

IS 14947 : 2001

भारतीय मानक

तेल प्रतिरोधक वायु शुष्कन, संश्लिष्ट ऐनामल —
विशिष्टि

Indian Standard

ENAMEL SYNTHETIC, OIL RESISTANT, AIR
DRYING — SPECIFICATION

ICS 87.040

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

June 2001

Price Group 3

FOREWORD

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

This standard prescribes the technical requirements of oil resistant, air drying, synthetic enamel suitable for painting metallic surfaces where transformer oil resistant property is required. The enamel is suitable for use on metallic surfaces without the use of any Primer.

There is no International Standard available on the subject.

The composition of committee responsible for the preparation of this standard is given in Annex B.

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***ENAMEL SYNTHETIC, OIL RESISTANT, AIR
DRYING — SPECIFICATION****1 SCOPE**

1.1 This standard prescribes requirements and methods of sampling and test for oil resistant, air drying, synthetic enamels intended for use on metallic surfaces where transformer oil resistant property is required.

1.2 The material is suitable for use without the use of any primer.

2 REFERENCES

The Indian Standards listed in Annex A contain provisions which through reference in this text, constitute provision 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.

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 1303, under 2 of IS 335, and the following shall apply.

3.2 Ambient Temperature

A temperature between 21°C and 38°C, unless otherwise specified.

4 REQUIREMENTS**4.1 Composition**

4.1.1 The binder shall consist of Oil Modified Alkyd/ Alkyd phenolic or other suitable synthetic resin in the mixture of organic solvents. The type and content of the binder shall be strictly adhered to.

4.1.2 It shall be suitably pigmented to meet the requirements of this specification and good quality extenders may be used, if necessary.

4.1.3 The material shall be supplied in brushing consistency but shall be suitable for application by brushing as well as by spraying after thinning with a suitable thinner as agreed to between the purchaser and the supplier.

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

4.3 Keeping Properties

The material shall conform to all the requirements as mentioned in 4.1 and Table 1 when stored in original

sealed containers under cover at ambient temperature and tested after a period of 12 months from the date of manufacture.

5 PACKING AND MARKING**5.1 Packing**

Unless otherwise agreed to between the purchaser and the supplier, the enamel shall be packed in metal containers conforming to IS 1407 and IS 2552.

5.2 Marking

5.2.1 Each container shall be marked with the following:

- a) Name of the material,
- b) Indication of the source of manufacture,
- c) Weight of the material,
- d) Batch No. or Lot No. in code or otherwise,
- e) Month and year of manufacture, and
- f) Expiry date.

5.2.2 BIS Certification Marking

The product may also be marked with the Standard Mark.

5.2.2.1 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 the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

6 TESTS

6.1 Unless specified otherwise, tests shall be conducted as prescribed in IS 101. Reference to the relevant sections of that standard are given in col 4 of Table 1.

6.2 The preparation of metal panels shall be according to IS 101 (Part 1/Sec 3).

6.3 Quality of Reagents

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

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

7 SAMPLING

7.1 Representative samples of the material shall be drawn according to 6 of IS 101 (Part 1/Sec 1).

Table 1 Requirements for Oil Resistant, Air Drying Synthetic Enamel

(Clause 4.2)

Sl No.	Characteristic	Requirement	Method of Test, Ref to IS 101
(1)	(2)	(3)	(4)
i)	Consistency	a) Smooth and uniform and suitable for brushing or spraying as required b) Viscosity 80 to 120 sec	Part 1/Sec 5 Part 1/Sec 5
ii)	Finish	Smooth and semi-glossy to glossy	Part 3/Sec 4
iii)	Colour	Close match to the specified IS Colour or to an agreed colour where IS colour is not specified	Part 4/Sec 2
iv)	Drying time, <i>Max</i>		Part 3/Sec 1
	a) Surface dry	3 h	
	b) Hard dry	12 h	
v)	Fineness of grind (on Hegman's gauge)	6+	Part 3/Sec 5
vi)	Gloss at 60°, <i>Min</i>	40	Part 4/Sec 4
vii)	Water content, percent by mass, <i>Max</i>	0.5	Part 2/Sec 1
viii)	Scratch hardness (7 days, 1 500 g)	No such scratch as to show the base metal	Part 5/Sec 1
ix)	Protection against corrosion under condition of condensation for 7 days continuous (resistant to humidity)	The panel shall not show any sign of deterioration and the metal surface shows no sign of corrosion	Part 6/Sec 1
x)	Flash point	Not below 30°C	Part 1/Sec 6
xi)	Mass in kgs per 10 l, <i>Min</i>	11	Part 1/Sec 7
xii)	Impact resistance	Shall pass the test	Part 5/ Sec 3
xiii)	Resistance to transformer oil (see IS 335) 90°, 48 h	The film shall not soften nor there shall be any change in the colour. The increase in acidity and sludge content shall not be more than 0.1 mg KOH/gm and 0.05 g respectively	Part 7/Sec 2
xiv)	Bend test	Shall pass the test with 6.25 mm (flap mandrel) bend test apparatus	(Part 5/Sec 2)

ANNEX A

(Clause 2.1)

