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شرکت ملی گاز ایران

مدیریت پژوهش و فناوری

امور تدوین استانداردها

IGS

مشخصات فنی

Technical Specification

نوار حرارتی نوع قیر پایه نفتی اصلاح شده برای عایقکاری سرجوش ها و تعمیرات

Hot Applied Modified Bituminous Tape for the Corrosion  
Protection of Field Joints and Repair



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شرکت ملی گاز ایران



دفتر مدیرعامل



## ابلاغ مصوبه هیأت مدیره



مدیر محترم پژوهش و فناوری

باسلام،

به استحضار می‌رساند در جلسه ۱۶۳۳ مورخ ۱۳۹۳/۱۲/۳ هیأت مدیره، نامه شماره ۱۷۲۳۶۴۸۰۰۰۰/۹ مورخ ۱۳۹۳/۱۱/۲۹ مدیر پژوهش و فناوری و رئیس شورای استاندارد در مورد تصویب نهایی استاندارد تحت عنوان مشخصات نوار حرارتی نوع غیر پایه تقنی اصلاح شده برای عایق کاری سرچوش‌ها و تعمیرات با شماره استاندارد IGS-M-TP-014-8(1) مطرح و مورد تصویب قرار گرفت.

ناصر آبگون

دبیر هیأت مدیره

رونوشت: مدیرعامل، مدیر شرکت ملی گاز ایران و سایر رؤسای هیأت مدیره

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## **FOREWORD**

This standard is intended to be mainly used by NIGC and contractors, and has been prepared based on interpretation of recognized standards, technical documents, knowledge, backgrounds and experiences in natural gas industry 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 employees and contractors.

This standard must not be modified or altered by NIGC employees or its contractors. Any deviation from normative references and / or well-known manufacturer's specifications must be reported to Standardization division.

The technical standard committee welcomes comments and feedbacks about this standard, and may revise this document accordingly based on the received feedbacks.

## **GENERAL DEFINITIONS:**

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

- 1- "STANDARDIZATION DIV." is organized to deal with all aspects of industry standards in NIGC. Therefore, all enquiries for clarification or amendments are requested to be directed to mentioned division.
- 2- "COMPANY": refers to National Iranian Gas Company (NIGC).
- 3- "SUPPLIER": refers to a firm who will supply the service, equipment or material to NIGC 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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**CONTENT**

<b>1. SCOPE</b>	<b>2</b>
<b>2. REFERENCES</b>	<b>2</b>
<b>3. DEFINITIONS</b>	<b>2</b>
<b>4. COATING MATERIAL</b>	<b>4</b>
<b>5. REQUIREMENTS</b>	<b>5</b>
<b>6. QUALITY CONTROL PLAN (Q.C.P.)</b>	<b>6</b>
<b>7. QUALITY ASSURANCE</b>	<b>6</b>
<b>8. INSPECTION AND TESTING</b>	<b>6</b>
<b>9. DOCUMENTATION</b>	<b>7</b>
<b>10. PACKAGING</b>	<b>7</b>
<b>11. MARKING</b>	<b>8</b>
<b>ANNEX A: Data sheet for hot applied modified bituminous tape</b>	<b>10</b>
<b>ANNEX B: Data sheet for primer</b>	<b>11</b>

## 1. SCOPE

This standard specification specifies the minimum requirements for hot applied modified bituminous tape for the corrosion protection of field joints and repair of pipelines coated with bitumen enamel or modified bitumen enamel in conjunction with cathodic protection.

This standard specification covers the use of hot applied bituminous tape when the design temperature is within -20 °C to +60 °C.

**Note:** This standard withdraws and replaces IGS-M-TP-014-2(0)-Section A standard.

## 2. REFERENCES

Throughout this standard specification the following standards are referred to. The editions of these standards that are in effect at the time of issue of this standard specification (2014) shall form part of this standard specification. The applicability of changes in standards that occur after the date of this standard specification shall be mutually agreed upon by the purchaser and the supplier and/or manufacturer.

