

**MATERIAL STANDARD**

**FOR**

**HAND-APPLIED LAMINATED TAPE**

**SUITABLE FOR COLD-APPLIED TAPE COATING SYSTEM**

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## **1. SCOPE**

This Standard Specification covers the minimum requirements for hand-applied laminated tape to be used for coating special sections, connections, fittings, cable to pipe connections and field repairs of buried steel pipes protected with cold-applied tape coating system.

## **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.

### **ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)**

- D 257 Standard test method for "D-C Resistance or Conductance of Insulating Materials"
- D 570 Standard test method for "Water Absorption of Plastics"
- D 618 Standard methods for "Conditioning Plastics and Electrical Insulating Materials for Testing"
- D 1000 Standard test method for "Pressure-Sensitive Adhesive Coated Tapes Used for Electrical and Electronic Applications"
- E 96 Standard test method for "Water Vapor Transmission of Materials"
- G 8 Standard test method for "Cathodic Disbonding of Pipeline Coatings"

### **IPS (IRANIAN PETROLEUM STANDARDS)**

- IPS-E-TP-270 "Coatings" (Not applicable for procurement)
- IPS-M-TP-322 "Primer for Use with Hand-Applied Laminated Tape"

## **3. DEFINITIONS & TERMINOLOGY**

For this Standard the following definitions shall apply:

### **ADHESION STRENGTH**

The force necessary to remove the tape from a prescribed surface when measured in accordance with specific conditions of test.

### **CATHODIC DISBONDING**

The failure of adhesion between a coating and a metallic surface that is directly attributable to cathodic protection conditions and that is often initiated by a defect in the coating system such as accidental damage, imperfect application or excessive permeability of the coating.

**COATING**

A coating is an electrically insulating covering applied to a metal surface, as passive protection against external corrosion.

**DIELECTRIC BREAKDOWN (DIELECTRIC STRENGTH)**

The dielectric breakdown is the voltage at which a single layer of tape will show electrical failure under specific conditions of test. The dielectric breakdown of a tape is an indication of its ability to withstand electrical stress.

**ELONGATION**

The increase in length at break when the tape is tested under specific conditions of test. Elongation of tape is important as a measurement of its uniformity and quality.

**INSULATION RESISTANCE**

The insulation resistance between two electrodes that are in contact with, or embedded in, a specimen, is the ratio of the direct voltage applied to the electrodes to the total current between them.

**LAMINATE**

A product made by bonding together two or more layers of material or materials.

**LOT OR BATCH**

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

**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.

**PRIMER**

A solution applied as an undercoat directly to the metal surface in order to assist the bonding of a subsequent coating.

**RELEASE PAPER**

A sheet, serving as a protectant or carrier, or both, for an adhesive film or mass, which is easily removed from the film or mass prior to use.

**TENSILE (BREAKING) STRENGTH**

The force required, per unit width, to break the tape when tested under specific conditions of test. Breaking strength of tape is of importance as a measurement of its uniformity, quality, and ability to withstand stress in application and service.

## WATER VAPOR TRANSMISSION RATE

The steady water vapor flow in unit time through unit area of a body, normal to specific parallel surfaces, under specific conditions of temperature and humidity at each surface.

## 4. UNITS

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

## 5. DESCRIPTION

The hand-applied tape shall consist of a laminate comprising a stabilized polyethylene (PE) backing and a primer activated adhesive layer of homogeneous elastomer-base compound. The product shall provide high electrical resistivity, resistance to corrosive environments, low moisture absorption and permeability, and shall provide an effective bond to the primed steel surface. In addition the tape must be compatible with, and provide an effective bond to, a previously applied coating, if present. The tape shall also be of such a nature that it resists fungi, bacteria, plant root, excessive mechanical damage during normal application operations and be sufficiently pliable so that it conforms to the surface that is to be coated. It shall also withstand, without tearing, the tensile force necessary to obtain a tightly wrapped coating that fills the helix at the overlap and is free of voids.

The tape shall be highly conformable for easy hand wrapping even at low temperatures. The tape shall be designed for use with its own primer and both tape and primer shall be from the same manufacturer. (For standard specification of primer see IPS-M-TP-322.)

## 6. PROPERTIES

The finished material shall meet the requirements of Table 1 and 6.1 to 6.5 inclusive.

### 6.1 Appearance

The backing shall be smooth and uniform, free from visible faults such as fish eyes, slits, folds, breaks, uneven or frayed edges.

The adhesive layer shall be smooth and uniform and as free from lumps and bare spots as the best commercial practice will permit. There shall be no adhesive transfer when the tape is unwound from the roll.

### 6.2 Color

The color of plastic backing shall be black.