LIST OF REFERRED INDIAN STANDARDS

IS No.	Title	IS No.	Title
5 : 1994	Colours for ready mixed paints and enamels (<i>fourth revision</i>)	(Part 3/Sec 4) : Tests on liquid paints (general and physical), Section 4 Finish (<i>third revision</i>)	
101	Methods of sampling and test for paints varnishes and related products:	(Part 3/Sec 5) : Tests on paint film formation	
		1987	Section 5 Fineness of grind (<i>third revision</i>)
(Part 1/Sec 1) : Tests on liquid paints (general and physical), Section 1 Sampling (<i>third revision</i>)		(Part 4/Sec 2) : Optical test on paint films,	
		1989	Section 2 Colour (<i>third revision</i>)
(Part 1/Sec 3) : Tests on liquid paints (general and physical), Section 3 Preparation of panels (<i>third revision</i>)		(Part 4/Sec 4) : Optical test on paint films,	
		1988	Section 4 Gloss (<i>third revision</i>)
(Part 1/Sec 5) : Tests on liquid paints (general and physical), Section 5 Flash point (<i>third revision</i>)		(Part 5/Sec 1) : Mechanical tests on paint films,	
		1988	Section 1 Hardness tests (<i>third revision</i>)
(Part 1/Sec 6) : Tests on liquid paints (general and physical), Section 6 Consistency (<i>third revision</i>)		(Part 5/Sec 3) : Mechanical tests on paint films,	
		1988	Section 3 Impact resistance (falling weight) (<i>third revision</i>)
(Part 1/Sec 7) : Tests on liquid paints (general and physical), Section 7 Mass per ten litres (<i>third revision</i>)		(Part 7/Sec 2) : Environmental tests on paint films,	
		1990	Section 2 Resistance to liquids (<i>third revision</i>)
(Part 2/Sec 1) : Tests on liquid paints (chemical examination), Section 1 Water content (<i>third revision</i>)		335 : 1993	New insulating oils — Specification (<i>fourth revision</i>)
(Part 3/Sec 1) : Tests on paint film formation, Section 1 Drying time (<i>third revision</i>)		1070 : 1992	Water for general laboratory use (<i>third revision</i>)
		1303 : 1983	Glossary of terms relating to paints (<i>second revision</i>)
		1407 : 1980	Round paint tins (<i>second revision</i>)
		2552 : 1989	Steel drums (galvanized and ungalvanized) (<i>second revision</i>)

ANNEX B

(Foreword)

COMMITTEE COMPOSITION

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Bharat Heavy Electricals Ltd, New Delhi

Bombay Paints Ltd, Mumbai

Development Commissioner (SSI), Government of India, New Delhi

Directorate General of Supplies and Disposal (DGS&D), Mumbai

Engineers India Ltd, New Delhi

Goodlass Nerolac Paints Ltd, Mumbai

Hindustan Shipyard Ltd, Vishakhapatnam

Indian Small Scale Paint Association, Mumbai

ICI India Ltd, Kolkata

Indian Institute of Chemical Technology, Hyderabad

Indian Paints Association, Kolkata

Indian Shipbuilders Association, New Delhi

Indian Petro Chemicals Ltd, Vadodra (Gujarat)

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(Continued on page 5

(Continued from page 4)

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

This Indian Standard has been developed from Doc : No. CHD 31 (564).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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CORPORATE PURCHASE SPECIFICATION

AA 561 32

Rev. No. 02

PAGE 1 OF 4

OIL RESISTANT, AIR DRYING, SYNTHETIC ENAMEL

1.0 GENERAL:

This specification governs the quality requirements of Oil Resistant, Air Drying, Synthetic Enamel.

2.0 APPLICATION:

The material is intended for use on internal metallic surfaces of tanks/vessels, which comes in contact with transformer/mineral oil and meets oil resistant property. The material shall be suitable for use of any (compatible) primer.

3.0 COMPLIANCE WITH NATIONAL STANDARDS:

The material shall conform to the following national standards, in general, and also meet the requirements of this specification:

IS 14947-2001: Enamel Synthetic, Oil Resistant, Air drying-Specification

4.0 COLOUR:

Crimson as per ISC 540 of IS:5 or as specified in BHEL order.

5.0 FINISH:

Smooth and semi-glossy to glossy.

6.0 FREEDOM FROM DEFECTS:

The material supplied shall be free from defects like, hard settling of pigments excessive skinning & viscosity build-up on storage during its rated shelf life.

The dried coating of the paint shall be free from visible defects like, wrinkles, orange peel, colour fading, floating of pigments pin holes, surfaces haze, hard particles etc.

7.0 CHEMICAL COMPOSITION:

The binder of synthetic enamel shall essentially consist of oil-modified alkyd phenolic, free from natural resins or its derivatives or other suitable synthetic resin in the mixture of organic solvents. The type and content of the binder as determined by infrared spectroscopy or thin layer chromatography shall be strictly adhered to the type-approved sample in bulk supply. Supplier shall furnish a copy of spectrograph of each lot along with test certificate.

