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RDSO specification for Bituminous emulsion			

**INDIAN RAILWAY STANDARD
SPECIFICATION No. IRS-P-30/2020**

(Rev.1.0)



**SPECIFICATION FOR
BITUMINOUS EMULSION**

**RESEARCH DESIGNS & STANDARDS ORGANISATION
MANAK NAGAR, LUCKNOW – 226 011**

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**INDIAN RAILWAY STANDARD SPECIFICATION
FOR
BITUMINOUS EMULSION
NO. P-30-2020
ISSUED BY
RESEARCH DESIGNS AND STANDARDS ORGANISATION
LUCKNOW – 226 011**

0.0 FOREWORDS

- 0.1 This standard was first published and adopted in 1968. It was revised in 1996 to include new tests such as resistance to water, chemicals and salt spray to make it more stringent and to enhance anticorrosive properties.
- 0.2 The original specification covered two grades i.e. Grade-I Plain Bituminous Emulsion and Grade-II Bituminous Emulsion with 20% mica. Normally two coats of Grade-I followed by a topcoat of Grade-II were recommended for corrosion protection of steel substrate.
- 0.3 Since the present practice of sandwiching FRP tissue between Bituminous Emulsion coatings adequately caters to the property of water repellency and also considering the better properties of the present coating covered by this specification, the Grade-I and Grade-II with mica has been withdrawn.

1.0 SCOPE

- 1.1 This specification prescribes the requirements and method of test for the Bituminous Emulsion based on indigenously available grade of bitumen.
- 1.2 This is generally used as a two coat system on rails and as a two coat system with FRP tissue sandwiched in between coats on trough floor and interior panels of coaches over one or two coats (as specified) of suitable Primer such as R/M Red Oxide Zinc Chrome, Priming, air drying to IS 2074 (Part -1): 2015 for Domestic and Decorative Applications (Third Revision).

Note: “Firm should comply Make in India Policy and Public Procurement (Preference to Make in India) Order-2017 under this specification” and subsequent Amendment done time to time.

2. TERMINOLOGY:

- 2.1 For the purpose of this standard apart from the Glossary of Terms given in IS: 1303-83(Reaffirmed) or its latest version, the following shall also apply.
- 2.2 For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the results of a test or analysis shall be rounded off in accordance with IS: 2-1960 or its latest version, specification for rules for rounding off numerical values (revised) Reaffirmed 2016 or its latest version.

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3. REQUIREMENTS:

- 3.1 Unless otherwise specified, the following testing conditions shall apply.
- 3.2 The preparation of metal panels shall be in accordance with IS: 101 (Part-1/Section-3)-1986, Reaffirmed 2012 or its latest version.
- 3.3 All the tests shall be conducted at room temperature $(27\pm 2)^{\circ}\text{C}$ and a Relative Humidity at $(65\pm 5)\%$ in a well-ventilated chamber free from draughts and dust. The temperature of the surface to be painted must be at least 3°C above the dew point to prevent moisture condensation.
- 3.4 The emulsion shall be suitable for brush/spray application.
- 3.5 The emulsion shall also comply with the requirements given in TABLE-I.

TABLE I – REQUIREMENTS FOR BITUMINOUS EMULSION

SN	Characteristics	Requirements	Test Method
1-	Drying Time, Hard Dry/ Recoating Time	Not more than 8 Hours.	IS:101 Part-3/Section-1)-1986, Reaffirmed 2017 or its latest version (without rubbing first coat with emery)
2-	Consistency	Smooth and Suitable for Brush/ Spray Application	IS:101(Part 1/Sec.5)-89, Reaffirmed 2019 or its latest version
3-	Color	Black/Brownish Black	Visual
4-	Dry Film thickness per coat, Min., By Brush /Spray	175 microns	IS:101(Part 3/Sec.2)-89 Reaffirmed 2019 or its latest version, Elcometer or other suitable instrument (use non magnetic strip of known thickness to avoid formation of dents on coating).
5-	Softening Point of Dry Film	Not less than 120°C	APPENDIX “A”
6-	Water Content, %, By Mass	50 ± 2	APPENDIX“ D” of IS: 7393-74 or its latest version
7-	Ash Content, % by mass, Max.	10.0	APPENDIX “E” OF IS: 7393-74 or its latest version
8-	pH, after dilution of emulsion with 25% water	5-6	pH paper/pH meter

