

SPECIFICATION FOR

MACHINE-MADE SHELLAC

B.S. 3722 : 1964

THIS BRITISH STANDARD, having been approved by the Pigments, Paints and Varnishes Industry Standards Committee and endorsed by the Chairman of the Chemical Divisional Council, was published under the authority of the General Council on 27th February, 1964.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 4000, indexed and cross-indexed for reference, together with an abstract of each standard, will be found in the Institution's Yearbook.

This standard makes reference to the following British Standards:

- B.S. 410. Test sieves.
- B.S. 507. Ethanol.
- B.S. 576. Acetic acid.
- B.S. 604. Graduated measuring cylinders.
- B.S. 698. Papers for electrical purposes.
- B.S. 1583. One-mark pipettes.
- B.S. 1820. Vegetable parchment for wrapping dairy and other food products.
- B.S. 1957. Presentation of numerical values (fineness of expression; rounding of numbers).
- B.S. 2058. Lunge-Rey weighing pipette.
- B.S. 2761. Spherical ground glass joints.
- B.S. 3591. Industrial methylated spirits.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following B.S.I. references relate to the work on this standard:
Committee references PVC/4 and PVC/4/1
Draft for comment AA(PVC) 1850

**Amendment No. 1
published and effective from 28 June 1991
to BS 3722 : 1964**

Specification for machine-made shellac

Revised text

**Appendix C. Methods for the determination of wax
Method 2. For types III and IV**

Procedure

In line 6, delete 'an asbestos mat' and substitute 'any type of glass wool'.

In line 9, delete 'the asbestos mat' and substitute 'the glass wool'.

In line 10, delete 'the mat' and substitute 'the glass wool'.

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CO-OPERATING ORGANIZATIONS

The Pigments, Paints and Varnishes Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

Admiralty
 Air Ministry
 Association of British Chemical Manufacturers
 *Board of Trade
 British Colour Makers' Association
 British Railways Board
 Crown Agents for Oversea Governments and Administrations
 D.S.I.R.—Building Research Station
 *D.S.I.R.—Laboratory of the Government Chemist
 Incorporated Institute of British Decorators
 Lead Oxide Convention
 London County Council
 London Transport Board
 Ministry of Aviation
 Ministry of Public Building and Works
 National Federation of Builders' and Plumbers' Merchants
 *Oil and Colour Chemists' Association
 Paint Manufacturers' and Allied Trades Association
 *Paintmakers' Association of Great Britain
 Post Office
 Research Association of British Paint, Colour and Varnish Manufacturers
 Royal Institute of British Architects
 Royal Institute of Public Health and Hygiene
 Titanium Pigment Manufacturers' Technical Committee
 *War Office
 White Lead Convention
 Zinc Development Association
 Zinc Pigment Development Association

The Government departments and scientific and industrial 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:

British Electrical and Allied Manufacturers' Association
 British Hat and Allied Felt Makers Research Association
 D.S.I.R.—Tropical Products Institute
 London Chamber of Commerce
 London Shellac Trade Association
 Society for Analytical Chemistry
 Individual manufacturers

BRITISH STANDARD SPECIFICATION FOR MACHINE-MADE SHELLAC

FOREWORD

It has been decided to split the subject matter of B.S. 954, the previous British Standard for all types of lac other than bleached lac, into three parts, covering seedlac, hand-made shellac and machine-made shellac, and to publish these as separate documents. B.S. 3279, 'Seedlac', and B.S. 3280, 'Hand-made shellac', were published in 1960.

During recent years, lac has been studied internationally, through the International Organization for Standardization, by various research institutions and trade organizations in different parts of the world. Advantage has been taken of this work and the Committee responsible for the preparation of this standard desires to acknowledge its indebtedness to the sources of information utilized.

For the purposes of a standard specification, machine-made shellacs differ from hand-made in several important respects.

