

## **SOUTH EASTERN RAILWAY.**

Office Of the G.M.(Engg.)  
Garden Reach ,Cal-43

### **CE's Circular No.198**

#### **Sub: Painting of Rail & Weld Collar.**

1. Corrosion of Rail has been a perennial problem in maintaining health of rails to desired standards. Though rail renewal are decided based on GMT carried by the rail on the consideration of fatigue life of rail, in many cases premature renewal are required due to corrosion of rails. In order to effectively utilise the rails to the maximum possible extent, it is, therefore, necessary to take necessary measures to prevent corrosion. Para 250(2) of IRPWM specifies painting of rail to prevent corrosion. Following detailed guide lines are issued for painting of rails.

#### **2. PAINTING OF RAILS:**

2.1 Anti-corrosive painting of rails should be carried out in severe corrosion prone locations such as coastal, industrial, all station areas, tunnels and cuttings in the approaches of major towns.

While carrying out renewals in these areas, anticorrosive treatment should be given before the rails are laid in the track. List of severe corrosion prone areas in S. E. Railway is detailed in Annexure-1. In severe corrosion prone areas Epoxy based paints as detailed below should be used to a dry film thickness (DFT) of 100-125 micron.

#### **2.2 SPECIFICATION OF PAINT:**

High build epoxy paint consisting of 2 packs as per RDSO specification No.M&C/PCN/III/88 will be used for painting as per detail specification attached as Annexure-II.

- a) Pack-`A' is an epoxy resin with or without diluent.
- b) Pack-`B' is liquid hardener.

#### **2.3 PROCEDURE FOR PAINTING:**

##### **2.3.1 Surface Preparation**

###### **(a) New Rails**

i) The surface of rail to be painted shall be thoroughly wire brushed to remove loose rust and dust shall be wiped off by dry waste cotton.

ii) Grease and oil shall be freed from surface with the use of solvent like carbon tetrachloride or equivalent conforming to IS 1745-1978. Use of detergent followed by water washing be also done to ensure removal of oil & grease apart from degreasing compound.

(b) Old Rails

- i) Old paint shall be removed thoroughly by scrapping.
- ii) All loose rust and dirt shall be removed thoroughly by wire brushing.
- iii) Grease and oil shall be removed by use of appropriate solvent to IS: 1745-1978. Use of detergent followed by water washing be also done to ensure removal of oil & grease apart from degreasing compound.

**2.3.2 Application of Paint**

- i) A homogeneous mix shall be prepared by mixing pack-`A' in simple proportion like 1:1, 1:2, 1:3 etc. as recommended by the manufacturer.
- ii) The mix shall be applied on the prepared surface with airless spray or by hand brushing with suitable thinner to a dry film thickness (DFT) of 100-125 micron and allow to dry for 8 hrs.

**2.4 FREQUENCY OF PAINTING:**

2.4.1 During maintenance, periodical painting of rail in heavy corrosion prone area will be carried out. Frequency of painting of rail with epoxy painting for heavy corrosion area will be once in 4 years. The specification and method of application will be same as described in para 2.2 and 2.3 above.

2.4.2 At all other location, the maintenance painting will be done, if required, with the specific approval of THOD.

**3. PAINTING OF AT WELD COLLARS:**

3.1 AT Weld collars shall also be painted as detailed in para 7.5 of AT weld manual. All new weld should be painted immediately after welding on welded area and up to 10 cm on either side. Preferably Epoxy paint should be used in painting of AT weld collars.

**3.2 SPECIFICATION OF PAINT:**

Initial painting of weld collar can be done with bituminous black ready mix paint conforming to IS:9862-1981 or Bituminous emulsion paint conforming to IRS-P-30-1996 in **normal corrosion area** and with high build Epoxy paint consisting of two pack as per RDSO's specification No. M&C/PCN/III/88 (Annexure-II) in **Heavy Corrosion prone area**.

**3.3 PROCEDURE OF PAINTING:**

### **3.3.1 Surface preparation**

- a) Clean thoroughly with wire brush to remove loose dust and rust and wipe by dry waste cotton.
- b) Grease and oil shall be freed from surface by use of solvent like carbon tetrachloride or equivalent to IS: 1745-1978.

### **3.3.2 Application of Normal paint.**

Apply by brush uniformly to a dry film thickness of 40 micron. Paint will not be applied by soaking in cotton waste.

### **3.3.3 Application of Epoxy paint.**

To be applied as detailed in para 2.3.2 above.

### **3.4 FREQUENCY OF PAINTING.**

Maintenance painting of AT weld collar will be done once in 4 years. Bituminous black ready mix paint or Bituminous emulsion paint will be utilised in Normal corrosive area and Epoxy based paint in heavy corrosive area.

In case normal Bituminous paint is used in heavy corrosive area, the frequency should be once every year.

