Bharat Heavy Electricals Limited
Piping Centre Chennai-17
ENGINEERING AND R&D

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Standard Technical Specification for Glass Flake Reinforced Ambient cure Polyester Acrylic Polimer Coating for Internal surface of steel pipes handling sea-water

APPLICABLE TO UTILITY AND INDUSTRIAL UNITS

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1 SCOPE

This specification covers the technical details of the two-component glass flake reinforced ambient cured polyester coating, its method of application, surface preparation requirements, testing requirement and QA/inspection criteria.

The glass-flake reinforced polyester coating material lining process shall be carried out at lining applicator's works before the internally lined pipes and components are dispatched to site, where only field joints are to be carried out at the previously planned cut-back portion of the pipes and components. In exceptional cases large diameter fittings and specialities may be allowed to be internally lined at site-fabrication yard/in-situ through automatic/semi-automatic or manufacturer recommend means to achieve same level of finish and quality as done in shop.

2 PRODUCT SPECIFICATION

The product (coating material shall be high build, fast cure anti-corrosive coating meant for application in aggressive corrosion environment like sea-water application in the internal surfaces of pipes.The recommended working "Volume Solids" is 85% or it should be as recommended by manufacturer. Method of application of this coating material by Airless spray technique and in exceptional cases of unforeseen encounter with "pits" in metal, through brush to ensure proper treatment.

The following recommended test data may be adhered to for the coating material. The same will be reviewed and approved by BHEL.

Coating thickness shall be 1000 micron (DFT) minimum.

Test type	Test Method	Specification Details	Typical Results
Cathodic Disbondment	ASTM G8 "Cathodic Disbonding of Pipeline Coatings" Method A	2x600 micron DFT applied directly to SA 2.5 blasted steel.	Typically less than 1 mm disbondment following 30 days exposure
Immersion	IS 2812 Part 2 (Modified)- "Resistance to sea water immersion @ 40 Deg C.	1x500 micron DFT applied directly to SA 2.5 blasted steel.	No film defects following 8000 hours exposure.
Salt Spray	ISO 7523-Resistance to neutral salt spray (fog) @ 35 Deg C.	2x600 micron DFT applied directly to SA 2.5 blasted steel.	No film defects, and no rust creep at the scribe following 6000 hours exposure.
Abrasion	ASTM D 4060-"Abrasion Resistance of coatings via the Taber Abraser"	1x500 micron DFT applied directly to SA 2.5 blasted steel.	Average of 224 mg weight loss per 1000 cycles using H18 wheels and a 1 Kg loading.
Adhesion	ISO 4624-"Pull off test for adhesion" using portable adhesion testers.	2x500 micron DFT applied directly to SA 2.5 blasted steel.	Not less than 7 MPa (1015 psi) when using a PAT Model GM 01 hydraulic adhesion tester on 5mm thick steel.
Elongation @ Break	BS 6319 Part 7	1 x 500 micron DFT "free film"	Elongation 0.61%
Impact	BS 3900 Part E3	1x500 micron DFT applied directly to SA 2.5 blasted steel.	Direct impact Resistane-6.5 Joules

Tensile Strength	BS 6319 Part 7	1x500 micron DFT "free film"	An average of 210 Kg/cm2 is required to achieve fracture of the coating.

3 SURFACE PREPARATION

All surfaces to be coated should be clean, dry and free from contamination. Prior to paint application all surfaces should be assessed and treated in accordance with ISO 8504:1992. Wherever necessary, the weld spatters are to be removed and wherever required weld seams and sharp edges are to be smoothened. Oil and grease shall be removed in accordance with SSPC SP1 Solvent cleaning.

The lining shall only be applied on surfaces prepared by abrasive blast cleaning to SA 2½ (ISO 8501-1:1988) or SSPC-SP-10. A sharp, angular surface profile of 75-100 microns (3-4 mils) shall be achieved.

The lining shall be applied before oxidation of the steel occurs. If oxidation does occur the entire oxidized areas should be reblasted to the standard specified above. Surface defects revealed by blast cleaning process, should be ground, filled or treated in the appropriate manner. Surfaces must be primed with suitable primer before oxidation occurs. Chlorides are also to be removed before blast cleaning,

4 PRIMING

Priming shall be done with a priming material suitable for the coating/lining material being applied and usually should be between 15-50 micron DFT (0.6-2 mils) or as recommended by manufacturer. Priming shall be done before oxidation of blasted surface starts to set in. Coating/lining material shall be applied on primed surface within the time frame recommended strictly by the coating/lining material manufacturer.

5 COATING

The coating material shall be applied in requisite thickness in accordance with recommended working procedure for application by manufacturer and shall be done by Airless spray technique within the recommended temperature and humidity range.

6 FIELD JOINTING

Field jointing shall be undertaken by the applicator agency strictly as per the recommended instruction of the manufacturer with stipulated "cut-back/"hold-back" dimensions earmarked for such jointing and abrasion/cleaning procedure.

7 INSPECTION AND TESTING

7.1 All work under this specification shall be subject to inspection by BHEL or its representatives. All parts of work shall be accessible. The bidder shall correct such work as is found defective under the specifications.

7.2 The following tests shall be made by the applicator prior to during and after priming and coating application.

7.2.1 Blast surface profile using elcometer 123 or equivalent surface profile gauge. The average of readings from five randomly selected areas shall constitute the average surface profile. Test area to be flat (without culvature).

7.2.2 The dry film thickness shall be checked with a magnetic mil gauge (positest by Defeisko or equivalent). The average of readings from five randomly selected areas shall constitute the film thickness. Individual readings shall not vary by more than 25% from the mean.

7.2.3 Holidays testing using high voltage holiday detector (Tinker Rasor or equivalent) as per NACE International RP 0188-90 "Holiday Testing". Coating to have cured at least 24 hours prior to holiday test. Due care should be taken not to use voltage exceeding the dielectric strength of the coating. The location of the holidays shall be noted on the coated surface for repair.

7.3 Pull of Adhesion to stell shall be measured using Elcomeer/ Postitest / Equivalent adhesion tester as per ASTM D 4541. Average reading from three (3) randomly selected spots shall constitute one test and shall be at least 10 (ten) N/mm2. Adhestion test shall be carried out on fully cured coating (7 days at 25 Deg C) & on flat (without curvature) test area.

Minimum 5 nos. tests shall be carried out in one (1) Km at locations desired by Engineer in charge/site engineer/Project Manager on behalf of Employer. If the adhesion is not satisfactory, a systematic inspection (adhesion test) of all pipe shall be carried out and all pipes not meeting this adhesion requirement shall be rejected. Damaged test areas of acceptable pipe shall be repaired as indicated in clause above. The rejected pipes shall be cleaned by blasting and re-coated.

7.4 All previously carried out test-certificates on material shall be furnished for Employer's scrutiny that have done already by manufacturer.