










R.F.F.	COMP. drg	<div><div>बीएसईएल</div><div>BHEL</div></div>	TITLE: - FULL GLOSSY POLYURETHANE FINISHING PAINT		TRE/165	
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COPYRIGHT AND CONFIDENTIAL The Information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the Company.		<p>1.0 SCOPE This specification governs the quality requirements of air / oven drying Aliphatic Polyurethane Finishing Paint (Two pack system). This is recommended for exterior applications where it is desirable for gloss and colour retention for long periods, chemical and corrosion resistance. This paint is suitable for both brush and spray application. The paint shall be compatible on surface primed with epoxy primer as per TRE / 166 and intermediate MIO paint as per TRE / 167.</p> <p>2.0 APPLICATION Suitable for use on exterior surfaces of Transformer to retain colour and gloss for longer period in addition to provide excellent chemical and corrosion resistance. Suitable for vapour phase drying operation of Transformer in solvent vapour Shellsol – H at 130⁰ C for 96 Hrs after oven drying at 90 ± 10⁰ C with flash off time of minimum 1 Hrs.</p> <p>3.0 COLOUR As specified on BHEL order.</p> <p>4.0 COMPLIANCE WITH NATIONAL STANDARDS There is no Indian Standard covering this material</p> <p>5.0 FINISH Smooth and Full Glossy.</p> <p>6.0 FREEDOM FROM DEFECTS The components of the paint shall remain free from defects like hard settling of pigments, skinning, livering (excessive viscosity build up) when kept in closed container till its shelf life. The dried paint film shall be free from defects like bittyness, floating of pigments, surface haze, orange peeling, colour fading, wrinkles etc.</p> <p>7.0 CHEMICAL COMPOSITION The paint consists of two components enamel and a hardener solution to be mixed by volume. The base contains acrylic resin and light fast pigments and hardener contains aliphatic iso-cyanate adduct. The mixing ratio of base and hardener shall be as per supplier's recommendation.</p> <p>The content and nature of the components shall be strictly same as type approved sample. This shall be confirmed by IR spectrography / thin layer chromatography by supplier and report should be provided. The paint shall confirm to the all requirements of ISO 14001 and shall be free from lead/ lead components.</p>				
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COPYRIGHT AND CONFIDENTIAL The Information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the Company.		8.0 TEST SAMPLES Tender samples will not be required when once the type approval is given and the supplier concerned declares that the material for which the tender is given of the same quality as the type approved sample. Sampling of paint shall be done as per IS: 101.				
		9.0 TEST METHODS Unless otherwise specified, the samples shall be tested in accordance with relevant part and section of IS 101.				
		9.1 PROPERTIES 9.1.1 Drying Time @ 30⁰ C (IS 101 Part 3, Sec 1/86) a) Surface dry : 90 Minutes b) Hard dry : 6.0 hours Max. c) Full cure : 7 days Note : In case of oven drying, hard dry to be 1 hr at 90 ± 10 ⁰ C after flash off time of 30 minutes at room temperature. 9.1.2 Consistency (IS101 Part1, Sec 5 /89) Smooth & Uniform suitable for brush or spray application by thinner addition Mix Viscosity : Min 125 gm @30 ⁰ C by Stormer Thinner Intake (By Volume) Air Spray : 15-45 % Air less Spray : 5-15% 9.1.3 Fineness of grind (IS 101 Part 3 Sec 5) 10 microns, minimum 9.1.4 Gloss at 60 ° Gloss Head (IS 101 Part4 Sec 4) 85 minimum 9.1.5 Scratch Hardness at 75 micron DFT after full cure for 7 days under load of 2000 gms, min (IS 101 Part 5 Sec 2) No such scratch as to show the bare metal 9.1.6 Adhesion test by pull off using UTM adhesion tester (ISO-4624) Minimum 8 MPA when applied at 75 micron DFT on suitable primer or intermediate conforming to TRE/166 & TRE/167 and tested after 7 days of air drying. 9.1.7 Mass per 10 litres (IS 101 Part 1, Sec7 /87) 10.0 kg, minimum				
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

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COPYRIGHT AND CONFIDENTIAL The Information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the Company.		10.1 Samples Samples for type approval testing shall be accepted only from those manufactures whose manufacturing and testing facilities are considered satisfactory to ensure continuous supply of good product.				
		10.2 Type Test				
		10.2.1 Accelerated Tests (IS: 13213): Tests shall be conducted as per procedure given below for chemical resistance to Sulphuric acid, Caustic potash, Oil & Solvents and the result shall not show any signs of bittyness, floating of pigments, surface haze, orange peeling, colour fading, wrinkles etc. Gloss retention shall be minimum 50 percent of the original gloss value. There will be no appreciable change in colour.				
