SRI LANKA STANDARD 350 : 2001

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SPECIFICATION FOR

STENCIL MARKING INK, (WATER BASED) FOR MARKING POROUS SURFACES

(FIRST REVISION)

SRI LANKA STANDARDS INSTITUTION

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SLS 350 : 2001

Gr. 7

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SRI LANKA.

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

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

SRI LANKA STANDARD
SPECIFICATION FOR STENCIL MARKING INK, (WATER BASED) FOR MARKING POROUS SURFACES (FIRST REVISION)

FOREWORD

This Sri Lanka Standard was approved by the Sectoral Committee on Chemical and Polymer Technology and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 2001-10-29.

This standard was first published in 1973. In this revision the requirement for resistance to light and water spray has been replaced by resistance to water and a relevant test method prescribed. The limit for efflux time has been revised. Drying time and application properties have been included as requirements and relevant test methods prescribed. A test method has been included for the requirement freedom from toxic or noxious material. The clause Marking has been amended to meet the necessity of covering imported products. A list of materials that should be excluded in the manufacture of the product is given in Appendix **K**.

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

Guidelines for the determination of a compliance of a lot with the requirements of this standard based on statistical sampling and inspection are given in Appendix **A**.

In the preparation of this standard the assistance obtained from the following publications is gratefully acknowledged.

IS 1234 : 1980 Indian Standard Specification for ink stencil, oil base, for marking porous surfaces (First Revision) Reaffirmed 1992
United States Federal Supply Services Administration document.

CEPE Exclusion list for printing inks – 1997 edition – British Coating Federation.

1 SCOPE

This specification prescribes the requirements and methods of sampling and test for black and coloured water based stencil ink, used for marking porous surfaces such as corrugated fibre board cartons, wooden crates and boxes , plywood chests and jute-hessain wrappings.

2 REFERENCES

ISO 11890 Paints and varnishes – determination of volatile organic compound (VOC) content
Part 1 : Gas-chromatographic method
Part 2 : Difference method
CS 102 Presentation of numerical values
CS 124 Test sieves
SLS 428 Random sampling methods
SLS 535 Methods of test for paints
SLS 751 Plywood panels for tea chests

3 DEFINITIONS

For the purpose of this specification the following definitions shall apply:

3.1 caking : The settling of pigment particles into a hard compact mass which is not easily redispersed by stirring.

3.2 chalking : The formation of a friable powdery coating on the surface of the ink caused by disintegration of the binding medium due to action of weather.

3.3 consistency : The apparent viscosity of ink when shearing forces of varying degrees are applied to it in various ways, for instance when it is in the can, poured from one vessel to another or brushed (or otherwise sprayed out) over a surface.

3.4 cracking : A breakdown of the film which the cracks penetrate at least one coat and which may be expected to result ultimately in complete failure.

3.5 dispersion : A suspension of either very fine solid particles of pigment in oil, varnish or any other medium or of colloidal particles of a non-volatile binding medium in a solvent.

3.6 erosion : The wearing away of the top layer of a stencilled surface.

3.7 flaking : The breaking away of the surface covering irreversible.

3.8 peeling : The spontaneous removal of sheets of coating from a surface due to faulty adhesion

3.10 skinning : The formation of a surface skin on ink in the container.

3.11 vehicle : The liquid part of the ink into which the pigment is dispersed.

4 DESCRIPTION

The material shall consist of a homogenous dispersion of pigment or dye in a suitable vehicle for the ink to dry by penetration and absorption. The material shall be suitable for application by means of a stencil brush and stencil board and it shall be free from any substances which have a deleterious effect on the tools.

5 REQUIREMENTS

5.1 Working properties and appearance

The ink shall show no hard settling. Any settling shall mix readily to a smooth homogenous state. The ink shall show no livering or caking and shall be free from lumps and skins.

5.2 Performance

When letters are stencilled as prescribed in Appendix **B.1.1**, they shall be clear, legible, opaque and shall be free from ragged edges. The ink shall not show any marks on the finger, when tested for resistance to smearing as in Appendix **B** .

5.3 Colour

When letters are stencilled as prescribed in Appendix **B.1.1**, the colour of the impressions shall be that specified on the label of the container.

5.4 Drying time

The material shall dry in not more than 30 minutes when tested as prescribed in Appendix **C**.

5.5 Freedom from toxic or noxious material

The ink shall be free from volatile toxic or noxious materials when tested as prescribed in **ISO 11890.** Either the difference method or the gas-chromatographic method may be used.

