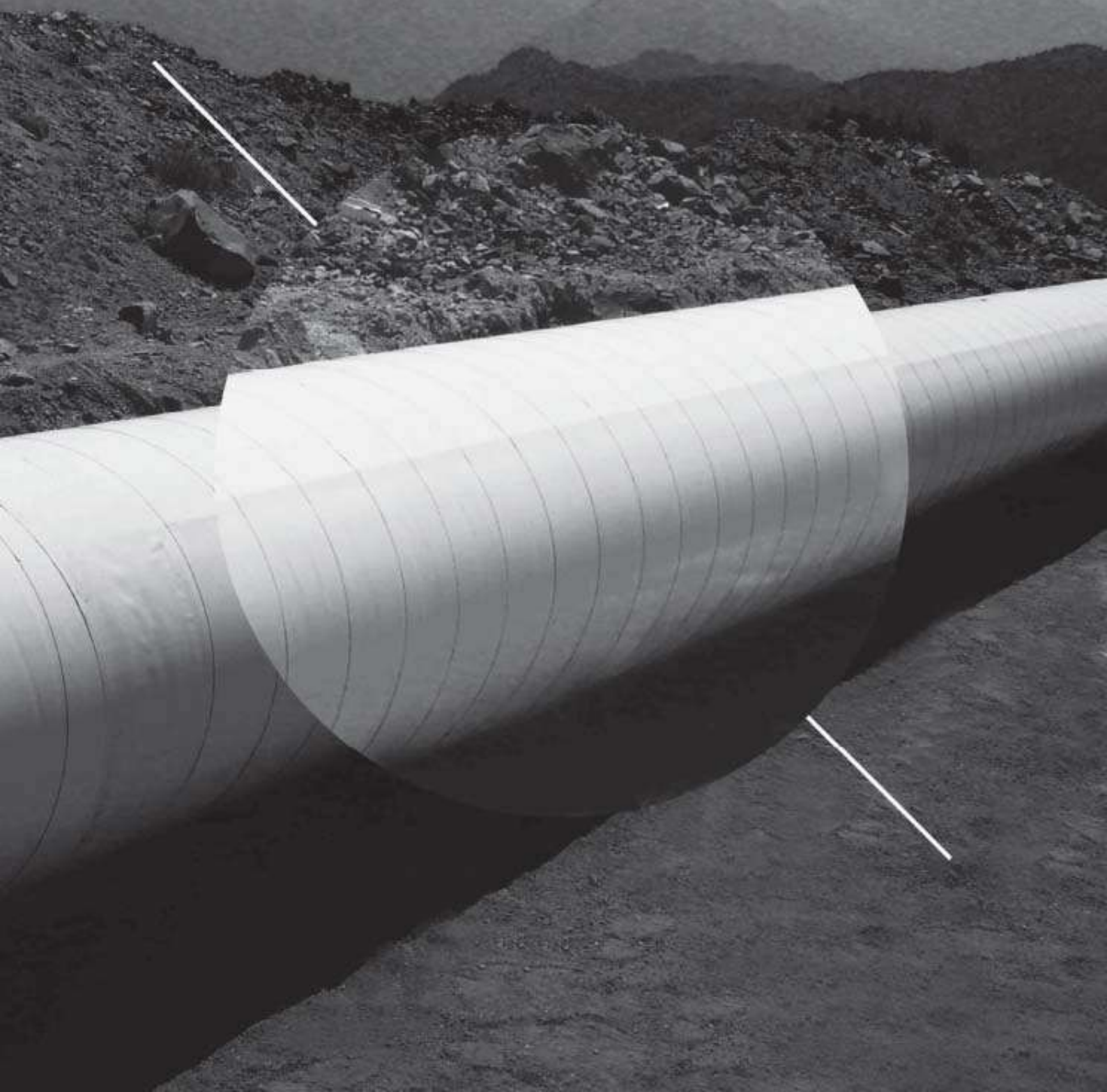


Develop the Pipeline Without Corrosion



History & Introduce



Manufacturing & Trading Co.

