SRI LANKA STANDARD 955 : PART 1 : 1992

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SPECIFICATION FOR

THERMOPLASTIC ROAD MARKING MATERIALS

PART 1 - REQUIREMENTS FOR AGGREGATE

SRI LANKA STANDARDS INSTITUTION

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SLS 955 : 1992

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 THERMOPLASTIC ROAD MARKING MATERIALS
PART 1 : REQUIREMENTS FOR AGGREGATE

FOREWORD

This standard was approved by the Sectoral Committee on Paints & Varnishes and Allied Products and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 1992-03-26.

This specification is applicable to solid or powdered thermoplastic material which have been melted by heat and then applied by spraying or screeding.

Provision is made for reflectorization using solid glass beads of a suitable grade complying with BS 6088 to improve the visibility of road markings.

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 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 specification.

In the preparation of this specification the assistance obtained from the relevant publications of the British Standards Institution and the Thai Industrial Standards Institution is gratefully acknowledged.

1 SCOPE

This specification prescribes the requirements, methods of sampling and test for white, yellow and black thermoplastic road marking material to be applied on road surfaces and runways.

2 REFERENCES

BS 2000 Petroleum and its products.
Part 58 : Softening point of bitumen (ring and ball)
BS 6088 Solid glass beads for use with road markings and for other industrial uses.
CS 102 Presentation of numerical values.
CS 124 Test sieves.
SLS 428 Random sampling methods.
SLS 489 Glossary of terms for paints.
SLS 535 Methods of test for paints.
Part 6 : Durability tests on paints films.
SLS 895 Road marking paints.
Munsell book of colour (1976 Edition).

3 DEFINITIONS

For the purpose of this specification, the definitions given in SLS 489 shall apply together with the following:

3.1 **reflectorization** : The use of solid glass beads complying with BS 6088 in road marking material.

3.2 **luminance factor** : The ratio of the luminance of a non-luminous body, under specified conditions of illumination and observation, to the luminance of a perfect diffuser receiving the same illumination.

3.3 **no pick-up time** : The period between application of a paint and the moment when the paint just ceases to be removed by a simulated tyre of a vehicle passing over the painted surface.

3.4 **maximum application temperature** : The maximum temperature at which the material can be maintained for at least 6 hours in an open-topped melting-machine or open-topped application-machine with constant agitation by an efficient stirring device, without serious degradation or discolouration occuring.

3.5 **maximum safe heating temperature** : The temperature above which the material is not to be heated at any time.

4 MATERIAL

4.1 Binder

The binder shall consist of plasticized synthetic resins and wood or gum rosins.

4.2 Pigment

4.2.1 For white road marking material the pigment used shall be titaminum dioxide.

4.2.2 For yellow road marking material, suitable yellow pigment shall be substituted for all or part of titanium dioxide.

4.2.3 For black road marking material, carbon black or a suitable pigment shall be used and the pigment may be predispersed.

4.3 Fillers

For white or yellow thermoplastic road marking material, the fillers shall consist of light-coloured silica sand, calcite, quartz etc. For black thermoplastic material, calcined bauxite or other dark coloured aggregate shall be used.

4.4 Glass beads

Solid glass beads of a suitable grade complying with the requirements of BS 6088 may be incorporated in road marking materials for reflectorization, to improve the visibility.

5 REQUIREMENTS

5.1 Composition

When tested in accordance with the methods given in Appendices A to C the proportions of the constituents of the thermoplastic road marking material shall be as in Table 1.

TABLE 1 - Proportions of constituents of thermoplastic road marking material

Sl. No.	Constituent	per cent by mass of total mixture	
		Without glass beads	with glass beads
i)	Binder.	20 ± 2	20 ±2
ii)	Solid glass beads, min.	-	20
iii)	Pigments, fillers	80 ± 2	-
iv)	Pigments, fillers and glass beads.	-	80 ± 2

5.2 Colour

When examined as in Section 4.2 of SLS 535 : Part 4 : 1981, the colour of the dry film of the yellow thermoplastic road marking material shall approximately match with Munsell reference 10YR 7/14.

5.3 No pick-up time

When tested in accordance with the method given in 8.1 the no pick-up time of thermoplastic road marking material shall be not more than 10 minutes.

5.4 Softening point

When measured in accordance with the method given in 8.2 the softening point of the thermoplastic road marking material shall be not less than 100 ^{o}C.

5.5 Luminance factor

5.5.1 *White material*

When tested in accordance with Appendix D the luminance factor of white material shall be not less than 65.

5.5.2 *Yellow material*

When tested in accordance with Appendix D the luminance factor of the yellow material shall be not less than 45.

5.6 Flow resistance

When tested in accordance with Appendix E, the flow resistance of the thermoplastic road marking material shall be not more than 25 per cent.

5.7 Skid resistance

When tested in accordance with Appendix F, the skid resistance of the thermoplastic road marking material shall be not less than 45.

