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IS 14506 (1998): Epoxy red oxide zinc phosphate weldable primer, two component [CHD 20: Paints, Varnishes and Related Products]



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*Indian Standard*

**EPOXY REDOXIDE ZINC PHOSPHATE  
WELDABLE PRIMER, TWO COMPONENT —  
SPECIFICATION**

ICS 87.040

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**BUREAU OF INDIAN STANDARDS**  
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## 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.

Epoxy based paint is required for the painting of steel structures and equipments for shore based equipment. This type of primer is used as a base coat in epoxy painting system and will have no deleterious effect on welding.

While formulating this standard, assistance has been derived from Swedish Standard SIS 18 5201, SIS 18 5202, SIS 18 5203.

The composition of Technical Committee responsible for formulation of this standard is given in Annex D.

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 specified value in this standard.

## Indian Standard

# EPOXY REDOXIDE ZINC PHOSPHATE WELDABLE PRIMER, TWO COMPONENT — SPECIFICATION

### 1 SCOPE

1.1 This standard prescribes requirements and method of sampling and test for two component epoxy redoxide zinc phosphate weldable primer.

1.2 This material is used as a base coat for the painting of steel structures/equipment where corrosion protection, chemical resistance under marine atmospheric conditions are required.

### 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

For the purpose of this standard, the definitions given in IS 1303 shall apply.

### 4 REQUIREMENTS

#### 4.1 Composition

Paints complying with this standard shall be epoxy based. The manufacturer shall specify the principal type of binder and the curing agent used in the paint. The principal anticorrosive pigment shall be zinc phosphate. The zinc phosphate content in total pigment shall not be less than 15 percent, when tested as per the method given in Annex B.

NOTE — A certificate preferably from a reputed testing agency stating that the paint will not have any deleterious effect on welding and will not pose adverse health hazards during welding shall be furnished by the manufacturer. However, validity of the certificate shall be as agreed to between the purchaser and the supplier.

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

**Table 1 Requirements for Epoxy Redoxide Zinc Phosphate Weldable Primer**  
(Clauses 4.2, 4.3 and 5.1)

Sl No.	Characteristics	Requirements	Method of Test	
			Annex of this Standard	Ref to IS 101 Standard
(1)	(2)	(3)	(4)	(5)
<b>A) WET PAINT</b>				
i)	Dual pack	To be specified by the manufacturer	—	
ii)	Mixing ratio	To be specified by the manufacturer	—	
iii)	Weight in kg per 10 litres, <i>Min</i>	12	—	(Part 1/Sec 7)
iv)	Consistency	Smooth and uniform	—	(Part 1/Sec 5)
v)	Flash point	Above 20°C	—	(Part 1/Sec 6)
vi)	Drying time, <i>Max</i>	4 h	—	(Part 3/Sec 1)
vii)	Pigment, percent by mass, <i>Min</i>	40	—	(Part 8/Sec 2)
viii)	Non-volatile matter, percent by mass	16 ± 2	—	(Part 8/Sec 2)
ix)	Volume solids, percent by mass, <i>Min</i>	35	—	(Part 8/Sec 6)
x)	Pot life, <i>Min</i>	4 h	C	—
NOTE — Tests from A (iii) to A (x) are applicable to mixed paint.				
<b>B) DRY COAT</b>				
i)	Dry film thickness, per coat	15-25 microns	—	(Part 3/Sec 2)
ii)	Colour	that of redoxide	—	(Part 4/Sec 2)
iii)	Finish	Matt	—	(Part 3/Sec 4)
iv)	Scratch hardness	To pass the test	—	(Part 5/Sec 1)
v)	Flexibility and adhesion (96 h)	do	—	(Part 5/Sec 2)
vi)	Protection against corrosion under conditions of condensation (168 h)	do	—	(Part 6/Sec 1)
vii)	Salt spray test (300 h)	do	—	(Part 6/Sec 1)

#### 4.3 Keeping Properties

The material when stored in original sealed container under ambient condition shall conform to all the requirements as mentioned in Table 1 of this standard when tested after a period of 9 months from the date of manufacture.