In 1996 our company, **NIASHIMI** trading & producing co, began to supply hot & cold applied In this regard, we have succeeded in manufacturing, supplying and performing many national & international projects such as 28" pipeline project of transferring gas from Iran to Armenia.

In 2007, due to increasing in customers demand, unbelievable development of our company regarding quality and quantity, fulfilling customer's satisfaction and collecting confirmation of gas & oil companies, international RWTUV certificates, ISO 9001:2008, ISO 17025 also, our production has increased from 5000 MT of wrapping tapes to 10000 MT and from 1800000 liters primer to 3000000 liters.

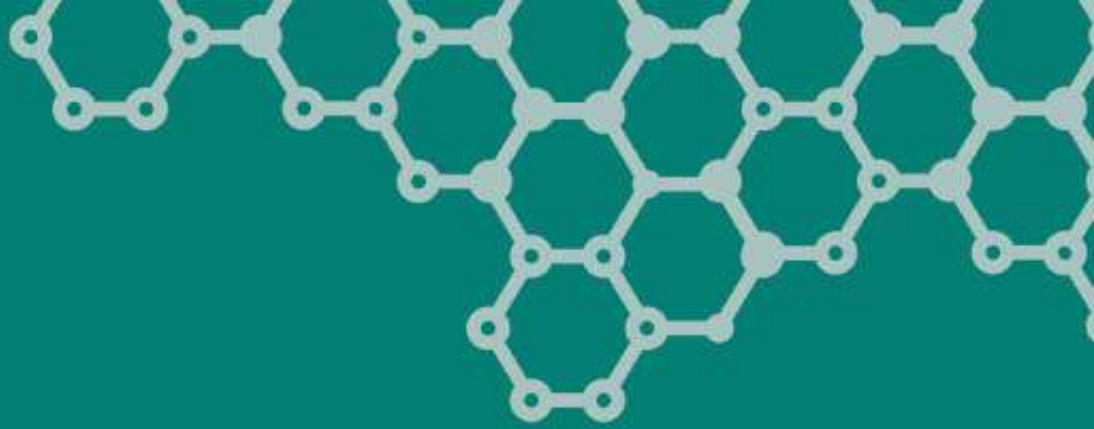
Moreover we have succeeded to install the production lines of co-extrude 3ply tapes and heat shrinkable sleeve, two component epoxy primer, repair patch, closure patch, mastic and other accessories.

By producing all these products and following global standards, we have became one of the most important manufacturers of pipeline coatings on gas, oil and petrochemical industry Also we honor this issue that we are founder of anticorrosion cold applied tapes in **IRAN**.

Moreover, we have changed our structure of industrial activities and based our planning on active, qualified human resource to increase our products quality and the continues of this plan is placed in our working structure.

The strategies for the future of **NIASHIMI** co. are relying on the high quality of our products, updating the process of production, concerning customer's satisfaction, training human resource by cooperation of wise managers and qualified experts, and this is how we place our Sleeve in the list of best manufacturers in this industry.

One of the most important factors for having good quality is to control consistently. So that we have done our best to keep the high quality of our products by installing equipped laboratory and following.



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REFERENCE STANDARD

- IGS-M-TP-014-4(1)
- IGS-M-TP-25(0)
- IGS-M-TP-014(2) (PART 5)
- IPS-M-TP-310
- IPS-M-TP-313
- IPS-M-TP-314
- IGS-M-TP-014-2-C (2)
- IGS-M-TP-014-3(2)
- IPS-M-TP-311
- IPS-M-TP-321
- IPS-M-TP-322
- IPS-M-TP-323
- IPS-M-TP-318
- EN 12068
- DIN 30672
- EN 10300
- ISO 21809-3



Manufacturing & Trading Co.

NIASHIMI CO EXTRUDED TAPE

Corrosion protection tapes coatings have been used for decades on all tapes and sizes of buried pipelines. Results thus obtained are as versatile as the available range of products.



The following paper deals with important aspects that have to be considered to ensure long term performance of corrosion protection tape coating.

