MATERIAL AND EQUIPMENT STANDARD

FOR

ZINC OXIDE, IRON OXIDE, RAW LINSEED OIL

AND

ALKYD PRIMER

ORIGINAL EDITION

MAY 1993

This standard specification is reviewed and updated by the relevant technical committee on June 1998(1) and Nov. 2006(2) and Feb. 2012(3). 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 are based on internationally acceptable standards and include 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 document.

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 covers the minimum requirements for the composition, analysis, properties, packaging, inspection and labeling of Zinc Oxide, iron oxide, raw linseed oil and alkyd primers.

Note 1:

This standard specification is reviewed and updated by the relevant technical committee on June 1998. The approved modifications by T.C. were sent to IPS users as amendment No. 1 by circular No. 34 on June 1998. 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 Nov. 2006. The approved modifications by T.C. were sent to IPS users as amendment No. 2 by circular No 308 on Nov. 2006. These modifications are included in the present issue of IPS.

Note 3:

This standard specification is reviewed and updated by the relevant technical committee on Feb. 2012. The approved modifications by T.C. were sent to IPS users as amendment No. 3 by circular No 334 on Feb. 2012. 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) Vol. 2

SSPC-PA Guide3	“Guide to Safety in Paint Application”
SSPC 25	“Paint Specification No. 25/Zinc Oxide, Alkyd, Linseed Oil Primer for use Over Hand Cleaned Type I and Type II”
SSPC 25 BCS	“Paint Specification No. 25 BSC/Zinc Oxide, Alkyd, Linseed Oil Primer for use Over Blast Cleaned Steel Type I and Type II”

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

D79	“Specification for Zinc Oxide Pigment”
D234	“Raw Linseed Oil”
D235	“Petroleum Spirits (Mineral Spirits)”
D600	“Liquid Paint Driers”
D605	“Specification for magnesium silicate pigment (Talk)”
D607	“Specification for wet ground mica pigments”

D3722	"Natural Red and Brown Iron Oxides"
D3951	"Standard Practice for Commercial Packaging"
D185	"Coarse Particles in Pigments, Pastes and Paints"
D562	"Consistency of Paints Using the Stormer Viscometer"
D1208	"Common Properties of Certain Pigments"
D1210	"Fineness of Dispersion of Pigment Vehicle Systems"
D1296	"Odors of Volatile Solvents and Diluents"
D1475	"Density of Paint, Varnish, Lacquer and Related Products"
D2369	"Volatile Content of Paints"
D2371	"Pigment Content of Solvent Type Paints"
D3278	"Flash Point of Liquids by Setaflash Closed Tester"
D4400	"Test Methods for Sag Resistance of Paints using a Multinotch Applicator"

US FEDERAL STANDARDS

(Standard Specifications for Ingredients)

MIL-A-15206	"Aluminum Stearate, Technical"
TT-R-266	"Resin, Alkyd: Solutions"
MIL-PRF-680	"Degreasing Solvent"

(FED-STD-141)

Method 3011	"Condition in Container"
Method 3021	"Skinning (Partially Filled Container)"
Method 4021	"Pigment Content (Centrifuge)"
Method 4053	"Nonvolatile Vehicle Content"
Method 4061	"Drying Time"
Method 4081	"Water Content (Reflux Method)"
Method 4203	"Reducibility and Dilution Stability"
Method 4321	"Brushing Properties"
Method 4331	"Spraying Properties"
Method 4494	"Sag Test (Multinotch Blade)"
Method 4541	"Working Properties and Appearance of Dried Film"

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-TP-100 "Engineering Standard for Paints"

ISO (INTERNATIONAL ORGANIZATION FOR STANDARDIZATION)

ISO 12944-6 "Paint and Varnish-Corrosion Protection of Steel Structures by Protective Paint system, Part 6: Laboratory Performance Test Methods"

3. UNITS

This standard is based on international system of units (SI), as per IPS-E-GN-100 except where otherwise specified.

4. COMPOSITION

This specification contains requirements to ensure performance that is comparable to that customarily expected from paints containing lead and chromate pigments.

It has fair wetting ability, about 18 hours drying time and good resistance to weathering before field coating. The wetting ability of this primer is the result of one third of the binder being raw linseed oil. Type II has a lower percentage of volatile organic compounds (VOC) than Type I. The reduced VOC content of Type II was achieved by replacing some of the mineral spirits with high flash naphtha and by making other minor composition changes. Details of the compositions are given in Table 1 for Type I and in Table 1 for Type II.

