiguous with, but not overlapping, the end sealer, and apply each coat at the manufacturer's recommended covering rate. Allow the two panels to dry at (20 ± 2) °C and relative humidity (65 ± 5) % for seven days.

Take the remaining two panels and apply one coat of medium build wood stain to the weathered face and edges. Leave the panels to dry for (20 ± 4) h before applying one further coat of medium build exterior wood stain. Ensure that the finishing system is contiguous with, but not overlapping, the end sealer and apply each coat at the manufacturer's recommended covering rate. Allow the panels to dry at (20 ± 2) °C and relative humidity (65 ± 5) % for seven days.

B.2.3 Machining of water trap

Machine a water trap into the centre of the test face of the overcoated panels by milling a cleanly cut circular hole, approximately 25 mm in diameter, through the coating system and to a depth of (5 ± 1) mm into the wood.

NOTE A Forstner drill bit with a peripheral cutting edge may be used to mill the circular hole. It is important to ensure that the drill is sharp so that the hole is cleanly cut and the tearing of fibres around its perimeter is minimized.

B.2.4 Exposure

On completion of the drying period and not later than 12 days after the application of the final coat, place the overcoated panels on exposure racks in accordance with BS 3900-F6, with the long edge horizontal and finished face outermost. Expose the panels at an angle of 45° facing the equator for a period of 12 months. Ensure that the panels are placed in the same alignment as they were when exposed for natural weathering prior to overcoating.

B.2.5 Examination

After the exposure period, examine the panels on the exposure rack and record any blistering in accordance with BS 3900-H2. Remove the test panels from exposure and condition for seven days at (20 ± 2) °C and relative humidity (65 ± 5) %.

Wash the panels by sponging with clean lukewarm water to remove surface deposits and atmospheric pollutants and allow to dry. Examine the coatings, using a magnification of approximately $\times 10$, for the following defects using the methods specified in the referenced standards:

- a) flaking in accordance with BS 3900-H5;
- b) cracking in accordance with BS 3900-H4;
- c) adhesion in accordance with BS EN ISO 2409, using a single edge cutting tool and making six cuts, 2 mm apart in each direction.

Annex C (normative)
Test for blister resistance

C.1 Apparatus and materials

C.1.1 *Constant head electrically-heated water bath.*

C.1.2 *Panels of Scots pine heartwood, 150 mm × 50 mm × 20 mm, conditioned and machined as described in A.1.1 and A.1.2.*

C.1.3 *Finishing system, comprising undercoat and white finishing paint (conforming to BS 7664). For type B primers, a semi-transparent exterior wood stain, classified as medium build in BS EN 927-1 and medium brown in colour, may be used.*

C.1.4 *Blister box, constructed of plywood 20 mm thick and with two pieces of 12.5 mm aluminium angle fixed across the top of the plywood to support the test panels. The box fits closely around the top of the water bath (C.1.1) and the panels (C.1.2) are supported 40 mm to 70 mm above the water surface at the centre of the bath, with at least 80 % of the panel surface exposed to the water vapour. The exposed areas of the panels are equal.*

NOTE A suitable box is shown in Figure C.1.

