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شرکت ملی گاز ایران
مدیریت پژوهش و فناوری
امور تدوین استانداردها

IGS

دستورالعمل

نوار پلاستیکی خودممزوج ۳ لایه برای سرجوشها و بازسازی خطوط لوله فلزی

3Ply Co-Extruded Plastic Tape for Field Joint and Rehabilitation of Steel linePipes



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شرکت ملی گاز ایران



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باسلام،

به استحضار می‌رساند در جلسه ۱۹۸۵ مورخ ۱۴۰۱/۰۸/۰۱ هیأت مدیره، نامه شماره گ/۰۰۰/۹/۱۰۷۸۶۸ مورخ ۱۴۰۱/۰۷/۲۰ آن مدیریت درمورد تصویب نهایی مقررات فنی شرکت ملی گاز ایران به شرح زیر مطرح و مورد تصویب قرار گرفت.

۱- دستورالعمل نوار پلاستیکی خود ممزوج سه لا برای سرجوش ها و بازسازی خطوط لوله فلزی

IGS-C-TP-014-2(0)

۲- مشخصات فنی خرید نوار پوشش سرد خارجی برای خطوط لوله فلزی مدفون

IGS-M-TP-025(1)

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Foreword

This standard specification is intended to be mainly used by N.I.G.C. and contractors, and has been prepared base on interpretation of recognized standards and technical documents, as well as knowledge, backgrounds and experiences in gas industries at national and international levels.

Iranian Gas Specification (IGS) are prepared, reviewed and amended by technical standard committees within NIGC standardization division of research and technology management and submitted to "the standards council of NIGC" for approval.

IGSs are subjected to revision, amendment or withdrawal, if required, and thus the latest edition of IGS shall be checked / inquired by NIGC'S users.

This standard must not be modified or altered by NIGC employees or its contractors. Any deviation or conflicts between this specification and other applicable standards, codes, procedure or well-known manufacturer's specifications must be resolved in writing by the user or its representative through Manager, Engineering Department or standardization division of NIGC.

The technical standard committee welcomes comments and feedbacks from concerned or interested corporate and individuals 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 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

1.1. This standard specification specifies the NIGC requirements concerning properties, and relevant test methods for 3Ply co-extruded cold applied plastic tape as external anti-corrosion protection of field joint, fitting, and rehabilitation of steel linepipes main coating, by hand or hand applied machine application.

This standard specification covers the use of 3Ply co – extruded cold applied plastic tape when the maximum continuous operating temperature is 50 °C.

1.2. The coating shall be high mechanical resistance class C according to EN 12068.

1.3. cold applied outer – layer tape to be applied as mechanical protection over the 3Ply co- extruded cold applied plastic tape (inner – layer tape) according to IGS-M-TP-025.

1.4. This standard withdraws and replaces IGS-M-TP-014-2C (2).

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 issue of this standard specification shall, to the extent specified herein, form part of this standard specification. The applicability of changes in standards and codes that occur after the date of standards that referred shall be mutually agreed upon by the purchaser and manufacturer or supplier.

2.1 Normative references

ASTM D 149 (2020) "Standard test method for dielectric breakdown voltage and dielectric strength of solid electrical insulating materials at commercial power frequencies"

ASTM D 570 (2018) "Standard test method for water absorption of plastics"

ASTM D 4940 (2020) "Standard Test Method for Conductimetric Analysis of Water Soluble Ionic Contamination of Blasting Abrasives"

ASTM D 4285-83 (2018) "Standard Test Method for Indicating Oil or Water in Compressed Air"

ASTM D 1000 (2017) "Standard test method for pressure-sensitive adhesive – coated tapes used for electrical and electronic applications"

ASME B 31.8 (2018) "Gas transmission and distribution piping systems"

EN 12068 (1999) "Cathodic protection – External organic coatings for the corrosion protection of buried or immersed steel pipeline used in conjunction with Cathodic protection – Tapes and shrinkable materials"

ISO 2811 (2016) "Paints and varnishes – Determination of density"

ISO 3251 (2019) "Paints and varnishes – Determination of non – volatile matter of paints, varnishes and binders for paints and varnishes"

