

MATERIAL STANDARD

FOR PRIMERS (DITCH AND YARD)

FOR USE WITH COLD-APPLIED LAMINATED PLASTIC TAPE

(IPS-M-TP-310)

FOR TAPE COATING SYSTEM OF BURIED STEEL PIPES

CONTENTS :	PAGE No.
PART 1: DITCH PRIMER	2
1. SCOPE	2
2. REFERENCES	2
3. DEFINITIONS AND TERMINOLOGY.....	3
4. UNITS	5
5. COMPOSITION	5
6. PROPERTIES.....	6
7. STORAGE LIFE AND PACKAGING.....	9
8. INSPECTION AND TESTING.....	9
9. LABELING.....	10
PART 2: YARD PRIMER	12
1. SCOPE	12
2. REQUIREMENTS.....	12

PART 1: DITCH PRIMER

1. SCOPE

This Part of Standard specification covers the minimum requirements for ditch primer to be used with cold applied Inner-layer tape (IPS-M-TP-310) in tape coating system. The primer is intended for use in line-travel coating application and the function of this primer is to provide a highly effective bonding medium between yard primer (Part 2 of this Specification) and Inner-layer tape as well as between steel surface and Inner-layer tape.

2. REFERENCES

Throughout this Standard the following Standards and codes are referred to. The editions 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.

ANSI (AMERICAN NATIONAL STANDARDS INSTITUTE)

Z 129.1 "Precautionary Labeling of Hazardous Industrial Chemicals"

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

B 117 Standard Method of "Salt Spray (Fog) Testing"
D 1000 Standard Test Method for "Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications"
D 1200 Standard Test Method for "Viscosity by Ford Viscosity Cup"
D 1296 Standard Test Method for "Odor of Volatile Solvents and Diluents"
D 1475 Standard Test Method for "Density of Paint, Varnish Lacquer, and Related Products"
D 2369 Standard Test Method for "Volatile Content of Coatings"
G 8 Standard Test Method for "Cathodic Disbonding of Pipeline Coatings"

IPS (IRANIAN PETROLEUM STANDARDS)

E-TP-270 "Coatings"
(Not applicable for procurement)
M-TP-310 "Cold-Applied Laminated Plastic Tape as Inner-Layer Tape for Tape Coating System of Buried Steel Pipes"
C-TP-101 "Construction Standard for Surface Preparation"
(Not applicable for procurement)

SIS (SWEDISH STANDARDS INSTITUTION)

055900 "Rust Levels of Steel Structure and Quality Levels for Preparation of Steel Surface for Rust Protecting Paints"

SSPC (STEEL STRUCTURES PAINTING COUNCIL)

PA Guide 3 "A Guide to Safety in Paint Application"

US FEDERAL STANDARD:

Federal test method standard No. 141-paint, varnish, lacquer, and related materials; methods of inspection, sampling, and testing.

Method 3011	"Condition in Container"
Method 4061	"Drying Time"
Method 4203	"Reducibility and Dilution Stability"
Method 2011	"Preparation of Steel Panels"
Method 6221	"Flexibility"

3. DEFINITIONS AND TERMINOLOGY

In this Standard the following definitions shall apply:

DENSITY

The mass of a unit volume of the liquid at a specified temperature. The units shall be stated, such as grams per milliliter or grams per cubic centimeter.

FLASH POINT

The minimum temperature (corrected to a barometric pressure of 760 mm Hg) at which a liquid gives off a vapor in sufficient concentration to ignite under specified conditions of test.

FLAMMABLE LIQUID

Any liquid having a flash point below 37.8°C, except any liquid mixture having one or more components with a flash point at or above the upper limit which make up 99% or more of the total volume of the mixture.

INHIBITOR

A material used, normally in small proportions, to arrest or retard a chemical reaction, especially corrosion.

LOT OR BATCH

The lot or batch shall consist of an indefinite amount of materials manufactured by a single plant run through the same processing equipment with no change in ingredient materials which offered for acceptance.

