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Hand-Applied Two-Layer P.E. Tape

## Foreword

This standard specification cancels and replace previous specification , which has been technically revised , it intended to be mainly used by all divisions of N.I.G.C., and has been prepared on interpretation of recognized standards, technical documents, knowledge, backgrounds and experiences in gas industries at national and international levels.

Iranian Gas Standards (IGS) are prepared , reviewed and amended by technical standard committees within NIGC standardization division of research & technology management and approved by the NIGC "Council Standard .

Iranian Gas Standards (IGS) are subjected to revision , amendment or withdrawal , if required , thus the latest edition of IGS shall be checked / inquired by NIGC users.

Any comments from concerned parties or individuals in IGS standards are welcome.

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## 1. SCOPE

This standard specification covers the NIGC requirements for hand applied two layer PE tape and it's primer to be used for the corrosion protection of field weld joints, special section fitting, cable to pipe joint with conjunction of cathodic protection system , and field repairs of buried steel pipelines mainly coated with cold – applied tape coating system.

## 2. NORMATIVE REFERENCES

Throughout this specification the following standards and codes are referred to. The applicability of changes in codes and standards that occur after the date of this specification shall be mutually agreed upon by the purchaser and manufacturer and / or supplier.

- ASTM D 1000 - (2004):** Standard test methods for pressure – sensitive Adhesive coated tapes used for electrical and electronic applications.
- ASTM D 257 - (1999):** Standard test methods for D-C resistance or conductance of insulating materials.
- ASTM D 570 - (1998):** Standard test method for water absorption of plastics.
- ASTM D 2369 - (2004):** Standard test method for volatile content of coatings.
- ASTM D 1475 - (1998):** Standard test method for density of paint, varnish, lacquer and related products.
- ASTM D 1200 - (1999):** Standard test method for viscosity by Ford viscosity cup.
- ASTM D 1296 - (2000):** Standard test method for odor of volatile solvents and diluents.
- ASTM E 96 - (2000):** Standard test methods for water vapor transmission of materials.
- ASTM G8 - (2003):** Standard test methods for cathodic disbonding of pipeline coatings.
- BS EN 12068 - (1999):** Cathodic protection – External organic coatings for the corrosion protection of buried or immersed steel pipelines used in conjunction with cathodic protection – tapes and shrinkable materials.
- BS EN ISO 9001 - (2000):** Quality management systems.
- SSPC.SP1 - (2000):** Surface preparation specification NO.1
- Federal test method standard . NO.141 C**

### 3. DEFINITIONS

**Coating**

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

**Elastomer**

A macromolecular material that returns rapidly to approximately its initial dimensions at room temperature and shape after substantial deformation by an instant.

**Inhibitor**

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

**Laminate**

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

**Lot or batch**

A lot or batch shall consist of an indefinite number of rolls of tape manufactured by a single plant, runs through the same processing equipment, with no change in ingredient materials.

**Primer**

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

**Removable interleaf**

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

**Resin**

A material, natural or synthetic, contained in varnishes, lacquers and paints; the film former.

**Solvent**

A volatile liquid, which is used in the manufacture of primer to dissolve or disperse the film – forming constituents, and evaporates during drying and therefore does not become a part of the dried film.

**Volatile organic compounds (VOC)**

Any organic compounds of carbon ,which participates in atmospheric photochemical reactions.

### 4. DOCUMENTATION

The manufacturer / supplier shall provide sufficient information to identify the coating systems and shall supply as the minimum requirement, the technical information of the coating components as follows:

a – ISO 9001: 2000 " CERTIFICATION" for "Design & Manufacturing" of offered tape coating system (tape & primer) for "pipeline corrosion protection" issued by an internationally recognized body.

b – Certificate and approval test report from a recognized laboratory for the coating system for maximum continuous operating temperature of 50°C and the compatibility with this standard specification.

c – Technical catalogues, manufacturing product data sheet, technical specifications, and application guides.

d – Material Safety data Sheets (MSDS).

