



**TITLE: - CHEMICAL AND THERMAL
RESISTANT EPOXY ENAMEL**

TRE/168

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1.GENERAL:

This specification covers the technical & quality requirements of air / oven drying two pack epoxy enamel which gives tough, flexible, glossy finish with excellent moisture , heat and oil resistance and good durability in chemical atmosphere.

2.APPLICATION:

Suitable for application by brushing or spraying on Transformers, Radiators etc. which are subsequently subjected to vapour phase treatment in Solvent Shellsol – H at 130⁰ C and oven drying at 90 ± 10⁰ C.

Paint can also be used directly on metallic surface without primer.

3.COMPLIANCE WITH NATIONAL STANDARDS:

There is no Indian Standard covering this material.

4.COLOUR:

Shall be specified in our order.

5.FINISH:

Smooth and full glossy.

6.FREEDOM FROM DEFECTS:

The paint shall remain free from defects like hard settling of pigments, skinning when kept in closed container and livering (excessive viscosity build up) during its rated shelf life. The dried paint film shall be free from defects like bittyness, floating of pigments, surface haze, orange peeling, colour fading, wrinkles etc when dried in oven at 90 ± 10⁰ C for 1 hour and subjected to vapour phase operation at 130⁰ C in Shellsol – H solvent for 72 hour.

The paint shall confirm to the requirements of ISO 14001 and shall be free from lead/ lead components.

7.CHEMICAL COMPOSITION:

The Material shall be based on two component epoxy system suitably pigmented base and accelerator. The mixing ratio of the base and accelerator shall be as per supplier's recommendation. The type and content of the binding material as determined by IR spectrography shall be strictly adhered to the "Type Approved Sample".

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8. TEST SAMPLES:

Tender samples will not be required when once the type approval (Clause 12) is given and the supplier concerned declares that the material for which the tender is given is of the same quality as the type approved sample. Representative samples of the material shall be drawn and treated as prescribed under Clause 3 of IS: 101.

9. TEST METHOD.

Unless otherwise specified material shall be tested in accordance with IS: 101.

10. PROPERTIES ON BASE AND CATALYST MIX:

Base and Catalyst mix (as per supplier's recommendations), when tested in accordance with IS:101 IS:2074, Defence specification DEF 1053 and Appendices 1 &2 to this specification, shall have the properties as below:

10.1 Specific Gravity

1.2 ± 0.2

10.2 Drying Time

Surface dry: 2 hours, Max. at ambient temperature

Hard dry : 16 hours, Max. at ambient temperature

Tack free : 24 hours, Max at ambient temperature

Hard dry : 1 hour, Max at 90 ± 10° C in oven with 15 minutes flash off time.

10.3 Consistency

40 to 70 seconds 27 ± 2° C in FC4 Cup.

10.4 Fineness of Grind

6 minimum on Hegman's gauge.

10.5 Gloss at 60°

90 percent, Minimum 10.6 Scratch Hardness on Mild Steel Panel After the paint film is cured for 7 days at ambient temperature and tested under a load of 2,000 ± 200 gram.

No such scratch as to show the bare metal shall be produced.

10.7 Flexibility and Adhesion

The paint film shall not show sign of damage, detachment or cracking when tested after 7 days curing at ambient temperature.

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10.8 Resistance to Salt Spray (CI.5.2.IS;2074)

The panel prepared from the material shall show no signs of corrosion after continuous exposure for 4 days in Salt Spray Cabinet.

10.9 Impact Test (Defence Spec.1053)

The film shall not show any sign of damage.

10.10 Resistance to transformer oil at 90 deg.C ± 2 degree C for 48 hrs

Shall not show any sign of deterioration.

10.11 Chemical and Thermal Resistance Test (Appendix -I) Type Test

Panels prepared and tested in accordance with Appendix-I to this specification, when kept in the SHELLSOL-H (or equivalents)vapour at 130⁰ C for 72 hours, shall not show any sign of deterioration.

10.12 Pot Life (Appendix-2)

8 to 24 hours.

11.PROPERTIES ON BASE ENAMEL:

11.1 Pigment And Non-Volatile Matter Content

60 percent, Min (by weight of the base paint).