NOMINAL PARAMETERS

The nominal parameters are the parameters (e.g., weight, thickness, density, etc.) specified on product labels, invoices, sales literature, and the like. The actual parameters shall not be less than 95% of nominal parameters.

RESIN

A solid or semi-solid organic compound which is thermoplastic, does not crystallize, is not a conductor of electricity, has no sharp melting point and is soluble in organic solvents but not in water. It originates, in the case of natural resins, from the secretions of certain plants or insects; or, in the case of synthetic resins, through chemical reaction of numerous substances producing complex compounds of higher molecular weight than the original materials.

BUTYL RUBBER

Butyl rubber is a designation for a series of rubber-like products made by polymerization a high percentage of a mono-olefin like isobutylene, and a small amount of a di-olefin like butadiene. The resulting products have only a fraction of the unsaturation present in natural rubber, and after vulcanization the product is essentially a cross-linked saturated hydrocarbon. Butyl rubber is essentially a paraffinic hydrocarbon.

SOLVENT

A volatile liquid, which is used in the manufacture of primer to dissolve or disperse the film-forming constituents, and which evaporates during drying and therefore does not become a part of the dried film. Solvents are used to control the consistency and character of the primer and to regulate application properties.

Aliphatic solvents are mild solvents derived from petroleum, such as mineral spirit.

Aromatic solvents are strong solvents derived from coaltar and certain petroleum types, such as Toluene, Xylene, and solvent naphtha.

THINNERS

Volatile liquids added to primers to facilitate application and to aid penetration by lowering the viscosity.

TOTAL SOLIDS

The non-volatile matter in a coating composition, i.e., the ingredients of a coating composition which, after drying, are left behind and constitute the dry film.

STABILIZERS

Substances added, usually in small proportions, to retard undesirable chemical or physical changes.

VISCOSITY

The property of a liquid to resist shear deformation increasingly with increasing rate of deformation. Shear is the orderly movement of layers of liquid relative to parallel adjacent layers.

Dynamic viscosity is the ratio of the applied shear stress to the velocity gradient.

Kinematic viscosity is the ratio of the dynamic viscosity to the density of the liquid, both measured at the same temperature.

Note:

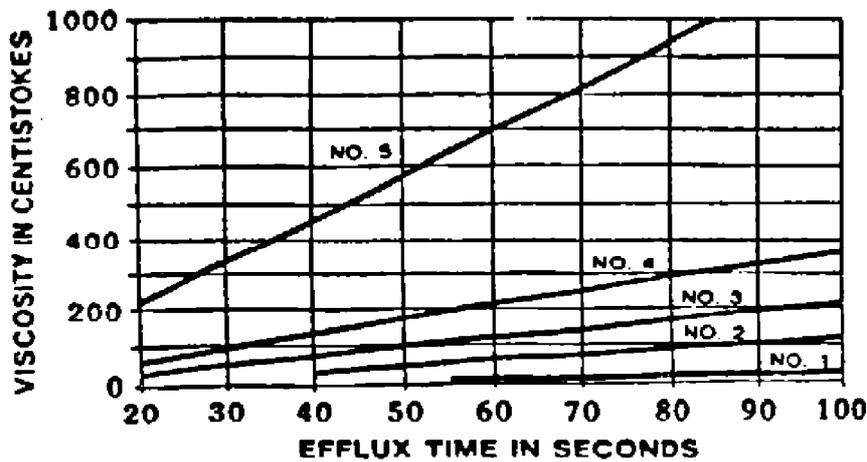
The SI unit for dynamic viscosity is the pascal second (Pa.s). The traditional unit is the centipoise (cp); 1 cp=1 mili Pa.s.

The SI unit for kinematic viscosity is the square-meter per second (m²/s). The traditional unit is the centistokes (cst); 1 cst=1 mm²/s.

FLOW TIME

The elapsed time from the moment when the material under test starts to flow from the orifice of the filled cup to the moment when the flow stream of material first breaks close to the orifice.

The curves shows in Fig. 1 can be used to convert the flow time in seconds to kinematic viscosity in centistokes for Ford Cups No. 1 to 5.