## **5. Requirements**

### **5.1 Hand – Applied Two Layer PE Tape**

#### **5.1.1 Description**

The tape shall consist of a laminate stabilized polyethylene (PE) backing and a primer activated adhesive layer of homogeneous elastomer – base. 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 the previously applied coating. The tape shall be of such a nature that it resist fungi, bacteria, 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 obtained a tightly wrapped coating that fills the helix at the overlap and be 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 the tape and the primer shall be supplied and certified by the tape manufacturer.

#### **5.1.2 Properties**

The finished material shall meet the requirements of table.1 and the followings.

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

- The adhesive layer shall be smooth, uniform and free from lumps and bare spots. The colour of PE backing shall be black.

- The tape shall be supplied in rolls wound on hollow cores. Hollow cores shall have a typical inside diameter of 38 mm. ( 1½ in).

- Removable interleaf (release paper) shall be incorporated against the adhesive compound which shall be extended for a minimum of ½ cm apart from either side.

**5.1.3 Roll sizes**

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

LENGTH	WIDTH
10m(33')	50mm(2")
20m(66')	100mm(4")
30m(100')	150mm(6") For hand applied machine

**5.2 Two Layer PE Tape Properties**

**TABLE 1**

PROPERTY		UNIT	REQUIREMENT	TEST METHOD	TYPE OF TEST
Thickness:	Backing	mm(mil)	0.13 (5) (min)	ASTM D 1000	Routine
	Adhesive		0.76 (30) (min)		
	Total		0.89(35) (min)		
Tensile strength		kg/cm	4 (min)	ASTM D 1000	Routine
Elongation at break		%	200 (min)	ASTM D 1000	Routine
Adhesion to primed steel		kg/cm	3 (min)	ASTM D 1000 (Method A)	Routine
Adhesion to self (at over laps)		kg/cm	1 (min)	ASTM D 1000	Routine
Dielectric strength		kV/mm	35 (min)	ASTM D 257	Routine
Indentation resistance		N/mm <sup>2</sup>	10 (min)	EN 12068	Routine
Impact resistance at 23 <sup>o</sup> C		J	≥ 15 (min)	EN12068	Routine
Cathodic disbondment at 23 <sup>o</sup> C		mm	30 (max)	ASTM G8 (Method A)	Type
Water vapor transmission rate		g/m <sup>2</sup> /24 hrs	3 (max)	ASTM E96 (Method B)	Routine
Water absorption		%wt	0.1 (max)	ASTM D 570	Routine
Heat aging in 30 days at 60 <sup>o</sup> C: Reduction of elongation and tensile strength		%	20 (max)	ASTM D 1000	Type **
Temperature range :	Application	<sup>o</sup> C	+5 to +45	-----	
	Operation		-5 to +50		
Insulation resistance		meg-ohms	10 <sup>6</sup> (min)	ASTM D257	Type **

\* Routine: Short term test

\*\*Type : Long term test

### 5.3 Primer

#### 5.3.1 Composition

The primer shall compose of synthetic resin, tackier, and rubber, anti-corrosion inhibitor, stabilizer, and etc, blended with proper type and amount of volatile organic solvent to produce a free flowing liquid coating that can be readily applied without heat by brushing, preferably low volatile organic compounds (VOC) type primer is preferred.

The primer shall contain no benzene (benzol), Chlorinated solvents, Hydrolyzable chlorine derivatives, or other materials of highly toxic nature. The solvent percentage of the primer shall be specified by the manufacturer.

The product shall be free from grit and coarse particles. It shall contain additives which inhibit corrosion and microbiological attack.

#### 5.3.2 Properties

The primer shall comply with the requirements of table 2, and shall have satisfactory brushing properties without tendency to produce bubble during application. The primer shall neither pull nor have a quick set under the brush.

### 5.4 Properties of Primer

**TABLE 2**

PROPERTY		UNIT	REQUIREMENT	TEST METHOD
Total solid content , min		% by weight	19	ASTM D 2369
Density (at 25 °C) , min		g/cm <sup>3</sup>	0.78	ASTM D 1475
Flow time : ford cup No.4 at 25 °C (Viscosity measurement)		second	25-30	ASTM D 1200
Drying time at room temp.(23± 2 °C) , max		minute	10	---
Shelf life		month	24 After delivery time	---
*Covering capacity		m <sup>2</sup> / litter	5	---
Colour		---	Black	---
Temperature	Application	°C	+5 to +45	---
	Operation		-5 to +50	

\* The minimum covering capacity of primer for surface with roughness of min. 50 microns and cleanliness of Sa 2 1/2 with min. 30µ DFT.