ISO 9001 (2015) "Quality system – Model for quality assurance in design, development, production, installation and servicing"

ISO 8502-3 (2017) "Preparation of Steel Substrates before Application of Paints and Related Products – Test for Assessment of Surface Cleanliness – Part 3: Assessment of Dust on Steel Surface Prepared for Painting (Pressure Sensitive Tape Method)"

ISO 8502-6 (2020) "Preparation of Steel Substrates before Application of Paints and Related Products – Test for Assessment of Surface Cleanliness – Part 6: Extraction of Soluble Contaminants for Analysis – The Bresle Method"

ISO 8502-9 (2020) "Preparation of Steel Substrates before Application of Paints and Related Products – Test for the Assessment of Surface Cleanliness – Part 9: Field Method for the Conduct Metric Determination of Water-Soluble Salts"

ISO 11124 (all parts) (2018) "Preparation of Steel Substrates before Application of Paints and Related Products –Specifications for Metallic Blast-Cleaning Abrasives"

ISO 11126 (all parts) (2018) "Preparation of Steel Substrates before Application of Paints and Related Products –Specifications for Non-metallic Blast-Cleaning Abrasives"

ISO 8501-1 (2007) "Preparation of Steel Substrates before Application of Paints and Related Products – Visual Assessment of Surface Cleanliness – Part 1: Rust Grades and Preparation Grades of Uncoated Steel Substrates and of Steel Substrates after Overall Removal of Previous Coatings"

ISO 8503-5 (2017) "Preparation of Steel Substrates before Application of Paints and Related Products –Surface Roughness Characteristics of Blast-Cleaned Steel Substrates – Part 5: Replica Tape Method for the Determination of the Surface Profile"

IGS-M-PL-001-2(1) (2016) "SMLS/HFW/SAWH Carbon Steel Pipes, Grades B to X80, Sizes 6 to 56 inch."

IGS-M-PL-001-1(1) (2017) "SMLS/HFW Carbon Steel Pipes, Grades B, Sizes 0.5 to 4 inch."

2.2 Informative References

EN 10204 (2004) "Metallic Products-Types of Inspection Documents"

3. DEFINITIONS

Co – extrusion

Two or more materials are extruded simultaneously from a single die, so they fuse together to form a single structure. Laminated tape system is not accepted.

Coating System

The complete number and types of coats applied to a substrate in a predetermined order. (when used in a broader sense, surface preparation, pretreatments, dry film thickness, and manner of application are included).

Maximum continuous operating temperature

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

Self-amalgamating (self-fusing)**-Tape to tape**

Two layer of 3Ply tape system in overlap area fuse to itself at room temperature with only slight pressure and over the time according to related method. This fusing action works only if the overlap layers are of same chemical nature (butyl rubber – butyl rubber)

-Within three individual ply

Only achievable by co – extruded method of production

MSDS

Material safety data sheets

Purchaser

The owner company that has the authority for the pipeline or piping systems to which the coating is to be applied.

Shelf Life

Amount of time a coating or other material remains in useable condition.

4. REQUIREMENTS

The coating system consist of a primer and a 3Ply plastic tape with following general description:

4.1 Primer

It shall be fast drying, butyl rubber base and special formulated to be used with 3Ply tape system. The primer properties shall meet the requirements of Table 2.

4.2 3Ply Tape

It should consist of a polyethylene carrier film, coated on both sides with a plastic butyl rubber based compound in one co – extrusion process.

4.3 The Tape Application System

The tape shall be applied with 50% overlap on primed surface. It amalgamates at the overlap at ambient temperature to form a sleeve type coating.

4.4 The Tape and the Coating System

The properties shall meet the requirements of Table 1.

4.5 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.

