



**Government of India  
Ministry of Railways**

**SCHEDULE OF TECHNICAL REQUIREMENTS FOR INFRASTRUCTURE,  
MANUFACTURING, TESTING FACILITIES & QUALITY CONTROL  
REQUIREMENTS**

**FOR**

**PAINTS BASED ON EPOXY AND POLYURETHANE RESIN  
FOR PAINTING OF COACHES, DIESEL AND ELECTRIC  
LOCOMOTIVES**

**STR No. M&C/PCN/040/2020**

**(Revision 2.0)**

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**Schedule of Technical Requirements  
of Epoxy & Polyurethane based Paints  
in Two Packs for Painting of Coaches, Diesel & Electric locomotives**

## **1. FOREWORD**

- 1.1 This document has been prepared [(Earlier reference STR No.M&C/040/2011 (Revision 1)] to lay down the eligibility and capability of suppliers seeking approval for manufacturing & supply Epoxy/Polyurethane based Paints in Two Packs for Painting of Coaches, Diesel & Electric locomotives as per the recommendation of design directorate.

## **2. SCOPE**

- 2.1 This document covers the infrastructure facilities at works, procurement of raw materials, manufacturing of paints, quality control etc. These paints will be used for painting of Coaches, diesel and electric locomotives.

## **3. APPLICABLE/REFERENCE DOCUMENTS**

- (i) IS: 101
- (ii) ASTM B117
- (iii) ASTM D3359
- (iv) ASTM G-154
- (v) ASTM 4060

## **4. TERMINOLOGY**

- STR – Schedule of Technical Requirements
- NTH – National Test House
- ISO – International Standards Organisation
- M&P – Machinery & Plant
- NABL – National Accredited Board of Laboratories
- NSIC – National Small Industries Corporation Limited
- MSME – Micro Small and Medium Enterprises- Testing Centre

## 5. General Requirements

### 5.1 Any firm seeking approval of this organisation:

- (i) shall possess valid ISO 9001 : 2015 or latest & ISO: 14000 Environmental maintenance system installation certificate for the products for which approval is sought.
- (ii) shall have minimum manufacturing experience of these paints for 2 years.
- (iii) shall procure these resins from national or international sources and shall produce bill of material.
- (iv) ~~shall have valid clearance from Pollution Control Board.~~ (Proposed for deletion)
- (v) ~~Shall have the record of supplying the products to the reputed national and international organisation like defence, heavy & earthmover industries like BEML, BHEL, railway and major automotive industries.~~ (Proposed for deletion)
- (vi) ~~Shall have minimum turnover of Rs. 1 Crore per annum for last 2 years.~~ (Proposed for deletion) Proposed for modification as:  
Shall have balance sheet for last 2 years.
- (vii) Shall have ERP/SAP supported multimodule application software for managing the important parts of business
- (viii) ~~Firm should have their own R&D facilities approved by Govt. Agency or the firm should have tie up with Govt. R&D Laboratory/Deemed/Govt. University. Valid certificate with clear date of validity on it should be available with the firm and same need to be submitted to RDSO/Lucknow.~~ (Proposed for deletion)
- (ix) The firm should have valid capacity certificate issued by NSIC /Other approved agency for small scale industries.
- (x) In case of medium & large scale industries, if capacity certification is not possible by any approved agency, capacity shall be declared by the firm itself detailing the points to arrive at the capacity and subsequently assessing officer will verify the capacity during the assessment of the firm.

The above information should be furnished by the firm in registration form.

5.2 The firm should have covered area with adequate space for the storage of raw material, intermediate and finish products like pigments, extenders, resins, hardeners, varnish, thinners, additives, paints etc. with the firm which is free from dampness and humidity and all manufacturing facilities should be available in same campus of factory. One bond room with lock and key facility for keeping finished products should also be available.

5.3 Approval of a firm will be given as per laid down procedure given in ISO apex document only after Inspection of the factory premises to assess the capacity/capability of the firm and samples of paints drawn during inspection

(comprising of a full system of painting) meets the norms and requirements of the relevant RDSO specifications on testing at RDSO. The initial approval shall be given in “List of RDSO Vendors for developmental orders” and further upgradation to “List of approved vendors” will be given after meeting the requirement given in ISO apex document and supply of minimum 20,000 litres after initial approval.

- 5.4 The firm should submit the Brand Names of the applied products.
- 5.5 The Approval to the firm will be given for full paint system . The list of paint items is furnished at Clause 11.0
- 5.6 The firms approved as “List of RDSO Vendors for developmental orders”/“List of approved vendors” shall submit statement of supplies during the duration between two periodic quality audits to RDSO, about the details of the supplies of the relevant paint systems to Zonal Railways/PUs and Wagon Builders in the format as Annexure-II.