5.6 Application properties

When applied by stencil brush on white pine wood and tested as prescribed in Appendix **D**, the ink shall leave clean stencil marks free from ragged edges, smudges and smears. The ink shall be satisfactorily retained in the brush without dripping.

5.7 Storage stability

When 250 ml. of ink , is allowed to stand for 12 hours in a 1000 ml. beaker at 27 ± 2^0C neither settling of pigments nor any other separations shall take place. There shall be no skinning , thickening or curdling of the ink after 12 hours.

5.8 Effect on stencil brush

The bristles of the stencil brush shall not show any impairment of its ability to be used in the regular manner when used as prescribed in Appendix **E.**

5.9 Resistance to water

When tested as in Appendix **F.2** there shall be no smudging, cracking or peeling.

5.10 Shelf life

The ink in unopened containers shall be in a workable condition after a storage period of six months from the date of manufacture.

5.11 Other requirements

The material shall also comply with the requirements given in Table **1** when tested according to the relevant test methods given in Column **4** of the table.

TABLE 1- Requirements for stencil marking ink (water based) for marking porous surfaces

Sl No. (1)	Characteristic (2)	Requirement (3)	Method of test (4)
i)	Total non-volatile matter per cent by mass min.	15	Appendix G
ii)	Residue on sieve per cent by mass max.	2	Appendix H
iii)	Consistency as efflux time at 25 °C (Ford cup no. 4) in sec.	10 – 15	SLS 535 : Part 1

6. PACKAGING AND MARKING

6.1 Packaging

The material shall be packed in suitable containers.

6.2 Marking

The containers shall be legibly and indelibly marked with the following information :

a) The name and colour of the material;
b) Name and address of the manufacturer, including the country of origin;
c) Brand name and / or trade mark, if any;
d) Date of manufacture;
e) Batch or code number;
f) Mass in kg ; and
g) Instructions for storage and use.

NOTE : *Attention is drawn to the certification marking facilities offered by the Sri Lanka Standards Institution. See the inside back cover of this standard.*

7. METHODS OF TEST

7.1 Tests shall be carried out as specified in Appendices **B** to **H** of this specification and **ISO 11890**.

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

APPENDIX A
COMPLIANCE OF A LOT

The sampling scheme given in this Appendix should be applied where compliance of a lot to the requirements of this standard is to be assessed based on statistical sampling and inspection.

A.1 LOT

In any consignment all the containers of the same size belonging to one batch of manufacture or supply shall constitute a lot.

A.2 SCALE OF SAMPLING

A.2.1 The number of containers to be selected from a lot shall depend on the size of the lot and shall be in accordance with Table **2**.

TABLE 2 - Scale of sampling for stencil marking ink

No. of containers in the lot (1)	No. of containers to be selected (2)
2 to 15	02
16 to 40	03
41 to 65	04
66 to 110	07
111 and above	10

A.2.2 The containers shall be selected at random. In order to ensure the randomness of selection, random number tables given in **SLS 428** shall be used .

A.3 GENERAL REQUIREMENTS OF SAMPLING

A.3.1 To draw a representative sample , the contents of each container selected for sampling shall be mixed thoroughly by shaking or stirring or both, by suitable means or by rolling.

A.3.2 The samples shall be placed in clean, dry and air-tight suitable containers which have no action on the material.

A.3.3 The sample containers shall be of such a size that they when filled by the sample leave an ullage of 10 per cent.

A.3.4 Each sample container shall be sealed air-tight after filling and marked with full details of the material as prescribed in clause **6** and the date of sampling.

A.3.5 Samples shall be stored in such a manner that the temperature of the material does not vary unduly from the normal temperature.

A.4 PREPARATION OF TEST SAMPLES

A.4.1 Draw, with a suitable sampling instrument, small portions of the material from different parts of each container selected. Thoroughly mix all portions of the material drawn from the same container.

A.4.2 A small but equal quantity of material prepared as in **A.4.1** shall be taken from each container selected and shall be well mixed together so as to form a composite sample.

A.5 CRITERIA FOR CONFORMITY

A.5.1 Residue on sieve

Tests for determination of the residue on sieve shall be conducted individually on each of the samples constituting a set of test samples.

