इंटरनेट मानक

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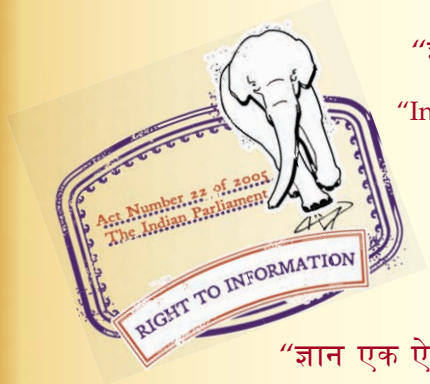
Mazdoor Kisan Shakti Sangathan
"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 15489 (2004): Paint, Plastic emulsion [CHD 20: Paints, Varnishes and Related Products]



"ज्ञान से एक नये भारत का निर्माण"
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"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS 15489 : 2004
[Superseding IS 5411 (Part 1) : 1974
and IS 5411 (Part 2) : 1972]

भारतीय मानक

पेन्ट, प्लास्टिक इमल्शन — विशिष्टि

Indian Standard

PAINT, PLASTIC EMULSION — SPECIFICATION

ICS 87.040

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 2004

Price Group 5

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Paints, Varnishes and Related Products Sectional Committee had been approved by the Chemical Division Council.

The use of the plastic emulsion paints has been on the increase over the last few years. These paints have gained popularity because of their ease of application, quick drying properties, non-objectionable odour and good washability. In view of the growing demand for this material, this standard was formulated to enable manufacturers to maintain the quality and assist the consumers in selecting material of an acceptable performance.

This standard was earlier published in two parts as IS 5411 (Part 1) : 1974 'Plastic emulsion paint: Part 1 For interior use' and IS 5411 (Part 2) : 1972 'Plastic emulsion paint: Part 2 For exterior use'. However, while revising this standard, the Committee felt that it would be more convenient for users to have a single standard, incorporating two types of plastic emulsion paints. This standard supersedes IS 5411 (Part 1) : 1974 and IS 5411 (Part 2) : 1972.

This standard also takes care to incorporate different types of finishes to bring it at par with present day practices. Accordingly, requirement of drying time, for both surface and hard dry, has been changed with regard to the type of finishes. Other optional requirements like spreading capacity, hiding power and spreading time have been deleted; while gloss value, at 60° for various classes has been included.

This standard also includes a scheme for labelling environment friendly product known as ECO-Mark introduced at the instance of Ministry of Environment and Forests (MEF). The ECO-Mark shall be administered by the Bureau of Indian Standards (BIS) under the *BIS Act,* 1986 as per the Resolution No. 71 dated 20th February, 1991 published in Gazette of Government of India. For a product to be eligible for ECO-Mark it shall carry standard mark of BIS for quality besides meeting additional optional environment friendly (EF) requirements.

The Committee responsible for formulation of this standard is given in Annex J.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

PAINT, PLASTIC EMULSION — SPECIFICATION

1 SCOPE

This standard prescribes the requirements and methods of sampling and test for plastic emulsion paint used for interior and exterior protection and decoration of building surfaces after surface preparation and priming.

2 REFERENCES

The standards listed in Annex A contain provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

3 TERMINOLOGY

3.1 For the purpose of this standard the definitions given in IS 1303 and the following shall appply.

3.1.1 *Volatile Organic Compounds (VOC)* — The volatile matter content minus the water content in plastic emulsion paint.

3.1.2 *Matt Finish* — having gloss values from 0 to 10, when viewed at 60°.

3.1.3 *Egg Shell/Satin Finish* — having gloss values from 11 to 25, when viewed at 60°.

3.1.4 *Semi-glossy Finish* — having gloss values from 26 to 70, when viewed at 60°.

3.1.5 *Glossy Finish* — having gloss values 71 and above, when viewed at 60°.