### 6.3 Form

The tape shall be supplied in rolls wound on hollow cores. Hollow cores shall have a nominal inside diameter of 38 mm. A removable interleaf (release paper) shall be incorporated against the adhesive compound preferably extend a minimum of 0.5 centimeter wider each side than the width of the tape.

**6.4 Heat Aging**

After test samples from inside of the roll have been aged for 30 days in an air-circulating oven at a constant temperature of 60°C, the tensile strength and the elongation shall be determined at 22°C by ASTM D 1000, an average value for tensile strength and elongation shall be not less than 80 percent of the original unaged value.

**6.5 Roll Sizes**

The roll sizes, as specified by the purchaser, shall be as follows:

- Roll length : 10 m., 20 m.**
- Roll width : 50 mm, 100 mm, 150 mm, 225 mm.**

**TABLE 1 - PHYSICAL PROPERTIES OF TAPE**

PROPERTY	UNIT	REQUIREMENT	TEST METHOD
			ASTM
THICKNESS:			
TOTAL (MIN.)	mm	0.900	D 1000
BACKING (MIN.)		0.150	
ADHESIVE (MIN.)		0.650	
TENSILE STRENGTH (MIN.)	kg/cm WIDTH	2.5	D 1000
ELONGATION AT BREAK (MIN.)	%	150	D 1000
ADHESION TO PRIMED STEEL (MIN.)	kg/cm WIDTH	1.5	D 1000 (METHOD A)
ADHESION TO SELF (AT OVER LAPS) (MIN.)	kg/cm WIDTH	0.5	D 1000
DIELECTRIC STRENGTH (MIN.)	V/μm	40	D 1000
INSULATION RESISTANCE (MIN.)	MEGOHMS	10 <sup>6</sup>	D 257
WATER VAPOR TRANSMISSION RATE (MAX.)	g/m <sup>2</sup> /24 HRS	3	E 96 (METHOD B)
WATER ABSORPTION (MAX.)	%WT.	0.1	D 570
CATHODIC DISBONDING (MAX.)	mm DIAMETER	50	G 8 (METHOD A)
HEAT AGING IN 30 DAYS AT 60°C: REDUCTION OF ELONGATION & TENSILE STRENGTH (MAX.)	%	20	SEE 6.4
TEMPERATURE RANGE: APPLICATION OPERATION	°C	-20 TO +60 -20 TO +60	—————

**7. STORAGE LIFE, PACKAGING AND SAMPLING**

**7.1 Storage Life**

The product shall meet the requirements of clause 6 after storage for 24 months from the date of delivery, in an original covered container at temperatures between -20 to +60°C.

## 7.2 Packaging

The tapes purchased according to this Standard Specification shall be packaged in suitable containers to ensure acceptance and safe delivery to their destination. Rolls of tape shall be packaged in quantities not to exceed the weight limitations of the container specifications. Each roll of tape shall be protected from adhering to other rolls, the container, or to the packaging material itself by the use of separators.

## 7.3 Sampling

Unless otherwise specified by the purchaser, 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 10 rolls. The results of the tests on four specimens cut from each sample roll shall be averaged for each test specified in clause 6 to determine conformance with the specified requirements. The numbers and types of test specimens shall be in accordance with the ASTM test method for the specific properties to be determined.

## 8. INSPECTION AND TESTING

**8.1** All materials supplied under this Standard 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** The supplier shall be responsible for the performance and costs for all laboratory test requirements as specified in this Standard. The supplier 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 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 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 shall furnish the purchaser with a certified copy of results of tests made by the manufacturer covering physical and performance characteristics 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 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 sample rolls (see 7.3) 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 in this Standard specification, the methods of sampling and testing shall be in accordance with applicable methods of the International Organization for Standardization (ISO), British Standard Institution (BSI) and Deutsch Institut fur Normung (DIN).

**9. LABELING**

**9.1 Marking of Rolls**

Each roll shall be marked with the following:

- a) Name and/or trade mark of the manufacturer;
- b) type and trade name of tape;
- c) length of the roll (in m);
- d) width of the roll (in mm).

**9.2 Marking of Containers**

Each container shall be plainly marked with the following information:

**Name : Hand-Applied Laminated Tape Suitable for Cold-Applied Tape Coating System**

**Specification : IPS-M-TP-313**

**Order No. :** .....

**MESC No. :** .....

**Type and trade name of tape :** .....

**Roll sizes : length .....m width .....mm**

**Type or trade name of primer to be used with the tape :** .....

**Batch No. :** .....

**Stock No.:** .....

**Date of manufacture :** .....

**Quantity (Number of rolls) :** .....

**Manufacturer's name and address:** .....

**Design guide : For guidance on the usage of this material reference shall be made to IPS-E-TP-270**

**9.3 Direction for Use**

The manufacturer's instructions for use shall be supplied with each container of tape.