

**MATERIAL STANDARD**

**FOR**

**PERFORATED PLASTIC TAPE (AS ROCKSHIELD)**

**FOR**

**PIPE COATING**

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## 1. SCOPE

This Standard Specification covers the minimum requirements for perforated plastic tape intended to be used as outer wrap and rockshield over tape coated pipes to be buried. It is intended to protect the coating of buried pipes that are subject to aggressive and rocky terrain, soil consolidation or shrinkage stresses, etc.

## 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 change 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)

D374	"Standard Test Method for Thickness of Solid Electrical Insulation"
D638	"Standard Test Method for Tensile Properties of Plastics"
D746	"Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact"
D1238	"Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer"
D1248	"Standard Specification for Polyethylene Plastics Molding and Extrusion Materials"
D1505	"Standard Test Method for Density of Plastics by the Density-Gradient Technique"
D1525	"Standard Test Method for Vicat Softening Temperature of Plastics"
D2240	"Standard Test Method for Rubber Property-Durometer Hardness"
D4801	"Standard Specification for Polyethylene Sheeting in Thickness of 0.25 mm and Greater"

### BSI (BRITISH STANDARD INSTITUTION)

BS 3412-76	"Polyethylene Materials for Moulding and Extrusion"
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### IPS (IRANIAN PETROLEUM STANDARDS)

E-TP-270	"Coatings"
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## 3. DEFINITIONS AND TERMINOLOGY

In this Standard, the following definitions shall apply:

### Brittleness Temperature

That temperature, estimated statistically, at which 50% of the specimens would fail in the specified test.

### Density

The weight per unit volume of material at 23°C, expressed as follows:

$$D^{23^{\circ}\text{C}}, \text{ kg/m}^3$$

Three density ranges of polyethylene are generally recognized, these being:

- a) low density polyethylene, from 910 kg/m<sup>3</sup> up to 925 kg/m<sup>3</sup>;
- b) medium density polyethylene, from 926 kg/m<sup>3</sup> up to 940 kg/m<sup>3</sup>;
- c) high density polyethylene greater than 940 kg/m<sup>3</sup>.

**Note:**

These densities refer to the base polymer, without pigment or carbon black, before extrusion, as determined by the method described in clause 6. For compounds containing a nominal 2.5% carbon black, a correction factor of +10 kg/m<sup>3</sup> can be used.

**Extrusion**

A process in which heated or unheated plastic is forced through a shaping orifice (a die) in one continuously formed shape, as in sheet, film, or tubing.

**Film**

A form of plastic in which the thickness is very small in proportion to length and width and in which the plastic is present as a continuous phase throughout.

**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.

**Polyethylene Plastics**

Plastics or resins prepared by the polymerization of no less than 85 W.% ethylene and no less than 95 W.% of total olefins.

**Vicat Softening Point**

The temperature at which a flat-ended needle of 1-mm<sup>2</sup> circular cross section will penetrate a thermoplastic specimen to a depth of 1 mm under a specified load using a selected uniform rate of temperature rise.

**4. UNITS**

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

**5. DESCRIPTION**

The plastic tape shall consist of a polyethylene plastic film, formed by extrusion molding and roll polishing, perforated on a 15-20 mm. square pattern with 1.5 mm. maximum diameter holes to provide a tough flexible protective sheeting with high mechanical properties and good resistance to chemical agents. The holes pattern shall be so designed as to encourage the passage of cathodic protection current to the coating surface.

It shall be resistant to shocks, bacteria when tested with ASTM G22, fungi when tested with ASTM G21, and natural and artificial agents contained in the soil or in the surrounding medium.

The plastic tape shall be sufficiently pliable for normal application operations. It shall be suitable for line-travel application as well as shop coating with wrapping machine.

## **6. MATERIALS AND MANUFACTURE**

The base material from which the plastic tape is produced shall be virgin polyethylene to which shall be added only those antioxidants, UV stabilizers and pigments necessary for the manufacture of plastic tape to the specification and to its end use.

The base material shall be as uniform in composition and size and as free of contamination as can be achieved by good manufacturing practice. Impurities which are occasionally contained in polymers shall not exceed 0.1% by mass.

The nominal density of the base material, when determined in accordance with ASTM D1505, shall be greater than 940 kg/m<sup>3</sup>.

The melt flow rate (Melt Index) of the polyethylene resin used shall not be less than 0.4 g/10 min. when determined by ASTM D1238 (condition E).