APPROXIMATE VISCOSITY CURVES FOR FORD CUPS
Fig. 1

4. UNITS

This Standard is based on International System of Units (SI) except where otherwise is specified.

5. COMPOSITION

The primer for cold application shall compose of a synthetic elastomers and resins, anti-corrosion inhibitors, stabilizers, etc. blended with proper-type and amount of volatile organic solvent to give a consistency suitable for spray-type, rug-type and brush-type application.

The primer shall be uniform, stable in storage, and free from grit and coarse particles. The primer shall contain additives that resists; the effect of humidity, water condensates, radiation, winds and salty environments, and also fungus and bacterial growth.

When required by the purchaser, suitable additives shall be utilized in the primer formulation in order to reduce the incidence of stress-corrosion cracking.

The primer shall be compatible with the inner-layer tape (IPS-M-TP-310).

6. PROPERTIES

The primer shall comply with the requirements of Table 1, and when dry shall provide a highly effective bonding medium between yard primer as well as the surface to be protected and adhesive layer of the subsequently applied inner-layer tape, to perform the requirements given in Table 2.

The primer shall also meet the requirements of 6.1 to 6.12 inclusive.

6.1 Odor

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

6.2 Color

The color of the primer shall be black.

6.3 Compatibility

There shall be no evidence of incompatibility of any of the ingredients of the primer when one volume of the primer is slowly mixed with one volume of its own thinner (US Federal Standard No. 141, method 4203).

The thinner shall be defined by the manufacturer.

6.4 Application Properties

The primer shall have good machine-application properties with a minimum tendency to produce bubbles during application. No heat shall be required to produce an effective bond between the pipe surface to be protected and the subsequently applied inner-layer tape. In addition the primer shall be so designed not to cause shrinkage of inner-layer tape before and after application of outer-layer tape (IPS-M-TP-311) in field coating application conditions.

Primer shall not settle in the container to form a cake or sludge that can not be mixed easily by hand or mechanical agitation.

6.5 Drying Time

The primer shall be quick-drying type (5-15 minutes) even at low application temperatures.

6.6 Covering Capacity

The covering capacity of primer for surface with roughness of 50 microns (Arithmetical average) and cleanliness of Sa 2½ shall not be less than 5 square meters per one liter of primer with regards to specified adhesion strength of coating system (see Table 2).

6.7 Flexibility

A film of the primer tested as below shall withstand bending without cracking or flaking.

This test shall be run in accordance with US Federal Standard No. 141, method 6221. Panels shall be 8 cm. × 16 cm. 20 gage cold-rolled steel, cleaned in accordance with Federal Standard No. 141, Method 2011, Procedure D, followed by Procedure A.

The primer shall be applied by spray to a 75 microns (3 mils) dry film thickness-approximately 225 microns (9 mils) wet film. After one week of drying at 21-27°C the panel shall be bent over a 4 cm mandrel and shall show no cracking or loss of adhesion.

6.8 Water Resistance

A film of the primer tested as below, shall show no appreciable film deterioration, or excessive change in general appearance.

Panels shall be 8 cm. × 16 cm. × 1/3 cm. cold-rolled steel prepared according to SIS 055900 "SA 2½" using 0.850-0.425 mm. (20-40 mesh) silica sand. The primer shall be applied by spray to a 75 microns (3 mils) dry film thickness-approximately 225 microns (9 mils) wet film. After one week of drying at 21-27°C, the panels shall be partially immersed (half way) in distilled water at 38°C.

Panels shall be examined every 24 hours for blistering, leaching, rusting, or loss of adhesion. Films of the primer prepared and exposed as above shall pass 500 hours immersion with no other defect than a slight discoloration (examine after a one-hour drying period).

6.9 Salt Spray Resistance

A film of primer tested as below and examined immediately after removal from the salt spray test shall show no more than a trace of rusting, and no more than five scattered blisters no larger than 1 mm in diameter. On removal of the primer, there shall be no more than a trace of rusting, pitting, or corrosion of the steel.

