SRI LANKA STANDARD 558 : 1982

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SPECIFICATION FOR SYNTHETIC RESIN BASED VARNISH

BUREAU OF CEYLON STANDARDS

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SLS 558 : 1982

Gr. 6

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This Standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD
SPECIFICATION FOR SYNTHETIC RESIN BASED VARNISH

FOREWORD

This Sri Lanka Standard was authorised for adoption and publication by the Council of the Bureau of Ceylon Standards on 1982-03-18, after the draft, finalized by the Drafting Committee on Paints had been approved by the Chemicals Divisional Committee.

This specification covers varnish suitable for applications where chemical resistance and heat resistance are important criteria.

All standard values in this specification are given in SI units.

For the purpose of deciding whether a particular requirement of this specification is complied with the final value observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with CS 102. The number of significant places retained in the rounded off value should be the same as that of the specified value in this specification.

In the preparation of this specification, the assistance obtained from the publications of the Indian Standards Institution is gratefully acknowledged.

1 SCOPE

This specification prescribes requirements and methods of sampling and test for the material commercially known as varnish, based on synthetic resins. The material is used in painting systems for protection and decoration.

2 REFERENCES

CS 33 Laundry soap

CS 102 Presentation of numerical values

SLS 341 Specification for black letterpress ink for general purposes

SLS 489 Glossary of terms for paints

SLS 523 Methods of sampling paints

SLS 535 Methods of test for paints

3 TERMINOLOGY

For the purpose of this specification definitions given in **SLS 489** shall apply.

4 REQUIREMENTS

4.1 Composition

The material shall be based on synthetic resins free from natural resins or their derivatives or their modifications, in any form. The material shall be free from rosin when tested as in **G**. It shall be free from any pigments and shall be of such a composition to satisfy the requirements of this specification.

4.2 Recoating properties

When two successive coats of the material are applied either by brushing or spraying at an interval of 24 h, between coats, as prescribed in **4.4** there shall be no lifting of the underlying coat. The varnish system shall not exhibit sagging, pitting, flaking or cracking.

4.3 Colour

The colour when determined in a 6.3 mm all-glass cell in a standard Lovibond tintometer shall not be darker than a combination of 39 yellow units and 3.3 red units.

4.4 Finish

Unless otherwise agreed to between the purchaser and the supplier, the material when applied on to a glass panel conforming to **SLS 535 Part 3 : Section 3.2** to give a dry film mass of 17 g/m^2 to 25.5 g/m^2 either by brushing or spraying, as specified in **SLS 535 Part 3 : Section 3.3** and allowed to air dry in a vertical position in the absence of direct sunlight and under ambient conditions shall dry to a hard firmly adherent smooth film free from sagging and wrinkling and orange peeling.

4.5 The material shall also comply with the requirements given in Table 1.

5 PACKING

The material shall be packed in suitable containers in the following measures:

100 ml, 200 ml, 500 ml, 1 l, 2 l, 4 l, and 5 l.

6 MARKING

6.1 Each container shall be marked legibly and indelibly with the following:

a) Name of the material;

b) The words 'Synthetic resin based';

c) Name and address of the manufacturer and/or his recognized trade mark;

d) Volume of the material in ml or l;

e) Date of manufacture; and

f) Batch number or lot number in code or otherwise.

TABLE 1 - Requirements for synthetic resin based varnish

Serial No. (1)	Characteristic (2)	Requirement (3)	Method of test reference (4)
1	Drying time, max. a) Surface dry, h b) Hard dry, h	 6 12	Appendix A
2	Print free time, max, h	24	SLS 535 Part 3: Section 3.6
3	Scratch hardness after air drying for 96 h (under a load of 1 kg)	No such scratch as to show the bare metal	SLS 535 Part 5: Section 5.2
4	Bending properties after air drying for 96 h	No visible damage or detachment of the film	SLS 535 Part 5: Section 5.3
5	Stripping test after air drying for 96 h	Scratches free from jagged edges	Appendix B
6	Flash point, min. ^{o}C	30	SLS 535 Part 1: Section 1.5
7	Volatile matter content, per cent by mass, max.	60.0	SLS 535 Part 2: Section 2.3
8	Viscosity in mm^2/s at 30 ^{o}C	150 to 300	SLS 535 Part 1: Section 1.3
9	Resistance to water	To pass the test	SLS 535 Part 6: Section 6.3
10	Resistance to acid	To pass the test	Appendix C
11	Resistance to alkali	To pass the test	Appendix D
12	Resistance to accelerated weathering	To pass the test	Appendix E
13	Keeping properties	Not less than one year from the date of manufacture	Appendix F

7 SAMPLING AND NUMBER OF TESTS

7.1 The method of drawing representative samples of the material shall be as specified in the relevant Clauses of **SLS 523.**

7.2 From each sample container prepared as in **7.2.1** (c) of **SLS 523** a small but equal quantity of material shall be taken and mixed thoroughly to form a composite sample. The composite sample shall be transferred to a sample container.