		PROCEDURE: <div><div>1. The preparation of panels shall generally be in accordance with IS 101 (Part 1/Sec 3): 1986.</div><div>2. Apply one coat of epoxy zinc phosphate primer (two-pack) as per TRE 166 at minimum 40 microns dry film thickness by spraying and allow to dry for 90 ± 10 C for 1 hours. Dry rub with emery paper No. 400 and wipe clean with a dry soft cloth.</div><div>3. Apply one coat of epoxy surfacer MIO (two-pack) as per TRE 167 at minimum 75 microns dry film thickness by spraying and allow to dry for at least 16 hours. Wet rub with waterproof emery paper No. 400 and allow to dry.</div><div>4. Apply one coat of full gloss polyurethane enamel (two-pack) as per TRE 165 at minimum 50 microns dry film thickness by spraying and allow to air dry for 7 days.</div></div> Note: For immersion tests prepare and paint both sides of the panels and protect the edges of the panels by sealing with MIO paint (TRE 167). Resistance to Sulphuric acid: Immerse 3/4 th of the panel in 30% sulphuric acid for 24 hours. Remove the panel, wash in running fresh water and allow it to dry for an hour. Resistance to Caustic potash: Immerse 3/4 th of the panel in 20% solution of potassium hydroxide for 24 hours. Remove the panel, wash in running fresh water and allow it to dry for an hour. Resistance to Oil: Immerse 3/4 th of the panel in a hot insulating oil as per IS 335 at 130 ⁰ C for 24 hours. Remove the Panel and wipe the excess oil with cotton, wash it with mineral turpine and allow to dry for 30 minutes.				
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<p>Resistance to Solvents: Test one panel each for resistance to xylene, ethanol, acetone and Shellsol - H respectively.</p> <p>1. For Xylene, Ethanol, and Acetone: Take three panels i.e. one for each solvent. Take a clean white sterilized cotton and soak it in the solvent and place it on the painted panels without squeezing the cotton. Immediately cover the soaked cotton with a suitable watch glass and leave it for 24 hours. Remove the watch glass and the soaked cotton, wipe the area with clean dry cotton.</p> <p>2. For Shellsol-H: Keep the painted panel in chamber filled with Shellsol – H solvent vapours at 130⁰ C for 96 hours. If this testing facility is not available with the vendor then four nos. painted panel which shall be prepared as per above procedure shall be submitted for further testing in BHEL.</p> <p>10.2.2 Durability Test</p> <p>10.2.2.1 Normal Outdoor Exposure Test: Preparation of panels for the test and tests shall be as per procedure given in Annexure 1.</p> <p>Test panels shall be exposed at an angle of 45⁰ facing south. The test shall satisfy the requirements laid down for at least 12 months after painting.</p> <p>10.2.2.2 Accelerated Weathering Test (1000 Hr) The test shall satisfy the requirement laid down, after 1000 hrs as under</p> <p>(a) Atlas Weathero meter : Xenon Arc Cycle : 102 min dry with continuous radiation followed by 18 minutes water spray as per ASTM G 26-96. Irradiance : 0.50±0.01 watt / sq.m/nm at 340</p> <p>(b) QUV 313-B (ASTM/G-53) Cycle: 4 hours UV @ 50±1 °C temp. & 4 hours condensation @45 ±1 °C</p> <p>The requirement of the test shall be taken to have been satisfied if the performance in respect of the film characteristics is within the limits specified below:</p> <p>1) Gloss : The film shall have a minimum gloss retention of 90% of the original value.</p> <p>2) Colour : The film shall have no appreciable change in colour.</p> <p>3) Freedom from Checking, Cracking, Flaking, Chalking, Spotting, Blistering and corrosion.</p>						
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COPYRIGHT AND CONFIDENTIAL The Information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the Company.		<p>NOTE:</p> <p>a) Test certificate of Cl.10.2.1 & 10.2.2 shall be forwarded by the supplier in line with IS:13213 and IS:8662 at the time of type approval. While supplying the material supplier shall furnish these test certificates after every three years.</p> <p>11.0 TEST CERTIFICATES</p> <p>Unless otherwise stated, three copies of test certificates shall be supplied along with each consignment.</p> <p>In addition, the supplier shall ensure to send one copy of test certificate along with their despatch documents to facilitate quick clearance of the material.</p> <p>The test certificate shall bear the following information: TRE / 165 : Full Glossy Polyurethane Finishing Paint. BHEL Order No. Manufacturer's / supplier's name. Trade mark, if any. Batch / lot no. Quantity supplied. Date of manufacture and expiry. Test results of clause 7,9 and 10. T.C.No & date Mixing ratio</p> <p>12.0 KEEPING PROPERTIES</p> <p>When stored under cover in a dry place in the original sealed container under normal temperature conditions, the base and accelerator shall retain the properties of the mixed paint prescribed in this specification for period of not less than 12 months after the date of manufacture which shall not be earlier than one month of the scheduled delivery date mentioned in BHEL order.</p> <p>13.0 PACKING & MARKING</p> <p>Unless otherwise stated, base and accelerator shall be packed separately in steel containers of appropriate capacities. Each container shall bear the following information:</p> <p>TRE/165 : Base / Accelerator for Full Gloss Polyurethane Finishing Paint. BHEL Order No. Manufacturer's / supplier's name. Trade name mark, if any. Batch/lot no. Date of manufacture and expiry. Quantity supplied. Mixing ratio</p>				
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COPYRIGHT AND CONFIDENTIAL The Information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the Company.		14.0 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.				
