MATERIAL AND EQUIPMENT STANDARD

FOR

EPOXY - POLYAMIDE PRIMER

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1. SCOPE

This Standard Specification which is generated from SSPC-Paint 22 covers the minimum requirements for the composition, analysis, properties, storage life and packaging, inspection and labeling of Epoxy Polyamide Primer.

2. REFERENCES

Throughout this Standard the following standards and codes are referred to. The edition of these standards and codes that are in effect at the time of publication of this Standard shall, to the extent specified herein, form a part of this Standard . The applicability of changes in standards and codes that occur after the date of this Standard shall be mutually agreed upon by the Company and the Vendor.

SSPC (STEEL STRUCTURES PAINTING COUNCIL)

SSPC 22 "Epoxy-Polyamide Paint (Primer)"

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

(Specifications for Ingredients)

D331 "2-Ethoxy Ethanol"

D364 "Industrial Grade Xylene"

D605 "Magnesium Silicate Pigments"

D607 "Wet Ground Mica Pigment"

D1153 "Methyl Isobutyl Ketone"

D1648 "Basic Lead Silico-Chromate"

D3722 "Natural Red and Brown Iron Oxides"

(Specifications for Packaging)

D3951 "Standard Practice for Commercial Packaging"

(Test Methods for Properties)

B117 "Salt Spray (Fog) Testing"

D522 "Elongation of Attached Organic Coatings with Conical Mandrel Apparatus"

D562 "Consistency of Paints Using the Stormer Viscometer"

D610 "Evaluating Degree of Rusting on Painting Steel Surfaces"

D714 "Evaluating Degree of Blistering of Paints"

D1210 "Fineness of Dispersion of Pigment Vehicle Systems"

D1310 "Flash Point of Liquids by Tag Open Cup Apparatus"

D1475 "Density of Paint, Varnish, Lacquer, and Related Products"

D1640 "Drying, Curing, or Film Formation of Organic Coatings at Room Temperature"

D1652 "Epoxy Content of Epoxy Resins"

D1654 "Evaluating Painted or Coated Specimens Subjected to Corrosive Environments"

D2369 "Volatile Content of Paints"

UFS(US FEDERAL STANDARDS)

MIL-P-24441 "Paint, Epoxy-Polyamide, General Specification for"

ANSI(AMERICAN NATIONAL STANDARDS INSTITUTE)

ANSI Z129.1 "Precautionary Labeling of Hazardous Industrial Chemicals"

IPS (IRANIAN PETROLEUM STANDARDS)

IPS-E-TP-100 "Paints"

3. UNITS

International System of Units (SI) in accordance with IPS-E-GN-100 shall be used.

4. COMPOSITION

4.1 Ingredients and Proportions

Ingredients and proportions of the reference formulations shall be as specified in Table 1.

4.2 Percentage

The primer contains approximately 65% by volume of nonvolatile film forming solids (pigment and binder).

4.3 The curing agent component of primer shall contain a liquid type polyamide resin and volatile solvent. The polyamide resin shall be a condensation product of dimerized fatty acids and polyamines.

TABLE 1 - COMPOSITION OF REFERENCE FORMULATION

INGREDIENTS	PRIMER kg	PRIMER Lit.	STANDARDS ASTM
BASE COMPONENTS:			
BASIC LEAD SILICO CHROMATE	195	47.8	D1648
RED IRON OXIDE	7.7	1/7	D3722
MAGNESIUM SILICATE	38.5	13.5	D605
MICA	12.7	4.5	D607
ORGANO MONTMORILLONITE	3.6	2.1	—
95/5 METHANOL/WATER	1.4	1.5	—
EPOXY RESIN	90.3	76	—
LEVELING AGENT	4.5	4.5	—
METHYL ISOBUTYL KETONE	19.5	24.4	—
XYLENE	57.1	65.7	—
2 - ETHOXY ETHANOL	30.4	32.8	—
TOTALS (BASE COMPONENTS)	460.7	274.5	—
CURING AGENT COMPONENTS:			
POLYAMIDE RESIN	48.6	50	—
XYLENE	47.2	54.2	—
TOTALS (CURING AGENT COMP.)	95.8	104.2	—
TOTALS (FORMULATION)	556.5	378.7	—

5. ANALYSIS

The primer shall conform to the composition (analysis) requirement of Table 2.

TABLE 2 - ANALYSIS

CHARACTERISTICS	PRIMER Min.	PRIMER Max.	STANDARDS ASTM
Nonvolatiles,% by weight	65	—	D2369

6. PROPERTIES

6.1 The epoxy resin shall meet the requirements of Table 3 and Sections 6.2 through 6.9.

6.2 The undiluted polyamide resin shall meet the requirements of Table 4.

6.3 The primer supplied under this specification shall be comparable in performance to the reference formulations of Table 1. It need not be composed of the quantities and types of ingredients given in Table 1. However, if substitutions of other ingredients are made, the primer shall meet the performance requirements of this specification.