Revisions :

Cl: 32.7.a) of MOM of MRC-CPO

APPROVED :

INTERPLANT MATERIAL
RATIONALISATION COMMITTEE-MRC (CPO)

Rev. No. 02

Amd.No.

Reaffirmed

Prepared
HEEP
HARDWAR

Issued
Corp. R&D

Dt. of 1st Issue
JANUARY 1980

Dt: 15.02.2004

Dt :

Year :



The enamel shall be suitably pigmented to meet the requirement of this specification and good quality extenders may be used, if necessary. The material shall be free from hazardous constituents so as to meet the legislative requirements of ISO 14001.

The enamel shall be capable to produce a coating thickness of 30 microns per coat when applied by brush or air spray. The material shall be supplied in brushing consistency but shall also be suitable for application by air spray after thinning with suitable thinner.

8.0 TEST SAMPLES:

The material in the container shall be thoroughly mixed to homogenize the contents and 500 ml of representative sample shall be drawn in clean and dried container and shall be kept in closed condition for testing purposes.

Unless specified otherwise, tests shall be conducted as prescribed in relevant part and section of IS: 101.

9.0 TECHNICAL REQUIREMENTS:

9.1 DRYING TIME:

Surface dry : 3 hrs., max.
Hard dry : 12 hrs., max.

9.2 CONSISTENCY:

- a) Smooth and uniform and suitable for brushing and spraying as required
- b) Efflux time 80-120 sec.

9.3 MASS IN KGS PER TEN LITRES: 11 min.

9.4 GLOSS AT 60° : 60, min.

9.5 IMPACT RESISTANCE (DEF 1053): Shall pass the test.

9.6 BEND TEST:

Shall pass the test with 6.25 mm, dia. round mandrel.

9.7 SCRATCH HARDNESS:

Shall pass the test when panel is air dried for 7 days and tested at a load of 1500gms.

9.8 RESISTANCE TO TRANSFORMER OIL (90°C, 48 hrs):

When tested in transformer oil conforming to AA 27101/IS:335 at 90° C for 48 hrs, the film shall not soften nor there shall be major change in the colour. The increase in acidity and sludge content shall not be more than 0.1mg KOH/gm and 0.05 gm respectively. The electrical properties of the oil should not adversely be affected.



CORPORATE PURCHASE SPECIFICATION

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9.9 RESISTANCE TO HUMIDITY (7 DAYS CONTINUOUS EXPOSURE):

The panel shall not show any sign of deterioration and the metal surface show no sign of corrosion.

9.10 RESISTANCE TO WATER:

The coating shall not show any sign of deterioration when panel is tested as per procedure given in Appendix.

9.11 WATER CONTENT(For information only):

0.5% by mass, max.

9.12 Volume Solids:

35%, min.

10.0 TEST CERTIFICATES

Unless stated, three copies of test certificates shall be supplied furnishing following information:

In addition, the supplier shall ensure to send one copy of test certificate along with the dispatch documents to facilitate quick clearance of the materials.

AA 561 32, Rev 02: Oil resistant, air drying, synthetic enamel

BHEL order No. & Date:

Suppliers Name & address:

Identification/Trade mark, if any:

Batch/Lot No.;

Date of manufacture & expiry:

Quantity :

Test results of clause 7& 9:

Special Instructions, if any:

11.0 KEEPING PROPERTY

When the material is stored in a covered dry place in original sealed container under normal temperature conditions, the same shall retain the properties prescribed in this specification for a period of at least 12 months after the date of manufacture which shall be subsequent to the date of placing the order.

12.0 PACKING AND MARKING:

Unless other wise stated, the material shall be supplied packed in air tight leak-proof metal containers conforming to IS: 1407 and IS: 2552. Each container shall bear the following information neatly written or pasted at suitable location.

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AA 561 32 : Oil Resistant, Air Drying, Synthetic Enamel
 BHEL order No. & Date:
 Name of Supplier's & address:
 Identification Trade mark , if any:
 Batch/Lot No.:
 Date of manufacture & expiry:
 Special Instruction, if any:

13.0 REFERRED STANDARDS (Latest Publications Including Amendments):

- | | | | |
|------------|-------------|-------------|-------------|
| 1) IS: 5 | 2) IS:101 | 3) IS: 335 | 4) IS:1407 |
| 5) IS:2552 | 6) IS:14947 | 7) DEF 1053 | 8) AA 27101 |

APPENDIX

TEST METHOD FOR RESISTANCE TO WATER

The enamel is coated on steel bars 12 mm diameters and length 90 mm with round ends. The surface of the bars should be cleaned from rust and the traces of previous coating if any, with the help of emery and trichloroethylene solvent. One coat of enamel is done on the bars and each layer is dried at ambient conditions for 8 hours so as to achieve a coating thickness of 30 microns, min.

The coated bars shall be dried at 110°C for 3 hours followed by cooling to room temperature before subjecting to test. At least two samples are kept in distilled water in a 250 ml. beaker kept at 60-70°C for 4 hours. This shall be followed by drying in air at room temperature for one hour. The tested bars are then examined for any deterioration or loss of adhesion of the coating. There shall not be any appreciable change in the colour of coating.