## 6. Manufacturing Machines & Plants

Firm should possess the following minimum machines and plants for manufacture paints based on Epoxy & Polyurethane resins with valid calibration certificates of balances at S.No.7 & 8.

**Table-I**

Sl. No.	Equipments	Quantity (min.)
1.	High Speed Disbursor/Pug mixer, min. capacity 500 kgs -3 nos. or the total capacity shall be 1500 Kgs/day min. may be considered irrespective of no. of machines.	3 Nos.
2.	Sand Mill/LMZ Sand mill,(min.chamber capacity 10 lts.) ( in case of higher capacity of the mill , total capacity shall be 2000 ltrs./day irrespective of kind of machine and no. of machines)	2 Nos.
3.	Bead Mill/ Dyno mill/ LMZ Sand mill,(min. capacity1000 lts./day), (total capacity of the mill shall be 3000 ltrs./day irrespective of no.of machines)	3 Nos.
4.	Paint Mixer, min. capacity 2 K ltr.( in case of higher capacity of the mill ,total capacity shall be 10000 ltrs./day irrespective of no.of machines)	5 Nos.

5.	Thinning Pump	6 Nos.
6.	Automatic Filling Machine	3 Nos.
7.	Weighing Machine, 300 Kg., Least count 0.100 Kg. Weighing Machine, 60 Kg., Least count 0.050 Kg. Weighing Machine, 10 Kg., Least count 25.00 gm	2 Nos. 2 Nos. 2 Nos.
8.	Electronic Balance, 1.00 Kg., Least count 10.00 gm.	3 Nos.
9.	Industrial Vibrator or agitator	3 Nos.
10.	Solvent Pump	3 Nos.
11.	Unloading Pump	5 Nos.
12.	Slow Speed Premixer and High Speed Premixer / variable speed premixer with gear design	3 Nos. each
13.	Resin Transfer Pump	2 Nos.
14.	Diesel Generator of adequate capacity	1 Nos.
15.	Hoist 2 ton / suitable plant design to fulfil the requirement	2 Nos.
16.	Filter press with variable mesh size filter	2 Nos.

## 7. Testing facilities

- 7.1 The firm should have proper air conditioned laboratory to maintain lab test conditions at  $27 \pm 2^{\circ}\text{C}$  and  $65 \pm 5\%$  relative humidity, for which suitable indicating/measuring instruments will be available in the lab.
- 7.2 There should be full testing facilities with equipments which are covered as per requirements of IS: 101 latest version or as per ASTM. Other equipments not covered in IS /ASTM shall be of reputed make and these should have valid calibration certificate. It is mandatory for a firm seeking approval of RDSO to have equipments listed in table –II at their end.

**Table-II**

<b>Sl No.</b>	<b>Name of the Equipment</b>	<b>Quantity (min.)</b>
1.	Humidity Chamber as per IS : 101	1 No.
2.	Salt Fog Test Cabinet as per ASTM B117 or equivalent	1 No.
3.	Gas Liquid Chromatograph	1 No.
4.	Cross cut adhesion tester as per ASTM D3359	1 No.
5.	Sagging index as per IS : 101	1 No.
6.	Gloss-O-Meter of 60° angle of incidence as per IS : 101	1 No.
7.	Abel's Flash Point Apparatus as per IS : 101	1 No.
8.	Cryptometer or Black & White Charts as per IS : 101	1 No. or Black and White Charts in adequate quantity
9.	Flexibility & Adhesion Apparatus as per IS : 101	1 No.
10.	Scratch Hardness Tester as per IS : 101	1 No.
11.	Flow Cup (Ford Cup No. 4) as per IS : 101	1 No.
12.	Stormer/Brooke Field Viscometer as per IS : 101	1 No.
13.	Weight/10 Litre Cup as per IS : 101	1 No.
14.	Hegman Gauge as per IS : 101	1 No.
15.	Centrifuge as per IS : 101	1 No.
16.	Dry Film Thickness Measuring Equipment as per IS :101	1 No.
17.	Dean & Stark Apparatus as per IS : 101 / Carl Fischer apparatus	1 No.
18.	Lovibond Tintometer as per IS : 101	1 No.
19.	Accelerated Weathering Tester viz QUV to ASTM G-53	1 No.
20.	Taber Abrasion tester as per ASTM D 4060	1 No.
21.	Color Spectrophotometer as per IS:101/ASTM	1 No.
22.	Chemical Balance upto 4 decimal places (in gms.)	1 No.
23.	Physical Balance upto 2 decimal places (in gms.)	1 No.
24.	Hot Air Electric Oven	1 No.
25.	Distillation Plant	1 No.
26.	Hydrometer of different ranges	1No.of each range
27.	Hygrometer	1 No.
28.	Drying time recorder as per ASTM D 5895	1 No
29.	Air & Air less spray gun	1 No each
30.	Hot Plates	3 Nos.