TABLE 1 –3Ply Tape and Coating System Properties

ITEM	ELEMENTS	REQUIREMENTS	UNITS	QUALIFICATION TEST	BATCH CERTIFICATE TEST	TEST METHODS
1	Width deviation	±5	mm	*	*	see 4.3.1
2	Total thickness	0.8 ± 0.05	mm	*	*	ASTM D 1000
3	Tensile strength, min	10	N/mm	*	*	Annex A EN 12068
4	Elongation at break, min	600	%	*	*	Annex A EN 12068
5	Peel strength to primed steel, min - at 23 °C - at 50 °C	2 0.20	N/mm	*	*	Annex C EN 12068
6	Peel strength tape to tape (inner to inner & inner to outer), min - at 23 °C - at 50 °C	2.5 0.3	N/mm	*	*	Annex B EN 12068
7	Impact resistance at 23°C, min (Shall be carried out on coating system (inner & outer layer) or 4 layer of 3Ply tape)	15	J	*	*	Annex H EN 12068
8	Cathodic disbandment resistance, max at 23 °C at 50 °C (Shall be carried out on coating system (inner & outer layer) or 4 layer of 3Ply tape)	15 30	mm	*	--	Annex K En 12068
9	Dielectric strength, min	30	kV/mm	*	*	ASTM D 149
10	Specific electrical insulation resistance,min	108	Ω m ²	*	--	Annex J EN 12068
11	Water absorption, 23°C, max	0.1	%	*	*	ASTM D 570
12	*Lap shear strength, at 50 °C, min	0.05	N/mm ²	*	*	Annex D EN 12068

TABLE 1 –3Ply Tape and Coating System Properties(cont.)

ITEM	ELEMENTS	REQUIREMENTS	UNITS	QUALIFICATION TEST	BATCH CERTIFICATE TEST	TEST METHODS
12	Peel strength to pipe surface at 23 °C after 28 days' hot water immersion test at 50 °C, min	0.4	N/mm	*	-	Annex B
13	Thermal ageing resistance ratio of - Tape strength - Elongation at Break - Peel strength layer to layer - Peel strength to pipe surface	($1.25 \geq S_{100}/S_0 \geq 0.75$, $S_{100}/S_{70} \geq 0.8$) ($1.25 \geq E_{100}/E_0 \geq 0.75$, $E_{100}/E_{70} \geq 0.8$) ($P_{100}/P_T \geq 0.75$, $P_{100}/P_{70} \geq 0.8$) ($A_{100}/A_T \geq 0.75$, $A_{100}/A_{70} \geq 0.8$)	--	*	--	Annex E EN 12068
14	Indentation resistance at 50 °C - Residual thickness - Holiday detection	≥ 0.6 pass	mm ---	*	*	Annex G EN 12068
15	Saponification value carrier film and Adhesive, max	25	mg KOH/g	*	*	Annex L EN 12068

TABLE 2 – Primer Properties

ELEMENTS	REQUIREMENTS	UNITS	QUALIFICATION TEST	BATCH CERTIFICATE TEST	TEST METHODS
Solid content by weight , min	25	%	*	*	ISO 3251
Density , min	0.78	g/cm ³	*	*	ISO 2811
Flow time: ford cup NO.4 at 25 °C (Viscosity measurement)	30-40	second	*	*	ASTM D 1200

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

TABLE 3 - Roll Size

LENGTH(m)	WIDTH(mm)	Hollow Core(mm)
10	50	38
20	100	75
30	150 For hand applied machine	75

5. DOCUMENTATION

5.1 Documents to be submitted by the manufacturer

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. Technical specification and material data sheets as detailed in Annex A
- b. Batch certificates;
- c. Application procedure of the coating material;
- d. Directions for handling and storage;
- e. Material safety data sheets (MSDS).
- f. ISO 9001: 2015 " CERTIFICATION" for "Design & Manufacturing" of offered tape coating system (tape and primer) for "pipeline corrosion protection" issued by an internationally recognized body
- g. b- Certificate and approval test report from an internationally well-known certifying body (i.e. DVGW (Germany) and ADVANTICA (UK) for the offered coating system for maximum continuous operating temperature up to 50 °C and the compatibility with this standard specification.

Note 1: Other certificates from recognized certifying body shall be approved by standard council of NIGC.

Note 2: at the discretion of the purchaser, the qualification tests may be waived, provided that the certificates and the results of tests carried out at a reputable third-party test laboratory, not exceeding two years from the date of tests, submitted by the manufacturer/supplier and approved by the purchaser.

