

**SRI LANKA STANDARD 590:1982**  
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**SPECIFICATION FOR  
CEMENT PAINTS**

**BUREAU OF CEYLON STANDARDS**



# SPECIFICATION FOR CEMENT PAINTS

SLS 590:1982

Gr. 9

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BUREAU OF CEYLON STANDARDS

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# SRI LANKA STANDARD SPECIFICATION FOR CEMENT PAINTS

## FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Bureau of Ceylon Standards on 1982-11-24, after the draft, finalized by the Drafting Committee on Paints had been approved by the Chemicals Divisional Committee.

Cement paints readily mix with water. They are used on interior and exterior porous surfaces of masonry, concrete, cement renderings, bricks, asbestos cement (except gypsum plaster or any other surface with an appreciable water soluble sulphate content). These paints have a better performance than distemper paints for outdoor protection and decoration of buildings.

In the formulation of this specification, considerable thought has been given to the provision of suitable tests to evaluate the durability of cement paints and the tests described in Appendix F are considered the best that can be put forward at present to define the requirements for a satisfactory material. Inclusion of tests for fungistatic and blooming properties will be considered at a later date when suitable test methods are devised.

Recommendations for the use of cement paints are given in Appendix L.

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 British Standards Institution, the Indian Standards Institution and the Singapore Institute of Standards and Industrial Research is gratefully acknowledged.

## 1 SCOPE

This specification prescribes requirements and methods of sampling and test for Portland cement-based paint powder.

## 2 REFERENCES

- CS 9 Asbestos cement corrugated and flat sheets
- CS 102 Presentation of numerical values
- CS 107 Ordinary portland cement
- CS 124 Test sieves
- SLS 489 Glossary of terms for paints
- SLS 523 Sampling of paints
- SLS 535 Tests for paints
  - Part 3 Tests associated with paint film formation
- BS 3900 Part F3:1971 Tests for paints

## 3 TERMINOLOGY

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

## 4 REQUIREMENTS

### 4.1 Composition

Cement paint shall be based on portland cement (complying with CS 107). Suitable pigments such as phthalocyanine, cadmium sulphide, cobalt blue and lithopone shall be used in coloured cement paints. The extender shall consist of barium sulphate, hydrated lime, siliceous matter or limestone, including chalk and whiting. Water repellents such as calcium stearate or aluminium stearate and hygroscopic salts such as calcium chloride shall be present.

#### 4.1.1 *Portland cement content*

Cement paint shall consist of a minimum of 60 per cent by mass of portland cement when determined as prescribed in Appendix A.

#### 4.1.2 *Freedom from organic binders*

Cement paint shall be free from organic binders when tested as prescribed in Appendix B.

### 4.2 Consistency

The material shall be in powder form, free from lumps and when mixed with water (see Note) in the proportions recommended by the manufacturer, shall form a homogeneous paint showing no unwetted material.

manufacturer, shall form a homogeneous paint showing no unwetted material.

*NOTE - Mixing is best achieved by the progressive addition of small quantities of water, first to form a paste on stirring and thereafter the required suspension by the addition of more water in larger quantities.*

#### 4.3 Finish

The material when applied on an asbestos cement panel as described in Appendix C shall dry to a hard, firmly adherent film with a smooth and matt finish.

#### 4.4 Other requirements

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

TABLE 1 - Requirements for cement paints

S1 No. (1)	Characteristic (2)	Requirement (3)	Method of test, Ref. to Appendix (4)
i)	Drying time (hard dry), h, max.	24	D
ii)	Colour	Close match to colour specified by the purchaser in accordance with the colour card provided by the manufacturer.	E
iii)	Colour fastness	No change of colour	F
iv)	Resistance to chalking	To pass the test	F
v)	Acid soluble residue on sieve, per cent by mass, max.		
	a) On a sieve of nominal aperture 150 $\mu\text{m}$	3.0	
	b) On a sieve of nominal aperture 300 $\mu\text{m}$	0.1	G
vi)	Water repellency	To pass the test	H
vii)	Pot life of mixed paint	Not less than one hour	J
viii)	Keeping properties	Not less than one year	K

## 5 PACKAGING

Unless otherwise agreed to, the material shall be packed in dry, air tight non-absorbant containers on which the material has no action.

## 6 MARKING

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

- a) The words *cement paint*;
- b) Name and address of the manufacturer;
- c) Mass of the material, in kilograms;
- d) Colour;
- e) Spreading capacity, in  $m^2/kg$ ;
- f) Mixing instructions; and
- g) Batch or code number.