4 TYPES

Plastic emulsion paint shall be of two types:

a) *Type* 1 For interior use, and
b) *Type* 2 For exterior use.

5 CLASS

There shall be following four classes of products:

a) Matt finish,
b) Egg shell/satin finish,
c) Semi-glossy finish, and
d) Glossy finish.

6 REQUIREMENTS

6.1 Composition

The material shall consists of pigments and if required suitable extenders in appropriate proportion in a medium consisting of any stable synthetic polymer emulsion in water with other suitable ingredients as may be necessary to produce a material so as to satisfy the requirements of this standard.

6.2 Conditions in the Container

The material shall be free from odour of putrefaction. It shall be free from lumps, skins and the conditions of the material shall be such that settling, if any, may be easily incorporated on stirring.

6.3 Thinning

When suitably thinned with water, the material shall mix readily with minimum amount of foaming to a smooth and homogeneous state. The foaming, if any, shall dissipate rapidly.

6.4 Application Properties

The material after recommended thinning shall be suitable for application by brush, spray or roller. The resulting film shall not show pigment flocculation, coarseness or other undesirable characteristics.

6.5 Recoating Properties

When three successive coats of the material, after suitable thinning with water, are applied on a dry asbestos cement sheet (*see* IS 2096) at an interval of 4 h for classes A and B material and 8 h for classes C and D material between coats, there shall be no lifting of the underlying coats. The paint shall not exhibit colour separation, sagging, pitting, flaking or cracking.

6.6 Consistency

Insert a clean metal rod or palette knife into the original container and examine the nature of settling. The material shall not cake hard inside the container and shall be in such a condition that stirring easily produces a smooth uniform paint suitable for application by appropriate method after recommended thinning.

6.7 Mass in kg/10 l

The mass in kg/10 l of the material, when tested as prescribed in IS 101 (Part 1/Sec 7), shall not differ by more than ±3 percent from that of the approved sample.

6.8 Opacity

The material, when tested as detailed in Annex B shall pass the test.

6.9 Durability

6.9.1 *Registered Sample*

6.9.1.1 General break down of the film, prepared from the registered sample of the material shall not occur in less than 12 months, when prepared and tested as prescribed in Annex C.

6.9.1.2 A film of the registered sample shall be prepared and maintained in an accelerated weathering apparatus (*see* **C-3**) for a period of 21 days; performance of the sample shall be recorded every third day.

NOTE — As a precaution against inadvertent accidents, it is recommended that the outdoor exposure test (*see* **C-2**) and the accelerated weathering test (*see* **C-3**) may be carried out in duplicate.

6.9.2 *Sample from Bulk Supply*

A film of the material prepared from a representative sample from bulk as described in **C-3** and tested in the accelerated weathering apparatus (*see* **C-3**) shall be not materially different in performance as compared with the record of the film of the registered sample, when examined every third day for a period of 21 days.

6.10 Keeping Properties

The material shall conform to all the requirements as mentioned in **6.2** to **6.9** and **6.11** (including requirements given in Table 1), when tested after one year from the date of manufacturing. The material shall be stored in original sealed container under normal atmospheric condition.

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

6.12 Additional Optional Requirements for ECO-Mark

6.12.1 *General Requirements*

6.12.1.1 The product shall confirm to the requirements for quality and performance prescribed under **6.1** to **6.11**.

Table 1 Requirements for Plastic Emulsion Paint
(*Clause* 6.11)

Sl No.	Characteristic	Requirement	Method of Test, Ref to	
			Annex	Parts of IS 101
(1)	(2)	(3)	(4)	(5)
i)	Drying time, *Max*		D-1.1 D-1.2	—
	a) Surface dry Class A and B Class C and D	 45 min 90 min		
	b) Hard dry Class A and B Class C and D	 4 h 8 h		
ii)	Finish	Smooth and uniform	D-1.3	—
iii)	Gloss at 60° Class A Class B Class C Class D	— 0 - 10 11 - 25 26 - 70 71 and above		(Part 4 / Sec 4) : 1988
iv)	Colour	Close match to colour specified by the purchaser	E	—
v)	Fastness to light	To pass the test (tested on white unglazed art paper)	—	(Part 4/ Sec 3) : 1988
vi)	Resistance to alkali	To pass the test	F	—
vii)	Washability and cleanability	To pass the test	G	—
viii)	Temperature stability	To pass the test	H	—

