MATERIAL AND EQUIPMENT STANDARD

FOR

EPOXY - POLYAMIDE PRIMER

ORIGINAL EDITION

NOV. 1993

This standard specification is reviewed and updated by the relevant technical committee on May 1999(1) and Dec. 2014(2). The approved modifications are included in the present issue of IPS.

FOREWORD

The Iranian Petroleum Standards (IPS) reflect the views of the Iranian Ministry of Petroleum and are intended for use in the oil and gas production facilities, oil refineries, chemical and petrochemical plants, gas handling and processing installations and other such facilities.

IPS is based on internationally acceptable standards and includes selections from the items stipulated in the referenced standards. They are also supplemented by additional requirements and/or modifications based on the experience acquired by the Iranian Petroleum Industry and the local market availability. The options which are not specified in the text of the standards are itemized in data sheet/s, so that, the user can select his appropriate preferences therein

The IPS standards are therefore expected to be sufficiently flexible so that the users can adapt these standards to their requirements. However, they may not cover every requirement of each project. For such cases, an addendum to IPS Standard shall be prepared by the user which elaborates the particular requirements of the user. This addendum together with the relevant IPS shall form the job specification for the specific project or work.

The IPS is reviewed and up-dated approximately every five years. Each standards are subject to amendment or withdrawal, if required, thus the latest edition of IPS shall be applicable

The users of IPS are therefore requested to send their views and comments, including any addendum prepared for particular cases to the following address. These comments and recommendations will be reviewed by the relevant technical committee and in case of approval will be incorporated in the next revision of the standard.

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GENERAL DEFINITIONS:

Throughout this Standard the following definitions shall apply.

COMPANY:

Refers to one of the related and/or affiliated companies of the Iranian Ministry of Petroleum such as National Iranian Oil Company, National Iranian Gas Company, National Petrochemical Company and National Iranian Oil Refinery And Distribution Company.

PURCHASER:

Means the “Company” where this standard is a part of direct purchaser order by the “Company”, and the “Contractor” where this Standard is a part of contract documents.

VENDOR AND SUPPLIER:

Refers to firm or person who will supply and/or fabricate the equipment or material.

CONTRACTOR:

Refers to the persons, firm or company whose tender has been accepted by the company.

EXECUTOR:

Executor is the party which carries out all or part of construction and/or commissioning for the project.

INSPECTOR:

The Inspector referred to in this Standard is a person/persons or a body appointed in writing by the company for the inspection of fabrication and installation work.

SHALL:

Is used where a provision is mandatory.

SHOULD:

Is used where a provision is advisory only.

WILL:

Is normally used in connection with the action by the “Company” rather than by a contractor, supplier or vendor.

MAY:

Is used where a provision is completely discretionary.

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1. SCOPE

This Standard Specification which is mainly 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.

Note 1:

This standard specification is reviewed and updated by the relevant technical committee on May 1999. The approved modifications by T.C. were sent to IPS users as amendment No. 1 by circular No. 85 on May 1999. These modifications are included in the present issue of IPS.

Note 2:

This standard specification is reviewed and updated by the relevant technical committee on Dec. 2014. The approved modifications by T.C. were sent to IPS users as amendment No. 2 by circular No. 436 on Dec. 2014. These modifications are included in the present issue of IPS.

2. REFERENCES

Throughout this Standard the following dated and undated standards/codes are referred to. These referenced documents shall, to the extent specified herein, form a part of this standard. For dated references, the edition cited applies. The applicability of changes in dated references that occur after the cited date shall be mutually agreed upon by the Company and the Vendor. For undated references, the latest edition of the referenced documents (including any supplements and amendments) applies.

SSPC (STEEL STRUCTURES PAINTING COUNCIL)

SSPC 22	"Epoxy-Polyamide Paint (Primer)"
SSPC PA Guide 3	"A Guide to Safety in Paint Application"
SSPC SP 10	"Joint Surface Preparation Standard"
SSPC VIS2	"Guide and Reference Photographs for Evaluating Degree of Rusting on Painted Steel Surfaces"

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

(Specifications for Ingredients)

D331	"2-Ethoxy Ethanol"
D605	"Magnesium Silicate Pigments" (TALK)
D607	"Wet Ground Mica Pigments"
D1153	"Methyl Isobutyl Ketone"
D1544	"Color of Transparent Liquiedes"
D1648	"Basic Lead Silico-Chromate Pigment"
D3722	"Natural Red and Brown Iron Oxides Pigment"