The proper choice of a suitable tape coating system starts with a basic requirement, which is valid for all pipe diameter and operation condition.

This requirement is related to material composition and structure.

Regarding their composition the available plastics tape coating can be assigned to the following main material and combination:

1-Carrier film material

- *Polyethylene (PE)*
- *Polypropylene (PP)*
- *Adhesive material*
- *Butyl rubber compound*
- *Bituminous compound*

Among possible tape composition the combination of a PE carrier film with butyl rubber adhesive has proven the best corrosion protection performance. In contrast to this PVC as carrier film material, particularly in case of contained plasticizers, is susceptible to embrittlement.

Bitumen as material basis for corrosion protection tapes is a less performing material also as it provides a lower aging resistance than butyl rubber based adhesive.

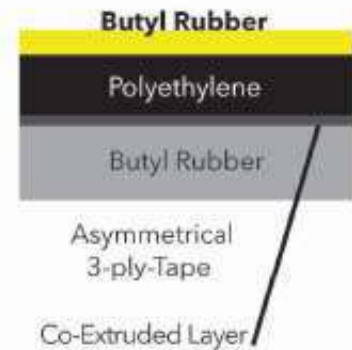
This lower aging resistance is expressed by a significantly lower electrical insulation resistance, compared to butyl rubber tapes, which future decrease after years of operation.

A Cross Section of Asymmetrical CO Extrude Anti Corrosion Tapes

Pure polyethylene tapes have only a very thin ($\leq 350 \mu\text{m}$) polyethylene film as carrier and butyl rubber based adhesive as a second layer ($\leq 350 \mu\text{m}$).

The intermediate layer (both side of carrier film) stops the tape from overstretching when spirally wrapped.

These layers thickness are $80\text{-}100 \mu\text{m}$. These tapes are primarily distinguished by a very plastic and supple behavior and are particularly suited to the wrapping of complex geometrical shapes.

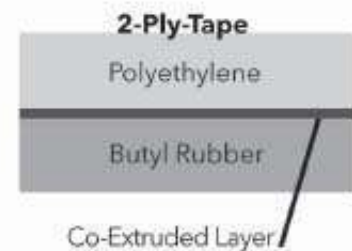


B Mechanical Protection Tapes (Outer Layer)

A distinction is made between 2-ply tapes and purely adhesive tapes.

2-ply tapes consist of a polyethylene film and a butyl base adhesive layer, both linked by a co-extrusion layer.

The butyl base adhesive layer amalgamates with the corrosion protection layer to make an impermeable butyl rubber layer.



Tapes systems have been used for more than 25 years to provide long-term corrosion protection for buried pipes, welded joints, pipe bends and structural elements.

Tapes can be combined in various ways to make tape systems. All systems have in common that a self-amalgamating three-ply tape or a butyl tape is always used for the innermost layer of corrosion protection.

Only tapes of this type amalgamate in the overlap area to form a sleeve-like coating that is practically diffusion resistant to water vapor and oxygen.

Tape systems are used for versatile fields of application in construction and rehabilitation of buried metal pipelines. In particular, this Wrapping is used for covering the following items:

- *Welded joints*
- *Full pipe lengths*
- *Bends*
- *Reducers*
- *Branches*
- *Fittings*

A Corrosion Protection Coating System

Tape systems should always contain at least two layers of a self-amalgamating three-ply tape. The resulting and completely sealed inner wrap then normally,

Over wrapped with a mechanically protecting outer wrap, which could be either a three-ply or a two-ply tape.

The even distribution of polyethylene and Butyl rubber plies in a one tape system as shown in Figure below affords a maximum resistance to mechanical stresses like indentation and impact.