## 5 TESTS

**5.1** Unless specified otherwise, tests shall be conducted as indicated in col 5 of Table 1, preferably on blasted panels.

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

### 5.3 Surface Preparation

Shot blasting to Sa 2 1/2 SSPC SP10 with profile equivalent to Rugotest No. 3 N10 a-b or Keane Tator Comparator, 3.0 mils Segments or ISO Comparator Medium (G). Welding certificate may be obtained preferably from INDIAN REGISTRAR OF SHIPPING. However, validity of the certificate will be as agreed to between the purchaser and the supplier.

### 5.4 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.

## 6 PACKING AND MARKING

### 6.1 Packing

It shall ensure that the quality does not deteriorate

during storage and shall be as agreed to between purchaser and supplier.

### 6.2 Marking

**6.2.1** Each container shall be marked with the following information:

- a) Name of the material;
- b) Indication of the source of manufacture;
- c) Batch No. or Lot No. and month and year of manufacture;
- d) Date of expiry; and
- e) Mass of the material.

### 6.2.2 BIS Certification Marking

The product may also be marked with Standard Mark.

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

## 7 SAMPLING

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

## 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 2): 1988	Part 4 Optical tests on paint films, Section 2 Colour ( <i>third revision</i> )
(Part 1/Sec 1): 1986	Part 1 Test on liquid paints (general and physical), Section 1 Sampling ( <i>third revision</i> )	(Part 5/Sec 1): 1988	Part 5 Mechanical tests on paint films, Section 1 Hardness test ( <i>third revision</i> )
(Part 1/Sec 3): 1986	Part 1 Test on liquid paints (general and physical), Section 3 Preparation of panels ( <i>third revision</i> )	(Part 5/Sec 2): 1988	Part 5 Mechanical tests on paint films, Section 2 Flexibility and adhesion tests ( <i>third revision</i> )
(Part 1/Sec 5): 1986	Part 1 Test on liquid paints (general and physical), Section 5 Consistency ( <i>third revision</i> )	(Part 6/Sec 1): 1988	Part 6 Durability tests, Section 1 Resistance to humidity under conditions of condensation ( <i>third revision</i> )
(Part 1/Sec 6): 1987	Part 1 Test on liquid paints (general and physical), Section 6 Flash point ( <i>third revision</i> )	(Part 6/Sec 2): 1989	Part 6 Durability tests, Section 2 Keeping properties ( <i>third revision</i> )
(Part 1/Sec 7): 1987	Part 1 Test on liquid paints (general and physical), Section 7 Mass per 10 litres ( <i>third revision</i> )	(Part 7/Sec 3): 1990	Part 7 Environmental tests on paint films, Section 3 Resistance to heat ( <i>third revision</i> )
(Part 3/Sec 1): 1987	Part 3 Tests on paint film formation, Section 1 Drying time ( <i>third revision</i> )	(Part 8/Sec 2): 1990	Part 8 Tests for pigments and other solids, Section 2 Pigments and non volatile matter ( <i>third revision</i> )
(Part 3/Sec 2): 1989	Part 3 Tests on paint film formation, Section 2 Film thickness ( <i>third revision</i> )	(Part 8/Sec 6): 1993	Part 8 Tests for pigments and other solids, Section 6 Volume solids
(Part 3/Sec 4): 1987	Part 3 Tests on paint film formation, Section 4 Finish ( <i>third revision</i> )	1070 : 1992	Reagent grade water ( <i>third revision</i> )
		1303 : 1983	Glossary of terms relating to paints ( <i>second revision</i> )

## ANNEX B

(Clause 4.1)

## DETERMINATION OF METALLIC ZINC

## B-0 GENERAL

Metallic zinc is estimated by determining the total reducing power by dissolving it in acidulated ferric chloride solution and titrating with standard potassium permanganate solution.