Test results for the characteristic, namely the residue on sieve shall be recorded as shown in Table **3.** The mean and the range of these test results shall be calculated as follows:

Mean $(\bar{X})$ = $\frac{\text{The sum of the test results}}{\text{Number of test results}}$

Range (R) = The difference between the maximum and minimum values of the test results

These values shall also be recorded as shown in Table **3**.

The appropriate expression as shown in Column **5** of Table **3** shall be calculated for this characteristic. If the value of this expression satisfies the inequality as given in Column **5** of Table **3**, the lot shall be declared to have satisfied the requirement of this characteristic.

Table 3 – Criterion of residue on sieve

Characteristic	**Test results** 1,2,3 .....r	**Mean**	**Range**	**Criterion for Conformity**
(1)	**(2)**	**(3)**	**(4)**	**(5)**
Residue on Sieve, per cent by mass	....,....,....,.....	$\bar{X}$	R	$\bar{X} - 0.6R \leq 8$

A.5.2 Tests for the determination of the other characteristics mentioned under **Clause 5** shall be conducted individually on the composite samples prepared under Appendix A 4.

A.5.3 A lot shall be declared as conforming to the specification if it satisfies the requirements of each of the characteristics mentioned in the standard.

APPENDIX B
DETERMINATION OF PERFORMANCE

B.1 PROCEDURE

B.1.1 Stencil five letters A, B, C, D and E 20 mm high on a panel of plywood of thickness 5 mm conforming to **SLS 751** by means of a stencil board and with a circular motion of a stencil brush using the material under test. This shall be done at a temperature of 27 ± 2 °C. Observe whether clear, legible and opaque letters are formed without dripping.

NOTE : *Too much ink should not be taken to the brush as it may smear or blur under the stencil board.*

B.1.2 Examine for set-to-touch 10 minutes, by slightly touching the inked letters with the finger. The material shall be considered to have passed the test if the finger does not pick up ink.

B.1.3 Examine the resistance to smearing by rubbing the letters lightly with fingers, 25 minutes after stencilling. The material shall be considered to have passed the test if it does not smear.

APPENDIX C
TEST FOR DRYING TIME

C.1 PROCEDURE

C.1.1 Stencil a number of letters about 20 mm high by means of a stencil brush and stencil board on a well seasoned teak wood panel using the material under test. Apply the material just sufficient to make legible opaque letters without smearing and let stand for 30 minutes.

C.1.2 The material shall be taken to have passed the test if rubbing with a finger under moderate pressure does not pick up, smudge or smear the stencilled letters.

APPENDIX D
TEST FOR APPLICATION PROPERTIES

D.1 PROCEDURE

D.1.1 Apply the ink on a white pine wood panel through a sharply cut stencil with a stencil brush. Apply only sufficient ink to make legible opaque letters. Lift the stencil straight up and examine the letters.

D.1.2 The ink shall be considered satisfactory if the letters stencilled on the wood are clear, distinct and there is no sign of smudginess and feathering. Fill the bristles of the brush with ink and hold the brush vertically to determine whether the ink drips.

APPENDIX E
TEST FOR EFFECT ON STENCIL BRUSH

E.1 PROCEDURE

E.1.1 After completion of the stencilling operation described in **B.1.1** wet the brush again thoroughly with the ink, allow any excess ink to drain off. Lay the brush on its side, so that the bristles do not touch an absorbent surface.

E.1.2 After a period of 48 hours, examine for any evidence of impairment of the function of the brush. The brush should be suitable for re-use after rubbing several times across a hard surface.

APPENDIX F
RESISTANCE TO WATER

F.1 APPARATUS

F.1.1 Proof Printing Equipment (Various)

F.1.2 Substrate (Various)

F.2 PROCEDURE

F.2.1 Using the recommended proof printing equipment for the material under test produce proof print (s) of the batch side by side against the master sample on the specified substrate (s). Apply any heating or keying specified to the print.

F.2.2 Ensure that the print produced is satisfactory for adhesion-tape, scratch and wrinkle. Immerse the print in cold tap water for 1 h.

F.2.3 On removal from the water wrinkle the print under cold running water. The print should be grasped with the thumb and forefinger of each hand about 250 mm apart with the dividing line between master and batch centred between the hands. The area of print is rotated vigorously through 10 cycles.

F.2.4 Report the water resistance of the batch relative to the master sample.

NOTE : *Any ink failing the water resistance test may require addition of a water resistance additive varnish and should then be retested.*

APPENDIX G
DETERMINATION OF NON VOLATILE MATTER CONTENT AT 103 ± 2 °C

G.1 APPARATUS

G.1.1 Flat bottom circular stainless dish - about 75 mm diameter.