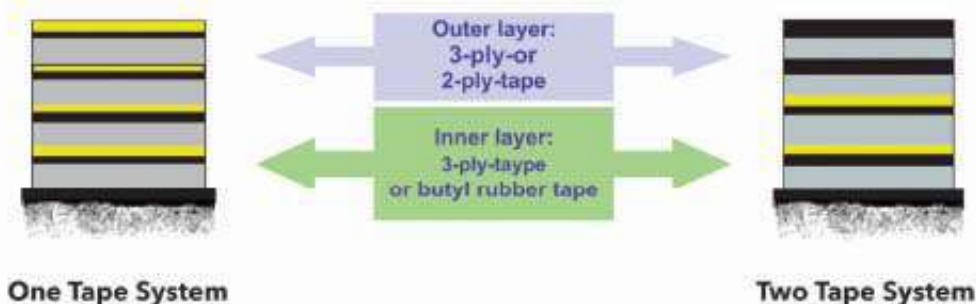
Additionally in a one tape system all tape layers self-amalgamate within their overlaps, forming a sleeve type coating throughout the whole tape system.

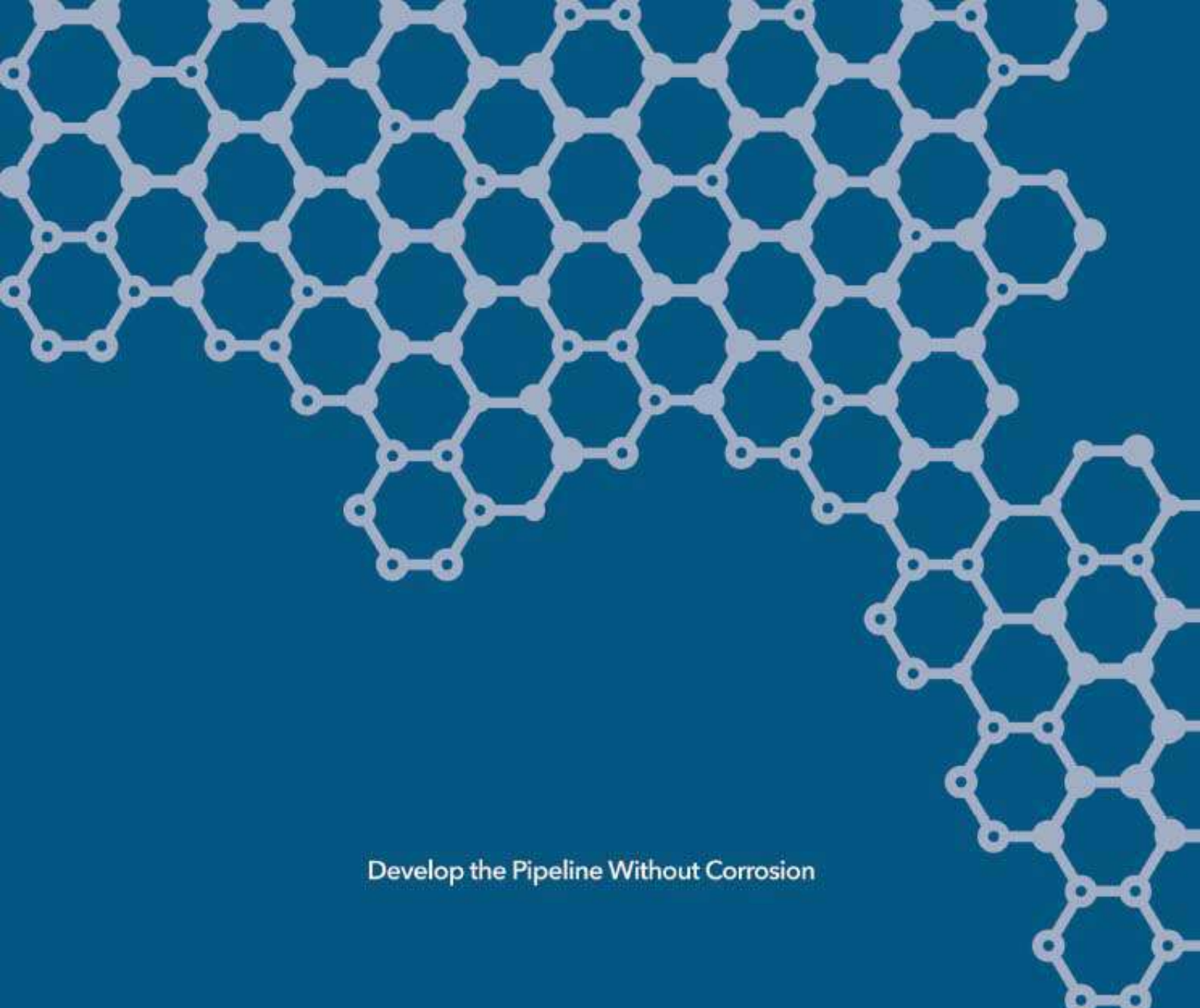
In two tape systems using two-ply tapes for the outer wrap, the overlap between the third and fourth tape layer does not self-amalgamate, which nevertheless is not detrimental to the corrosion protection performance of the whole system.