31.	Set of Sieves, Thermometers, Glass Wares, Crucibles, Reagents & Chemicals for Testing of Raw Materials, Intermediate and Finished Products as per relevant specifications	In adequate Qty./Nos.
32.	Heating Mantles	3 Nos.
33.	Water Bath	2Nos.
34.	Muffle Furnace	1 No.
35.	Mild Steel, Tinned and Glass Panels and Test Racks	In adequate number

## 8. Quality Control Requirements

- 8.1 There should be a well-designed system for traceability and identification of the materials from raw material, intermediate and finished product stages.
- 8.2 The quality manual of the firm for ISO should clearly indicate at any stage the quality control over procurements of raw materials, manufacturing of intermediate and finished products by computerized process control technique.
- 8.3 The technical supervisors/managers responsible for production & quality control activities related to manufacturing of subject paint item should have the minimum qualification of B.E. / B.Tech (Paint /Polymer Technology/Chemical Engg.) with a minimum of 3 years experience or M.Sc. (Chemistry) with a minimum of 7 years experience in relevant fields to look after the production, quality control and testing activities and should have knowledge of paint manufacturing, testing of raw materials etc. They should be able to take corrective steps in case of difficulties in maintaining quality control.
- 8.4 The firm should ensure that proper analysis is being done on monthly basis to study the rejection at various levels and it is documented. Process capability should also be studied.
- 8.5 The firms should ensure that all the relevant RDSO/BIS/ASTM and other specifications, standards, manuals etc. are available with them.
- 8.6 ~~If the firm intends to obtain approval for paints based on epoxy as well as polyurethane resins they should possess test certificates for both, one primer and one finishing paint based on epoxy or polyurethane resins issued by approved test houses viz NTH/MSME/HBTI/ Shri Ram Test House/National Laboratories under CSIR.~~

**(Proposed for deletion)**



- 8.7 A periodical/Need basis Quality Audit check may be carried out of the firm to check the quality of paint and other infrastructure and testing facilities mentioned in the STR .
- 8.8 The firm should prepare and submit Quality Assurance Plan for products, which they intend to supply to Indian Railway and Production Units as per Guidelines of ISO Document no. QM-RF-8.1-3 (Latest version) detailing various aspects:

- Organisation chart
- Write up on manufacturing process of paints
- Process flow chart for paints
- Traceability of various products.
- Inspection and testing plan for all the products starting from raw materials, in process and final product.
- Details of non-conformity
- Details of customer complaints and warranty failures/In service failures.
- M&P/T&P as per specification/STR/IS

## 9. **Repair / Service Centre**

The firm should have 24X7 customer complaint registration & redressal mechanism through website.

## 10. **Major steps involved in getting the firms approval / registration** as per latest ISO apex documents:

- 10.1 The firm shall apply online for vendor registration on RDSO website.
- 10.2 The application form and other relevant documents shall be scrutinized at M&C Dte and if any deficiencies are found, the firm shall be asked to comply the deficiencies as per latest ISO apex guidelines.
- 10.3 After all deficiencies are complied by the firm, the capacity, capability and STR verification of the firm shall be assessed by nominated official. Samples shall also be drawn from the firms premises after satisfactory compliance of STR and shall be tested at RDSO/National Test House (Lab which is accredited by an accrediting agency which meets the criteria laid down in QO-D-8.1-11 {Latest version}) and if test facility for any of parameter is not available either at RDSO/NTH/as specified in QO-D-8.1-11 then it may be referred to Govt lab/University/any other NABL accredited lab, where it exist.
- 10.4 If all the test results are satisfactory and all other requirements are

fulfilled, the firm shall be approved for “List of RDSO Vendors for developmental orders”.

11. The list of paints based on epoxy and polyurethane resins which may be used for painting, coaches, diesel and electric locomotives as per RDSO Specn. M&C/PCN/100/2018 etc. in Indian Railways and Production Units is furnished below:

- (i) Epoxy Zinc Phosphate Primer to M&C/PCN/100/2018 (Chapter II)
- (ii) Unsaturated Polyester Putty to M&C/PCN/100/2018 (Chapter III) for coaches only.
- (iii) PU Surfacer to M&C/PCN/100/2018 (Chapter IV) for coaches .
- (iv) Polyurethane finishing paint to M&C/PCN/100/2018 (Chapter V) for coaches.