G.2 PROCEDURE

G.2.1 Weigh, to the nearest milligram, 2 g of the well mixed material in a flat bottom circular stainless steel dish of about 75 mm diameter.

G.2.2 Heat the dish in an oven maintained at a temperature of 103 ± 2 °C for 1 h. Cool in a desiccator and weigh to the nearest milligram. Repeat the process of heating, cooling and weighing at 30-minute intervals until the difference between two consecutive weighings does not exceed 0.002 g. Record the final mass.

G.3 CALCULATION

$$\text{Non-volatile matter per cent by mass} = \frac{m_1}{m_0} \times 100$$

where,

m_0 is the mass, in g. of the material before heating ; and
m_1 is the mass, in g. of the material after heating.

APPENDIX H
DETERMINATION OF RESIDUE ON SIEVE

H.1 APPARATUS

H.1.1 Sieve of aperture 75 µm

H.2 PROCEDURE

H.2.1 Mix thoroughly at least 20 g of the material taking care not to include particles of skin and any other extraneous matter.

H.2.2 Weigh accurately the required quantity of the material and transfer to a 250 ml beaker using distilled water. Wet a 75 µm sieve on both sides with distilled water. Transfer the contents of the beaker to the sieve using a wash bottle. Remove any small particles of pigment that may be retained on the stirring rod or the walls of the beaker with a camel hair brush. Wash the residue left on the sieve with distilled water and gently brush with a camel hair brush until the water passing through the sieve is clear and free from solid particles.

H.2.3 When the washing is complete, dry the sieve to constant mass at 100 ± 2 °C. Cool and transfer the residue with the help of a camel hair brush to a watch glass of known mass and determine the mass of the residue.

H.3 CALCULATION

$$\text{Residue on sieve per cent by mass} = \frac{m_1}{m_0} \times 100$$

where,

m_0 is the mass, in g. of the material taken for test ; and
m_1 is the mass, in g. of residue on sieve.

APPENDIX J
THE GENERAL EXCLUSION LIST

J.1 The following materials should not be used as ingredients in stencil marking ink.

J.1.1 Substances classified and labelled as toxic or highly toxic according to the Chemicals (Hazard Information and Packaging for Supply) Regulations, which implement Directive 67/548/EEC and subsequent amendments and adaptations.

J.1.2 Pigments and compounds based on antimony *, arsenic, cadmium, chromium (vi), lead**, mercury and selenium.

J.1.3 Dye colourants

Auramine (Basic Yellow 2 – CI 41000)
Azo dyes which can decompose in the body to bioavailable aromatic amines that are classified as category 1 or 2 carcinogens, according to Directive 67/548/EEC
Chrysoidine (Basic Orange 2 – CI 11270)
Cresylene Brown (Basic Brown 4 – CI 21010)
Fuschine (Basic Violet 14 – CI 42510) *Note : formerly listed as 'magenta'*
Induline (Solvent Blue 7 – CI 50400)

J.1.4 Solvents :

Benzene
Dichlorobenzene
2-ethoxy ethanol
2-ethoxy ethyl acetate
Methanol
2-methoxy ethanol
2-methoxy ethyl acetate
Monochlorobenzene
2-nitropropane
Volatile chlorinated hydrocarbons
Volatile fluorochlorinated hydrocarbons

* With the exception of non-biodegradable antimony titanate present in titanium dioxide Pigments.

** Except where necessary in certain screen inks to meet specified resistance requirements.

J.1.5 Plasticisers :

Chlorinated naphthalenes
Chlorinated paraffins
Monocresyl diphenyl phosphate
Monocresyl phosphate
Polychlorinated biphenyls (PCB)
Polychlorinated terphenyls (PCT)
Tricresyl phosphate

J.1.6 Various Compounds :

Asbestos
Brominated flame retardants
Diamino stilbene and derivatives
2,4 dimethyl 6 tertiary butyl phenol
Dioxins
Hexachloricyclohexane
Nitrosoamines
Pentachlorophenol and its salts
Polychlorinated biphenyls (PCB)
Polychlorinated terphenyls (PCT)
Polychlorinated dibenzofuranes
4,4 tetramethyl diamino benzophenone (Michlers ketone)
Toluene di-isocyanate
Vinyl chloride monomer

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SRI LANKA STANDARDS INSTITUTION

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