Firstly, machine-made shellacs are marketed in the trade, and known to the consumers, by the private trade marks of the manufacturers, not by accepted trade descriptions as in hand-made grades of shellac.

Secondly, whereas there is only one manufacturing process, a heat process, for hand-made shellac, there are several processes for machine-made shellacs, namely heat process, solvent extraction, and decolorization, leading to physical differences which consumers recognize and specify.

Thirdly, two of the recognized criteria for the grading of hand-made shellacs, namely amount of insoluble impurities and colour or appearance, are roughly in line with each other. In machine-made shellacs, the amount of insoluble impurities is low in all grades; the basis of grading in each type is the colour only.

The Committee responsible for the preparation of this specification decided against following the system of classification of ISO Recommendation R.56* because of the diversity of machine-made shellacs. The physical differences between the several types of machine-made shellac are at least as great as between the heat process hand-made and the heat process machine-made. As an extension of the principle which led to the separation of hand-made from machine-made in these British Standards, the Committee has divided the machine-made shellacs into four main types, I to IV, based on different methods of manufacture, and has established a grading based on colour, in each type. This system makes it possible for the consumer to specify the method of manu-

* ISO/R 56—Shellac.

facture and colour grading, and to define a grade of shellac when marketed under a private trade mark.

The mandatory requirements included in this specification are those for appearance and colour, colour index, wax, matter insoluble in hot alcohol, absence of orpiment and absence of rosin; and methods of test are given for these. Also included are optional clauses and methods of test, operative only by agreement between purchaser and vendor, for volatile matter, non-volatile matter soluble in cold alcohol, clarity of cold alcoholic solution, ash, grit, flow, life under heat, water-soluble acidity or alkalinity, acid value, iodine value, arsenic, lead and adhesion to mica.

No specific requirement is given for the absence of visible impurities; this is considered to be covered by the requirements of Clauses 3 and 6.

SPECIFICATION

MANDATORY CLAUSES

SCOPE AND DESCRIPTION

1. This British Standard applies to machine-made shellac, in the form of flakes, sheets or buttons, or any other form agreed between purchaser and vendor. The product is obtained by refining seedlac or other lac raw materials, and is classified into four types, as follows, based upon the process of manufacture employed:

Type I. Heat process. Shellacs produced by a mechanized version of the hand process. These retain most of the natural wax and colour of the lac raw material.

Type II. Hot solvent process. Shellacs produced by extraction with hot alcohol. These retain most of the natural wax and colour of the lac raw material.

Type III. De-waxed. Shellacs produced by extraction with cold alcohol. From these the natural wax has been removed.

Type IV. Decolorized and de-waxed. Shellacs from which the natural colour of the lac raw material has been removed to a varying extent by adsorption by activated carbon and from which the natural wax has also been removed.

Five grades are specified in each of Types I and II and four in each of Types III and IV.

SAMPLE

2. For the purpose of examination under this specification, samples shall be drawn and prepared in the manner described in Appendix A. Only original unopened packages of shellac shall be sampled.

Not less than 10 per cent of the packages, selected at random from each lot of not more than 200 packages, shall be sampled.

APPEARANCE AND COLOUR

3. The appearance and colour of the material shall be not inferior to those of an agreed sample, when judged by visual examination.

COLOUR INDEX

4. The colour index of the material, determined in the manner described in Appendix B, shall not exceed the limits shown in Table 1.

WAX

5. The material shall not contain wax in excess of the limits given in Table 1, when determined by the appropriate method described in Appendix C.

MATTER INSOLUBLE IN HOT ALCOHOL

6. The material shall not contain matter insoluble in hot alcohol in excess of the limits given in Table 1, when tested in the manner described in Appendix D.