6.2 The containers may also be marked with the Certification Mark of the Bureau of Ceylon Standards illustrated below on permission being granted for such marking by the Bureau of Ceylon Standards.



*NOTE - The use of the Bureau of Ceylon Standards Certification Mark (SLS Mark) is governed by the provisions of the Bureau of Ceylon Standards Act and the regulations framed thereunder. The SLS mark on products covered by a Sri Lanka Standard is an assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control, which is devised and supervised by the Bureau and operated by the producer. SLS marked products are also continuously checked by the Bureau for conformity to that standard as a further safeguard. Details of conditions under which a permit for the use of the Certification Mark may be granted to manufacturers or processors may be obtained from the Bureau of Ceylon Standards.*

## 7 SAMPLING

7.1 The method of drawing a representative sample of the material shall be as specified in the relevant clauses of SLS 523.

7.2 From each sample container prepared as in 7.2.3 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 shall constitute an individual sample representing a particular container in the lot.

#### 7.4 Number of tests

7.4.1 Each container selected as in 7.1 shall be examined for packaging and marking requirements (see 5 and 6).

7.4.2 Each individual sample obtained as in 7.3 shall be tested for requirements given in 4.2 and 4.3.

7.4.3 The composite sample obtained as in 7.2 shall be tested for requirements given in 4.1 and 4.4.

### 8 METHODS OF TEST

8.1 Tests shall be carried out as specified in 4.2 and Appendices A to L.

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

### 9 CONFORMITY TO STANDARD

The material shall be taken to have conformed to the requirements of the specification if the following conditions are satisfied:

9.1 Each sample container examined as in 7.4.1 satisfies the relevant requirements.

9.2 Each individual sample tested as in 7.4.2 satisfies the relevant requirements.

9.3 The composite sample tested as in 7.4.3 satisfies the relevant requirements.

## APPENDIX A

### DETERMINATION OF PORTLAND CEMENT

#### A.1 PRINCIPLE

The percentage of portland cement is computed on the basis of results obtained from determinations for total calcium oxide, calcium oxide combined with carbon dioxide and free lime.

#### A.2 APPARATUS

##### A.2.1 Erlenmeyer flask

A.2.2 *Reflux condenser*, of suitable size.

A.2.3 *Carbon dioxide absorption train*

### A.3 REAGENTS

A.3.1 *Ammonium chloride*, solid.

A.3.2 *Hydrochloric acid*,  $\rho = 1.18$  g/ml.

A.3.3 *Ammonia solution*,  $\rho = 0.91$  g/ml.

A.3.4 *Standard potassium permanganate solution*, 0.1N.

A.3.5 *Bromine water*, prepared by saturating freshly distilled water with bromine.

A.3.6 *Ammonium oxalate solution*, saturated.

A.3.7 *Sulphuric acid*,  $\rho = 1.84$  g/ml.

A.3.8 *Neutral glycerol-alcohol solution*, 1:5. Mix one part by volume of glycerol with 5 parts by volume of absolute alcohol. To each litre of this solution, add 2 ml of phenolphthalein indicator solution. It is necessary that the glycerol-alcohol solution should be neutral to the indicator. If the solution is colourless after addition of indicator, add a dilute solution of alcoholic sodium or potassium hydroxide until the pink colour appears. Add alcoholic ammonium acetate solution dropwise until the solution is just decolourized. If the initial colour is pink, add alcoholic ammonium acetate solution dropwise until the solution is just decolourized.

A.3.9 *Barium chloride*, solid.

A.3.10 *Standard alcoholic ammonium acetate solution*, approx. 0.2N. Dissolve 16 g of reagent grade ammonium acetate in 1 l of absolute alcohol. Standardize this solution by titrating against pure, freshly prepared calcium oxide as follows:

A.3.10.1 Ignite approximately 0.1 g of calcium carbonate or calcium oxalate in a weighed platinum crucible at 900 °C to 1000 °C, cool the contents in a desiccator, and weigh to the nearest 0.1 mg. Reignite at 900 °C to 1000 °C for further 15-minute periods, until any further change in mass does not exceed 1 mg. The weighing shall be performed quickly to prevent absorption of water and carbon dioxide. Transfer immediately the calcium oxide to a 200-ml Erlenmeyer flask containing 60 ml of neutralized glycerol-alcohol solution and approximately 0.5 g of barium chloride. Disperse the calcium oxide in the solution by shaking and attach a reflux condenser. Boil and titrate the solution while near boiling, with standard ammonium acetate solution. The titration is completed when the pink colour does not reappear in the solution during

the continuous boiling for 1 h. Calculate the calcium oxide equivalent of the ammonium acetate solution in g/ml.