7.3 The remaining portion of material from each sample container constitute an individual sample representing a particular container in the lot.

7.4 Test requirements given in 4.2 to 4.4 shall be carried out on each individual sample.

7.5 Test requirements given in 4.1 and 4.5 shall be carried out on the composite sample.

8 METHODS OF TEST

8.1 Tests shall be carried out as specified in **4.3, 4.4,** Appendices A to G and relevant sections of **SLS 535.**

8.2 Unless specified otherwise, chemicals of analytical grade and distilled water shall be employed in tests.

9 CRITERIA FOR CONFORMITY

The material shall be taken to have conformed to the specification if the following conditions are satisfied.

9.1 Each individual sample satisfies the relevant requirements tested as in 7.4.

9.2 The composite sample satisfies the relevant requirements tested as in 7.5.

APPENDIX A

DETERMINATION OF DRYING TIME

Two methods have been specified for each of the determination for surface drying and hard drying times. The method specified in A.1 shall be the reference method and shall be carried out in case of any dispute.

A.1 METHOD 1

A.1.1 Determination of surface drying time (Ballotini method)

This test shall be carried out as specified in **SLS 535 Part 3: Section 3.4.**

A.1.2 Determination of hard drying time

This test shall be carried out as specified in **SLS 535 Part 3 : Section 3.5.**

A.2 METHOD 2

A.2.1 Procedure

Apply the material by brushing or spraying (see 4.4) as specified in **SLS 535 Part 3 : Section 3.3** to obtain an even and uniform coat on a 150 mm x 150 mm glass panel conforming to **SLS 535 Part 3 : Section 3.2** and allow to air dry under standard conditions (27 ± 2 °C and a relative humidity of 65 ± 5 per cent) in a well ventilated chamber, care being taken to protect it from direct sunlight. Examine the material after specified intervals for the following conditions.

a) Surface dry,

b) Hard dry.

APPENDIX B

DETERMINATION OF STRIPPING

B.1 PRINCIPLE

The minimum load required to produce a scratch showing the bare metal surface of the panel coated with the material is determined.

B.2 APPARATUS

The apparatus used for determining scratch hardness as prescribed in **SLS 535 Part 5 : Section 5.2** shall be used.

B.3 PROCEDURE

Apply a coat of the material by brushing or spraying, to a 150 mm x 50 mm x 0.315 mm mild steel panel conforming to **SLS 535 Part 3: Section 3.2** to give a dry film mass of 17 g/m^2 to 25.5 g/m^2. Allow the panel to air-dry in a horizontal position for 96 h under standard conditions (27 ± 2 °C and a relative humidity of 65 ± 5 per cent). Test the dried film in the apparatus under such a load that a scratch is produced showing the bare metal surface.

B.4 The scratch so produced shall be free from jagged edges.

APPENDIX C

DETERMINATION OF RESISTANCE TO ACID

C.1 PRINCIPLE

A clean glass panel is coated with the varnish and after the specified drying period it is immersed in a definite concentration of sulphuric acid. After 24 h it is washed, dried and examined for the effects of acid.

C.2 TEST PANEL

A clean glass panel of 150 mm x 50 mm in size conforming to **SLS 535 Part 3 : Section 3.2.** The edges of the panel shall be protected with a coat of wax.

C.3 PROCEDURE

C.3.1 Apply an even and uniform coat of varnish on the glass panel as specified in **SLS 535 Part 3 : Section 3.3** and allow to air-dry in a vertical position under standard conditions (27 $\pm$ 2 ^{o}C and a relative humidity of 65 $\pm$ 5 per cent) for 48 h **(see 4.4)**. Immerse the panel in a 2 per cent (m/v) solution of concentrated sulphuric acid relative density 1.84 for 24 h at room temperature. Remove the panel, wash in running fresh water and allow to air dry for an hour at room temperature.

C.3.2 The film when examined shall show no signs of disintegration, whitening or appreciable dulling.

APPENDIX D

DETERMINATION OF RESISTANCE TO ALKALI

D.1 PRINCIPLE

A clean glass panel is coated with the varnish and after the specified drying period, it is immersed in a solution of laundry soap followed by a solution of sodium carbonate by the procedure specified under **D.2.**

D.2 PROCEDURE

D.2.1 Immerse the test panel prepared as described in **Appendix C** in a one per cent (m/v) solution of laundry soap conforming to **CS 33** for half an hour at a temperature of 27 $\pm$ 2 ^{o}C. Remove, and wash in running water, air-dry for one hour and examine the film and then subject to test as described in **D.2.2.**

D.2.2 Immerse the panel in a 2 per cent (m/v) solution of anhydrous sodium carbonate for half an hour at a temperature of 27 $\pm$ 2 ^{o}C. Remove, wash in running water, dry for one hour and examine the film.

