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شرکت ملی گاز ایران

مدیریت پژوهش و فنآوری

امورتدوین استانداردها

IGS

دستورالعمل

نوار دولایه پلی اتیلنی سرد اجرا

Cold-Applied Two-Layer P.E. Tape

دفترمدیرعامل

شرکت ملی گازایران

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ابلاغ مصوبه هیأت مدیره

مدیر محترم پژوهش و فناوری

باسلام،

به استحضار می‌رساند در جلسه ۲۰۵۴ مورخ ۱۴۰۳/۰۲/۰۲ هیات مدیره، نامه شماره ۴۳۸۱ مورخ ۱۴۰۳/۰۱/۱۹ مدیر پژوهش و فناوری درمورد تصویب نهایی مقررات فنی شرکت ملی گاز ایران به شرح زیر مطرح و مورد تصویب قرار گرفت.

۱-مشخصات فنی خرید پایانه راه دور Remote Terminal Unit(RTU)

IGS-R-IT-009(0)

۲-دستور العمل نوار دو لایه پلی اتیلنی سرد اجرا

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سیدمحمد پیشوایی
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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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Contents

1. SCOPE

This standard specification covers the NIGC requirements for cold – applied two-layer homogeneous synthetic elastomer adhesive tape and its primer to be used for the corrosion protection of field weld joints, special sections, fittings, cable to pipe joint with conjunction of cathodic protection system and field repairs of buried steel pipelines mainly coated with cold – applied tape coating system.

This standard specification covers the use of cold – applied two-layer homogeneous synthetic elastomer tape coating system when the maximum continuous operating temperature is 50°C.

Note1: Cold applied outer – layer tape to be applied as mechanical protection over the cold – applied two-layer homogeneous synthetic elastomer adhesive tape (inner – layer tape) according to IGS-M-TP-025.

Note2: This standard withdraws and replaces IGS-M-TP-014-4 (0).

2. REFERENCES

Throughout this standard the following dated and undated standards/codes are referred to. This referenced documents shall, to the extent specified herein, from a part of this standard. For dated references, the edition cited applies. For undated references, the latest edition of the referenced documents applies.

2.1 Normative References

ASTM D 1000 (2017) Standard test methods for pressure – sensitive Adhesive coated tapes used for electrical and electronic applications

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 2369 (2020) Standard test method for volatile content of coatings

ASTM D 1475 (2020) Standard test method for density of paint, varnish, lacquer and related products

ASTM D 1200 (2018) Standard test method for viscosity by Ford viscosity cup

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

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

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

AWWA C214 (2020) Machine Applied Polyolefin Tape Coating for Steel Water Pipe

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 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 SMLS/HFW/SAWH Carbon Steel Pipes, Part 2- Grades B to X80, Sizes 6 to 56 inches

IGS-M-PL-001-2 SMLS/HFW Carbon Steel Pipes, Part 1- Grades B, 0.5 to 4 inches

IGS-O-TP-001 Maintenance and Rehabilitation of Coating of Gas Pipeline Under Operation

2.2 Informative References

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

3. DEFINITIONS

Applicator
The party that applies the coating

Batch
The batch shall consist of an indefinite number of rolls of tape manufactured by a single plant run through the same processing equipment, with no change in ingredient materials

Coating
A coating is an electrically insulating covering applied to a metal surface, as passive protection against external corrosion.

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)

Inspection Test Plan (ITP)
document providing an overview of the sequence of inspections and tests, including standard references, recommended apparatuses (tools) and testing procedures

Laminate
A product made by bonding together two or more layers of materials

Maximum Continuous Operating Temperature
Maximum continuous operating temperature of the medium transported through the buried or immersed coated pipeline

MSDS
Material safety data sheets.

Primer
A solution applied as an undercoat directly to the metal surface in order to assist the bonding of a subsequent coating

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

Removable Interleaf
A sheet, serving as a protectant and/or carrier, for an adhesive film or mass, which is easily removed from the film or mass, prior to use

Solvent
A volatile liquid, which is used in the manufacture of primer to dissolve or disperse the film – forming constituents, and evaporates during drying and therefore does not become a part of the dried film

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

Volatile Organic Compounds (VOC)
Any organic compounds of carbon, which participates in atmospheric photochemical reactions