#### A.4 PROCEDURE

##### A.4.1 Total calcium oxide

Weigh to the nearest milligram about 0.5 g of the material and mix with 0.5 g of ammonium chloride in a 50-ml beaker. Add 5 ml of hydrochloric acid, cover the beaker and heat over a water bath for 15 min. Transfer the gel completely to a filter paper or Gooch crucible and wash the insoluble residue thoroughly with hot water. Discard the residue. To the filtrate add 8 g to 10 g of ammonium chloride. Bring to near boiling, add a few millilitres of bromine water and make alkaline with ammonium hydroxide solution. Allow the precipitate to settle, filter and wash thoroughly with hot water. Concentrate the filtrate to about 200 ml and add a few drops of ammonium hydroxide. Boil, add 25 ml to 30 ml of hot saturated ammonium oxalate solution to the boiling solution, stir and continue the boiling until the precipitated calcium oxalate becomes granular. Heat over a water bath for about 1 h to complete precipitation. Filter and wash the precipitate with small amounts of hot water. Transfer the moist precipitate quantitatively to a 400-ml beaker using distilled water. Dissolve the precipitate remaining on the filter by washing with warm dilute sulphuric acid. Add 20 ml of dilute sulphuric acid to the beaker, dilute to about 300 ml with hot water, and titrate the hot solution against standard potassium permanganate solution.

##### A.4.1.1 Calculation

Total calcium oxide, per cent by mass =  $\frac{0.02804 \times v \times N \times 100}{m}$

where,

v = volume, in ml, of potassium permanganate solution;

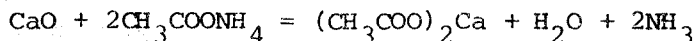
N = normality of potassium permanganate solution; and

m = mass, in g, of sample taken.

##### A.4.2 Free lime (as uncombined CaO)

##### A.4.2.1 Principle

The determination is based on the solution of the uncombined lime in a hot solution of glycerol and alcohol and the subsequent titration of the dissolved lime with an alcoholic solution of ammonium acetate in accordance with the following reaction.



**A.4.2.2** Weigh to the nearest milligram about 0.5 g of the material and transfer to a 200-ml Erlenmeyer flask containing 100 ml of glycerol-alcohol solution. Add 0.5 g of barium chloride to the flask. Attach a reflux condenser and boil the mixture for 18 h. Titrate the solution against standard alcoholic ammonium acetate solution as described in A.3.10. Replace the condenser and boil again for 2 h. To confirm that the end point has been reached, a drop of indicator may be added to the liquid in the flask. No colour should appear.

#### A.4.2.3 Calculation

$$\text{Free lime, per cent by mass} = \frac{E \times v \times 100}{m}$$

where,

v = volume, in ml, of ammonium acetate solution;

m = mass, in g, of sample taken; and

E = grams of lime equivalent per ml of ammonium acetate solution.

#### A.4.3 Carbon dioxide

Weigh to the nearest milligram, about 5 g of the material and transfer to a small Erlenmeyer flask. Place this flask in a carbon dioxide train consisting of an inclined condenser, U-tubes containing calcium chloride, anhydrous cupric sulphate and calcium chloride, followed by a U-tube filled with porous soda lime, and finally a U-tube half filled with soda lime and the remaining portion with calcium chloride, in that order of succession. Pour some hot water to the material in the Erlenmeyer flask, connect the flask in the train, detach the soda lime tubes and pass a current of carbon dioxide free air through the train. Weigh and attach the soda lime tubes. Add some dilute hydrochloric acid (1:1) into the flask slowly. When any apparent reaction has ceased, heat the flask gradually to boiling and continue boiling until no further gas is evolved. Cool gradually. The current of carbon dioxide free air is continued throughout the experiment. Detach and close the soda lime tubes and let them stand in a balance case. Weigh them at 30-min intervals until two successive weighings agree within 0.5 mg. Record the gain in mass of the soda lime tubes as the mass of carbon dioxide.

##### A.4.3.1 Calculation

$$\text{Carbon dioxide, per cent by mass} = \frac{m_2 - m_1}{m} \times 100$$

where,

$m_1$  = mass, in g, of soda lime tubes before reaction;

$m_2$  = mass, in g, of soda lime tubes after reaction; and

m = mass, in g, of sample taken.