5.2 Documents to be submitted by the applicator

The following documents shall be prepared by the applicator and submitted to the purchaser for review and approval:

- a. Quality control plan (QCP) for application of the coating;
- b. Repair procedure.
- c.

6. PACKAGING

6.1 3Ply Tape

The tapes purchased according to this standard specification shall be rolled on a polyethylene hollow cores pipe with internal diameter according to Table 3 and packaged in suitable and approved containers so that during stocking and transport, full quality of

performance is retained. A removable Interleaf shall be incorporated against adhesive compound to prevent sticking of layers. Each roll of tape shall be individually put in a plastic bag. Rolls of tape shall be packed in quantities not to exceed the weight limitations of the container specification. Type and dimensions of packages shall be chosen to suit transport in containers and suitably palletized and packed with plastic cover.

6.2 Primer

The primer shall be delivered in maximum 20 liters' new steel drums.

7. MARKING

7.1 Tape

Each roll shall be legibly marked with the following information:

Product designation, the name of manufacturer, purchaser and any applicable precautionary markings. The indent number, length, width of the roll and shall also be marked on the packages. Storage in closed and dry place, must be marked with a red "double roof" symbol.

Each container shall be plainly marked with the following information:

- Name and trademark of the manufacturer
- Product designation
- Quantity (number of rolls in container)
- Roll sizes
- Batch No.
- Date of manufacture
- Manufacturer's name and address

7.2 Primer

Each drum shall be legibly marked with the following information:

- Name and trade mark of the manufacturer
- Product designation
- Batch No.
- Application temperature
- Type of thinner (if applicable)
- Cleaning material
- Flash point
- Drying time
- Date of manufacture
- Quantity of primer in container
- Maximum/minimum storage temperature
- Manufacturer's name and address
- MSDS warning sticker
- Shelf life

8. STORAGE CONDITION

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 or according to manufacturer storage condition. 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.

9. QUALITY ASSURANCE

Manufacturer shall operate an effective, documented quality system based on the relevant part of the ISO 9001:2015 and maintain records identifying the product, date of manufacturing, batch numbers and all results of inspection and testing.

10. APPLICATION OF COATING

10.1 Surface preparation

- Prior to blast cleaning, the steel surface shall be dry and free from surface defects (such as slivers and laminations), contamination (such as oil, grease, hydrocarbons and temporary corrosion protection), previously applied coatings and deleterious materials. The pre blasting surface preparation processes may be used such as chemical treatment, solvent cleaning, water jetting and use of hand or power tools. These processes shall be approved by purchaser. After blast cleaning the degree of cleanliness shall be SA 2½ or better in accordance with ISO 8501-1 and the roughness Rz shall be between 60 and 100 µm as measured in accordance with ISO 8503-5.
- Abrasive materials shall comply with the requirements of ISO 11124 (all parts) or ISO 11126 (all parts). They shall be free from contamination and contain less than 100 mg/kg chlorides and less than 0.3% copper. If the conductivity of the blasting material is greater than 50 µS/cm (in accordance with ASTM D 4940), the blasting material shall be replaced.
- Compressed air for surface preparation shall be free of oil and condensed water. These shall be determined daily with a blotter test in accordance with ASTM D4285. If necessary, after-coolers shall be provided to reduce the water content to an acceptable level. Traps, filters and separators shall be regularly emptied and cleaned.
- Nozzles for blast cleaning equipment shall be of Venturi design and shall be discarded when wear reaches 30% of the original bore.
- The pipe surface shall be maintained at least 3 °C above the dew point temperature and humidity shall not exceed 85% during cleaning and prior to coating.
- If pipe heating is used to meet required environmental conditions, the pipe must be heated with caution to prevent damage to parent coating or lining.
- Blast-cleaned pipe surfaces shall be protected from condensation, moisture, rainfall, frost and snow. Blast-cleaned surfaces shall also be protected from other contaminants including sand, grit and dirt. The blasted pipe surface shall not be allowed to flash rust or exhibit deterioration before coating.
- The maximum residual chloride level on the blast-cleaned surface shall be 20 mg/m² in accordance with ISO 8502-6 or ISO 8502-9 or using Elcometer 130/SCM400 or any other method approved by purchaser.
- Contaminants (e.g. residual abrasive dust and dirt) shall be removed from all blasted surfaces prior to coating application. Dust contamination shall be a maximum of class 2, in accordance with ISO 8502-3. A tape test shall be conducted to verify that the surface is free of contaminants.