The specification and procedure of painting will be same as detailed in para 3.2 and 3.3 above.

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Dated: 3 /12/1999.

No. TC/Track Maint/Poly/Pt.III/

#### Distribution.

1. Secy to G. M. for kind information of G.M.
2. Secy to C.E. for kind information of C.E.
- 3 All Sr. DEN(Co-Ord) for information and necessary action please.
4. CBE, CTE(TM),CTE(TP),CPDE,CE(S),CGE,C.E/E.C.Railway/BBS, Principal ZTS/Sini for information and necessary action please.
5. CVO(E) & FA & CAO.
6. AM/C E, Railway Board.
7. Director,IRICEN,PUNE.
8. O.S/Gr.II to keep one copy in C.E's Circular file.

Location of heavy corrosion prone areas

Srl.No.	Division		Locations
1	Adra	1)	Bokaro to Ramgarh
2	Bilaspur	1) 2)	Durg to Raipur UP & DN. BSP to Champa. UP & DN.
3.	Chakradharpur	1) 2)	Tata to Adityapur UP &DN ROU to Bondamunda UP &DN
4	Kharagpur	1) 2)	Howrah-PKU UP, DN & Mid line. KGP to BHC – UP & DN line.
5	Khurda Road	1) 2) 3)	BHC to PSA – UP& DN line. CTC-Paradip KUR-PUI
6.	Nagpur	1)	Nagpur to Kalnma UP & DN.
7.	Sambalpur	1) 2)	Sambalpur Jn. To Sambalpur. Sambalpur city to Sambalpur.
8.	Waltair	1)	PSA to DVD UP & DN lines including VSKP
9.	All platform lines at stations.		
10.	All tunnels.		
11.	All cuttings in approaches of major towns.		

1. **SCOPE**

1.1 This standard prescribes the requirements and methods of testing two pack High build Epoxy paint intended to be used at areas where grit blasting is not practicable. The material shall be suitable for application on a metal surface having surface finish equivalent to DST2 of IS:9954. It should be suitable for application by airless spray but by using suitable thinner it shall be suitable for brush application.

2. **TERMINOLOGY**

2.1 For the purpose of these standard apart from the glossary of terms given in IS:1303-63 and terminology as per clause 2 of IS:9162-79 and IS:9954 and clause 2 of IS:101-64 the following shall also apply.

2.1.1 **Pack** The term used to describe each of the two packs of the paint which when mixed together form High Build Epoxy Paint.

2.1.2 **Paint** The mixture of the two packs in the proportion recommended by the manufacturer.

3. **REQUIREMENTS**

3.1 The mixing ratio of the pack A and pack B shall be in simple ratio by volume.

3.2 Composition: The paint shall consist essentially of two packs namely pack A and pack B.

3.2.1 pack A: (Normally referred to as Base) shall consist of epoxy resin with or without diluents.

3.2.1.1 In the formulation of paint, epoxy resin of the following grade shall be used.

**Table -I : Requirements for epoxy resin**

<b><u>Sl.No.</u></b>	<b><u>Characteristics</u></b>	<b><u>Requirement</u></b>	<b><u>Method of test</u></b>
1.	Weight per epoxy Equivalent on Non-volatile content basis.	180-260	Cl.4 of IS:9162-79
3.2.2	Pack B : (Normally referred to as Hardener) shall consist of any liquid hardener.		
3.2.2	Liquid Hardener : This shall be liquid type such as an aliphatic amine , an aliphatic or aromatic amine adduct, a polyamide or amido polyamine or any other suitable hardener . it shall react with epoxy resin at normal ambient temperature.		

4. **PROPERTIES:**

4.1 **General** : The paint shall comply with the requirements specified in Table II of this specification.

4.2 Unless otherwise specified, the following testing conditions shall apply.

4.2.1 The preparation of metal panels shall be in accordance with CL. 5.2 to 5.2.1.1 of IS :101-87.

4.2.2 All the tests shall be conducted at room temperature (27±2°C) and a relative humidity at 65±5%, in a well ventilated chamber free from draughts and dust.

4.2.3 The two components i.e. base and hardener shall be mixed in the ratio recommended by the manufacturer before conducting the tests. Where the paint is required to be applied on panels, it shall be done so by using suitable airless spray/brush application.