6.12.1.2 The manufacturer shall produce to BIS Environmental consent clearance from the concerned state pollution control board as per the *provisions of water (Prevention and Control of Pollution) Act,* 1974 and *Air (Prevention and Control of Pollution) Act,* 1981 along with the authorization, if required under the *Environment (Protection) Act,* 1986 and *Rules* made thereunder, while applying for ECO-Mark.

6.12.2 *Specific Requirements*

6.12.2.1 The product shall contain not more than 5 percent, by mass, volatile organic compounds, when tested according to the method prescribed in IS 101 (Part 2 /Sec 1) and IS 101 (Part 2 / Sec 2).

6.12.2.2 The product shall not contain more than 0.1 percent by mass (as metal), of any toxic metals such as lead, cadmium, chromium (VI) and their compounds when tested by the relevant Atomic Absorption Spectrophotometric methods.

6.12.2.3 The product shall not be manufactured from any carcinogenic ingredients.

NOTE — The Central Drugs Research Institute and Industrial Toxicological Research Centre would furnish a list of carcinogenic ingredients to BIS and would also keep BIS informed about the changes therein.

7 PACKING AND MARKING

7.1 Packing

Unless specified otherwise, the material shall be packed in suitable metal or plastic containers.

7.1.1 The ECO-Mark product shall be packed in such packages which shall be recyclable/reusable or biodegradable. It shall be accompanied with instructions for proper use so as to maximize product performance and minimize wastage.

NOTE — Subsequently the parameters evolved for packaging material/packages for ECO-Mark which are being separately notified/circulated, shall also apply.

7.2 Marking

Each container shall be marked with the following:

a) Name of the material,
b) Name of the manufacturer,
c) Volume of the material,
d) Batch No. or lot No. in code or otherwise, and
e) Month and year of manufacture.

7.3 BIS Certification Marking

The containers may also be marked with the Standard Mark and ECO-Mark.

7.3.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act,* 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

7.3.1.1 In case of products certified for ECO-Mark three major ingredients and hazardous chemicals shall be marked on the container.

7.3.1.2 The criteria for which the product has been labelled as ECO-Mark may also be marked on the container.

8 SAMPLING

Representative samples of the material shall be drawn as prescribed in IS 101 (Part 1/Sec 1).

9 TESTS

9.1 Tests shall be conducted according to the methods prescribed in various parts and sections of IS 101 and various Annex to this standard.

9.2 Quality of Reagents

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*	*IS No.*	*Title*
101	Methods of sampling and test for paints,varnishes and related products:	(Part 4/Sec 3) : 1988	Optical tests on paint films, Section 3 Light fastness test (*third revision*)
(Part 1/Sec 1) : 1986	Test on liquid paints (general and physical), Section 1 Sampling (*third revision*)	(Part 4/Sec 4) : 1988	Optical tests on paint films, Section 4 Gloss (*third revision*)
(Part 1/Sec 3) : 1986	Test on liquid paints (general and physical), Section 3 Preparation of panels (*third revision*)	109 : 1968	Ready mixed paint, brushing, priming, plaster, to Indian Standard Colour No. 361 & 631 white & off-white (*first revision*)
(Part 1/Sec 7) : 1987	Test on liquid paints (general and physical), Section 7 Mass per 10 litres (*third revision*)	285 : 1992	Laundry soaps (*third revision*)
(Part 2/Sec 1) : 1988	Test on liquid paints (chemical examination), Section 1 Water content (*third revision*)	1070 : 1992	Reagent grade water (*third revision*)
(Part 2/Sec 2) : 1986	Test on liquid paints (chemical examination), Section 2 Volatile matter (*third revision*)	1303 : 1983	Glossary of terms relating to paints (*second revision*)
		1407 : 1980	Round paint tins (*second revision*)
		2096 : 1992	Specification for Asbestos cement flat sheets (*first revision*)
		3574 (Part 2) : 2000	Organic pigments for paints: Part 2 Phthalocyanines (*first revision*)