- Prepared surface shall be visually inspected for surface defects and surface imperfections that may cause holidays in the coating.
- After blast cleaning, the surface of the pipe shall be inspected. All slivers, laminations, weld spatters and other surface imperfections made visible by the blast cleaning process shall be removed. After removal of these defects, the residual thickness of pipe shall satisfy the minimum requirements specified by IGS-M-PL-001-1(1) & IGS-M-PL-001-2(1). The treated areas greater than 10 cm² shall be ground flash to a smooth contour profile.

10.2 Application procedure

- The applicator shall follow the coating manufacturer's procedures and recommendations, which are subject to approval by the purchaser.
- No thinner shall be used to dilute or change the consistency of the coating material.
- Coating shall not be applied during rain, fog, mist or when there is free moisture on the prepared surface or rust flashed.
- The coating operation shall be suspended when the metal temperature falls to within 3 °C of the dew point, or is less than 5 °C and/or when the relative humidity is higher than 85%.
- If the surface to be coated is below 10 °C, preheating of the substrate is recommended. Pipe temperature shall not exceed 50 °C as a result of preheat.
- The maximum time between surface preparation and start of the coating application shall be no longer than 4 hours for relative humidity up to 70% and 2 hours for relative humidity between 70% and 85%.

11. INSPECTION AND TESTING

11.1 INSPECTION FOR QUALIFICATION

- Inspection shall be carried out as per Table 1 & 2 by the applicator. The results of inspection shall be recorded by the applicator and made available to the purchaser's inspector
- The purchaser's appointed inspector shall have free access to the workshops, storage yards and laboratory of the coating applicator. Inspector shall have the right and opportunity to witness any quality control tests and/or to perform such tests himself. The applicator shall furnish the purchaser's inspector with all tools and equipment necessary for inspection at the application site.
- Purchaser's inspector shall have free access at all times to all work related to the coating application process, with the right to inspect work and materials. All such work and materials shall be subject to approval by inspector. Failure of inspector to identify or reject defective work or materials shall not be construed as acceptance of such work or materials.

11.2 INSPECTION FOR BATCH CERTIFICATE

To guarantee the quality of the products to be delivered, the inspection is carried out at the manufacturer's site prior to shipment.

Based on the results of material tests during the inspection and on the provided quality control data (process control, in-house and external tests) an inspection report shall be filled-out and signed by the inspector according to inspection type 3.1 of standard EN 10204. This inspection and Testing Procedure regulates the steps that be performed during the inspection process. The Inspector's works and duties consist of the following activities, but not limited to:

1. Checking of Documents

- a. Checking the raw material quality control test results and Certificates for all items and verifying the results versus the manufacturer's data sheets.
- b. Checking the manufacturer's daily production quality control test reports showing the amounts of produced material & results of the relevant tests and verify the results versus the manufacturer's data sheets.
- c. Check the calibration certificates of the testing and inspection instruments.
- d. Check the test report for all items (long terms and short terms) of qualification properties according to related standard IGS, not exceeding two years from issuance date.

2. Visual inspection of the produced goods:

- a. Visual inspection of the marking and packaging (number and weight of container, batch number of components, etc.) according to this standard and purchase order.
- b. Crosscheck of purchase order quantities with stock

3. Selection of samples for material tests

- a. Selection of three rolls per each batch of all material to prepare samples from coating system running for each item according to related test methods.

4. Batch certificate tests:

All test shall be carried out according to table 1 & 2 of this standards.

5. Inspection report:

Inspection report shall be including of the following items, but not limited to:

- List of inspection materials, quantities and batch numbers
- Report of document check (according to section 1)
- Report of visual inspection (according to section 2), plus photos of activities
- Description of sample selection and preparation of specimens, plus photos of activities
- Report of calibration certificates of the testing and inspection instruments
- Date of presence in factory, preparation of specimens and start test
- Tests report include of tests result and graphs (if that to exist)
- Third party inspection agency approves

Notes: All in-house tests shall be performed in witness of inspector.