Even contrary and beside the fact, that they are economically preferred, there may be also technical reasons to choose two-ply outer wrap tapes instead of three-ply outer wrap tapes.

Particularly in hot climates it could be useful to employ two-ply tapes comprising a white polyethylene backing.

Such tapes would show only a minor rise in temperature when exposed to sun irradiation. The well-known effect of bubble formation under tape coatings, which are exposed to sunlight, would consequently be avoided.



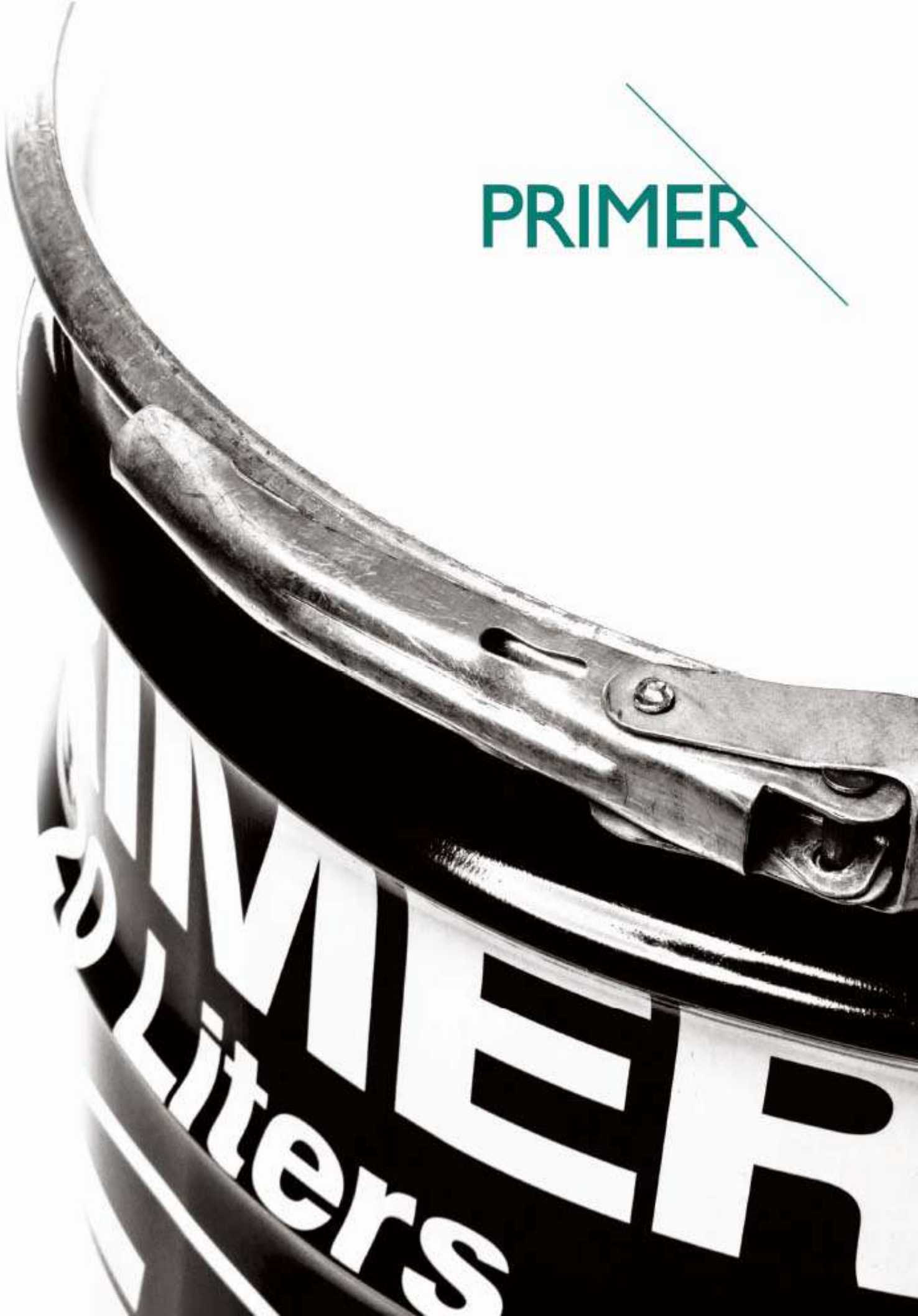


Develop the Pipeline Without Corrosion



Manufacturing & Trading Co.

PRIMER



PRIMER FOR COLD WRAP SYSTEM

NIASHIMI liquid adhesive systems are recommended for use with only **NIASHIMI** coating systems.

The liquid adhesive systems consist of elastomers blended with polymeric resins, corrosion inhibitors and other additives that will facilitate good adhesion to the blasted pipe surface as well as maximize bonding of the inner-wrap tape layer to the pipe surface.

Dissolved in an organic solvent system. They can be used for machine or hand applications and provide excellent adhesion to the pipe substrate and cathodic disbondment Resistance.

NIASHIMI primers may be used in almost all climate condition and various services temperature all around the world and give long term adhesion and protection to steel pipelines.

COMPOSITION:

The primer shall compose of synthetic resin, tackier, bitumen (for Bituminous Type) and rubber, anti-corrosion inhibitor, Stabilizer, and etc., blended with proper type of hydrocarbon organic solvent to produce.

A free flowing liquid coating that can be readily applied without heat by brushing and airless spray.

The primer shall contain no benzene (benzoyl), Chlorinated solvents, Hydrolysable chlorine derivatives. 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.