4.2.4 For the preparation of painted panels for conducting different tests mentioned in Table II, the details given in Table III shall be followed :

TABLE II - REQUIREMENTS FOR HIGH BUILD EPOXYPAINT ( TWO PACK )

Sl. No.	Charecteristics	Requirements	Test Method
1.	Drying time a) Hard Dry, max b) Recoating time, Max	8 Hours 6 Hours	IS: 101-86
2.	Consistency	Smooth and uniform, and suitable for air-less Spray/brush application.	IS: 101-89
3.	Finish	Smooth - matt/ semi-glossy, free from sagging & wrinkling	IS: 101-87
4.	Colour	Buff to Grey	IS: 101-89
5.	Dry Film Thickness per coat, min. a) By brush b) By airless spray	100-125 200	By Elcometer - do-
6.	Volume solids, % .min.	60%	See Appendix-1
7.	Scratch hardness ( 1.5 Kg LOAD)	No such scratch so as to show base metal	IS: 101-88
8.	Flexibility & Adhesion	No visible damage or detachment of film	IS: 101-88
9.	Flash Point for both packs	Above 20°C	IS:101-87
10.	Resistance to salt spray	No sign of corrosion & no sign of deterioration up to 2000 hrs	ASTM B-117
11.	Protection against corrosion under Condition of condensation	-do-	IS: 101-88
12.	Keeping properties for both the packs	Not less than 6 months	IS: 101-89
13.	Pot life at 27±2°C, min.	5 hours	See Appendix-II
14.	Mass in Kg / 10 litres, min.	12.0	IS: 101-87
15.	Spreading capacity, min.	3 m / litre	IS: 101-89



## APPENDIX I

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**PROCEDURE FOR DETERMINING VOLUME SOLIDS PERCENTAGE IN POLYURETHANE PAINTS**

## SCOPE

This method is applicable to the determination of the volume nonvolatile matter of paint coatings.

## SIGNIFICANCE

This method is intended to provide a measure of the volume of dry coating obtainable from a given volume of liquid coating. This volume is considered to be the most equitable means of comparing the coverage (square feet of surface covered at a specific film thickness per unit volume ) and also for calculating the wet film thickness of the given paint.

## APPARATUS:

- i) ANALITICAL BALANCE
- ii) STEEL DISC – Preferably stainless steel, 60 mm. Dia and 0.70 mm. thickness with a small hole 2 to 3 mm. from the edge. A fine wire such as chromel is attached through the hole and made of the appropriate length for suspending the disc in a liquid.
- iii) Weight box
- iv) Breaker 1 litre for weighing the disc in liquid.
- v) Weight per litre cup for determining the specific gravity of the paint material and of the suspending liquid if not known.
- vi) Oven

## PROCEDURE:

- i) Dry the disc. in an oven at 105°C for 10 minutes and cool.
- ii) Weight the disc in air. Let it be W1 grams.
- iii) Suspend the disc in water and weigh again. Let it be W2 grams.
- iv) Calculate the volume of the disc V as follows:

$$V = \frac{W1 - W2}{d} \quad \text{where } d \text{ is the density of the water at room temperature.}$$



- v) Determine the weight of nonvolatile content of the liquid coating material by drying a known amount of paint at 105°C for 3 hours. Let it be W grams.
- vi) Determine the specific gravity of the paint to the nearest 0.001 g / ml. by using weight per gallon cup. Let it be P.
- vii) Dip the disc. in the paint sample for 10 minutes and take out the disc. and allow the excess coating material to drain off. Blot the coating material off the bottom edge of the disc. so that beads or drops do not dry on the bottom edge of the disc.
- viii) Dry the disc. in an oven for 3 hours at 105°C and cool.
- ix) Weigh the coated disc. in air. Let it be W3 grams.
- x) Suspend the coated disc. in water and weigh again. Let it be W4 grams.
- xi) Calculate the volume of the coated disc. as follows:

$$W3 - W4$$

$$V1 = \frac{\quad}{d}, \text{ where } d \text{ is the density of water at room temperature.}$$

- xii) Calculate the volume of the dried coating as follows:

$$\text{Volume of dried coating (Vd)} = V1 - V$$

- xiii) Calculate the volume of wet coating as follows:

$$W3 - W1$$

$$V_w = \frac{\quad}{W \times P}, \text{ where } W = \text{grams of nonvolatile water.}$$

$$P = \text{specific gravity of the paint.}$$

- xiv) Calculate the percentage volume solids of the paints as follows:

$$\frac{V1 - V}{V_w} \times 100 \text{ or } \frac{V_d}{V_w} \times 100$$

The volume of non-volatile matter or the percentage volume solids of a paint is related to the covering capacity and thickness in the following manner:

$$(a) \text{ Theoretical coverage (sq. m. / litre) } = \frac{\% \text{ Volume Solids}}{\text{Dry film thickness ( microns )}} \times 10$$

$$(b) \text{ Wet film thickness ( Microns ) } = \frac{\text{Dry film thickness ( microns )}}{\% \text{ Volume solids}} \times 100$$

## APPENDIX II

### PROCEDURE FOR DETERMINING THE POT LIFE

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It is the duration where the mixed paint shall still be in usable condition, starting from the time of mixing.