TABLE 1. MACHINE-MADE SHELLACS

LIMITS							
Type I Heat process				Type II Hot solvent process			
Grade	Colour index	Wax per cent	Alcohol insol. per cent	Grade	Colour index	Wax per cent	Alcohol insol. per cent
1	8	5.5	0.6	1	8	5.5	0.3
2	12			2	12		
3	22			3	22		
4	35			4	35		
5	50			5	50		
Type III De-waxed				Type IV Decolorized and de-waxed			
Grade	Colour index	Wax per cent	Alcohol insol. per cent	Grade	Colour index	Wax per cent	Alcohol insol. per cent
1	9	0.2	0.2	1	0.9	0.2	0.2
2	20			2	2.0		
3	35			3	3.5		
4	50			4	5.0		

ORPIMENT

7. The material shall not show the presence of orpiment when tested in the manner described in Appendix E.

ROSIN

8. The material shall not show the presence of rosin when tested in the manner described in Appendix F.

EXPRESSION OF ANALYTICAL RESULTS

9. The results of analyses made in accordance with the appendices to this standard shall be expressed to the number of significant figures indicated in the specification requirements. The principles embodied in B.S. 1957* apply to such results.

OPTIONAL CLAUSES

**These clauses are only applicable by agreement between
purchaser and vendor**

VOLATILE MATTER

10. The material, when tested in the manner described in Appendix G, shall not yield more than 2.0 per cent by weight of volatile matter.

NON-VOLATILE MATTER SOLUBLE IN COLD ALCOHOL

11. The material, when tested in the manner described in Appendix H, shall contain not less than the agreed percentage of non-volatile matter soluble in cold alcohol.

CLARITY OF COLD ALCOHOLIC SOLUTION
(For Types III and IV only)

12. The material, when tested in the manner described in Appendix I, shall show no turbidity.

ASH

13. The material, when tested in the manner described in Appendix J, shall not leave more than 0.3 per cent of ash.

GRIT

14. The material, when tested in the manner described in Appendix K, shall not contain grit in excess of the percentage agreed between purchaser and vendor.

* B.S. 1957, 'Presentation of numerical values (fineness of expression; rounding of numbers)'.

FLOW

15. The material, previously conditioned as described in Appendix L, shall have a flow within the range agreed between purchaser and vendor, when tested in the manner described in Appendix M.

LIFE UNDER HEAT

16. The material, previously conditioned as described in Appendix L, shall have a polymerization time within the range agreed between purchaser and vendor, when tested in the manner described in Appendix N.

WATER-SOLUBLE ACIDITY OR ALKALINITY

17. The aqueous extract of the material, when tested by the method described in Appendix O, shall not be acid to methyl red or alkaline to bromothymol blue.

ACID VALUE

18. The acid value of the material, determined in the manner described in Appendix P, shall not exceed the figure agreed between purchaser and vendor.

IODINE VALUE

19. The iodine value of the material, determined by one of the methods described in Appendix Q, shall not exceed the figure agreed between purchaser and vendor.

ARSENIC

20. The material shall not contain arsenic, calculated as elemental arsenic, in excess of the content agreed between purchaser and vendor, when determined in the manner described in Appendix R.

LEAD

21. The material shall not contain lead, calculated as elemental lead, in excess of the content agreed between purchaser and vendor, when determined by one of the methods described in Appendix S.

ADHESION TO MICA

22. When tested in the manner described in Appendix T, the average value for adhesion shall be not less than 120 g. Three consecutive tests from any sample shall pass the test requirement.

APPENDIX A. SAMPLING

Drawing of samples. Take samples from different places in each package, in the case of free flowing shellac by means of a suitable tryer and in the case of blocky or matted shellac in the form of small pieces (not more than 1.2 in (30 mm) across) by chipping or other suitable means, so as to yield a total bulk sample of 5 kg (or 10 lb) of material consisting of approximately equal portions from each package sampled. Thoroughly mix this bulk sample and heap and quarter along diameters at right angles.