For Non-Iranian manufacturers tests of one produced batch exemplary for the whole shipment, to be carried out by an internationally well-known independent laboratory and all of documents shall be accepted by inspector.

For Iranian manufacturers the tests shall be carried out at a third-party laboratory that approved by Technical & Industrial Research Laboratories of NIGC.

Details of all inspection and testing shall be fully documented by the manufacturer and certified by inspector.

The results of all mentioned tests shall be checked and complied by criteria which are remarked in related standard.

In the case of any failure to comply with any of the NIGC's requirements mentioned in related standard IGS, new samples according to above mentioned table shall be selected by inspector and all of required tests shall be carried out accordingly. If any failure occurred again, it shall be effect of rejection for each batch presented.

At least one photo of inspector next to the goods is required. The photos of the all parts (include of storage, batch number of drum, preparation of test specimens, test instruments and etc.), plus the image of the inspector's photo attached to the certificate on the inspection report (via CD/DVD) is required.

Third party inspector shall issue release note to supplier and purchaser (two copies) after enquiry items acceptance

Third party inspection agency shall issue inspection certificate after release note has been issued.

11.3 INSPECTION FOR FIELD

The applicator shall prepare a daily production summary containing the following information for each pipe section coated:

- Date and pipe section number;
- Number of holidays;
- The coating shall not have any defects such as wrinkles, pinholes, cuts, disbanded zones, bubble spots, etc.
- The type of tests and frequency of inspection shall be as per purchaser's ITP.

12. REPAIR

- Any repair operation shall be carried out in accordance with the repair procedure approved by the purchaser.
- The repair material and the application conditions shall be in accordance with IGS-O-TP-001

13. HEALTH, SAFETY AND ENVIRONMENT

The applicator shall comply with the requirements of the purchaser's HSE Management System, the product's MSDS and other requirements such as site regulations, safety rules, etc. The applicator shall ensure that updated MSDS are obtained from the manufacturer.

The applicator shall provide all painters with approved protective clothing including safety glasses, safety shoes, hard hats, goggles, respirators, earplugs, fresh-air-fed hood and any other necessary safety equipment. All the safety equipment shall be maintained in a good working condition.

The applicator shall be required to test work areas for flammable vapors, with an appropriate vapor tester, prior to and throughout abrasive blasting and coating operations. The applicator shall post appropriate warning signs and erect appropriate barriers in the work area.

ANNEX (Normative)

Data sheet — Primer

Property	Unit	ACTUAL & REPRODUCEABLE DATA	Test method
Primer trade name	-		-
Generic type	-		-
Solid content	%mass		ISO 3251
Saponification value(solids)	mg/g		EN 12068 Annex L
Type of solvent	-		ISO 4626
Flash point	°C		ISO 1523
Density	g/cm ³		ISO 2811-1
Coverage area	m ² /l		ISO 7254
Dry film thickness	µm		ISO 2808
Storage conditions — temperature, minimum	°C		-
— temperature, maximum	°C		-
Shelf life at storage temperature	month		-

Data Sheet- Co – Extruded 3Ply Cold Applied Plastic Tape

Manufacturer's name and address	
Product	
Product designation	
Mechanical resistance class	

ITEMS	ELEMENTS	ACTUAL and REPRODUCEABLE DATA	UNITS	TEST METHODS	REMARK
1	Total thickness				
2	Tensile strength				
3	Elongation at break				
4	Peel strength to primed steel min: - at 23 °C - at 50 °C				
5	Peel strength tape to tape (inner to inner & inner To outer), min - at 23 °C - at 50 °C				
6	Impact resistance at 23 °C,min				
7	Cathodic disbandment resistance: - at 23 °C - at 50 °C				
8	Dielectric strength				
9	Specific electrical insulation resistance, max - at 23 °C - at 50 °C				
10	Water absorption, max 23 °C				
11	Lap shear strength, at 50 °C,min				
12	Peel strength to pipe surface at 23 °C after 28 days hot water immersion test at 50 °C , min				
13	Thermal ageing resistance ratio of - Tape strength - Elongation at break - Peel strength layer to layer - Peel strength to pipe surface				
14	Indentation resistance at 50 °C - Residual thickness - Holiday detection				
15	Saponification value carrier film and adhesive				
16	Width				
17	Application temperature Max &Min Temp.				

