MATERIAL STANDARD

FOR

COLD-APPLIED LAMINATED PLASTIC TAPE

AS

OUTER-LAYER TAPE

FOR TAPE COATING SYSTEM OF BURIED STEEL PIPES

ORIGINAL EDITION

JULY 1995

This standard specification is reviewed and updated by the relevant technical committee on Oct. 1999. The approved modifications are included in the present issue of IPS.

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1. SCOPE

This Standard Specification covers the minimum requirements for cold-applied laminated plastic tape to be used as outer-layer tape (outerwrap) in tape coating system to the exterior of all diameters of buried steel pipes through mechanical methods. The main function of the outer-layer tape is to provide mechanical protection to the inner-layer tape (IPS-M-TP-310) and to protect the system from environmental hazards.

Note:

This standard specification is reviewed and updated by the relevant technical committee on Oct. 1999. The approved modifications by T.C. were sent to IPS users as amendment No. 1 by circular No. 94 on Oct. 1999. 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.

ASTM (AMERICAN SOCIETY FOR TESTING AND MATERIALS)

D 1000	"Standard Test Method for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications"
D 1505	“Standard Test Method for Density of Plastics Technique”
G 8	"Standard Test Method for Cathodic Disbonding of Pipeline Coatings"
G 14	"Standard Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test)"

IPS (IRANIAN PETROLEUM STANDARDS)

IPS-E-TP-270	"Engineering Standard for Coatings"
IPS-M-TP-310	"Cold-Applied Laminated Plastic Tape as Inner-Layer Tape for Tape Coating System of Buried Steel Pipes"

3. DEFINITIONS & TERMINOLOGY

In 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.

Dielectric Strength

The voltage at which a single layer of tape will show electrical failure under specific conditions of test.

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.

Impact Resistance

The ability of a pipe coating to resist impact from a falling weight under specific conditions of test.

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.

Tensile Strength

The force required, per unit width, to break the tape when tested under specific conditions of test.

4. UNITS

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

5. DESCRIPTION

The outer-layer tape shall be a prefabricated tape consisting of a plastic backing of a polyethylene film and an adhesive layer of homogeneous elastomeric-sealant component laminated to the polyethylene film. Although the materials used in the outer-layer tape will provide electrical resistivity, low moisture absorption and permeability, and resistance to corrosive environments, the primary function is to provide mechanical protection to the inner-layer tape and to protect the system from the elements.

The outer-layer tape shall be compounded so that it will be resistant to outdoor weathering.

6. PROPERTIES

The outer-layer tape shall comply with the requirements of table 2, and when applied over the inner-layer tape, shall provide an effective bond to the inner-layer tape in accordance with the appropriate performance requirements given in Table 3. The outer-layer tape shall also meet the requirements of 6.1 to 6.7 inclusive.

6.1 Polyethylene Component

The polyethylene shall consist of high-molecular-weight film-grade resins with densities in the range of 0.90-0.96 g/cm^3, when determined by ASTM D1505, and suitable additives.

6.2 Adhesive Layer

The adhesive layer shall be an elastomeric compound composed of a stable synthetic rubber and suitable additives. Typically, the elastomer content shall not be less than 20 percent by weight.

6.3 Appearance

The plastic backing shall be smooth and uniform, free from visible faults such as fish eyes, slits, folds, breaks, uneven or frayed edges, and other defects that could affect appearance or serviceability .

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.

6.4 Application Properties

The outer-layer tape shall be sufficiently pliable for normal application operations and shall form an effective bond to the inner-layer tape.

The outer-layer tape shall be suitable for line-travel application and shop coating with wrapping machine, and no significant wrinkles or blisters shall be developed during application even under sunshine.

6.5 Color

The color of plastic backing shall be black or white, and uv resistant.

6.6 Form

The outer-layer tape shall be supplied in roll form, wound on hollow cores with a nominal inside diameter of 80 mm.

6.7 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 D1000. An average value for tensile strength and elongation shall be not less than 80 percent of the original unaged value.

6.8 Dimensions (Roll Sizes)

The outer-layer tape shall be furnished in standard widths and lengths consistent with the pipe diameter as shown in Table 1. The purchaser will specify the roll size of the tape.

TABLE 1 - STANDARD DIMENSIONS FOR TAPE (NOMINAL)

PIPE DIAMETER	TAPE WIDTHS	TAPE LENGTHS
100 mm AND UNDER	100 mm	60 M., 120 M.
150-300 mm	230 mm	60 M., 120 M.
355-610 mm	300 mm	60 M., 120 M., 240 M.
660 mm AND OVER	300 mm OR 460 mm	60 M., 120 M., 240 M.

TABLE 2 - PHYSICAL PROPERTIES OF OUTER-LAYER TAPE

PROPERTY	UNIT	REQUIREMENT	TEST METHOD ASTM
THICKNESS	MM	0.760 ±10%	D 1000
TENSILE STRENGTH (MIN.)	KG/CM WIDTH	7	D 1000
ELONGATION AT BREAK (MIN)	%	100	D 1000
ADHESION TO INNER-LAYER TAPE (MIN.)	KG/CM WIDTH	0.5	D 1000 (METHOD A)
HEAT AGING IN 30 DAYS AT 60°C: REDUCTION OF ELONGATION & TENSILE STRENGTH (MAX.)	%	20	SEE 6.7
TEMPERATURE RANGE: APPLICATION OPERATION	°C	- 20 TO+60 - 20 TO+60	—

TABLE - 3 PERFORMANCE REQUIREMENTS OF OUTER-LAYER TAPE IN CONJUNCTION WITH INNER-LAYER TAPE (TOTAL COATING SYSTEM)

PROPERTY	UNIT	REQUIREMENT	TEST METHOD ASTM
DIELECTRIC STRENGTH (MIN.)	V/mM (KV/MM)	40	D 1000
CATHODIC DISBONDMENT (MAX.)	MM DIAMETER	50	G 8 (METHOD A)
IMPACT RESISTANCE (MIN.)	N	2.8	G 14

7. STORAGE LIFE AND PACKAGING

7.1 Storage Life

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

7.2 Packaging

The tapes purchased according to this standard specification shall be rolled on a cardboard tubes with internal diameter of 80 mm (nominal) and packaged in suitable and approved containers so that during stocking and transport, full quality of performance is retained. Each roll of tape shall be protected from adhering to other rolls, to the container, or to the packaging material itself by the use of separators.

Packing shall be weather-proof and strapped on pallets suitable for long distance shipment.

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 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 materials that have been previously accepted are found not to conform to this Standard, all such materials 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 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.

9. LABELING

9.1 Marking of Rolls

Each roll shall be legibly marked with the following:

a) Name and/or trade mark of the supplier;

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	: Cold Applied Laminated Plastic Tape as Outer-Layer Tape for Tape Coating System of Buried Steel Pipes.
Specification	: IPS-M-TP-311
Order No.	: .....
MESC No.	: .....

Type and Trade Name of Tape	: .....
Roll sizes	: Length ..... m, width ……..... mm.
Max. Temperature Resistance (°C)	: .....
Lot or 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.