Preparation of samples. *a. Original observation sample.* Mix thoroughly two opposite quarters of the bulk sample quartered as above to constitute the 'original observation sample'; or, if more than one such sample is required, further sub-divide the latter into a number of 'original observation samples'. Preserve these samples in air-tight containers, labelled 'Original observation sample'. This sample is used for the determination of grit and for the adhesion to mica test.

b. Analysis sample. Mix thoroughly the remaining two opposite quarters of the bulk sample and heap and quarter along two diameters at right angles. Mix the opposite quarters, grind the mixture to pass through an 8 mesh B.S. test sieve*. Thoroughly mix and divide by quartering into four samples each of approximately 300 g (or 11 oz) and preserve in air-tight containers labelled 'Analysis sample'.

c. Prepared sample. Grind an adequate amount (40–50 g) of the well mixed 'analysis sample' to pass entirely through a 22 mesh B.S. test sieve*. Transfer to an air-tight container, labelled 'Prepared sample'. This sample is used for all determinations other than for grit and for the adhesion to mica test.

APPENDIX B. METHOD FOR THE DETERMINATION OF COLOUR INDEX

Principle. The colour of a solution of shellac in alcohol is compared with that of a standard iodine solution by diluting either solution progressively until a close match is obtained.

Reagents. *a. Alcohol,* 95 per cent (v/v) ethanol conforming to B.S. 507† or industrial methylated spirits, 66 degrees O.P., conforming to B.S. 3591‡.

* B.S. 410, 'Test sieves'.

† B.S. 507, 'Ethanol'.

‡ B.S. 3591, 'Industrial methylated spirits'. It should be noted that the use of industrial methylated spirits is governed by The Methylated Spirits Regulations 1952 (S.I. 1952 No. 2230).

b. For Types I, II and III. Standard iodine solution, 0.005N. Prepare freshly by appropriate dilution of a 0.1N solution of iodine in potassium iodide with water. The colour of the 0.005N solution is arbitrarily designated as of colour index 5.

c. For Type IV. Standard iodine solution, 0.001N. Prepare freshly by appropriate dilution of a 0.1N solution of iodine in potassium iodide with water. The colour of the 0.001N solution is arbitrarily designated as of colour index 1.

Procedure. Add 100 ml of the alcohol to 10.0 g of the 'prepared sample' (see Appendix A.) contained in a stoppered flask. Shake vigorously as soon as the alcohol is added, to prevent coalescence of lac particles, then intermittently over a period of 4 hours. Allow to stand for 16 to 24 hours at $20 \pm 5^{\circ}\text{C}$, shake again and allow to settle at $20 \pm 2^{\circ}\text{C}$ for 2 hours. Filter the solution in an ordinary funnel using a medium grade filter paper and keeping the funnel covered. Discard the first 15 ml of the filtrate and then collect 5 ml or more of the clear filtrate for the test.

By means of a pipette transfer 5.0 ml of the filtered lac solution to a thin-walled 200×13 mm test tube. Transfer 5.0 ml of the appropriate standard iodine solution to another test tube, similar in every respect, for matching. Compare the colour of the two solutions, holding the test tubes against the light with a piece of moistened filter paper or opal glass interposed between the light source and the test tube. It will be found advantageous to use a standard type of light source and a viewing cabinet to cut off extraneous light. Add the alcohol from a burette to the lac solution with mixing, until the colour is the same as that of the standard iodine solution. Note the volume of alcohol added. Alternatively in the case of Type IV shellac, if the lac solution is the lighter, dilute the standard iodine solution with water contained in a second burette until a match is obtained and note the volume added.

Calculation. *For Types I, II and III.*

$$\text{Colour index} = A + 5$$

where A is the volume of alcohol, in millilitres, added to the lac solution.

For Type IV.

$$\text{Colour index} = \frac{A + 5}{W + 5}$$

where A is the volume of alcohol, in millilitres, added to the lac solution and W is the volume of water, in millilitres, added to the standard iodine solution.

NOTE. The repeatability of this test is about ± 5 per cent of the observed figure.