**ASTM D 149 (2013)** "Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies"

**ASTM D 1000 (2010)** "Pressure Sensitive Adhesion-Coated Tapes Used for Electrical and Electronic Applications"

**EN 10300 (2005)** "Steel Tubes and Fittings for Onshore and Offshore Pipelines – Bituminous Hot Applied Materials for External Coating"

**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"

**IGS-M-TP-016(2) (2012)** "Polymer Modified Bitumen Enamel Coating System for Line Pipe"

**ISO 2591-1 (1988)** "Test Sieving – Part 1: Methods Using Test Sieves of Woven Wire Cloth and Perforated Metal Plate"

**ISO 3801 (1977)** "Textiles – Woven Fabrics – Determination of Mass per Unit Length and Mass per Unit Area"

**ISO 5256 (1985)** "Steel Pipes and Fittings for Buried or Submerged Pipelines – External and Internal Coating by Bitumen or Coal Tar Derived Materials"

**ISO 9001 (2008)** "Quality Management Systems – Requirements"

## 3. DEFINITIONS

### **Batch**

Quantity of coating material produced in a single production run.

**Bitumen**

Viscous liquid or a solid, consisting of hydrocarbons and their derivatives, which is soluble in carbon disulfide or trichloroethylene. It is substantially non-volatile and softens gradually when heated. It is black or brown in color and possesses waterproofing and adhesive properties. It is obtained by refinery processes from petroleum.

**Bituminous Tape (Hot Applied)**

Corrosion protection tape consisting of glass or synthetic reinforcement coated on both sides with a bituminous compound.

**Bitumen Based Enamel**

A coating material, which comprises oxidized or modified bitumen and filler.

**Coating Applicator**

The party, which is ultimately responsible for the coating operations which include supply coating materials, application of the coating materials, etc. as specified in the relevant contract.

**Hot Applied Material**

Material which is solid at ambient temperature and becomes fluid on heating to application temperature.

**Inert Filler**

Does not react with other ingredients of the coating material or with the environment in finely divided mineral powder, which is not hygroscopic, not electrically conductive in which it will be used.

**Manufacturer/Supplier**

The company that manufactures or supplies coating material.

**Maximum Continuous Operating Temperature (Service Temperature),  $T_{max}$** 

Maximum continuous temperature of the medium transported through the buried or immersed coated pipeline.

**Modified Bitumen Enamel**

Bitumen enamel, which has been rheologically changed by the addition of a polymer or polymers.

**Plasticizer**

A substance incorporated in a material to increase its workability, flexibility, or distensibility.

**Primer**

A material applied as a thin film to metal in order to ensure adhesion of the subsequent protective coating.

**Resin**

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

#### 4. COATING MATERIAL

The coating system consists of a primer and a coated tape with following general description:

##### 4.1 Primer

It shall be fast drying (5 – 15 minutes at 23 °C), synthetic and special formulated to be used with the relevant polymer modified coated tape.

The primer shall consist of hydrocarbon resins and plasticizer and, when required, coloring matter, together with solvents needed to give a consistency suitable for application by spray, brush or other approved method. It shall be fast drying and compatible with the modified bitumen enamel and shall be supplied by the same manufacturer of the modified bitumen enamel.

The primer shall comply with the requirements given in Table 2 of IGS-M-TP-016(2) standard when tested by the methods specified and, when dry, shall provide a suitable bond between the metal and subsequent coating.

##### 4.2 Polymer Modified Bitumen

It shall consist of a uniform mixture of modified bitumen with thermoplastic rubbers and 25% to 35% inert filler.

The modified bitumen enamel shall comply with the requirements given in Table 3 of IGS-M-TP-016(2) standard when tested by the methods specified.

The modified bitumen enamel in conjunction with an appropriate primer shall comply with the requirements given in Table 4 of IGS-M-TP-016(2) standard when tested by the methods specified.

The inert filler shall be physically and chemically stable at the maximum application temperature of the coating material. Powdered slate and talc are typical examples of suitable filler types.

The fillers graded in accordance with ISO 2591-1, subclause 7.3, shall meet the following requirements:

- Passing 90 µm: more than 93% by weight
- Passing 250 µm: more than 99% by weight

**Note:** The modified bitumen enamel shall be supplied hot in bulk. The hot bulk shall be accompanied by a delivery note clearly marked with the manufacturer's name, material designation, date of manufacture and batch number.

##### 4.3 Bituminous Coated Tape

It shall consist of a special glass fiber, impregnated and coated with polymer modified bitumen.