## A.5 CALCULATION

The percentage of portland cement in the paint is obtained by adding the amount of calcium oxide combined with carbon dioxide (A.4.3) to free lime (A.4.2), subtracting this from the total calcium oxide (A.4.1) and multiplying the difference by 1.56 (see Note).

*NOTE - The factor 1.56 is based on the assumption that portland cement contains on an average 64 per cent by mass of calcium oxide.*

## APPENDIX B

### DETECTION OF ORGANIC BINDERS

#### B.1 APPARATUS

B.1.1 *Evaporating dish*

B.1.2 *Burnished steel panel, conforming to SLS 535:Part 3:Section 3.2.*

#### B.2 PROCEDURE

B.2.1 Mix 25 ml of sample with 25 ml of water and allow to stand for 30 minutes. Stir and brush on a clean steel panel. Allow to dry for 1 h. If the material bonds to the impervious surface, organic binder is present.

B.2.2 The material shall be deemed to have passed the test, if the paint film does not bond to the impervious surface of the panel.

## APPENDIX C

### PREPARATION OF COATED PANELS

#### C.1 PREPARATION OF PANELS

C.1.1 Panels of flat asbestos cement complying with CS 9, of dimensions 150 mm x 100 mm x 6.5 mm shall be used.

C.1.2 Immerse the panels in water for 24 h, then remove them from the water and wipe off excess water with a clean, dry cloth.

#### C.2 PREPARATION OF PAINT FOR TESTING

Mix the paint according to the manufacturer's instructions (see also Note 4.2) if a range of proportions of paint to water is given, use mean proportions. Allow the mixture to stand for 15 minutes and then remix it before using.

### C.3 PREPARATION OF COATED TEST PANELS

C.3.1 Coat the rough textured side of the asbestos-cement panels with paint by brushing with a stiff fibre brush to give a spreading rate of  $5 \pm 1 \text{ m}^2/\text{kg}$  dry film mass. Immediately after coating, place each of the test panels in a well ventilated room free from air draughts and dust. Allow the coated test panel to dry.

C.3.2 Apply two coats with a minimum interval of 24 h in between coats, keeping the panel wet during the paint application.

## APPENDIX D

### DETERMINATION OF DRYING TIME (HARD DRY)

#### D.1 APPARATUS

D.1.1 *Hard-drying time apparatus*, complying with SLS 535:Part 3:Section 3.5.

#### D.2 PROCEDURE

Test one of the coated test panels prepared as in C.3.1, by the method prescribed in SLS 535:Part 3:Section 3.5.

## APPENDIX E

### DETERMINATION OF COLOUR

#### E.1 PRINCIPLE

The colour of the material applied on a flat asbestos cement panel (see C.1) is compared visually in diffused daylight, with that of the standard or agreed colour card provided by the manufacturer.

#### E.2 PROCEDURE

E.2.1 Apply two coats of the mixed paint on asbestos cement panel as prescribed in Appendix C. After applying the second coat, allow to air dry for 24 h. Compare the colour of the coated test panel with that of the standard or previously agreed colour visually in diffused daylight.

E.2.2 The material shall be deemed to have passed the test if the colour of the material matches the standard or previously agreed colour. The material shall also be uniform in colour and free from streaks, spots or mottling.

## APPENDIX F

## COLOUR FASTNESS AND RESISTANCE TO CHALKING

## F.1 APPARATUS

F.1.1 *Hard-drying time apparatus*, complying with SLS 535:Part 3:Section 3.5.

F.1.2 *Velvet cloth*, black or white velvet (for dark colours) shall be used in place of the twill cloth used in SLS 535:Part 3:Section 3.5. Use a new piece of velvet for each test.

F.1.3 *Artificial weathering apparatus*, of the carbon arc type as specified in BS 3900, Part F.3.

## F.2 PROCEDURE

F.2.1 Using the method prescribed in SLS 535:Part 3:Section 3.5, but with a piece of velvet on the plunger, test the middle of one of the coated test panels prepared as in Appendix C. Examine the velvet for signs of chalking. There shall be no chalking, i.e. no marking of the velvet.

F.2.2 Expose the second panel in the artificial weathering apparatus for a total of 1000 h. Remove the panel and allow it to stand for 24 h. Examine the paint coat for change of colour and thereafter, test the panel as in F.2.1 for chalking. Again there shall be no chalking.