This test method shall be performed in accordance with ASTM Standard B117. Panels shall be 8 cm. × 16 cm. × 1/3 cm. cold-rolled steel, sand blasted in accordance with SIS 055900 "Sa 2½", using 0.850-0.425 mm. (20-40 mesh) silica sand. The primer shall be applied by spray to a 75 microns (3 mils) dry film thickness-approximately 225 microns (9 mils) wet film. After one week of drying at 21-27°C, the panels shall be scored as indicated in ASTM Standard B 117. Panels shall be exposed in the cabinet at a 30 degree angle from the vertical. Panels shall be tested in duplicate and examined at 96 hour intervals for a period of 500 hours.

6.10 Weather Resistance

Films of the primer prepared and tested as below shall show no rusting, blistering, flaking, loss of adhesion, or excessive change in general appearance.

Panels shall be 16 cm. channel steel in a 30 cm. long section and exposed at a 45 degree angle south exposure with the flanges horizontal, each panel shall have a weld bead approximately 8 cm. long placed at the left end of the panel about 8 cm. from the end.

The primer shall be applied by spray to a 75 microns (3 mils) dry film thickness-approximately 225 microns (9 mils) wet film. After one week of drying at 21-27°C, the coated steel shall be scored in an "X" pattern on the right 8 cm. from the end. Each stroke of the "X" must be 10 cm. long. Then the panels shall be placed on exposure.

After 60 days' exposure, it shall show no blistering, rusting, or corrosion on the face and only minor blistering or rusting at the weld and score.

6.11 Toxic Ingredients

The primer shall contain no benzene (benzol), chlorinated solvents, hydrolyzable chlorine derivatives or other materials of highly toxic nature.

6.12 Safety and Environmental Regulations

The solvent portion of the primer shall be certified by the manufacturer to comply with the air pollution control rules and regulations and all safety rules and regulations in effect where the coating is used.

Note:

The primer should be supplied by the manufacturer that supplies the inner-layer tape (IPS-M-TP-310).

**TABLE 1
PROPERTIES**

PROPERTY	UNIT	REQUIREMENT	TEST METHOD ASTM
TOTAL SOLID CONTENT (Min.)	Wt. %	20	D 2369
DENSITY AT 25 °C	g/cm ³	0.8±0.05	D 1475
VISCOSITY (FLOW TIME; FORD CUP No. 4) AT 25° C	SECOND	30-60	D 1200
TEMPERATURE RANGE OF: APPLICATION OPERATION	°C	-20 TO + 60 -20 TO + 60	

**TABLE 2
PERFORMANCE REQUIREMENTS OF PRIMER IN CONJUNCTION
WITH COLD APPLIED INNER-LAYER TAPE (IPS-M-TP-310)**

PROPERTY	UNIT	REQUIREMENT	TEST METHOD ASTM
ADHESION STRENGTH (Min)	kg/cm WIDTH	2.2	D 1000 (METHOD A)
DIELECTRIC STRENGTH BREAKDOWN (Min)	v/ μm (kv/MM)	40	D 1000
CATHODIC DISBONDING (Max)	mm. DIAMETER	50	G8 (METHOD A)

7. STORAGE LIFE AND PACKAGING

7.1 Storage Life

The primer shall show no thickening, curdling, skinning, gelling, or hard caking after storage for 24 months, at normal condition, from date of delivery in a full, tightly covered container when tested in accordance with US Federal test method Standard No. 141 method 3011.

7.2 Packaging

The primer shall be packaged in containers which shall be perfectly tight in order to prevent solvent from evaporating and being polluted with dust, water ,and foreign materials.

The primer shall be furnished in new heavy gage steel drums with the capacities specified by the purchaser.

8. INSPECTION AND TESTING

8.1 All materials supplied under this Standard Specification and It's related Standard (IPS-M-TP-310) shall be subject to timely inspection by the purchaser or his authorized representative. The purchaser shall have 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 The supplier and/or manufacturer shall be responsible for the performance and costs for all laboratory test requirements as specified in this Standard.

The manufacturer shall set up and maintain such quality assurance and inspection systems as are necessary to ensure that the materials comply in all respects with the requirements of this Standard Specification.