ANNEX B

(*Clause* 6.8)

DETERMINATION OF OPACITY

B-1 PROCEDURE

Apply one coat of a primer paint conforming to IS 109 of off-white/grey shade on an asbestos element panel of size 100 mm × 150 mm and air dry. Again, apply two coats of paint (to be tested) on the panel and match with the specified colour after hard drying.

ANNEX C

(*Clauses* 6.9.1.1, 6.9.1.2 *and* 6.9.2)

DURABILITY

C-0 GENERAL

C-0.1 Outline of the Method

An asbestos cement panel is evenly coated with three coats of the material by the appropriate method and air-dried for a specified period and exposed to outdoor weathering for period of not less than 12 months at 45° angle facing south.

C-1 MATERIAL

C-1.1 Asbestos Cement Panels — of 300 mm × 100 mm size (*see* IS 2096).

C-2 PROCEDURE

C-2.1 Select approximately 300 mm × 100 mm asbestos cement panels with *p*H not more than 10 (preferably between 8 to 10) and brush one coat of the paint suitably thinned (*see* **6.4**). Air-dry for 8 h and apply a second coat of the paint and again air-dry for over night and apply a third coat of the material. Air-dry for 8 h and then expose the panels at 45° to the horizon. The test should be done in duplicate to safeguard against any inadvertent accidents. The exposure to commence between third week of January and first week of April. These tests shall be carried out at National Test House, Kolkata.

C-2.2 Examine the conditions of the exposed films at an interval of 6 months for the following characteristics:

a) Colour,
b) Flaking,
c) Cracking, and
d) Chalking.

C-2.3 For the above examination, wash the right-hand half of the surface of test panels by pouring water and then wiping with soft cloth. Examine the same half of the test panels at each examination. At the end of the stipulated period for durability test, examine the two halves of the test panels for the above characteristics. The sample shall be considered satisfactory if the condition of the film in both the halves, the one washed periodically as well as the one washed only for the final examination, is satisfactory by the method of evaluation described in **C-2.4**. Stray film failure due to extraneous causes other than climatic shall be ignored.

C-2.4 Method of Rating

The film of the unexposed panel shall be rated with the following basic values for the respective characteristics:

a) Possessing correct colour	:	25
b) Freedom from flaking (loss of adhesion and hence lifting)	:	25
c) Freedom from cracking	:	25
d) Freedom from chalking	:	25
		100

NOTE — The initial rating of the film may be 100 or less according to the condition of colour, the rating for freedom from flaking, cracking and chalking being always the maximum in the case of unexposed films.

C-2.5 Evaluation of Exposed Films

In recording the condition of exposed films at each examination, express the observed relative values of different characteristics in percentages of the basic value allotted to each characteristic under **C-2.4**. The allotment of performance value should be multiples of 10. For arriving at an assessment multiply the basic value for each characteristic (*see* **C-2.6**) by the percentage awarded for the performance in the test and divide the product so obtained by 100 to obtain the percentage award of the observed value of each characteristic. Take the sum total of these resulting values as the overall assessment.