APPLICATION:

- For application on new or wire brush cleaned metallic surface.
- For application on metallic surface cleaned by grit /shot blasting.
- All of the surface after cleaning must be free from grease, dust and foreign materials.



TECHNICAL SPECIFICATION

PRIMER NSP-P19

<i>Properties</i>	<i>Unit</i>	NSP P-19	Test method
Color	---	black	
<i>Solid content (min)</i>	% by weight	19	ASTM D 2369
Density at 25 °C	gr/cm³	0.78	ASTM D 1475
<i>Viscosity at 25 °C</i>	Sec	25-30	ASTM D 1200
Drying time (min) <i>(Touch Dry)</i> at 23 °C at 5 °C	Minute	5-10 20	-----
<i>Coverage capacity</i>	m ² /lit	5.0	-----
Temperature range Application Operation	°C	+5 to +50 -20 to +60	-----
<i>Shelf time</i>	month	24	

TECHNICAL SPECIFICATION

PRIMER NSP-P27

<i>Properties</i>	<i>Unit</i>	NSP P-27	Test method
Color	---	black	
<i>Solid content (min)</i>	% by weight	27	ASTM D 2369
Density at 25 °C	gr/cm³	0.8±0.03	ASTM D 1475
<i>Viscosity at 25 °C</i>	Sec	30-60	ASTM D 1200
Drying time (min) <i>(Touch Dry)</i> at 23 °C at 5 °C	Minute	5-10 25	-----
<i>Coverage capacity</i>	m ² /lit	5.0	-----
Temperature range Application Operation	°C	+5 to +60 -20 to +60	-----
Shelf time	month	24	



TECHNICAL SPECIFICATION

PRIMER NSP-P27B

Properties	Unit	NSP P-27B	Test method
Color	---	black	
Solid content (min)	% by weight	27	ASTM D 2369
Density at 25 °C	gr/cm ³	0.9	ASTM D 1475
Viscosity at 25 °C	Sec	30-40	ASTM D 1200
Drying time (min) (Touch Dry) at 23 °C at 5 °C	Minute	5-10 25	-----
Coverage capacity	m ² /lit	5.0	-----
Temperature range Application Operation	°C	+5 to +50 -20 to +60	-----
Shelf time	month	24	

INNER WRAP



INNER WRAP

2 ply tapes consist of a stabilization polyethylene carrier film with a butyl rubber adhesive layer on one side.



