



شرکت ملی گاز ایران - مدیریت پژوهش و فناوری

امور تدوین استانداردها

**IGS**

Iranian Gas Standards

مشخصات فنی خرید

نوار پوشش سرد بعنوان پوشش خارجی خطوط لوله فولادی مدفون

Cold-Applied Outer-Layer Tape for Buried Steel Pipelines

ابلاغ مصوبه هیأت مدیره

مدیر محترم پژوهش و فناوری

باسلام،

به استحضار می رساند در جلسه ۱۳۷۱ مورخ ۱۳۸۸/۵/۶ هیأت مدیره، نامه شماره گ.۳۸۳۴۱/۰۰۰/۹ مورخ ۸۸/۳/۲۶ آن مدیریت در مورد تصویب نهایی استاندارد تحت عنوان "نوار پوشش سرد به عنوان پوشش خارجی خطوط لوله فولادی مدفون" به شماره استاندارد IGS-M-IP-025(0) مطرح و مورد تصویب قرار گرفت.

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## FOREWORD

This standard specification is intended to be mainly used by NIGC and contractors and has been prepared on interpretation 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 and submitted to the NIGC's "STANDARDS COUNCIL" for approval .

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

This standard must not be modified or altered by the end users within NIGC and her contractors . Any deviation from normative references and/or well known manufacturers specifications must be reported to Standardization division .

Any comments from concerned parties on NIGC distributed IGS are welcome to technical standards committees and will receive serious attention and consideration should a revision to standards is recommended .

## GENERAL DEFINITIONS :

Throughout this standard the following definitions , where applicable , should be followed :

- 1- "STANDARDIZATION DIV." has been organized to deal with all aspects of industrial standards in NIGC . Therefore , all queries for clarification or amendments are requested to be directed to mentioned div.
- 2- "COMPANY" : refers to national Iranian gas company .
- 3- "SUPPLIER" : refers to a firm who will supply the service , equipment or material to igs specification whether as the prime producer or manufacturer or a trading firm .
- 4- "SHALL " : is used where a provision is mandatory .
- 5- "SHOULD" : is used where a provision is advised only .
- 6- "MAY" : is used where a provision is completely discretionary .

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## 1.SCOPE

This standard specification covers the minimum requirements for cold applied outer – layer tape to be applied as mechanical protection over the inner – layer tape (IGS-M-TP-014-2-C(2) , IGS-M-TP-014-4(1) , IGS-M-TP-014-5(1)) to the exterior of all diameters of buried steel pipelines for long – term protection and prevention of underground corrosion having design temperature within -10 to +50 °C .

## 2. REFERENCES

Throughout this standard specification the following standards and codes are referred to , the edition of them , that are in effect at the time of issues of this standard specification (2009) shall , to the extent specified herein form part of this standard specification . The applicability of changes in codes and standards that occur after the date of standard , shall be mutually agreed upon by the purchaser and manufacturer and /or applicator.

### 2.1 Normative References

**ASTM D 149 (2004)** "Test method for dielectric breakdown voltage and dielectric strength of solid electrical insulating materials at commercial power frequencies"

**ASTM D 1000 (2008)** "Standard test method for pressure – sensitive adhesive – coated tapes used for electrical and electronic applications"

**ASTM D 4218 (2008)** "Standard test method for determination of carbon black content in polyethylene compounds by the muffle – furnace technique"

### 2.2 Informative References

**ANSI/AWWA C214 (2007)** "Standard for tape coating systems for the exterior of steel water pipelines"

**IPS-M-TP-311 (1999)** "Cold applied laminated plastic tape as outer – layer tape for tape coating system of buried steel pipes"

**NACE TG 251 (2009)** "Field application of bonded tape coatings for external repair , rehabilitation , and weld joints on buried metal pipelines"

## 3. DEFINITION

### Batch

The 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 .

## **4. REQUIREMENTS**

### **4.1 Description**

The outer – layer tape shall be a two – layer tape consisting of a polyethylene backing layer with a butyl adhesive layer .

The primary functions of the outer – layer tape shall be to provide mechanical and outdoor weathering protection to the tape system , and secondarily , to contribute to the overall corrosion – protection properties of the system . The outer – layer tape backing shall be compounded so that it will be resistant to outdoor weathering and ultraviolet – light .

The manufacturer shall certify that the backing material is polyethylene only , containing not less than 3.0 percent nor more than 7.0 percent , by weight , of non–polyethylene material consisting of pigments , antioxidants , and stabilizers .

The manufacturer shall certify that the elastomer content of the adhesive layer is not less than 20 percent by weight .

The outer – layer tape shall be made from materials that provide high electrical resistivity, low moisture absorption and permeability , and resistance to corrosive environments .

### **4.2 Properties**

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

**4.2.2** 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 .

**4.2.3** The outer – layer tape shall be sufficiently pliable for normal application operations and shall be suitable for hand applied application and shop coating with wrapping machine , and no significant wrinkles or blisters shall be developed during application even under sunlight .

**4.2.4** The outer – layer tape shall be compatible with the Inner – layer tape .

**4.2.5** The outer – layer tape shall comply with the requirements of Table 1 , and when applied over the Inner – layer tape , shall provide an effective bond to the Inner – layer tape .