C-2.6 The following table is intended to serve as a guide for the assessment of emulsion paint film after exposure:

Sl No.	*Characteristic*	*Basic Value*	*Performance Value*	*Assessment Value*
(1)	(2)	(3)	(4)	(5)
i)	Possessing correct colour	25	70	17.50
ii)	Freedom from flaking (loss of adhesion and hence lifting)	25	70	17.50
iii)	Freedom from cracking	25	60	15.00
iv)	Freedom from chalking	25	10	2.50
				52.50

C-2.7 Result of Exposure

Reckon the period for general breakdown of the exposed film from the date of commencement of exposure to the time when the overall assessment falls below 50 percent or when the performance value of any one characteristic falls below 25 percent of the basic value adopted for that characteristic. In the example given above although the overall assessment is 52.50 percent, yet the film is to be regarded as having generally broken down because the performance value of chalking has fallen below 25 percent of its basic value.

C-3 ACCELERATED WEATHERING TEST

C-3.1 Accelerated Weathering Apparatus

An artificial weathering apparatus of the carbon arc type or UV condensation type for uniform and controlled exposure to the effects of heat, light and water.

C-3.2 Samples for registration shall be tested in duplicate in a suitable accelerated weathering apparatus (*see* **C-3.1**) and samples drawn from bulk supply shall be tested in a similar manner. The test panels shall be prepared as discribed under **C-2.1**. The requirements of this test shall be taken to have been satisfied if the performance in respect of all the characteristics is similar to the recorded results of the film of the registered sample.

ANNEX D

[*Table* 1, *Sl No.* (i) *and* (ii)]

DETERMINATION OF DRYING TIME AND FINISH

D-0 GENERAL

D-0.1 Outline of the Method

An asbestos cement panel is evenly coated with the material by appropriate method and air-dried for a specified time. Another coat is applied at the end of the specified time. The panel is examined for drying time and finish.

D-1 PROCEDURE

D-1.1 Apply by appropriate method one coat of the material to give a wet film of approximate thickness of 50 micron on a 100 mm × 150 mm asbestos cement panel (*see* IS 2096) and air-dry as specified in Table 1, Sl No. (i) in a well ventilated room in a horizontal position. During drying protect the film from direct sunlight.

D-1.2 The material shall be deemed to have complied with the requirements of this standard for drying, if a second coat of the material can be applied satisfactorily at the end of specified hours and the film becomes surface dry and hard dry within the specified time.

D-1.3 Examine the panel after applying the second coat as in **D-1.1**. The material shall be deemed to have complied with the requirement of this standard for finish, if the composite film gives a smooth and uniform finish.

ANNEX E

[*Table* 1, *Sl No.* (iv)]

DETERMINATION OF COLOUR

E-0 GENERAL

E- 0.1 Outline of the Method

The colour of the material applied on a white unglazed art paper is compared visually in diffused daylight with that of the standard or agreed colour.

E -1 PROCEDURE

E-1.1 Apply the paint to give a wet film thickness of approximately 50 microns by appropriate method evenly on a 150 mm × 150 mm white unglazed art paper. Air-dry the film as prescribed in Annex B. When the film is dry, apply a second coat of the material to give again a wet film thickness of approximately 50 microns and air-dry. After 24 h compare the colour of the film with that of a standard or previously agreed colour visually in diffused daylight.

E-1.2 The material shall be deemed to have passed the test, if the colour of the material matches with the standard or previously agreed colour.

ANNEX F

[*Table* 1, *Sl No.* (vi)]

DETERMINATION OF RESISTANCE TO ALKALI

F-0 GENERAL

F-0.1 Outline of the Method

The material is applied to asbestos cement panel and the bleaching effect is examined. In order to give a basis for comparison, one-half of the panel is sealed with alkali-resistant solvent based primer. The method is also known as lime burning test.

F-1 MATERIAL

F-1.1 Asbestos Cement Panels, of 150 mm × 100 mm size and having a *p*H of not less than 10 (*see* IS 2096).

F-1.2 Phthalocyanine Blue Pigment Paste — Prepared using phthalocyanine pigment [*see* IS 3574 (Part 2)].