The compound shall be class W as defined in BS 3412:1976 (as amended by amendment Nos. 1 and 2) and the antioxidants used shall comply with 8.1 and 8.2 of that standard. The carbon black characterization, dispersion and content shall be in accordance with BS 3412:1976.

## **7. PROPERTIES**

The finished material shall comply with the requirements of table 1 and 7.1 to 7.5 inclusive.

### **7.1 Form**

The plastic tape shall be supplied in roll form, wound on hollow cores in the dimensions specified. Hollow cores shall have nominal inside diameter of 80 mm.

### **7.2 Appearance**

The plastic tape shall have appearance qualities conforming with those produced by good commercial practice. It shall be as free as commercially possible of cracks, blisters, bubbles, discolorations, craze, particles of foreign matter, undispersed raw material and other defects that could affect appearance or serviceability.

### **7.3 Color**

The color of plastic tape shall be black.

## 7.4 Dimensions

The plastic tape shall be furnished in standard widths and lengths consistent with the pipe diameter.

The nominal roll sizes, as will be specified by the purchaser, may be one of the following:

Roll length:	60 m	120 m	240 m
Roll width :	100 mm	150 mm	230 mm
	300 mm	460 mm	

## 7.5 Heat Reversion

The diameter of a disc of approximately 50 mm diameter cut from inside of the roll shall not alter by more than 5% when immersed in boiling water for 30 minutes and allowed to cool to ambient temperature.

**TABLE 1 - PHYSICAL PROPERTIES**

PROPERTY	UNIT	REQUIREMENT	TEST METHOD ASTM
DENSITY OF BASE POLYMER (MIN)	kg/m <sup>3</sup>	940	D 1505
TENSILE STRENGTH (MIN)	mPa	15	D 638 *
ELONGATION (MIN)	%	100	D 638 *
BRITTLINESS TEMPERATURE (MAX)	°C	-70	D 746
VICAT SOFTENING POINT (MIN)	°C	120	D 1525
HARDNESS	—	50-70	D 2240 (SHORE D)
THICKNESS (NOMINAL)	mm	1.0	D 4801 (SUBCLAUSE 11.5)
WEIGHT (MIN)**	g/m <sup>2</sup>	800	—

\* Determine tensile strength at yield and elongation at break, except that speed of grip separation shall be 50 mm/min. It is important that these properties be measured in both the transverse and longitudinal directions.

\*\* The actual net weight of each roll shall be determined to the nearest 50g on suitably calibrated equipment.

## 8. STORAGE LIFE, PACKAGING, AND SAMPLING

### 8.1 Storage Life

The product shall meet the requirements of clause 7 after storage for 24 months from date of delivery, in an original container.

### 8.2 Packaging

The plastic tapes purchased according to this Standard Specification shall be packaged in suitable containers to ensure acceptance for storage and safe delivery to their destination.

Each roll shall be wrapped with at least one layer of polyethylene film or craft paper, and tightly sealed with tape to prevent contamination.

### 8.3 Sampling

Unless otherwise specified by purchaser, the number of samples for testing shall consist of 10 percent of the lot, but in no case shall be less than one nor more than ten rolls. The results of the tests on 4 specimens cut from each sample roll shall be averaged for each test specified in table 1 to determine conformance with the specified requirements. The types of test specimens shall be in accordance with the ASTM test method for the specific properties to be determined.

## 9. INSPECTION AND TESTING

**9.1** 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.

**9.2** 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.

**9.3** 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.

**9.4** 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.

**9.5** 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.

**9.6** 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.

**9.7** Prior to acceptance of the supplier's and/or manufacturer's materials, samples of materials submitted by the supplier, or collected by the purchaser, will be tested by the purchaser. If any of the sample sheets (see 8.3) 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.

**9.8** 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) or German Standards (DIN).

## 10. LABELING

### 10.1 Marking of Rolls

Each roll shall be durably marked with the following information:

- a) The name and/or trade mark of the supplier.
- b) The type or trade name of tape.
- c) The length of the roll (in m.)
- d) The width of the roll (in mm.)
- e) The weight of the roll (in kg.)

### 10.2 Marking of Containers

Each container shall be plainly marked with the following information:

**Name : Perforated Plastic Tape (As Rockshield) for Pipe Coating.**

**Specification: IPS-M-TP-315**

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

**M.E.S.C No. :** .....

**Type or Trade Name of Tape :** .....

**Roll Sizes: Length.....m, Width.....mm,**

**Maximum 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.