6.4 After combining the base and curing agent components, the primer, shall conform to the requirements of Table 5.

6.5 Each Component of this primer based on the specified ingredients shall be uniform stable in storage, and free from grit and coarse particles.

6.6 Solvent Resistance

The development of solvent (methyl ethyl ketone) resistance is required as an indication of satisfactory cure and subsequent chemical resistance. Apply the primer by spray or brush to a clean test panel so that a dry film thickness of 50-75 microns per coat is obtained. Air dry the panel for five days at 25±2°C and relative humidity of 40%-50%. Following the curing period, saturate a small cotton ball with methyl ethyl ketone and place on the test panel under a watch glass for 30 minutes. After a ten minute recovery period, determine the pencil hardness of the coating. The minimum allowable rating is 7B.

Determine pencil hardness as follows:
Using a series of drawing leads (either wood clinched or secured in a mechanical holder), expose approximately 6 mm of lead. With a rotary motion square the point of the lead against No. 400 grit paper. Hold the lead at approximately 45° and push forward against the film using a pressure just short of breaking the lead. If penetration is not made, repeat using the next harder lead until penetration is made. Rate the film by indicating the hardest lead that does not penetrate.

6.7 Test Panel

Test panels shall be carbon steel minimum size 10 cm × 20 cm × 31 cm unless otherwise specified. They shall be blast cleaned in accordance with SSPC-SP 10. AIR drying and test conditions shall be at 25 ± 2°C and 40% -50% relative humidity.

6.8 Salt Spray Resistance

Prepare at least two test panels as in Section 6.7 and apply one prime coat at 63-75 microns dry film thickness. Air dry five days. Protect the backs and edges. Scribe the panels as per ASTM-D-1654 to base metal and expose for 500 hours at five percent salt spray in accordance with ASTM-B117. During the test, the panels shall be inclined at an angle of 15

degrees off the vertical. At the end of the test period, the primer shall have a minimum rust grade rating of "8". Blistering shall be no more that Blister Size No. 4, few photographic standards SSPC-Vis2, "Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces", or ASTM D 610 may be used for rusting, and ASTM D 714 may be used for blistering.

6.9 Elcometer Adhesion Test

Prepare test panels as in Section 6.7 using 6 mm thick steel plate.

Apply primer at 50-75 microns dry film thickness per coat in accordance with the following schedule.

COATING	SUBSTRATE	DRYING TIMES
Primer	**Steel**	**Five days**
Intermediate	**Primer**	**72 hours for prime** **72 hour for intermediate**
Topcoat	**Primer and intermediate**	**72 hours for primer** **72 hours for intermediate** **Five days for topcoat**

The adhesion of the prime coat to the substrate, intercoat adhesion, or cohesion of any coat of the painting system shall be determined by the adhesion tester 156 kg. Prepare test panels as described above. Lightly sand the coating surface and aluminum dolly, and apply a quick set adhesive containing Alpha Cyanoacrylate. Allow the adhesive to cure overnight. Scribe the coating and adhesive around the dolly prior to testing. Make a minimum of three trials and report the average. An average of 280,000 Kg/square meter is considered acceptable.

TABLE 3 - EPOXY RESIN ANALYSIS

CHARACTERISTICS	REQUIREMENTS Min.	Max.	ASTM METHOD
EPOXIDE EQUIVALENT	450	550	D1652
COLOR, GARDNER (40% IN BUTYL CARBITOL)		4	D1544

TABLE 4 - POLYAMIDE RESIN ANALYSIS

CHARACTERISTICS	REQUIREMENTS Min.	Max.	ASTM METHOD
AMINE VALUE[1]	230	250	—
COLOR, GARDNER	—	8	D1544
SPECIFIC GRAVITY	0.96	0.98	D1475
VISCOSITY, BROOKFIELD, AT 75°C, POISES	31	37	—

1 PERCHLORIC ACID TITRATION

TABLE 5 - PROPERTIES

CHARACTERISTICS	PRIMER Min.	Max.	STANDARDS ASTM
PAINT CONSISTENCY			
VISCOSITY SHEAR RATE 200 rpm			
GRAMS	120	220	
KREB UNITS	65	85	D562
DENSITY Kg/Lit	1.4	1.5	D14175
FINENESS OF GRIND, MICRONS	65		D1210
" " HEGMAN UNITS	3.0	—	—
DRYING TIME (24°C 45 % R. H.)			
TACK - FREE, HOURS	—	2	D4640
DRY HARD, HOURS	—	5	
DRY THROUGH, HOURS	—	8	
FLASH POINT °C	27.2	—	D1310

7. STORAGE LIFE AND PACKAGING

7.1 Condition in Container

POT LIFE: Determine pot life of the individual coatings as follows: Thoroughly mix half a litre (25±2°C) for eight hours. At the end of this time there shall be no evidence of gelation. The coatings shall be in a free flowing condition and brushable without thinning.