F-2 PROCEDURE

F-2.1 Select a 150 mm × 100 mm asbestos cement panel having *p*H of not less than 10 and take an alkali-resistant solvent-based primer (*see* IS 109). Condition both of them at 27 ± 2°C for 1 h and seal one half of the panel by brushing the primer. Dry the panel for the period stipulated in IS 109. Apply the material with a 300μ block spreader to the entire panel

and before application, condition the sample and the sealed panel at a temperature of 27 ± 2°C for 1 h. Leave the coating dry. Put the panel over a nylon sponge placed in tray containing water. Make sure that sponge is completely wet and it wets the panel. Remove the panel after 48 h and leave it until dry. If the plastic emulsion paint under test is not coloured, it shall be tinted to a light blue shade using suitable phthalocyanine pigment paste, before application. Leave the coating until dry and when dry examine the panel for difference in colour between the sealed and the unsealed halves.

F-2.1.1 The material shall be deemed to have passed the test, if the colour difference between the unsealed and the sealed halves is not appreciable when examined visually.

ANNEX G

[Table 1, Sl No. (vii)]

DETERMINATION OF WASHABILITY AND CLEANABILITY

G-0 GENERAL

G-0.1 Outline of the Method

The painted panels are subjected to wet rubbing in the abrasion test apparatus at a specified speed and load of the brush. The panels are examined at the end of the stipulated oscillations for film defects.

G-1 APPARATUS

G-1-1 Wet Abrasion Tester — As shown in Fig. 1 and having the following accessories:

a) *Washing Unit* — of such a construction as to hold the brush in a box or holder which moves backwards and forwards in a straight line