## B-1 REAGENTS

## B-1.1 Standard Potassium Permanganate Solution (0.1 N)

Heat 5 g of potassium permanganate ( $\text{KMnO}_4$ ) for one hour at  $100 \pm 2^\circ\text{C}$ . Dissolve 3.16 g of potassium permanganate in water and dilute it to one litre. Allow it to stand for 7 days. Filter through a medium porosity fritted disc and standardize against sodium oxalate as follows:

Dissolve 0.25 to 0.30 g of sodium oxalate in 250 ml of hot water ( $80-90^\circ\text{C}$ ) and add 15 ml sulphuric acid

(1:1). Titrate at once with  $\text{KMnO}_4$  solution stirring the liquid vigorously and continuously. The  $\text{KMnO}_4$  shall not be added more rapidly than 10 to 15 ml/min and the last 0.5 to 1 ml shall be added dropwise with particular care to allow each drop to be fully decolourised before the next is introduced. The solution shall not be below  $60^\circ\text{C}$  by the time the end point has been reached. Keep the  $\text{KMnO}_4$  solution in a brown glass-stoppered glass bottle and store in a dark place.

## B-1.2 Ferric Chloride Solution

Prepare a solution containing 20 g of ferric chloride ( $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$ ) and 20 ml of 20 percent sodium acetate solution. It is advisable to make up one day's requirement at a time.

NOTE — 50 ml are required for each determination.



**B-1.3 Sodium Acetate Solution**

Dissolve 200 g of anhydrous sodium acetate (NaC<sub>2</sub>H<sub>3</sub>O<sub>2</sub>) or 332 g of NaC<sub>2</sub>H<sub>3</sub>O<sub>2</sub>.3H<sub>2</sub>O in water and dilute to 1 litre.

**B-1.4 Zimmerman — Reinhardt Solution**

Prepare one litre of solution containing 67 g of manganese sulphate (MnSO<sub>4</sub>.4H<sub>2</sub>O), 130 ml of sulphuric acid (H<sub>2</sub>SO<sub>4</sub>) (sp. gr. 1.84) and 138 ml of phosphoric acid (85 percent).

**B-2 PROCEDURE**

**B-2.1** Weigh 0.2 g of the sample of the pigment. Transfer immediately to a dry 600 ml heavy-wall Erlenmeyer flask and add 50 ml of the FeCl<sub>3</sub> solution. Tightly stopper the flask and agitate constantly for approximately 15 minutes. As soon as all zinc dust is dissolved, add 50 ml of the Zimmerman — Reinhardt

solution and 250 ml of water. Titrate with 0.1 N KMnO<sub>4</sub> solution.

**B-2.2** Make a blank determination, following the same procedure and using the same amounts of all reagents except the pigment.

**B-3 CALCULATIONS**

Calculate the percent of metallic zinc as follows:

$$\text{Metallic zinc, percent} = [(V-B) \times N \times 0.0327 / W] \times 100$$

where

*V* = ml of KMnO<sub>4</sub> solution required for titration,

*B* = ml of KMnO<sub>4</sub> solution required for titration of blank,

*N* = normality of the KMnO<sub>4</sub> solution, and

*W* = grams of sample used.

NOTE — Metallic zinc content determination method as per ASTM D 521-28 may be used as an alternate method.

**ANNEX C**

[Table 1, SI No. (x)]

**DETERMINATION OF POT LIFE**

**C-1 GENERAL**

**C-1.1** The time taken to double the viscosity from the original value shall be considered as the pot life of the material.

**C-2 PROCEDURE**

**C-2.1** Condition the component parts of the product for one hour at 27 ± 2°C.

**C-2.2** Mix immediately in proper ratio specified by the manufacturer, to fill 1 litre can to approximately 1.25 cm of the top. The lid be loosely placed on the can.

**C-2.3** Measure the viscosity as prescribed in IS 101 (Part 1/Sec 5) initially and every hour thereafter;

however, the interval may be shortened if desired.

**C-2.4** Viscosity builds up rapidly near the end of working life of the mixed components. During this period, when the mixed components become too viscous to spray, remove a small portion and add the appropriate thinner. If the mix can still be thinned, end of the working life has not been reached. The end of the working life is reached when the mixed components become stringy or cannot be thinned for application.

**C-2.5** Report the working life in the approximate time units.

## ANNEX D

( Foreword )

## COMMITTEE COMPOSITION

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### Amendments Issued Since Publication

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