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9-	Residue on 150 microns IS Sieve, % by mass, max.	0.05	APPENDIX "B"
10-	Water Resistance test (for 24 hrs.)	No blistering and re-emulsification of the coating (evidenced by the presence of dispersed bituminous particles)	ASTM D 2939
11-	Resistance to Chemicals: (i) 10 % Caustic Soda solution (m/v) (ii)10% Magnesium Chloride solution (m/v)	No blistering, wrinkling and lifting of the coating when tested for 120 hrs.	APPENDIX "C"
12-	Resistance to Salt Spray test (i) Two coats of Bituminous Emulsion	(i) No sign of corrosion on metal surface when tested for 120 hrs. (ii) On the coating surface brown/rust spots at isolated places and fungus growth may be ignored. (iii) Tightly adherent grey/brownish stains on metal surface should not be considered as failure.	APPENDIX D and IS:101(Part 6/Sec.1)-88, Reaffirmed 2015
	(ii) One coat of R/M Red-Oxide Zinc Chrome Primer to IS 2074 (Part -1): 2015 for Domestic and Decorative Applications (Third Revision) + one coat of Bituminous Emulsion	(i) No sign of corrosion on metal surface when tested for 168 hrs. (ii) On the coating surface, brown/rust spots at isolated places and blisters if any and fungus growth may be ignored.	-do-
13.	Mass in Kg/10 liters	11±0.5	IS:101(Part 1/Sec.7)-87, Reaffirmed 2019 or its latest version
14.	Viscosity	(8000±2000) cps	By Brookfield Viscometer, Use Spindle No.6 at 20RPM
15.	Theoretical Coverage/coat for getting min.175 microns DFT	27.0 sq. mtr/10 liters	IS:101(Pt.4 /Sec.1)-1988 or its latest version
16.	Keeping Properties	Not less than one year from the date of manufacture	IS: 101 Pt.6/Sec.2-1989 or its latest version

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4. PACKING

4.1 The emulsion should be packed in steel drums conforming to IS: 2552-89 or its latest version having Polythene sheet bag inside.

5. MARKING

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

- (i) Name of Manufacturer.
- (ii) Name of the class of Material, if any.
- (iii) Weight or volume of the Material.
- (iv) Month and year of Manufacture.
- (v) Approximate Composition.
- (vi) Batch No./Lot No.
- (vii) Specification No.

6. SAMPLING:

6.1 For the purpose of testing the size of sample and the sampling procedure from drums and barrels shall be as described in IS: 1201-78 or its latest version subject to the following. The contents of the drum or barrel from which the sample is to be taken shall be thoroughly mixed by rolling the container to and fro for a period of 2 or 3 minutes successively in opposite direction, allowing at least five revolutions of the container in each direction and then upending the container through two revolutions first in one direction and then in the opposite direction.

REFERENCES:

- (i) IS: 101 Pt.1 / Sec7 -1987, Reaffirmed 2019 or its latest version Methods of sampling and test for Paints, Varnishes & related products, Test on Liquid Paints (Third revision).
- (ii) IS: 7393-1974, Reaffirmed 2005 or its latest version, Specification for Adhesive, Bitumen Emulsion (Reaffirmed 1989).
- (iii) ASTM D 2939, Standard methods of testing “Emulsified Bitumens used as protective coatings”.
- (iv) IS 2074 (Part -1): 2015 for Domestic and Decorative Applications (Third Revision). or its latest version
- (v) IS: 101 Pt.6 /Sec2-1989, Reaffirmed 2019 or its latest version, Methods of sampling and test for Paints, Varnishes & related products, Durability Test on Paint film (Third revision).
- (vi) IS:2552-89, Reaffirmed 2006 or its latest version, Specification for Steel Drums (Galvanized & Un galvanized).
- (vii) IS: 1201-1978 or its latest version Specification for Methods of testing Tar and Bituminous Materials, Sampling (First Revision).
- (viii) IS: 1303-1983 Reaffirmed 2017 or its latest version, Specification for Glossary of Terms relating to Paints.
- (ix) IS: 334-2002 or its latest version, Specification for Glossary of Terms relating to Bitumen and tar

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APPENDIX “A”
(TABLE No. 1, Sl. No. 5)
Softening Point of Dry film

A-1 A Film of Bituminous Emulsion is applied to a glass plate (approx. 305 x 105 mm.) sufficiently thin to ensure that it dries completely in 24 hrs. After being allowed to dry for this period, a sufficient quantity of the film is then removed, placed in the ring of the ball & ring apparatus and melted on a metal plate over a glycerin bath. The ring is then allowed to cool for 30 minutes, the excess material being removed with a slightly heated knife blade and then softening point of the material determined by the method described under IP 58/42 Procedure “A” in Standard methods for testing petroleum and its products (latest edition) of the Institute of Petroleum.