4. REQUIREMENTS

4.1 Cold– Applied Two Layer Homogeneous Synthetic Elastomer Adhesive Tape

4.1.1 Description

The tape shall consist of a laminate comprising a stabilized polyethylene (PE) backing and a primer activated adhesive layer of homogeneous elastomer–base compound. The product shall provide high electrical resistivity, resistance to corrosive environments, low moisture absorption and permeability, and shall provide an effective bond to The primed steel surface. In addition, the tape shall be compatible with, and provide an effective bond to a previously applied coating. The tape shall also be of such a nature that it resists fungi, bacteria, plant root, excessive mechanical damage during normal application operations and be sufficiently pliable so that it conforms to the surface that is to be coated. It shall also withstand, without tearing, the tensile force necessary to obtain a tightly wrapped coating that fills the helix at the overlap and be free of voids. The tape shall be highly conformable for easy hand wrapping even at low temperatures.
The tape shall be designed for use with its own primer and both the tape and the primer shall be supplied and certified by the tape manufacturer.

4.1.2 Properties

The finished material shall meet the requirements of table 1 and the followings:

- The backing shall be smooth and uniform, free from visible defects such as slits, folds, breaks, uneven or frayed edges.

- The adhesive layer shall be smooth, uniform and free from lumps and bare spots. The color of PE backing shall be black.

- The tape shall be supplied in rolls wound on polyethylene hollow cores pipe. Hollow cores shall have a typical inside diameter according to Table 1.

- Removable interleaf (release paper) shall be incorporated against the adhesive compound which shall be extended for a minimum of 1/2 cm apart from either side.

4.1.3 Roll Sizes

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

Table 1-Roll Size

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

Table 2- Two Layer homogeneous synthetic elastomer adhesive Tape Properties

PROPERTY	UNIT	REQUIREMENT	QUALIFICATION TEST	BATCH CERTIFICATE TEST	TEST METHOD
Total Thickness, min Backing min Adhesive min	mm mm mm	0.800 0.240 0.560	*	*	ASTM D 1000
Tensile strength , min	kg/cm	4	*	*	ASTM D1000
Elongation at break , min	%	200	*	*	
Adhesion to primed steel , min	kg/cm	3	*	*	ASTM D1000
Adhesion to self (at overlaps) , min	kg/cm	1	*	*	ASTM D1000
Specific electrical resistance Rs100 *Rs100/Rs70	$\Omega.m^2$ -	 $\geq 10^8$ ≥0.8	*	--	Annex J EN12068
Indentation resistance pressure (23 °C and Tmax) -residual thickness	N/mm^2 mm	10 ≥0.6	*	*	Annex G EN 12068
**Impact resistance at 23 °C , min	J	15	*	*	Annex H EN 12068
Cathodic disbondment at 28d and 23 °C , max radius	mm	15	*	-	Annex K EN 12068
Water absorption , max	% wt.	0.1	*	*	ASTM D 570
Lap shear strength at 23°C& Tmax	N/mm^2	≥0.05	*	*	Annex D EN 12068
Thermal aging resistance ratio of -tape strength Or -bursting strength -elongation at break -peel strength layer to layer - peel strength to pipe surface	--- 	 $1.25 \geq S_{100}/S_0 \geq 0.75$ $S_{100}/S_{70} \geq 0.8$ $1.25 \geq B_{100}/B_0 \geq 0.75$ $B_{100}/B_{70} \geq 0.8$ $1.25 \geq E_{100}/E_0 \geq 0.75$ $E_{100}/E_{70} \geq 0.8$ $P_{100}/P_T \geq 0.75$ $P_{100}/P_{70} \geq 0.8$ $A_{100}/A_T \geq 0.75$ $A_{100}/A_{70} \geq 0.8$	*	--	Annex E EN 12068

*** Note1: It is necessary that this requirement (RS100/RS70 ≥ 0,8) be fulfilled only if the specific electrical insulation resistance after 70 days is less than 10 times the requirement of the specific electrical insulation resistance after 100 days.**

****Note2: Shall be carried out on coating system**

4.2 Primer

4.2.1 Composition

The primer shall compose of synthetic resin, tackier, and rubber, anti-corrosion inhibitor, stabilizer, and etc. blended with proper type and amount of volatile organic solvent to produce a free flowing liquid coating that can be readily applied without heat by brushing, preferably low volatile organic compounds (VOC) type primer is preferred.
The primer shall contain no benzene (benzoyl), Chlorinated solvents, Hydrolysable chlorine derivatives, or other materials of highly toxic nature. The solvent percentage of the primer shall be specified by the manufacturer. The product shall be free from grit and coarse particles. It shall contain additives which inhibit corrosion and microbiological attack.