5.8 Resistance to weathering

When examined as in section 6.4 of SLS 535 : Part 6: 1981, the Thermoplastic roadmarking material shall not crack or blister and shall not show appreciable change in colour.

6 PACKAGING AND MARKING

6.1 Packaging

The thermoplastic road marking material shall be packed in suitable containers which protects the contents from contamination.

6.2 Marking

Each container shall be legibly and indelibly marked or labelled with the following ;

a) Name of the product as "Thermoplastic Road marking Material";
b) colour;
c) The word reflectorized or non-reflectorized;
d) Brand name/trade mark;
e) Net content, in kilograms;
f) Name and address of the manufacturer;
g) Batch or code number; and
h) Shelf life
i) Directions for use including maximum application temperature and maximum safe heating temperature.

7 SAMPLING

7.1 Lot

In any consignment all containers of thermoplastic road marking material of the same colour and size belonging to one batch of manufacture or supply shall constitute a lot.

7.2 Scale of sampling

7.2.1 Samples shall be tested from each lot for ascertaining its conformity to the requirements of this specification.

7.2.2 The number of containers to be selected from a lot shall be in accordance with Table 2.

Table 2 - Scale of sampling

Number of containers in the lot (1)	Number of containers to be selected (2)
Up to 90	3
91 to 150	4
151 to 280	5
281 to 500	6
501 to 1 200	8
1 201 and above	10

7.2.3 The containers shall be selected at random. In order to ensure randomness of selection, tables of random numbers as given in SLS 428 shall be used.

7.3 Preparation of composite sample

Sufficient quantities of material shall be drawn from five different locations of each container selected as in 7.2.2 and mixed together and reduced to a composite sample of required size using conning and quartering method.

7.4 Number of tests

7.4.1 Each container selected as in 7.2.2 shall be inspected for packaging and marking requirements.

7.4.2 The composite sample prepared as in 7.3 shall be tested for the requirements given in 5.1 to 5.8

8 METHODS OF TEST

Tests shall be carried out in accordance with the methods given in BS 2000 : Part 58, 8.1, 8.2 and Appendices A to F of this specification.

8.1 Determination of no pick-up time

Weigh about 100 g of the composite sample into a container. Heat to 200 $_{o}$C and maintain at this temperature for 3 hours while stirring. Pour into a screed box (see Figure 1) and immediately apply to a thickness of 1.5 mm to 3 mm on a glass panel prepared as given in Appendix A of SLS 895 : 1990.

Carry out the no pick-up time test as given in Appendix C of SLS 895 : 1990.

8.2 Determination of softening point (Ring and ball method)

Weigh about 100 g of the composite sample into a container. Heat to 200 ^{o}C and maintain at this temperature for 3 hours while stirring. Transfer the contents to the ring cautiously. Allow to cool.

Determine the softening point by the ring and ball method as described in BS 2000 : Part 58.

9 CRITERIA FOR CONFORMITY

A lot shall be declared as conforming to this specification if the following conditions are satisfied:

9.1 Each container inspected as in 7.4.1 satisfies packaging and marking requirements.

9.2 The test results obtained when tested as in 7.4.2 satisfy the relevant requirements.

APPENDIX A
DETERMINATION OF BINDER CONTENT (IGNITION METHOD)

A.1 APPARATUS

A.1.1 *Crucible*, made of porcelain or other suitable material, having a capacity of about 50 50 ml.

A.1.2 *Muffle furnace*, controlled at 500 ± 25 °C.

A.1.3 *Desiccator*.

A.1.4 *Balance*, with an accuracy of 0.001 g.

A.2 PROCEDURE

Weigh, to the nearest milligram, about 10 g of the composite sample into a tared, dry crucible (A.1.1). Place the cruible in the muffle furnace (A.1.2) and ignite for at least one hour at 500 ± 25 °C. Cool in a desiccator (A.1.3) and weigh to the nearest milligram.

Repeat the process of heating, cooling and weighing until the difference between two successive weighings does not exceed 1 mg.

A.3 CALCULATION

$$\text{Binder content, per cent by mass} = \frac{m_0 - m_1}{m_0} \times 100$$

where,

m_1 is the mass in g, of the sample after ignition; and
m_0 is the mass in g, of the composite sample before ignition.

APPENDIX B
DETERMINATION OF THE PIGMEMT AND FILLER CONTENT

B.1 PROCEDURE

Weigh accuracy, about 150 g of the composite sample and about 500 ml of dichloromethane to dissolve the binder. Separate the insoluble matter by centrifuging and dry well. Weigh the material to the nearest milligram.

Determine the glass bead content as given in Appendix C.

B.2 CALCULATION

$$\text{Pigment and filler content per cent by mass} = \frac{m_0 - m_1 - m_2}{m_0} \times 100$$

where,

m_2 is the mass, in g, of the binder;
m_1 is the mass, in g, of the glass beads ; and
m_0 is the mass, in g, of the composite sample.