		15.0 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 notwithstanding 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 the entire commercial terms and conditions.				
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ANNEXURE 1 (Cl: 10.2.2.1)						
PROCEDURE OF DURABILITY TEST:						
PREPARATION OF TEST PANELS:						
<p>The panel shall be mild steel plate of 1.25 to 3.15 mm thick and free from surface defects. Size of the panel for out door exposure test shall be 300mm x 300mm and for the Accelerated weathering test 150mm x 150mm. Panels shall be cleaned and the back and edges of the panels shall be protected with two coats of a suitable paint. The surface of the test panels to be exposed shall be prepared as follows, taking care that total dry film thickness of the complete system shall be between 75 and 150 microns. Oven drying of films shall be done at temperature 90 ±10⁰ C and at a relative humidity of 65 ±5 percent.</p>						
<p>a) Apply one coat of ready mixed paint red oxide zinc phosphate primer by brushing and allow to oven dry at 90 ±10⁰ C for 1 hour.</p>						
<p>b) Rub down lightly with waterproof emery paper No.280/330, wipe off the surface with a clean and dry soft cloth and then apply by brushing one coat of the under coating enamel and allow it to dry for 24 hours.</p>						
<p>c) Rub down, wet, with water proof emery paper No.280/320 wipe off the surface with a clean and dry soft cloth and then apply by brushing one coat of the finishing enamel and allow it to oven dry at 90 ±10⁰ C for 1 hour.</p>						
<p>d) Rub down, wet, with water proof emery paper No.220, wash and wipe off water, and when the surface is dry, apply by brushing a second coat of the finishing enamel and allow it to dry for 7 days before subjecting to exposure test.</p>						
OUT DOOR EXPOSURE TEST:						
<p>Expose in open the test panels prepared as above in duplicate at an angle of 45 o facing south. Examine the condition of the exposed films at monthly intervals for the first quarter and thereafter quarterly for the rest of the period for the properties gloss, colour, checking, cracking, flaking, chalking</p>						
<p>For the above examinations, wash the right hand half of the surface of the two test panels by pouring water and then wiping with a soft cloth or chamois leather. Examine the same half of the test panel at each examination At the end of the stipulated period for durability test examine the two halves of the test panels. The sample shall be considered satisfactory if the material surface underneath as well as condition of the film in both the halves, the one washed periodically as well as the one washed only for the final examination is satisfactory by the method of evaluation given below. Stray film failure due to extraneous causes other than climatic shall be ignored.</p>						
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<p>Evaluation and Rating of Film Characteristics:</p> <p>a) Gloss: Specular 45 o and 60 o head glossometer reading.</p> <p>b) Colour: The initial rating for a good colour match shall be 10. The colour Retention on exposure shall be expressed and recorded as the abbreviation of the type of colour change followed by numerical rating as follows:</p> <p>RATING TYPE OF COLOUR CHANGE</p> <p>10 - Good match D - Darkening 9 - Satisfactory F - Fading 8-7 - Slight colour change B - Blueing 6-5 - Definite colour change R - Reddening 4-3 - Bad colour change Y - Yellowing 2-1 - Very bad colour change L - Loss of colour 0 - Complete colour change</p> <p>c) Checking: Freedom for checking shall be rated as 10 for no checking and 0 for most severe and complete checking.</p> <p>d) Cracking: Freedom for cracking shall be rated as 10 for no cracking and 0 for most severe and complete cracking.</p> <p>e) Flaking: Freedom for flaking shall be rated as 10 for no flaking and 0 for most severe and complete flaking.</p> <p>f) Chalking: Freedom for chalking shall be rated as 10 for no chalking and 0 for most severe and complete chalking.</p> <p>g) Spotting: Freedom from spotting shall be rated as follows:</p> <p>Numerical value Rating</p> <p>10 No spotting 9 Satisfactory 8-7 Slight spotting 6-5 Definite spotting 4-3 Bad spotting 2-1 Very bad spotting 0 Complete spotting</p> <p>h) Blistering and Corrosion: The film shall remain generally free from blisters and the metal underneath shall show no signs of corrosion on exposure for 12 months. A few isolated blisters without any signs of corrosion underneath as well as one or two localized corrosion and/or rust spots shall not constitute a cause of failure.</p>						
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