The Type I primer contains approximately 65% by volume of nonvolatile film forming solids (pigment and binder). The theoretical spreading rate for a 50 micrometer (2.0 mil) dry film thickness is 12.8 m^2/L (520 ft^2/U.S. Gallon). Actual spreading rates can be significantly lower. On a calculated basis, the VOC content is 270 grams per liter (2.3 lb/gal).

The Type II primer contains approximately 72% by volume of nonvolatile film forming solids (pigment and binder). The theoretical spreading rate for a 50 micrometer (2.0 mil) dry film thickness is 14.2 m^2/L (580 ft^2/U.S. gallon). Actual spreading rates can be significantly lower. On a calculated basis, the VOC content is 220 g/L (1.9 lb/gal).

4.1 Ingredients and Proportions

Ingredients and proportions shall be as specified in Table 1.

The primer based on the specified ingredients shall be uniform, stable in storage, and free from grit and coarse particles. No rosin or rosin derivatives may be used. Beneficial additives such as anti skinning agents, suspending agents, or wetting aids may be added.

4.2 Percentage

This primer shall contain approximately 82% by volume of nonvolatile film forming solid.

TABLE 1 - COMPOSITION, Type I

INGREDIENTS	REQUIRED Min. Wt.%	REQUIRED Max. Wt.%	TYPICAL COMPOSITION Wt.%	TYPICAL COMPOSITION Vol.%	INGREDIENT STANDARD ASTM	INGREDIENT STANDARD FEDERAL
PIGMENT: (52.5±2 Wt.%)						
Zinc Oxide	15	17.0	8.4	2.3	D 79, Dry Pigment, French Process	---
Iron Oxide (85% minimum Fe_2O_3)	39.0	---	21.5	7.9	D 3722/D 3724	---
Magnesium Silicate	---	33.0	17.3	9.2	D 605	---
Mica	10.0	12.0	5.3	2.8	D 607	---
TOTAL PIGMENT:	100		52.5	22.2		
VEHICLE: (47.5±2 Wt.%)						
Raw Linseed Oil	21.0	---	10.0	16.2	D 234	---
Alkyd Resin Solids	41.0	---	19.5	27.0	---	TT-R-226 Type I Class A Type II Class B
Mineral Spirit Thinner	---	38.0	18.0	34.6	D 235	---
Driers	---	---	---	---	D 600, Non-Lead	---
TOTAL VEHICLE:	100		47.5	77.8		
TOTAL:			100	100		

The preblended composite pigment shall comply with the following:

PROPERTY	METHOD	REQUIRED
pH	---	7 to 8
Specific Resistance of Leachate	ASTM D 2448	5000 ohm-cm minimum

TABLE 1 - COMPOSITION, Type II

INGREDIENTS	REQUIRED Min. Wt.%	REQUIRED Max. Wt.%	TYPICAL COMPOSITION Wt.%	TYPICAL COMPOSITION Vol.%	INGREDIENT STANDARD ASTM	INGREDIENT STANDARD FEDERAL
PIGMENT: (54.0±2 Wt.%)						
Zinc Oxide	15.0	17.0	8.7	2.4	D 79, Dry Pigment, French Process	---
Iron Oxide (85% minimum Fe_2O_3)	39.0	---	22.1	8.5	D 3722/D 3724	---
Magnesium Silicate	---	33.0	17.8	9.9	D 605	---
Mica	10.0	12.0	5.4	3.0	D 607	---
TOTAL PIGMENT:	100		54.0	23.8		
VEHICLE: (47.5±2 Wt.%)						
Raw Linseed Oil	22.5	---	10.3	17.5	D 234	---
Alkyd Resin Solids	46.5	---	21.4	31.0	---	TT-R-226 Type I Class A Type II Class B
Mineral Spirit Thinner	---	21.0	9.7	19.4	D 235	---
High Flash Naphtha	---	10.0	4.6	8.3	D 3734	---
Driers	---	---	---	---	D 600, Non-Lead	
TOTAL VEHICLE:	100		46.0	76.2		
TOTAL:			100	100		

The preblended composite pigment shall comply with the following:

PROPERTY	METHOD	REQUIRED
pH	---	7 to 8
Specific Resistance of Leachate	ASTM D 2448	5000 ohm-cm minimum

5. ANALYSIS

5.1 The paint shall conform to the composition (analysis) requirements of Table 2.

TABLE 2 – ANALYSIS

REQUIREMENTS				
CHARACTERISTICS	**Min. Wt.%**	**Max. Wt.%**	**ASTM METHOD**	**US FEDERAL Std. No. 141**
Pigment	75	-	D 2371	4021
Volatiles	-	6	D 2369	-
Nonvolatile vehicle calculated by difference	19	-	-	4053
Uncombined water	-	0.5	D 1208	4081

6. PROPERTIES

6.1 Requirements

The paint shall meet the requirements of table 3 and sections 6.2 through 6.6

6.2 Odor

The odor shall be normal for the materials permitted (ASTM Standard D 1296).