11.1.1 Pigment;

15 percent Min.(by weight of the base paint)

11.1.2 EPOXY Resin Content;

30 percent, Min.(by weight of the base paint after finding the pigment and non-volatile matter content).

12.TYPE APPROVAL:

12.1 Samples

Samples for Type Approval testing shall be accepted only from those manufacturers whose manufacturing and testing facilities are considered satisfactory to ensure continuous supply of good product.

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12.2 Type Test:

12.2.1 Outdoor durability test (Annexure-D.IS 2932-1993)

Painted panels prepared as per Annexure D, but with the primer and finish paints as per this specification and tested as per D-3 of IS:2932-1993 shall satisfy the requirements laid down D 3.3 for at least 12 months after painting.

13.KEEPING PROPERTY:

When stored in a covered dry place in the original sealed containers under normal temperature conditions, the base and accelerator when mixed in appropriate proportions 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.

14.INSPECTION AT SUPPLIER'S WORKS:

Whenever specified, tests and inspections are to be conducted in the presence of BHEL's representative. The supplier shall offer BHEL's representative all reasonable facilities, without charge to satisfy the later that the material is being furnished in accordance with this specification. The supplier shall prepare and provide necessary test specimens for testing to be carried out at his premises. If facilities are not available at his works, the supplier shall make necessary arrangements for carrying out the prescribed tests else-where. The supplier shall notify BHEL in advance about the readiness of the material for inspection and testing. BHEL reserves the right to test the material at BHEL's works and the final acceptance of the material shall be based on these test results.

15.TEST CERTIFICATES:

Unless otherwise stated, three copies of Test Certificates shall be supplied giving the following information: In addition the supplier shall ensure to enclose one copy of Test Certificate along with their despatch document to facilitate quick clearance of the material.

TRE/168 : Chemical and Thermal Resistant Epoxy Enamel

BHEL Order No.

Supplier's Name and Trade Mark, if any.

Batch No.

Date of Manufacture and Expiry

Test Results of Clauses 10 &11.

16.PACKING AND MARKING:

Unless otherwise stated, base and accelerator shall be packed separately in steel containers of appropriate capacities .

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Each container shall bear the following information:

- TRE/ 168 : Chemical and Thermal Resistant Epoxy Enamel
- BHEL Order No.
- Manufacturer's/Supplier's Name.
- Trade Mark,if any.
- Batch No.
- Date of Manufacture and Expiry
- Quantity.

17.REJECTION AND REPLACEMENT:

If the material does not comply with the requirements of this specification during receipt inspection at BHEL or if any defect is found during further processing of the material, BHEL reserves the right to reject the whole consignment not withstanding any previous certification of satisfactory testing and/or inspection. The supplier shall undertake to replace the rejected material at his own cost and the rejected material shall be taken back by the supplier after fulfilling all the commercial terms and conditions..

APPENDIX -I

CHEMICAL AND THERMAL RESISTANCE TESTS (Clause 10.11)

Take a panel of 150 x 150 mm mild Steel, emery and degrease with xylol to remove dirt, oil and grease, if any. Apply a coat of epoxy finishing paint and allow to oven dry at $90 \pm 10^{\circ}\text{C}$. Apply a second coat of epoxy paint to get uniform coating and allow to dry for 72 hours. Weight the painted panel and expose the panel in the chamber of SHELLSOL-H vapours at 130 deg.C under vacuum for 72 hrs. At the end of 72 hrs takeout the panel from the chamber and observe for any deterioration in paint film i.e .blisters, paint film softening and colour change etc. and weight the panel again. The paint passes the test if no discolouration, softening , blistering in paint film takes place and weight loss is not more than 50 mg.

APPENDIX-2

DETERMINATION OF POT LIFE (Clause 9.12)

About 100 ml of the mixed paint prepared by mixing the base and accelerator in the recommended proportions is taken in a beaker. The paint shall be such that it should be usable by brush under a specified pot life of 8-24 hours at room temperature. In order to see if the paint has gelled or not, a small quantity of the mixed paint is dissolved in the recommended thinner. It should not dissolve if the paint has gelled and vice-versa.

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