APPENDIX C
DETERMINATION OF GLASS BEAD CONTENT

C.1 APPARATUS

Metal tray, of approximate dimensions 150 mm x 350 mm, inclined at an angle of 5 $\pm$ 1 ^{o}C to the horizontal.

C.2 PROCEDURE

Take the material obtained in B.1, place about of 5 g to 10 g on the upper end of the tray and gently brush the material until all the glass beads have been moved to the bottom of the tray.

C.3 CALCULATION

Report the total mass of the round glass beads collected as a percentage of the mass of the original sample of thermoplastic material x 100.

APPENDIX D
DETERMINATION OF LUMINANCE FACTOR

D.1 APPARATUS

The apparatus for comparison of materials under test with calibrated reference panels shall consist essentially of a light source arranged at an angle of 45 ^{o} to the specimen and a photo-detector postioned to view the specimen at right angles.

D.1.1 *Light source,* CIE standard source 'C' with an international colour temperature of 6774 $\pm$ 200 ^{o}K representing average daylight viewing.

D.1.2 *Filtered photo-detector,* with a CIE type 'Y' filter and a selenium barrier - layer type photo-detector.

D.2 CALIBRATED REFERENCE PANELS

Calibrate the apparatus used for measuring luminance factor using calibrated panels with 'Y' luminance factor.

D.2.1 White material

Calibrate using a panel having a CIE 'Y' luminance factor in the range of 65 per cent to 95 per cent.

D.2.2 Yellow material

Calibrate using a panel yellow in colour approximately to Munsell reference 10YR 7/14 and having a CIE 'Y' luminance factor within the range 50 per cent to 70 per cent.

D.3 PROCEDURE

Heat a suitable quantity of the composite sample to 200 °C and maintain at this temperature for 3 hours while stirring. Cast a slab 100 mm in diameter and at least 10 mm thick, on a clean flat silicone rubber mould.

Allow the specimen to cool at room temperature and remove if from the mould. Immediately measure the reflectance value of the cast face and record.

Repeat the measurement on two different parts of the specimen.

APPENDIX E
DETERMINATION OF FLOW RESISTANCE

E.1 PROCEDURE

Heat a suitable quantity of the composite sample to 200 °C and maintain at this temperature for 3 hours while stirring. Cast two conical shaped specimens of the material using a suitable mould (silicone rubber) having a nominal angle of 60 ° at the apex and a vertical height of 100 $\pm$ 5 mm.

After cooling and settling for 36 hours remove the specimens from the mould and place them point upwards on a flat level surface. Measure the heights of the cones to the nearest millimetre.

Keep the specimens for 48 hours at room temperature and measure the heights of the cones.

E.2 CALCULATION

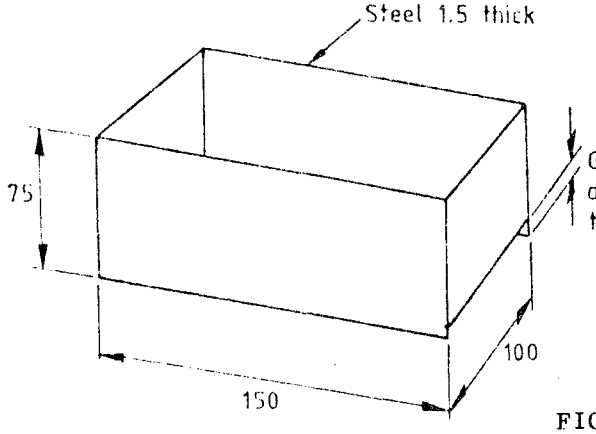
Calculate the decrease in height of the two specimens as a percentage and report the average of the percentage to the nearest one percent.

APPENDIX F
DETERMINATION OF SKID RESISTANCE

F.1 APPARATUS

F.1.1 *Steel sheet,* approximately 1.6 mm thick, at least 150 mm wide and 850 mm long.

F.1.2 *Screed box,* as shown in Figure 1.



All dimensions are in millimeters.

FIGURE 1 - SCREED BOX

F.1.3 *Skid resistance tester*

NOTE

Information could be obtained from Enquiries Section, BSI, Linford Wood, Milton Keynes MK 14 6LE.

F.2 PROCEDURE

Weigh about 100 g of the composite sample. Heat upto 200 ^{o}C and maintain at this temperature for 3 hours while stirring.

Pour the material into the screed (F.1.2) box and immediately draw the box at a steady speed over the steel sheet (F.1.1) to give a coating approximately 100 mm wide and at least 800 mm long.

Allow to cool and determine the skid resistance at three different parts of the screeded material using the skid resistance tester in accordance with the instructions supplied with the insturment.

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

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SRI LANKA STANDARDS INSTITUTION

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