**Note:** The coated tape and primer shall be supplied by the same manufacturer.

## 5. REQUIREMENTS

Coating shall meet the requirements specified in Table 1.

**Table 1 – Qualification Requirements**

Item	Property	Unit	Acceptance Criteria	Test Method
1	Thickness, min	mm	4.0	EN ISO 2808
2	Mass per unit area, min	g/m <sup>2</sup>	5000	ISO 3801
3	Holiday detection (5 kV per mm of coating thickness), max	kV	20	EN 10300 Annex R
4	Tensile strength, min - Longitudinal - Transverse	N/mm N/mm	15 20	EN 12068 Annex A
5	Peel strength at 23±2 °C (to pipe surface, to factory coating), min	N/cm	70	EN 10300 Annex S
6	Peel strength at 60±3 °C (to pipe surface, to factory coating), min*	N/cm	20	EN 10300 Annex S
7	Lap shear strength at 60±3 °C, min	N/mm <sup>2</sup>	0.05	EN 12068 Annex D
8	Impact resistance at 23±2 °C, min	J	15	EN 12068 Annex H
9	Specific electrical insulation resistance, min - R <sub>S100</sub> - R <sub>S100</sub> / R <sub>S70</sub>	Ω.m <sup>2</sup> ---	10 <sup>8</sup> 0.8	EN 12068 Annex J
10	Cathodic disbondment resistance, max - at 23±2 °C - at 60±3 °C	mm mm	5 12	EN 12068 Annex K
11	Dielectric strength, min	kV	25	ASTM D 149
12	Water absorption, max	g/m <sup>2</sup>	0.7	ISO 5256

\* Using water bath that set at 60 ± 3 °C and keeping sample in it for minimum 45 minutes or oven that set at 60±3 °C and keeping sample in it for minimum 12 hours.



## **6. QUALITY CONTROL PLAN (Q.C.P.)**

The coating applicator shall obtain the following documents from coating materials manufacturer and submit them to company for review and approval:

- A statement certifying that the delivered primer and modified bitumen enamel meet the required characteristics as set forth in this standard specification according to the specified methods.
- The batch test certificates for the primer and the bituminous coated tape supplied.

## **7. QUALITY ASSURANCE**

Manufacturer shall operate an effective, documented quality system based on the relevant part of the ISO 9001 and maintain records identifying the product, date of manufacturing, batch numbers and all results of inspection and testing.

## **8. INSPECTION AND TESTING**

The manufacturer shall set up and maintain such quality and inspection system as to ensure the material supplied comply with all aspect of the requirements of this standard specification.

The manufacturer shall furnish the purchaser or his 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.

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 standard specification.

Purchaser's inspector shall have free access to the manufacturer's works at any time during manufacture.

The manufacturer shall provide all means necessary for carrying out all inspections and tests as required by this standard specification.

Random sampling proportional to the quantity of each item shall be at the discretion of the inspector.

If a sample is rejected in any inspections or tests, double sampling shall be carried out. In case of any rejection in new samples, all materials represented by such sampling shall be rejected.

Inspections or tests carried out by the purchaser's inspector in no way relieve the manufacturer/supplier of his responsibilities and liabilities under the terms and conditions of this standard specification.

**8.1** Coating inspection shall be carried out by coating applicator in the presence of purchaser or his nominated inspector(s).

**8.2** The inspector shall have free access to the workshops, storage yards and laboratory of the coating applicator that shall provide him with all the facilities necessary for the proper execution of his mission.

**8.3** Upon attendance in the coating plants, the coating applicator shall submit the documents supplied by coating manufacturer as specified in this standard specification. Inspector shall check the conformity of coating material with this standard specification.

**8.4** The coated line pipe inspection certificates including the results of all tests and inspections as set forth in this standard specification shall be verified by the inspector(s).

## **9. DOCUMENTATION**

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

- ISO 9001:2008 "CERTIFICATION" for "Design, Manufacturing and Quality Control" of offered coating system for "pipeline corrosion protection" issued by an internationally recognized body.
- Original technical catalogues, manufacturing product data sheet and application procedure recommendation and guidelines (application instructions) for all of the items offered.
- Storage and handling procedure.
- Material Safety Data Sheet (MSDS).
- Filled, signed and stamped data sheets stating in Annex A and Annex B.