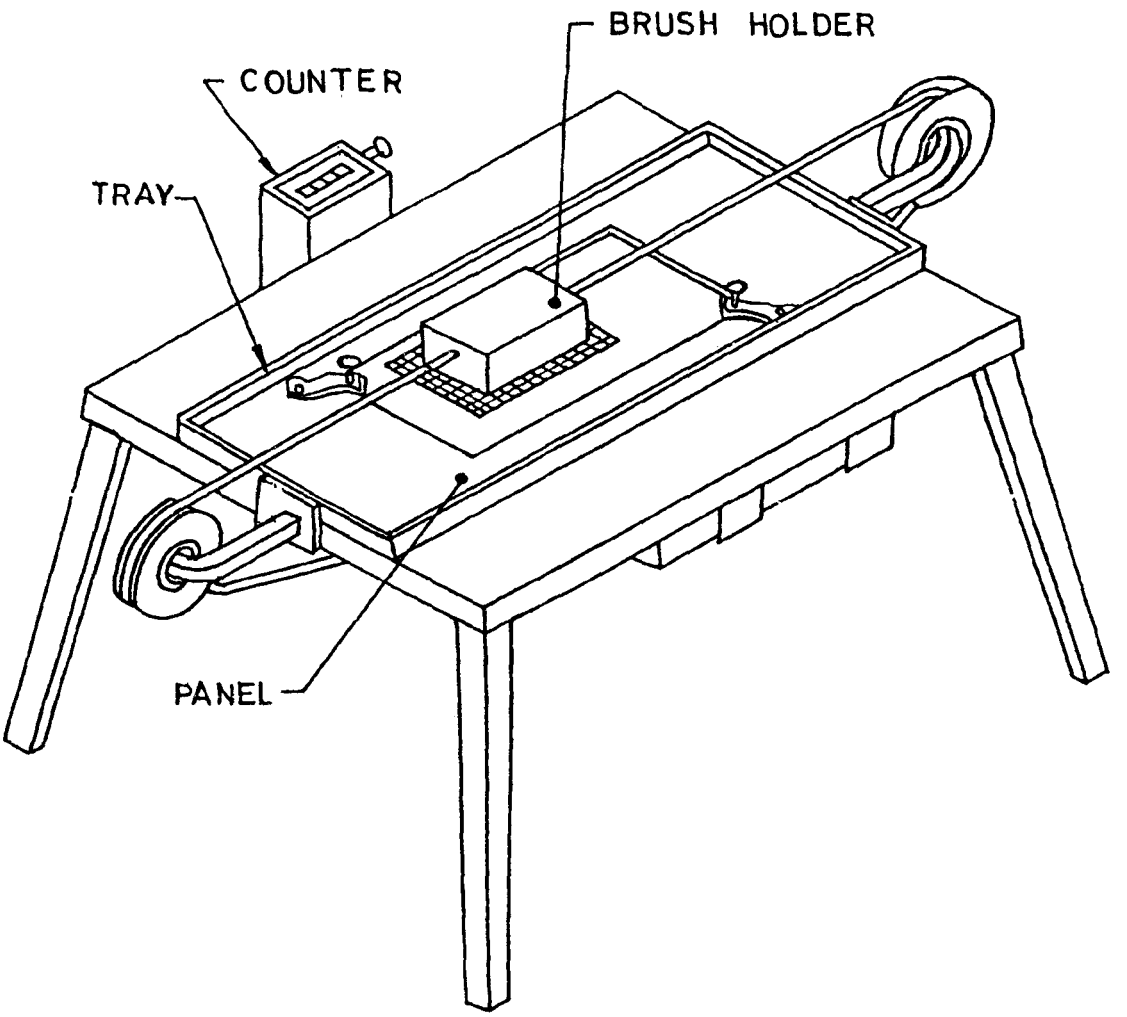

FIG. 1 WET ABRASION TESTER

across the test panels at the rate of 38 ± 2 strokes per minute.

b) *Trays* — water-tight to hold the panels.

c) *Brush* — of polyurethane foam of density approximately 25 kg/m^3, with arrangements for weighing the brush with specified loads; and of size 85 mm × 36 mm × 12 mm.

d) *Fractional Horse Power Motor* — of suitable speed to regulate the oscillations of the brush.

G-2 REAGENTS

G-2.1 Soap Solution — Dissolve 0.5 g of soap (conforming to Type I of IS 285) (previously dried at 105 ± 2°C for 30 min), in distilled water to give 0.5 percent (*m/v*) solution.

G-3 PROCEDURE

G-3.1 Preparation of the Panel

Clean a ground glass panel, 475 mm × 170 mm × 4 mm in size as prescribed in IS 101 (Part 1/Sec 3). Apply a coat of the undercoating enamel using a film applicator to give a wet film thickness of 35 to 38μ and stove at 120°C for 30 min. Rub down with No. 280 emery paper and wipe until the gloss is removed completely. Apply a coat of the material by brushing over the dried undercoat to give a wet film thickness of 150μ. Allow this to air-dry for 168 h.

G-3.2 Dip the brush in distilled water at 25 to 30°C for 30 min to a depth of 12 mm. Shake off excess water and soak in the soap solution for 5 min. Fix the painted test panel in the tray in position with painted surface upwards. Fix the brush in its holder having a total load of 0.5 kg and adjust the stroke in such a way that not less than 10 mm of the film is left free on both ends. Start the oscillations of the brush. Keep the panel wet by adding soap solution at the rate of 10 to 12 drops per minute in the path of the brush. At the end of 4 000 oscillations, remove the panel. Wash with water, allow to dry, and examine the film for any defects.

G-3.3 The material shall be deemed to have passed the test if the material does not show film defects like blistering, exposure of undercoat, *e* and *d* colour fading.

ANNEX H

[*Table* 1, *Sl No.* (viii)]

TEMPERATURE STABILITY TEST

H-0 GENERAL

H-0.1 Outline of the Method

The material is subjected to extremes of temperature and then tested for thinning and application properties.

H-1 PROCEDURE

H-1.1 Fill two clean, dry 500 ml metal containers (conforming to IS 1407) with the material leaving the usual ullage and seal tightly. Keep one of the containers at – 5 ± 1°C and the other at 60 ± 2°C for 48 h. Keep these two containers at room temperature for 24 h thereafter. Subsequently examine the material in the two containers.