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

8.4 Purchaser's inspector(s) shall have free access to the supplier's work to follow up the progress of the materials covered by this Standard and to check the quality of materials. The supplier and/or manufacturer shall place free of charge at the disposal of the purchaser's inspector(s) all means necessary for carrying out their inspection: results of tests, checking of conformity of materials with this Standard requirements, checking of marking and packing and temporary acceptance of materials.

8.5 Samples of primer (and it's tape) submitted to the purchaser and/or collected by the purchaser will be tested in the purchaser's laboratory or in a responsible commercial laboratory including manufacturer's laboratory designated by the purchaser.

8.6 The supplier and/or manufacturer shall furnish the purchaser with a certified copy of results of tests made by the manufacturer covering physical (Table 1) and performance characteristics (Table 2) of each batch of product to be supplied under this Standard Specification. The supplier shall furnish, or allow the purchaser to collect samples of the material representative of each batch of product.

Certified test reports and samples furnished by the supplier and/or manufacturer shall be properly identified with each batch of product.

8.7 Prior to acceptance of the supplier's and/or manufacturer's materials, samples of material submitted by the supplier, or collected by the purchaser, will be tested by the purchaser.

If any of the samples (see 8.8) is found not to conform to this Standard, materials represented by such sample will be rejected.

If samples of the supplier's and/or manufacturer's material that have been previously accepted are found not to conform to this Standard, all such material will be rejected.

8.8 Unless otherwise specified, the number of samples for testing shall consist of 10 percent of the lot, but in no case shall be less than one or more than ten samples. The results of the tests on four specimens made from each sample shall be averaged for each test specified in clause 6 to determine conformance with the specified requirements.

9. LABELING

9.1 Labeling Standard

Refer to ANSI Standard Z 129.1 "Precautionary Labeling of Hazardous Industrial Chemicals".

9.2 Marking of Containers

Each container shall be legibly marked with the following information:

- Name: **Ditch Primer for Use with Cold Applied Laminated Plastic Tape (IPS-M-TP-310).**
- Specification: **IPS-M-TP-321 (Part 1)**
- Order No.:
- MESC No.:
- Type and trade name of primer:
- Application temperature:
- Kind of thinner:
- Cleaning material:
- Flash point (°C):
- Drying time (minute) ; For tape application:
- Color: **Black**
- Batch or lot No.:
- Stock No. :
- Date of manufacture:
- Quantity of primer in container:
- Method of application :
- Information and warnings, (if needed):
- Manufacturer's name and address:
- Design guide: **For guidance on the usage of this primer reference shall be made to IPS-E-TP-270.**

9.3 Direction For Use

In addition to the manufacturer's instructions for use, the following directions shall also be supplied with each container of primer.

- This material is intended for use as a ditch primer on primed steel pipes as well as on prepared steel surfaces. The surface of steel shall be prepared in accordance with IPS-C-TP-101 before applying the primer.
- This primer is intended to be followed by cold applied laminated plastic tape conforming to IPS-M-TP-310. mix primer thoroughly before use.

9.4 Direction for Safety

In addition to the manufacturer's instructions for safety, the following directions shall also be supplied with each container of primer:

- This primer is hazardous because of its flammability and potential toxicity. Proper safety precautions shall be observed to protect against these recognized hazards. Safe handling practices are required and shall 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 primer 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 primer with the eyes or skin.
- Clean hands thoroughly after handling primer and before eating or smoking.
- Provide sufficient ventilation to ensure that vapor concentrations do not exceed the published permissible exposure limits. When necessary, supply appropriate personal protective equipment and enforce its use.

PART 2: YARD PRIMER

1. SCOPE

This Part of Standard specification covers the minimum requirements for yard primer to be used mainly for temporary protection of prepared surfaces of steel pipes against rusting in open air condition.

The nature of this primer shall be such that it will give suitable bond to the prepared surfaces of steel pipes as well as the over the ditch applied primer.

2. REQUIREMENTS

The primer shall meet all requirements of ditch primer (Part 1 of this specification). In addition to that, the solid content of yard primer shall be 35% min. in this case the physical properties of Table 1 and labeling (see Part 1) may change accordingly.