APPENDIX “B”
(TABLE NO. 1, Sl. No. 9)
Residue on 150 micron IS Sieve

B-1 Accurately weigh (approximate 25.0 gm.) of the thoroughly mixed material in a 250 ml. Beaker. Mix the material and water (approximately 25.0 ml.) in the beaker thoroughly, breaking up all lumps, without grinding action, with the flattened end of a stirring rod. Transfer all the contents of the beaker to the sieve, using a wash bottle containing water and a camel hairbrush. Wash the residue left on the sieve with the water and gently brush with a camel hairbrush until the water passing through the sieve is clear and free from solid particles. When the washing is complete, transfer all the remaining contents from sieve to a pre-weighed Whatman filter paper No.1 with the help of water and camel hairbrush. After the water filters away, filter paper containing residue is dried at $(100 \pm 2)^{\circ}$ C for 1 hour. Cool the filter paper and weigh.

B-2 Calculate and express the results as percentage, of the mass of the material taken for the test.

APPENDIX “C”
(TABLE NO. 1, Sl. No. 11)
Resistance to Chemicals

C-1 The following short term tests of chemical resistance do not categorize the type of service for which bituminous emulsion are intended but are included to assure the customer/consumer a quality product which will meet the long term service requirements.

C-2 PREPARATION OF PANELS:

Take properly cleaned (as per IS: 101 Part-1/Section-3)-86, Reaffirmed 2012 or its latest version, 150 mm x 100 mm x 1.25 mm mild steel panel. Apply one coat of Bituminous Emulsion on both sides. Allow it to air dry for minimum 8 hrs. Apply second coat of Bituminous Emulsion on first coat and air dry for 24 hrs. Total dry film thickness build up in two coats should be (375 ± 25) microns. Seal the edges of the Panel with wax.

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C-3 Resistance to 10%(m/v) Caustic Soda solution: Immerse 3/4th of the panels prepared as above in duplicate in 10% (m/v) Caustic soda solutions for 120 hrs. Remove the panels, wash in running water and allow them to air dry for an hour and record the observations.

C-4 Resistance to 10%(m/v) Magnesium Chloride Solution : Immerse 3/4th of the panels prepared as above in duplicate in 10%(m/v) Magnesium chloride solution for 120 hrs. Remove the panels, wash in running water and allow them to air dry for an hour and record the observations.

**APPENDIX “D”
(TABLE NO.1, Sl. No.12)
Resistance to Salt Spray Test**

D-1 PREPARATIONS OF PANELS:

D-1.1 Two coats of Bituminous emulsion under test.

D-1.1.1 Take properly cleaned (as per IS: 101 Part-1/Section-3)-86, Reaffirmed 2012 or its latest version ,150mm x100mm x1.25 mm mild steel panels. Apply one coat of Bituminous Emulsion on both sides and allow it to air dry for minimum 8 hrs. Apply second coat of Bituminous Emulsion and allow it to air dry for 24 hrs. Total dry film thickness build up in two coats should be (375±25) microns. Seal the edges of the panels with wax.

D-1.2 One coat of R/M Red Oxide Zinc Chrome Primer to IS 2074 (Part -1): 2015 for Domestic and Decorative Applications (Third Revision) or its latest version followed by one coat of Bituminous Emulsion.

D-1.2.1 Take properly cleaned (as per IS: 101 Part-1/Section-3)-86, Reaffirmed 2012 or its latest version 150mm x 100mm x1.25 mm mild steel panels. Apply one coat of R/M Red Oxide Zinc Chrome primer to IS 2074 (part -1): 2015 for Domestic and Decorative Applications (Third Revision) or its latest version on both sides and allow it to air dry for 8 hrs giving a dry film thickness of minimum 25 microns. After slight rubbing down the primer coat with fine emery paper no.220/240, apply a coat of bituminous emulsion and allow it to air dry for 24 hrs. Total dry film thickness, (i.e. one coat of Red oxide zinc chrome primer + one coat of Bituminous emulsion) should be (200±25) microns. Seal the edges of the panels with wax.

D-3 Panels prepared as above, in D-1.1 and D-1.2 should be tested in duplicate as procedure lay down in ANNEXURE- “E” of IS 2074 (Part -1): 2015 for Domestic and Decorative Applications (Third Revision) or its latest version and record the observations.