**4.2.6** The color of polyethylene backing shall be white or grey .

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

**4.2.8** Unless otherwise specified , the outer – layer tape shall be supplied in the following dimensions :

Roll length : 10 m , 20 m , 30 m

Roll width : 4 , 6 , 9 inches

**Table 1 : Physical Properties of Outer – Layer Tape**

ITEM	PROPERTY	UNIT	REQUIREMENT	TEST METHOD
1	Width deviation	mm	$\pm 5$	see 4.3.1
2	Total thickness , min	$\mu\text{m}$	500	ASTM D 1000
3	Tensile strength , min	N/mm width	7	ASTM D 1000
4	Elongation , min	%	400	ASTM D 1000
5	Adhesion to backing and inner layer tape , min	N/mm width	0.5	ASTM D 1000
6	Dielectric strength , min	V/mm	22000	ASTM D 149
7	Non–polyethylene material	% by weight	min 3.0 max 7.0	ASTM D 4218 (see 4.3.3)

### 4.3 Tape Tests

#### 4.3.1 Width deviation

A specimen of outer – layer tape at least 1m long shall be removed from each of three randomly selected rolls . The width of the specimen shall be measured at several points along the length of the sample to the nearest 1.0 mm using a standard steel scale . The width deviation shall not exceed the limits stated in Table 1 .

#### 4.3.2 Thickness

The thickness of the outer – layer tape shall be measured at not less than 10 locations on the three rolls of tape coating used according to 4.3.1 . The measurements shall be made with a micrometer calibrated to read minimum in thousandths of an inch and having contact feet of not less than 6 mm in diameter . Thickness measurements outside the limits stated in Table 1 shall constitute failure of the tape to meet the thickness requirement . The preferred method of adhesive removal when measuring the thickness of backing shall be defined by tape manufacturer .

#### **4.3.3 Non-polyethylene material content**

The outer – layer tape shall be tested for nonpolyethylene content in accordance with ASTM D 4218 . Sections 9.11 , 9.12 , and 9.13 of ASTM D 4218 need not be performed in this test method to obtain accurate results . The adhesive layer must not be present on the tape backing when performing the ASTM D 4218 test . The preferred method of adhesive removal shall be defined by tape manufacturer . The tests should be performed only on samples taken from tape supplied by the tape manufacturer . Five samples shall be tested and the results averaged . An average value outside the limits given in Table 1 shall constitute failure to meet this requirement .

**4.3.4** The tape manufacturer / supplier shall provide the purchaser with certified test reports on each order of tape supplied .

### **5. DOCUMENTATION**

The manufacturer / supplier shall provide sufficient information to identify the outer – layer tape and shall supply as a minimum the technical information of the product as follows :

- ISO 9001 : 2008 "Certification" for "Design , Manufacturing and Quality control" of tape coating system for "pipeline corrosion protection" issued by an internationally recognized body .
- "Certificate" and "type approval test report" obtained from an independent laboratory or institute for the coating system (primer , inner layer tape , outer layer tape) for maximum continuous operating temperature up to 50°C (stress class C – 50) .
- Manufacturing product data sheets , technical catalogue , technical specification and application procedure .

### **6. QUALITY ASSURANCE**

The manufacturer shall operate an effective documented quality system based on the relevant part of the BS EN ISO 9001:2008 and maintain records identifying the product , date of manufacture , batch numbers and all results of inspection and testing .

### **7. INSPECTION AND TESTING**

**7.1** Materials supplied under this standard specification shall be inspected 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 .

**7.2** The supplier and / or manufacturer shall be responsible for the performance and costs for all laboratory test requirements as specified in this standard specification .

**7.3** The manufacturer shall set up and maintain such quality assurance and inspection systems to ensure that the materials comply in all respects with the requirements of this standard specification (see clause 6) .

**7.4** Purchaser's inspector(s) shall have free access to the manufacturer's works to follow up the progress of the materials covered by this standard specification and to check the quality of materials . The supplier / manufacturer shall place free of charge at the disposal of the purchaser's inspector(s) all means necessary for carrying out the required inspection , results of tests , checking of conformity of materials with this standard specification requirements , checking of marking and packing of materials .

**7.5** Unless otherwise specified by the purchaser , the number of samples for testing shall consist of 10 percent of the batch , but in no case shall be less than three or more than ten samples .

The results of the tests on the samples shall be conformed with the requirements that specified in Table 1 .

**7.6** If the results of one or more tests carried out on samples are found not to conform to this standard specification , the test(s) failed shall be repeated on at least three new samples collected by the NIGC's inspector(s) . In case , any of the new samples fail to conform with this standard specification , all materials represented by such samples shall be considered rejected .

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

### **8.1 Storage Life**

**8.1.1** The tape shall meet the requirements of clause 4 after storage for 24 months of delivery date at temperatures between +5 to +35°C .

### **8.2 Packaging**

**8.2.1** 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 .

## **9. MARKING**

### **9.1 Marking of Rolls**

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

- Name and trademark of the manufacturer
- Product designation
- Length of the roll
- Width of the roll

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

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

**ANNEX A**  
**Data Sheet for Cold Applied Outer Layer Tape**

<b>Manufacturer's name and address</b>	
<b>Product</b>	
<b>Product designation</b>	

ITEM	PROPERTY	UNIT	ACTUAL and REPRODUCIBLE DATA	TEST METHOD	REMARK
1	Width deviation				
2	Total thickness				
3	Tensile strength				
4	Elongation				
5	Adhesion to backing and inner layer tape				
6	Dielectric strength				
7	Non-polyethylene material				
8	Application temperature				
9	Service temperature				

**NOTES :**

1. This data sheet shall be filled , signed , and stamped by manufacturer .
2. Any deviation from this standard specification shall clearly be specified by manufacturer .

<b>DEVIATION(S)</b>

**AUTHORIZED SIGNATURE ;**

**COMPANY'S STAMP :**