## APPENDIX G

## DETERMINATION OF ACID SOLUBLE RESIDUE ON SIEVE

## G.1 APPARATUS

G.1.1 *Test sieves*, of nominal aperture 150  $\mu\text{m}$  and 300  $\mu\text{m}$ , conforming to CS 124.

G.1.2 *Soft brush*

## G.2 REAGENT

G.2.1 *Hydrochloric acid*, 0.1 N solution.

### G.3 PROCEDURE

G.3.1 Weigh to the nearest 0.05 g about 20 g of the material into a beaker and add sufficient water to make a thin uniform suspension. Then transfer to the sieve by washing with water. Wash the residue remaining on the sieve with water (not under pressure) and gently brush with a soft brush until the washings are clear. Allow the sieve to drain, dry in an oven for 1 h at  $105 \pm 2$  °C, cool and weigh.

G.3.2 Brush the residue into the beaker previously used and add 20 ml of hydrochloric acid. Warm the solution with stirring for about 10 min. Allow to settle and wash the residue with water until free from acid. Transfer the residue to the sieve using water and allow the sieve to drain. Dry in an oven for 1 h at  $105 \pm 2$  °C, cool and weigh.

### G.4 CALCULATION

Acid soluble residue on sieve, per cent, by mass =  $\frac{100 (m_1 - m_2)}{m}$

where,

$m$  = mass, in g, of sample taken;

$m_1$  = mass, in g, of sieve and first residue; and

$m_2$  = mass in g, of sieve and second residue.

## APPENDIX H

### DETERMINATION OF WATER REPELLANCY

#### H.1 PRINCIPLE

The painted film is subjected to a spray of water for 15 minutes and the amount of water absorbed is determined.

#### H.2 PROCEDURE

H.2.1 Prepare a flat asbestos cement panel of size 450 mm x 350 mm as prescribed in C.1. Condition it for 48 h at room temperature. Apply two coats of the mixed paint and allow to air dry for 24 h (see C.3). Keep the panels inclined at an angle of  $30^\circ$  to  $45^\circ$  and subject the central area of the panel to a fine spray of water (see Note) for 15 minutes, with the spray held 600 mm away and 600 mm above the panel. At the end of the stipulated period, remove the panel. Carefully drain away all the surface water and determine its mass.

NOTE - A suitable spray is provided by a water supply at a pressure of 13.8 kPa.



H.2.2 The material shall be taken to have passed the test if the water absorbed by the asbestos panel is not more than 200 g/m<sup>2</sup>.

#### APPENDIX J

##### DETERMINATION OF POT LIFE OF MIXED PAINT

###### J.1 PROCEDURE

J.1.1 Prepare a mix of the material as prescribed in C.2 and allow it to stand for one hour. At the end of this period, examine the mix for any settling.

J.1.2 The material shall be deemed to have passed the test if the degree of settling of the mix is not such as to affect the easy application of the material.

#### APPENDIX K

##### DETERMINATION OF KEEPING PROPERTIES

###### K.1 PROCEDURE

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

K.1.2 The material shall retain the properties as prescribed in this specification for the specified period after the date of manufacture.

K.1.3 The material shall also be free from any extraneous matter such as fungal growth, bacterial degradative products.

#### APPENDIX L

##### RECOMMENDATIONS FOR USE OF CEMENT PAINTS

###### L.1 PREPARATION OF SURFACE

The surface should be porous and should absorb water freely. It should be free from loose matter, dirt, dust, oil or grease, or cement paint which shows chalking, which would interfere with the adhesion of the paint to the surface.

###### L.2 MIXING

The manufacturer's directions should be followed exactly. The water mixed paint should be applied within one hour of preparation.

### L.3 APPLICATION

The surfaces to be painted should be wetted with water before application, but there should not be liquid water on the surface when the paint is applied. It is recommended that the first coat should be thoroughly brushed or scrubbed into the surface, preferably with a stiff fibre brush. A second coat is usually necessary for best appearance and should be applied not less than 24 h, later, rewetting the surface if necessary. The second coat may be applied by brush, spray or roller.

### L.4 CURING

To obtain optimum properties the cement paint must remain wet during the curing period. The wetting of the substrate before painting is normally sufficient to ensure this. In exceptional drying conditions however, it may be necessary to apply a fine mist of clean water from time to time during the first 24 h after application.

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*Further particulars of the terms and conditions of the permit may be obtained from the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.*



## **SRI LANKA STANDARDS INSTITUTION**

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

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