ANNEXURE -I

SN	Description of Machine /Equipment/ Manpower	Capacity requirement/ Qualification	Total requirement	No. of Machines available	Operation to be performed by Machine/ Equipment	Capacity of available Machine	Year & Make of Machine	Present Status— Working/ Under Commencing /Not working
1	2	3	4	5	6	7	8	9
1	Highspeed Disburser/ Pug Mixer	500 kg.	3 Nos.					
2	Sand Mill/LMZ Sand Mill(chambercap.10lit.)	2000 lit. /day	2Nos.					
3	Bead/Dyno Mill/LMZ Sand Mill	3000 lit. /day	3 Nos.					
4	Paint Mixer	2K lit.each	5 Nos.					
5	Thinning Pump		6 Nos.					
6	Automatic Filling Machine		3No.					
7	WeighingMachine,LC=0.100 kg	300 kg	2 Nos.					
8	WeighingMachine LC=0.050 kg	60 kg	2 Nos.					
9	WeighingMachine LC=25.0 gm	10 kg	2 Nos.					
10	Electronic Balance LC=10.0 gm	1.0 kg	3 Nos.					
11	Industrial Vibrator or Agitator		3 Nos.					
12	Solvent Pump		3 Nos.					
13	Unloading Pump		5 Nos.					
14	Slow /High/Variable speed premixer		3 Nos. each					
15	Resin Transfer Pump		2 Nos.					
16	Hoist	2 ton	2 Nos.					
17	Diesel Generator	Adequate	1 Nos.					
18	Filter Press		2 Nos.					
19	Humidity Chamber		2 Nos.					
20	Gas Chromatograph		1No.					
21	Salt Fog Test Cabinet as per ASTM B117 or equivalent		1No.					
22	Cross cut adhesion as per ASTMD3359		1No.					
23	Sagging Index		1No.					
24	Glossometer	60° Angle	1No.					
25	Abel's Flash point Apparatus		1No.					

26	Cryptometer/Black & White Charts		1No.					
27	Flexibility & Adhesion Apparatus		1No.					
28	Scratch Hardness Tester		1 No.					
29	Ford Cup no.4		1No.					
30	Stromer/ Brookefield Viscometer		1No.					
31	Weight/10 lit Cup		1No.					
32	Hegman Gauge		1No.					
33	Centrifuge		1No.					
34	Dry Film Thickness Measuring Apparatus		1No.					
35	Dean & Stark Apparatus		1 No.					
36	Lovibond Tintometer		1 No.					
37	Accelerated Weathering Tester		1 No.					
38	Taber Abraser		1 No.					
39	Colour Spectrometer		1 No.					
40	Chemical Balance, upto 4 decimal place		1 No.					
41	Physical Balance, upto 2 decimal place		1 No.					
42	Hot Air Oven		1 No.					
43	Muffle Furnace		1 No.					
44	Distillation Plant		1 No.					
45	Hydrometer		1 No. each					
46	Hygrometer		1 No.					
47	Drying time Recorder		1 No.					
48	Air & Airless Spray Gun		1 No. each					
49	Set of Sieves, Thermometers, Glassware, Crucible, Reagents & Chemicals for testing of Raw materials, Intermediate & finished products as per relevant specifications.		Adequate qty.					
50	Hot Plates		3 No.					
51	Heating Mantles		3 No.					
52	Water Bath		2 No.					
53	Mild Steel, Tinned & Glass panels & test Racks		Adequate					

1	2	3	4	5	6	7	8	9
54	<p><b>Manpower—</b> The technical supervisors/managers responsible for production &amp; quality control activities related to manufacturing of subject paint item should have the minimum qualification of B.E. / B.Tech (Paint /Polymer Technology/Chemical Engg.) with a minimum of 3 years experience or M.Sc. (Chemistry) with a minimum of 7 years experience in relevant fields to look after the production, quality control and testing activities and should have knowledge of paint manufacturing, testing of raw materials etc.</p>		1 No. each for Production & Quality Control respectively.					

**Note:-** Information in column 1 to 4 shall be indicated by RDSO whereas information in column 5 to 9 shall be furnished by vendor.

**ANNEXURE -II****Statement of supplies during the duration between two periodic quality audits as per QO-D- 8.1-13 (Latest version)**

Name of the Vendor:

S.No.	Period	Full Item detail with specification	Supplied to Zonal Rly/ PU/ Wagon Builder	P.O No. and date	Quantity	Inspecting Agency	Performance Report of Inspecting Agency	Whether supplied within D.P or extension of D.P Taken (Information to be given in detail)	Any other information

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