H-1.2 The material shall be deemed to have passed this test, if it is free from lumps, skins, settling and is capable of thinning suitably for application by appropriate method.

ANNEX J

(Foreword)

COMMITTEE COMPOSITION

Paints, Varnishes and Related Products Sectional Committee, CHD 20

Organization	*Representative (s)*
In personal capacity (14, *Orion, Oomer Park, Bhulabhai Desai Road, Mumbai 400 026)*	SHRI RAVI MARPHATIA (***Chairman***)
Addisons Paint & Chemicals Ltd, Chennai	SHRI R. SRINIVASAN
Asian Paints (India) Ltd, Mumbai	SHRI A. B. MENON DR B. P. MALIK (*Alternate*)
Bajaj Auto Limited, Pune	REPRESENTATIVE
Berger Paints India Ltd, Howrah	SHRI K. NIRMAL KUMAR SHRI N. K. RAY (*Alternate*)
Bharat Heavy Electricals Ltd, Tiruchirapalli	SHRI M. SOMU
Central Building Research Institute, Roorkee	DR L. K. AGGARWAL DR K. K. ASTHANA (*Alternate*)
Central Public Works Deptt, New Delhi	REPRESENTATIVE
Colour-Chem Limited, Thane	SHRI R. R. VAIDYA
Consumer Unity & Trust Society (CUTS), Jaipur	SHRI SANDEEP SINGH
Continental Coatings Pvt Ltd, Chennai	SHRI M. B. SATYANARAYANA
Directorate General of Supplies & Disposal, New Delhi	REPRESENTATIVE
Export Inspection Council of India, New Delhi	REPRESENTATIVE
Goodlass Nerolac Paints Ltd, Mumbai	SHRI S. V. PORWAL,
Hindustan Shipyard Ltd, Visakhapatnam	SHRI P. V. RAMANA MURTHY SHRI A. P.CH. N. PRASAD (*Alternate*)
ICI (India) Ltd, Kolkata	REPRESENTATIVE
Indian Institute of Chem Technology, Hyderabad	DR K. V. S. N. RAJU
Indian Paints Association, Kolkata	DR M. B. GUHA SHRI V. M. NATU (*Alternate*)
Indian Petrochemicals Corporation Ltd, Vadodra	REPRESENTATIVE
Indian Small Scale Paint Association, Mumbai	REPRESENTATIVE
Jenson & Nicholson (India) Ltd, West Bengal	REPRESENTATIVE
Maruti Udyog Ltd, Gurgaon	SHRI T. K. BANERJEE
Ministry of Defence (DGQA), Kanpur	SHRI M.S. SULTANIA SHRI L.S. MISHRA (*Alternate*)
Ministry of Environment & Forest, New Delhi	REPRESENTATIVE
Ministry of Industry, New Delhi	SHRI P. K. JAIN SHRI N. C. TIWARI (*Alternate*)
Mumbai Paints Limited, Mumbai	REPRESENTATIVE
National Organic Chemical Industries Ltd, Mumbai	DR B. V. BAPAT
National Test House (ER), Kolkata	DR B. B. PAL DR SUNIL KUMAR SAHA (*Alternate*)
Office of the Devlopment Comissioner(SSI), New Delhi	SHRI Y. S. BHATNAGAR SHRI A. K. JAIN (*Alternate*)
Office of the SA to CNS, New Delhi	SHRI R. K. SEHGAL
Oil and Natural Gas Corporation Ltd, New Delhi	REPRESENTATIVE
Oil Technologists Association of India, Kanpur	REPRESENTATIVE
Punjab Paint Colour and Varnish Works, Kanpur	SHRI G. N. TIWARI
Research Designs & Standards Organization, Lucknow	REPRESENTATIVE
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