(Specifications for Packaging)

D3951	"Standard Practice for Commercial Packaging"

(Test Methods for Properties)

B117	"Operating Salt Spray (Fog) Apparatus"
D522	"Mandrel Bend Test of Attached Organic Coatings"
D562	"Consistency of Paints Measuring Kerbunit (ku) Viscosity using a Stormer Type Viscometre"
D610	"Evaluating Degree of Rusting on Painted Steel Surfaces"
D714	"Evaluating Degree of Blistering of Paints"
D1210	"Fineness of Dispersion of Pigment Vehicle System by Hegman-Type Gage"
D1310	"Flash Point and Fire of Liquids by Tag Open Cup Apparatus"
D1475	"Density of Liquid Coatings, Inks, 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 Coatings"

ANSI (AMERICAN NATIONAL STANDARDS INSTITUTE)

ANSI Z400.1/Z129.1	"Hazard Evaluation and Safety Data Sheet and Precautionary Labeling Preparation"

IPS (IRANIAN PETROLEUM STANDARDS)

IPS-E-GN-100	"Units"
IPS-E-TP-100	"Paints"

3. UNITS

This Standard is based on International System of Units (SI), as per IPS-E-GN-100 except where otherwise specified.

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). The theoretical spreading rate for a (63 micrometers) dry film thickness is 10.2 spare meters/liter.

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	kg	Lit.	STANDARDS ASTM
BASE COMPONENTS:			
BASIC LEAD SILICO CHROMATE	195	47.8	D1648
RED IRON OXIDE	7.7	1.7	D3722
MAGNESIUM SILICATE	38.6	13.6	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	76.1	----
LEVELING AGENT	4.5	4.5	----
METHYL ISOBUTYL KETONE	19.5	24.4	D1153
XYLENE	57.2	65.7	D331
2 - ETHOXY ETHANOL	30.4	32.8	----
TOTALS (BASE COMPONENTS)	460.7	274.5	----
CURING AGENT COMPONENTS:			
POLYAMIDE RESIN	48.6	50.0	----
XYLENE	47.2	54.2	----
TOTALS (CURING AGENT COMP.)	95.8	104.2	----
TOTALS (FORMULATION)	556.5	378.7	----

See for more info. SSPC 22.

5. ANALYSIS

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

TABLE 2 - ANALYSIS

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

6. PROPERTIES

6.1 The epoxy resin shall meet the requirements of Table 3.

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 needs 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 and, when incorporated into a painting system, the performance requirements of SSPC – PS 13.01, Epoxy Polyamide Painting system.

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 × 0.31 cm unless otherwise specified. They shall be blast cleaned in accordance with SSPC-SP 10. Near-white blast cleaning 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 than 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 Adhesion Test

Prepare test panels as in Section 6.7 using 6 mm thick steel plate. Apply coatings at 50-75 microns dry film thickness per coat in accordance with the following schedule.

COATING	SUBSTRATE	DRYING TIMES
Primer	Steel	Five days
		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.

6.10 Pot Life

After combining the base and curing agent components determine pot life of the primer as follows: Throughly will half a litre of sample and let stood at (25±2 °C) for eight hours.

Note:

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

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	STANDARDS Min.	Max.	ASTM
PAINT CONSISTENCY			
VISCOSITY SHEAR RATE 200 rpm			
GRAMS	120	220	
KREB UNITS	65	85	D562
DENSITY Kg/Lit	1.4	1.5	D1475
FINENESS OF GRIND, MICRONS	65		D1210
DRYING TIME (24°C 45% R. H.)			
TACK - FREE, HOURS		2	D1640
DRY HARD, HOURS		5	
DRY THROUGH, HOURS		8	
FLASH POINT °C	27.2	---	D1310

7. STORAGE LIFE AND PACKAGING

7.1 Condition in Container

The component of paint shall show no thickening, curdling, gelling, gassing or hard caking after being stored for 12 month from the date of delivery in a tightly covered unopened container.

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.

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 nozzle tip: .....

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: .....

MSDS: .....

Inspection Date: .....

Shelf Life: .....

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 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 sunlight, 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.