## **6. QUALITY ASSURANCE**

Manufacturer shall operate an effective, documented quality system based on the relevant part of the BS-EN-ISO 9001:2000 and maintain records to identifying the product, date of manufacturing, batch numbers as well as all results of inspection and testing.

## **7. INSPECTION AND TESTING**

1. The manufacturer set up and maintain such quality and inspection system as to ensure the material supplied, comply with all aspects of with the requirements of this IGS standard.
2. The manufacturer shall furnish the purchaser or its nominated inspector an overall compliance certificate accompanied with all in – production quality control test results for review. These documents and test results shall be traceable with regard to the batch number of each item.
3. The purchaser or his nominated inspector may inspect a part or the whole of the materials at the manufacturer's works during manufacture and prior to packing and may witness any inspections and tests as called for, by this IGS standard.
4. Purchaser's inspector shall have free access to the manufacturer's works at any time during manufacturing.
5. The manufacturer shall provide all means necessary for carrying out all inspections and tests as required by this IGS standard.
6. Random sampling proportional to the quantity of each item and frequency of inspections and tests as required by this IGS standard shall be at the discretion of the inspector .
7. If a sample is rejected in any inspection or test, double sampling shall be carried out, in case of any rejection in new samples, all materials represented by such sampling shall be rejected.
8. Inspection or tests carried out by the purchaser's inspector, in no way relieves the manufacturer/ supplier of his responsibilities and liabilities under the conditions, terms and specification of this IGS standard.

## **8. STORAGE LIFE AND PACKAGING**

### **8.1 Storage Life**

**8.1.1** The tape shall meet the requirements of clause 5 after storage for 24 months of delivery date, in a tightly covered container at temperatures between -10 to +35°C.

**8.1.2** 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.

## 8.2 Packing

**8.2.1** Rolls of tape shall be packed in quantities not to exceed the weight limitations of the container specification.

Tapes must be carefully protected and packed to provide adequate protection during transit to destination and shall be in accordance with and special provision contained in the specification or purchase order.

Each tape roll, shall be protected from adhering to other rolls, the container, or the packaging material itself by the use of separators.

Each container of tape shall contain application procedure, the packing of tapes shall be carried out in order to comply with transportation .

Type and dimensions of packages shall be chosen to suit transport in containers so that the space in the containers can fully be utilized.

The package of tapes shall meet all related packages standards.

**8.2.2** 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.

All containers shall be of a suitable shape, with a sufficiently large aperture to allow adequate stirring and mixing.

The primer shall be furnished in 3.8 liters (1-US gal) new steel cans, or 20 liters new steel pails as specified by the purchaser.

## 9.0 MARKING

### 9.1 Hand – applied laminated tape

**9.1.1** Each roll shall be legibly marked with the following information:

The name and address of manufacturer, purchaser and any applicable precautionary markings.

The indent number, port of destination, project number, length width of the roll & product designation, shall also be marked on the packages.

Storage in closed & dry place, and must be marked with a red "double roof" symbol.

**9.1.2** Each container shall be plainly marked with the following information :

- Name and trademark of the manufacturer
- Product designation (Type and trade name of tape)
- Quantity (number of rolls in container)
- Roll sizes
- Order No.
- IGS No.
- Batch No.
- Date of manufacture
- MSDS warning sticker
- Manufacturer's name and address

**9.2 Primer**

Each container shall be legibly marked with the following information:

- Name and trade mark of the manufacturer
- Product designation
- Order No.
- IGS No.
- Batch No.
- Application temperature
- Type of thinner
- Cleaning material
- Flash point
- Drying time
- Date of manufacture
- Quantity of primer in container
- Max. storage temperature
- Manufacturer's name and address