Note:

When mixing larger volumes, more heat will develop with a resultant shortening of the pot life.

7.2 Packaging

The packaging shall meet the relevant requirement of ASTM D3951(88)

8. INSPECTION

8.1 All materials supplied under this specification shall be subject to timely inspection by the purchaser or his authorized representative. The purchaser shall have the right to reject any material(s) supplied which is (are) found to be defective under this specification. In case of dispute, the arbitration or settlement procedure, established in the procurement documents shall be followed.

8.2 Samples of any or all ingredients used in the manufacture of this paint may be requested by the purchaser and shall be supplied upon request, along with the supplier's name and identification for the material.

8.3 Unless otherwise specified, the methods of sampling and testing should be in accordance with US Federal Test Method Standard No. 141, or applicable methods of the American Society for Testing and Materials (ASTM).

9. LABELING

9.1 Refer to ANSI Standard Z129.1 Precautionary Labeling of Hazardous Industrial Chemicals.

9.2 Marking of Containers

Each container of each component shall be legibly marked with the following information

Name: Epoxy-Polyamide Primer .....
Specification: IPS-M-TP-215 .....
MESC No.: .....
No of components: .....
Maximum temperature resistance: .....
Type of spray: .....
Kind and size of spray nozzletip: .....
Cleaning material: .....
Flash point °C: .....
Pot life (hours): .....
Drying time for overcoating: .....
Kind of thinner: .....
Color: .....
Lot Number: .....
Stock Number: .....
Date of Manufacture: .....
Quantity of Paint in Container: .....
Information and Warnings,if needed,: .....
Manufacturer's Name and Address: .....
Design Guide: For guidance on the usage of this Paint for Various application/environments and temperature range, reference shall be made to IPS-E-TP-100.

9.3 Directions for Use

The manufacturer shall supply complete instructions covering uses, surface preparation, mixing, thinning, application method, application conditions, pot life, wet and dry film thicknesses, temperature and humidity limitation, drying time etc.,with each container of paint.

The followings are guidelines for the instructions required.

9.3.1 Mixing and thinning

Each component should be stirred to a smooth homogeneous mixture. Then the proper amount of base and curing agent components, as recommended by the manufacturer, should be added together and mixed thoroughly. After allowing to stand for 30 minutes at 25±2°C the primer may be thinned up to 12% by volume of the total primer for spraying. The primer should be applied within the manufacturer's pot life limitations.

9.3.2 Coating thickness

The primers are usually applied by spray to a dry film thickness of 50-75 microns (two to three mils) per coat.

9.3.3 Cure time between coats

Under normal conditions, each coat should be air dried a minimum of four hours, but no more than 72 hours between application of coats. In very hot weather with surfaces exposed to direct sun-light, it may be necessary to limit the intercoat drying period to 24 hours or less.

Long drying time between coats may cause poor intercoat adhesion. These coatings shall not be applied at temperatures below 10°C.

9.4 Directions for Safety

The following directions for safety shall be supplied with each container of paint:

- Paints are hazardous because of their flammabilty and potential toxicity. Proper safety precautions shall be observed to protect against these recognized hazards. Safe handling practices are required and should include, but not be limited to, the provisions of SSPC-PA Guide 3, "A Guide to Safety in paint Application" and to the following:

- Keep paints away from heat, sparks, and open flame during storage, mixing, and application. Provide sufficient ventilation to maintain vapor concentration at less than 25% of the lower explosive limit.

- Avoid prolonged or repeated breathing of vapors or spray mists, and prevent contact of the paint with the eyes or skin.

- Clean hands thoroughly after handling paints and before eating or smoking.

- Provide sufficient ventilation to insure that vapor concentrations do not exceed the published permissible exposure limits. When necessary, supply appropriate personal protective equipment and enforce its use.

- This paint may not comply with some air pollution regulations because of its hydrocarbon solvent content.

- Ingredients in this paint, which may pose a hazard include lead and Chromate-Containing pigments, hydrocarbon solvents, and plasticizers. Applicable regulations governing safe handling practices shall apply to the use of this paint.