## **10. PACKAGING**

The packaging of primer and tapes shall be according to NIGC "Protection, Packing, Marking and Despatching Instructions" but as a minimum the following conditions, shall be fulfilled:

### **10.1 Primer**

The primer shall be packaged in new steel drums 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 capacity of steel drums shall not be more than 20 liter.

The primer shall be located on heavy wooden pallets with a light plate on top.

Pallets shall be strapped on all sides to be suitable for long distance shipment.

### **10.2 Tape**

The tapes shall be delivered in roll form and the surface shall be dusted with fine sand to prevent sticking during storage.

Each roll of tapes shall be individually packaged with a moisture proof material.

The tapes shall be packaged in strong cartons then located on heavy wooden pallets with a light plate on top.

Pallets shall be strapped on all sides to be suitable for long distance shipment and additionally shrink wrapped to be weather proof.

Each pallet of coating material shall contain an application instruction.

## **11. MARKING**

### **11.1 Tape**

#### **11.1.1 Marking of rolls**

Each roll shall be marked with the following information:

- Name or trade mark of manufacturer
- Type and trade name of tape
- Dimension
- Batch No.
- Date of manufacture

#### **11.1.2 Marking of cartons**

Each carton shall be plainly marked with the following information:

- Name
- IGS Specification
- Order No.
- Type and trade name of tape
- Roll sizes
- Type and trade name of primer to be used with the tape
- Maximum temperature resistance (°C)
- Batch No.
- Date of manufacture
- Quantity (number of rolls)
- Manufacturer's name and address

#### **11.1.3 Direction for use**

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

### **11.2 Prime**

#### **11.2.1 Marking of drums**

Each drum shall be legibly marked with the following information:

- Name
- IGS Specification
- Order No.
- Type and trade name of primer
- Application temperature
- Kind of thinner
- Cleaning material
- Flash point (°C)
- Drying time (minute) for tape application
- Color
- Type and trade name of tape to be used with the primer
- Batch No.
- Date of manufacture
- Net weight
- Method of application

- Information and warnings (if needed)
- Manufacturer's name and address
- HMIS (including Health, Fire, Reactivity, Personal Protection, Specified Hazard, etc.)

**11.2.2 Direction for safety**

In addition to the manufacturer's instruction for safety, the following directions shall also be supplied with each container of primer:

- This primer is hazardous because of its flammability and potential toxicity. Proper safety precautions shall be observed to protect against these recognized hazards. Safe handling practices are required and shall include, but not be limited to, the provisions of SSPC-PA guide 3, "A Guide to Safety in Paint Application" and to the following:
  - Keep primer away from heat, sparks, and open flame during storage, mixing, and application. Provide sufficient ventilation to maintain vapor concentration at less than 25% of the lower explosive limit.
  - Avoid prolonged or repeated breathing of vapors or spray mists, and prevent contact of the primer with the eyes or skin.
  - Clean hands thoroughly after handling primer and before eating or smoking.
  - Provide sufficient ventilation (if working in closed area) to insure that the vapor concentrations do not exceed the published permissible exposure limits. When necessary, supply appropriate personal protective equipment and enforce its use.

**ANNEX A**  
**Data Sheet for Hot Applied Modified Bituminous Tape**

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

Item	Property	Actual and Reproducible Data	Unit	Test Method	Remark
1	Thickness				
2	Mass per unit area				
3	Holiday detection (5 kV per mm of coating thickness)				
4	Tensile strength - Longitudinal - Transverse				
5	Peel strength at 23±2 °C (to pipe surface, to factory coating)				
6	Peel strength at 60±3 °C (to pipe surface, to factory coating)				
7	Lap shear strength at 60±3 °C				
8	Impact resistance at 23±2 °C				
9	Specific electrical insulation resistance - R <sub>S100</sub> - R <sub>S100</sub> / R <sub>S70</sub>				
10	Cathodic disbondment resistance - at 23±2 °C - at 60±3 °C				
11	Dielectric strength				
12	Water absorption				
13	Low temperature unrolling test				

**ANNEX B**  
**Data Sheet for Primer**

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

<b>Item</b>	<b>Property</b>	<b>Actual and Reproducible Data</b>	<b>Unit</b>	<b>Test Method</b>	<b>Remark</b>
<b>1</b>	Flow time				
<b>2</b>	Flash point				
<b>3</b>	Volatile matter				