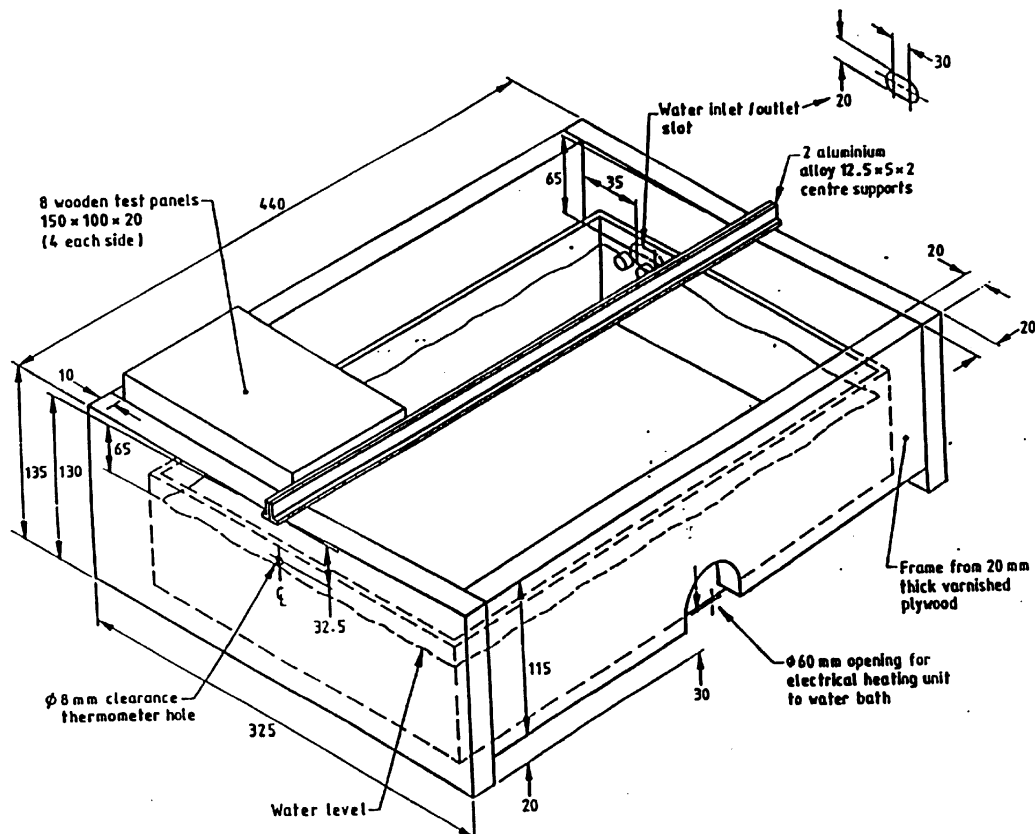
C.1.5 *Dial thermometer, conforming to BS 5235.*

C.2 Preparation of the test panels

Three panels are selected for test and one face and all edges of the three panels are coated with the primer under test, using the manufacturer's recommended method of application, and temporarily masking the uncoated face if necessary. The panels are allowed to dry at (20 ± 2) °C and relative humidity (65 ± 5) % for seven days.

The primed face and edges of the panels are coated with one coat of undercoat and left to dry for (20 ± 4) h. One coat of white finishing paint is then applied to the primed and undercoated faces and the panels are allowed to dry at (20 ± 2) °C and relative humidity (65 ± 5) % for seven days. Each coat is applied at the manufacturer's recommended covering rate. Any temporary masking is removed before the panels are placed in the blister box.

In addition, type B primers may be tested with two coats of the medium build exterior wood stain instead of alkyd undercoat and gloss as the overcoating system.



Dimensions are in millimetres

NOTE 1 The dial thermometer conforms to BS 5235 (i.e. temperature range 0 °C to 100 °C and stem length 300 mm).

NOTE 2 The hole is situated half way between the centre support and the water level (approximately 32.5 mm) so that the thermometer is directly below and parallel to the centre support.

NOTE 3 The box length is reduced to take exactly eight panels without overlap.

NOTE 4 All panels have approximately 90 % of their unpainted surfaces exposed to steam.

Figure C.1 — Details of a blister box suitable for the for blister resistance test

C.3 Procedure

After seven days, place the blister box (C.1.4) over the water bath. Maintain the water bath such that the water vapour temperature is (60 ± 2) °C. Place the coated panels on the blister box with the unpainted faces downwards, for a period of (50 ± 2) h. Butt panels together and cover the unused spaces of the box with glass panels.

After (50 ± 2) h, remove the panels and immediately examine the coated face areas for blistering and cracking, using a magnification of $\times 10$.

Annex D (normative)

Test for low temperature film formation

D.1 Apparatus and materials

D.1.1 *Refrigerator or controlled temperature enclosure*, capable of being controlled at (4 ± 1) °C and relative humidity (65 ± 10) %.