6.3 Color

The color shall be typical of the specified mixture of Zinc Oxide and red or brown iron oxide.

6.4 Compatibility

There shall be no evidence of incompatibility of any of the ingredients of the primer when two volumes of the primers are slowly mixed with one volume of mineral spirits US Federal Standard No. 141, Method 4203.

6.5 Skinning

There shall be no skinning in a three quarters filled closed container after 48 hours when tested in the standard manner specified in US Federal standard No. 141, Method 3021.

6.6 Paint System Properties

6.6.1 Water condensation test method

Refer to ISO 6270.

6.6.2 Neutral salt spray test method

Refer to ISO 7253.

6.7 Working Properties

The paint shall be easily applied and shall show no streaking, running or sagging and wrinkling, blistering after drying.

TABLE 3 - PROPERTIES

REQUIREMENTS				
CHARACTERISTICS	**Min.**	**Max.**	**ASTM METHOD**	**US FEDERAL STD. No. 141**
Viscosity* shear rate 200 rpm.:				
Grams	190	230	D 562	-
Krebs	80	87	D 562	-
Density Kg/Lit	2.64	-	D 1475	-
Fineness of grind, hegman units (Mic)	5.0 (40)	-	D 1210	-
Drying time, hours	-	24		4061
Flash point °C	38	-	D 3278	-
Sag resistance, microns	150	-	D 4400	4494

*** Viscosity 48 hours or more after manufacturing.**

7. STORAGE LIFE AND PACKAGING

7.1 Condition in Container

The primer shall show no thickening, curdling, gelling, or hard caking or any other degradation and decomposing after storage for a period of time which is specified by manufacturer from the date of delivery, in a full, tightly covered container.

7.2 Packaging

The packaging shall meet the relevant requirements 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 Standard 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 primer 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 Labeling Standard

Labeling shall be in accordance with ANSI Z400.1/Z129.1 "Hazard Evaluation and Safety Data Sheet and Precautionary Labeling Preparation".

9.2 Marking of Containers

Each container shall be legibly marked with the following information:

Name: Zinc Oxide, Iron oxide, and Raw Linseed Oil and Alkyd Primer:

Specification: IPS-M-TP-115

MESC No.: ……..

No of components: .....

Maximum temperature resistance: .....

Type of spray: .....

Kind and size of spray nozzle tip: .....

Cleaning material: .....

Flash point °C: .....

Drying time for overcoating .....

Kind of thinner: .....

Color: Zinc Oxide: .....

Lot Number: .....

Stock Number: .....

Date of Manufacture: .....

Shelf Life: .....

Storage Temperature: .....

Quantity of Primer in Container: .....

Information and Warnings as may be required by procurement: .....

Documents: .....

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 "Paints"

9.3 Directions for Use

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

- Directions for use of Zinc Oxide
- Alkyd, Linseed Oil Primer for Use Over
- Hand Cleaned Steel

This paint is intended for use as a primer over steel surfaces cleaned at least to SSPC-SP 6, "Power Tool Cleaning to Bare Metal" in atmospheric exposure. The surfaces shall be free of all visible oil, grease, dirt, dust, mill scale, rust and paint.

Mix paint thoroughly before use. If the pigment has settled, pour off most of the liquid. Thoroughly mix the pigment with the remaining liquid, taking care to scrape all the pigment off the bottom of the can. Gradually add the poured-off liquid and mix thoroughly. Mixing may be made easier by transferring the contents to a larger container. Examine bottom of container for unmixed pigment. Screen paint before applying.

The thinning of paint may change the VOC class. For roller, brush, or airless spray application, no thinning should be necessary. A minimum amount of thinning may be necessary for conventional air spray.

Apply by brush or spray to the specified film thickness or, if none is specified, to at least 50 micrometers (2 mils) dry. The surface to be painted shall be dry; the surface temperature shall be at least 3°C (5°F) above the dew point and the temperature of the air shall be over 4°C (40°F). Do not paint outdoors in rainy weather or if freezing temperatures are expected before the paint dries.

Allow paint at least 18 hours for drying before recoating.

9.4 Directions for Safety

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

- Paints are hazardous because of their flammability 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 Zinc Oxide, hydrocarbon solvent. Applicable regulations governing safe handling practices shall apply to the use of this paint.