D.2.3 After each of the tests described in D.2.1 and D.2.2, the film shall show no blistering, wrinkling, loss of adhesion, appreciable softening or change in colour.

APPENDIX E

DETERMINATION OF RESISTANCE TO ACCELERATED WEATHERING

E.1 PRINCIPLE

The durability of the varnish is evaluated by an accelerated weathering test wherein a prepared panel is subjected to controlled exposure of heat, light and water in an artificial weathering apparatus.

E.2 TEST PANELS

The panels shall be teak wood (*Tectona grandis Linn. f.* Fam. *Verbenaceae*) of 150 mm x 75 mm x 12 mm in size conforming to **SLS 535 Part 3 : Section 3.2.**

E.3 APPARATUS

An artificial weathering apparatus of the carbon arc type for uniform and controlled exposure to the effects of heat, light and water prescribed as in Appendix A of SLS 341 : 1975.

E.4 PROCEDURE

E.4.1 Apply one coat of liquid transparent wood filler on the panel and remove the excess after it has dried to touch, by rubbing across the grains with jute fibres and allow it to air-dry for 24 hours. Rub down with emery paper and wipe off the dust and apply one coat of varnish as in B.3 and allow to air-dry for 24 hours. Rub down with water proof emery paper, wash and wipe off water and when dry, apply a second coat of the varnish and allow to air dry for 48 hours. Rub down again with waterproof emery paper, wash and wipe off water and when dry apply the third coat of the varnish and allow to air dry for 7 days. Test the prepared panel in an accelerated weathering apparatus for 15 days.

E.4.2 The requirements of this test shall be taken to have been satisfied if there is no cracking, flaking, appreciable dulling or loss in general appearance of the film.

APPENDIX F

DETERMINATION OF KEEPING PROPERTIES

F.1 PROCEDURE

F.1.1 Store the material under cover in a dry place in the original sealed containers and under normal temperature conditions.

F.1.2 The material shall retain the properties as prescribed for the specified period after the date of manufacture which shall be subsequent to the date of placing the contract.

F.1.3 The material shall also show no skinning, gelling, hard caking or curdling and shall be free from any extraneous matter.

APPENDIX G

DETECTION OF ROSIN

G.1 PRINCIPLE

The material is tested for freedom from rosin by the Lieberman-Storch test, and the Halphen-Hicks test. The rosin may be present as either free rosin, (abietic acid), esterified rosin, or as metal salts.

G.2 REAGENTS

G.2.1 *Acetic anhydride*

G.2.2 *Sulphuric acid,* relative density 1.53, prepared by mixing 34.7 ml of concentrated sulphuric acid, relative density 1.84 with 35.7 ml of distilled water.

G.2.3 *Ethanol,* absolute.

G.2.4 *Acetic acid,* glacial

G.2.5 *Petroleum ether,* boiling point below 80 °C.

G.2.6 *Solution A,* comprising 1 part by volume of phenol dissolved in 2 parts by volume of carbon tetrachloride.

G.2.7 *Solution B,* comprising 1 part by volume of bromine dissolved in 4 parts by volume of carbon tetrachloride.

G.3 PROCEDURE

G.3.1 Lieberman-Storch test

G.3.1.1 Gently warm about 5 ml of the material with an equal volume of acetic anhydride in a test tube. Cool and transfer into a porcelain dish. Add a drop of sulphuric acid.

G.3.1.2 A rapidly developing, fugitive, violet colouration indicates the presence of rosin.

G.3.2 Halphen-Hicks test

G.3.2.1 Place 2 g of the material in a 250-ml conical flask, add 10 ml of absolute alcohol or acetic acid and shake until dissolution is complete. Add slowly and with continuous agitation, 50 ml of petroleum hydrocarbon solvent. Then add 50 ml of water in exactly the same manner, transfer to a small separating funnel, and allow it to stand until the petroleum hydrocarbon solvent separates. Draw off the water layer, wash petroleum hydrocarbon layer once with water and extract through a paper dry filter into a round-bottom evaporating dish. Evaporate the extract to dryness on steam-bath and test the residue as given in G.3.2.2.

G.3.2.2 Add one millilitre to two millilitres of solution A to the residue left after evaporation of the solution in petroleum hydrocarbon solvent and pour this mixture into the cavity of an ordinary porcelain colour-reaction plate until it just fills the depression. Immediately fill an adjacent cavity with solution B. Cover the plate with an inverted watch-glass and note the colour, if any, produced in solution A by the action of bromine vapours from solution B.

G.3.2.3 A decidedly purple or deep indigo blue colour indicates the presence of rosin.

BUREAU OF CEYLON STANDARDS

The Bureau of Ceylon Standards (BCS) is the national standards organization of Sri Lanka and was established by the Hon. Minister of Industries & Fisheries, as provided for by the Bureau of Ceylon Standards Act. No. 38 of 1964.

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