ITEMS	ELEMENTS	ACTUAL and REPRODU CEABLE DATA	UNITS	TEST METHODS	REMARK
18	Service temperature Max &Min Temp.				
19	Dielectric strength, min				
20	Specific electric insulation resistance, min				
4	Peel strength to primed steel min: - at 23 °C - at 50 °C				
5	Peel strength tape to tape (inner to inner & inner To outer), min - at 23 °C - at 50 °C				
6	Impact resistance at 23 °C,min				
7	Catholic disbandment resistance: - at 23 °C - at 50 °C				
8	Dielectric strength				
9	Specific electrical insulation resistance, max - at 23 °C - at 50 °C				

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

AUTHORIZED SIGNATURE:

COMPANY'S STAMP:

ANNEX B (Normative)

Hot Water Immersion Test

B.1 General

-This test shall be carried out to assess the comparative resistance of FJC applied to the bare steel substrate and the plant-applied coating to loss of adhesion due to water immersion.

-Unless otherwise specified, the test temperature shall be the maximum design temperature of the FJC with the following limitations.

-If the maximum design temperature of the FJC to be tested exceeds 95°C, the test temperature shall be limited to 95°C.

-The test temperature shall not be greater than the maximum design temperature of the plant coating.

B.2 Equipment

The following equipment shall be required:

- oven controllable to within 30°C;
- holiday detector;
- 75 mm \pm 3 mm interior diameter plastic cylinder, 150 mm long;
- pointed sharp knife;
- elastomeric adhesive, e.g. silicone sealant;
- small hacksaw blade, "Junior" type or similar.

B.3 Sample preparation

B.3.1 Laboratory prepared samples

B.3.1.1 Samples for FBE and liquid coatings

Cold cut 100 mm \times 100 mm \times 6 mm plates and apply the FJC material under conditions of application similar to those for a field joint coating.

B.3.1.2 Samples for heat shrinkable materials, flame spray coatings, injection molded coatings, tapes and others

Cold cut 150 mm long, 100 mm diameter pipe sections (coated or bare) and coat these samples with the FJC under conditions of application similar to those for a field joint coating.

B.3.2 Samples from qualification trials

B.3.2.1 Samples for FBE and liquid coatings

Cold cut 100 mm \times 100 mm \times WT samples with direct to metal joint coating and joint coating onto plant coating.

B.3.2.2 Samples for heat shrinkable materials, flame spray coatings, injection molded coatings, tapes and others

Cold cut 150 mm pipe rings with direct to metal joint coating and joint coating on plant coating. If the pipe diameter is too large, 100 mm \times 100 mm \times WT panels may be used with some coating systems.

B.4 Preparation of test area

To ensure freedom from holidays, test the prepared panels or rings for holidays with the holiday detector set at the required voltage for the coating system.

B.5 Test procedure

The following steps shall be followed:

- 5 samples per coating shall be used for evaluation;
- Carry out an initial adhesion test on one sample as described in clause 1.6;
- Attach plastic cylinders onto four samples using the elastomeric adhesive, lightly abrade or flame oxidize coating surface if required to form a water-resistant seal.
- Allow sealant to set or cure fully. On samples cut from pipes, the bottom of plastic cylinder may have to be cut to conform to the curvature of the panel;
- Fill the cylinder with 400 ml \pm 50 ml of tap water preheated to test temperature and seal the top opening with a plastic film. Place sample into oven set at test temperature;
- Remove one sample after seven days;
- Allow to cool to ambient temperature and test adhesion as specified in clause 10 to 17. Repeat the adhesion test at intervals of seven days up to 28 days.

B.6 Results

For coating 1B and 1C record whether it leaves a film of compound during the peel test on the steel substrate and on the parent coating.

For other coatings, report the peel strength in N/mm or the degree of disbandment from the steel substrate and the parent coating.