4.2.2 Properties

The primer shall comply with the requirements of table 3 and when dry shall provide a highly effective bonding medium between the surface to be protected and adhesive layer of the subsequently applied tape, to perform the requirements given in table 2.

4.3 Properties of Primer

Table 3-Properties of Primer

PROPERTY	UNIT	REQUIREMENT	QUALIFICATION TEST	BATCH CERTIFICATE TEST	TEST METHOD
Total solid content , min	%wt.	19	*	*	ASTM D 2369
Density at 25 ^{0}C , min	g/cm^3	0.78	*	*	ASTM D 1475
Flow time: ford cup NO.4 at 25 ^{0}C (Viscosity measurement)	second	25-30	*	*	ASTM D 1200

***** The minimum covering capacity of primer for surface with roughness of min. 60 microns and cleanliness of Sa 2 1/2 with min. 30µ DFT.

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
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. 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 ^{o}C and the compatibility with this standard specification

Note 1: For Iranian manufacturers 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.

6. PACKAGING

6.1 Tape

The tape shall be delivered in roll form. A removable Interleaf shall be incorporated against adhesive compound to prevent sticking of layers. Each roll shall be individually put in a Non- stick plastic bag. Rolls shall be suitably palletized and packed with plastic cover.Each container of tape shall contain application procedure

6.2 Primer

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

7. MARKING

7.1 Cold – Applied Two Layer Homogeneous Synthetic Elastomer Adhesive 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 4 after storage for 12 months of delivery date. This means 12 month remain until the expiration date, in a tightly covered container at temperatures between -10 to +35 ^{o}C. The primer shall show no thickening, curdling, skinning, gelling, or hard caking after storage for 12 months at storage condition, from date of delivery This means 12 months remain until the expiration date, 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 9001and 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 R_Z 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 ºC 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/m^2 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 & IGS-M-PL-001-2.

The treated areas greater than 10 cm^2 shall be ground flash to a smooth contour profile.
- The tape shall be applied with 50% overlap on primed surface (outer tape shall be applied with 1-inch overlap).

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 ºC of the dew point, or is less than 5 ºC and/or when the relative humidity is higher than 85%.

– If the surface to be coated is below 10 ºC, preheating of the substrate is recommended. Pipe temperature shall not exceed 50 ºC 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 &3 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 tables 1, 2,3 of this standard.

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.

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. The waste produced during operation, repairing and maintenance shall be managed and disposed under waste management laws and related regulations (MOP-HSED-301 to 306).

14.ANNEX (Normative)

Table 4-Data Sheet-Primer

PROPERTY	UNIT	REQUIREMENT	TEST METHOD
Total solid content , min	% by weight		ASTM D 2369
Density at 25 ^{0}C , min	g/cm^3		ASTM D 1475
Flow time: ford cup NO.4 at 25 ^{0}C (Viscosity measurement)	second		ASTM D 1200
Drying time at room temp (23 ±2 ^{0}C) , max	minute		----
Shelf life at storage temperature	month		----
Covering capacity	m^2/ litter		-----
Color	-----		-----
Storage conditions Min. Temp. Max. Temp.	°C °C		-----

The minimum covering capacity of primer for surface with roughness of min. 60 microns and cleanliness of Sa 2 1/2 with min. 30µ DFT.

Table 5- Data Sheet -Two Layer homogeneous synthetic elastomer adhesive Tape

PROPERTY	UNIT	REQUIREMENT	QUALIFICATION TEST	BATCH CERTIFICATE TEST	TEST METHOD
Total Thickness, min Backing min Adhesive min	mm mm mm		*	*	ASTM D 1000
Tensile strength , min	kg/cm		*	*	Annex A EN12068
Elongation at break , min	%		*	*	
Adhesion to primed steel , min	kg/cm		*	*	ASTM D1000
Adhesion to self (at overlaps) , min	kg/cm		*	*	ASTM D1000
Specific electrical resistance Rs100 *Rs100/Rs70	$\Omega.m^2$		*	--	Annex J EN12068
Indentation resistance	mm		*	*	Annex G EN 12068
**Impact resistance at 23 °C , min	J		*	*	Annex H EN 12068
Cathodic disbondment at 28d and 23 °C , max radius	mm		*	-	Annex K EN 12068
Water absorption , max	% wt.		*	*	ASTM D 570
Lap shear strength at 23°C& Tmax	N/mm^2		*	*	Annex D EN 12068
Thermal aging resistance ratio of -tape strength Or -bursting strength -elongation at break -peel strength layer to layer - peel strength to pipe surface	---		*	--	Annex E EN 12068