D.1.2 *Kraft paper*, machine glazed, of grammage (60 ± 10) g/m².

D.1.3 *Applicator*, suitable for applying the test primer at a uniform thickness.

D.1.4 *Ink*, blue-black and water-borne is suitable.

D.2 Procedure

Attach the kraft paper (D.1.2), with its glazed face uppermost, to a glass panel using double-sided adhesive tape. Place the glass panel and attached kraft paper, together with the applicator (D.1.3) and (200 ± 50) ml of the primer in the refrigerator (D.1.1) at (4 ± 1) °C and relative humidity (65 ± 10) % for 2 h.

Remove the materials from the refrigerator and immediately apply the primer to the glazed face of the kraft paper using the applicator to give a dry film thickness on a non-absorbent substrate of (27.5 ± 2.5) µm.

If a weighing method is used, the mass of liquid primer to be applied may be calculated by determining the non-volatile content of the primer using the method described in BS 3900-B18.

Immediately replace the glass panel and paper in the refrigerator at (4 ± 1) °C.

After 24 h in the refrigerator, remove the paper and panel and apply ink (D.1.4) in the form of a cross using a fine pipette. After a period of 5 min, examine the kraft paper for lateral penetration of the ink into the primer film.

Annex E (normative)

Test for stain resistance (primer type C only)

E.1 Apparatus and materials

E.1.1 Wood

The wood is European redwood or British-grown Scots pine that has been selected to be free from cracks and resinous streaks, to be straight-grained and of normal growth rate (i.e. 3 to 8 annual growth rings per 10 mm). The inclination of the growth rings to the face is 0° to 45°. The wood is required to contain knots.

The wood is free from blue stain and evidence of surface or bulk fungal infection. Abnormal porosity (caused by bacterial attack) is avoided.

NOTE Abnormal porosity may be detected qualitatively by the rapid absorption of a drop of propan-2-ol applied to a smooth surface; the drop should not be absorbed in less than 30 s by wood of normal porosity. The test should be carried out at not less than six widely separated places in the test panel.

The wood is conditioned at (20 ± 2) °C and relative humidity (65 ± 5) % (in accordance with ISO 554:1976) to an equilibrium moisture content of (13 ± 2) %.

E.1.2 Panels

The panels are cut from sawn boards planed all round and have dimensions of approximately 150 mm × 74 mm × 18 mm. The panels are planed to a smooth and uniform finish and are not be sanded.

Each panel contains one live, intergrown knot. Any panel showing surface splitting is rejected.

E.1.3 Artificial weathering equipment, of the fluorescent UV-condensation type conforming to, and operated in accordance with, ASTM G53:1988.

E.1.4 Finishing system, undercoat and white finishing paint (conforming to BS 7664).

E.2 Procedure

E.2.1 Application

Prepare two panels for each primer under test, by applying the primer to all surfaces, using a technique specified by the manufacturer to achieve the recommended spreading rate. Allow the panels to dry in a vertical position with free access of air at (20 ± 2) °C and relative humidity (65 ± 5) % for four days.

E.2.2 Overcoating

Apply one coat of undercoat all round. Leave the panels to dry at (20 ± 2) °C and relative humidity (65 ± 5) % for (20 ± 4) h. Then apply one coat of white finishing paint to all of the panels at the manufacturer's recommended spreading rate. Leave the panels to dry at (20 ± 2) °C and relative humidity (65 ± 5) % for seven days.

E.2.3 Exposure to artificial weathering

Expose the panels for a period of (500 ± 5) h in the artificial weathering equipment, using the following conditions:

- 4 h UV exposure using UVA 351 lamps at 60 °C;
- 4 h condensation at 40 °C.

E.2.4 Examination

After exposure, inspect the paint visually for discoloration, cracking or checking over the knot.

Bibliography

BS 4756, *Specification for ready-mixed aluminium printing paints for woodwork.*

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