DESCRIPTION:

NIASHIMI 2 PLY tape with HDPE carrier film and butyl rubber adhesive on one side.

2 PLY plastic tape with stabilized polyethylene backing and rubber layer on one side.

- Practically impermeable to water vapor and oxygen.
- Resistance to soil bacteria and soil electrolyte.
- Excellent bonding between adhesive and carrier film via co-extrude intermediate layer.
- Delaminating didn't occur during peel test.
- Compatible with coating from PE.PP.PU, CTE and bitumen.

COMPOSITON:

Backing: stabilized polyethylene

Adhesive: butyl rubber synthetic elastomer resin

APPLICATION:

- Provides a permanent bond to the primed steel pipes surface and provides protection against chemicaletrolytic corrosion for underground pipelines.
- Long term corrosion protection.
- High chemical resistance under service temperature.
- Complies with EN-DIN 12068 and AWWAC-214 international standards.
- Outstanding electric property and permanent adhesion.
- The product must be applied using "constant tension" brakes, applying tension to the inter tape itself, to achieve a continuous, uniform, coating.
- The service temperature is -20°C up to 60°C.

TECHNICAL SPECIFICATION

INNER NST-500

Properties	Unit	NST 500	Test method
Color	-----	Black	Visual
Thickness total (min)	mm	0.5	ASTM D1000
Tensile strength (min)	N/mm	5	ASTM D1000
Elongation at break (min)	%	250	ASTM D1000
Cathodic disbandment (max) (diameter)	mm	30	ASTM G8 (method A)
Insulation resistance (min)	$\Omega \cdot m^2$	10^9	EN12068 Annex J
Water absorption (max)	%wt.	0.1	ASTM D570
Water vapor(max)	g/m ² /24hrs	0.3	E 96(METHOD B)
Adhesion to primed steel at 23°C (min) and to self	N/mm	3 0.9	ASTM D 1000
Temperature range application operation	°C	+5 to +50 -20 to +60	-----

TECHNICAL SPECIFICATION

INNER NST-625

Properties	Unit	NST 625	Test method
Color	-----	Black	Visual
Thickness total (min)	mm	0.625	ASTM D1000
Tensile strength (min)	N/mm	5.5	ASTM D1000
Elongation at break (min)	%	300	ASTM D1000
Cathodic disbandment (max) (diameter)	mm	30	ASTM G8 (method A)
Insulation resistance (min)	$\Omega \cdot m^2$	10^9	EN12068 Annex J
Water absorption (max)	%wt.	0.1	ASTM D570
Water vapor(max)	g/m ² /24hrs	0.3	E 96(METHOD B)
Adhesion to primed steel at 23°C (min) and to self	N/mm	3 0.9	ASTM D 1000
Temperature range application operation	°C	+5 to +50 -20 to +60	-----

TECHNICAL SPECIFICATION

INNER NST-750

Properties	Unit	NST 750	Test method
Color	-----	Black	Visual
Thickness total (min)	mm	0.75	ASTM D1000
Tensile strength (min)	N/mm	6	ASTM D1000
Elongation at break (min)	%	360	ASTM D1000
Cathodic disbandment (max) (diameter)	mm	30	ASTM G8 (method A)
Insulation resistance (min)	$\Omega.m^2$	10^8	EN12068 Annex J
Water absorption (max)	%wt.	0.1	ASTM D570
Water vapor(max)	g/m ² /24hrs	0.3	E 96(METHOD B)
Adhesion to primed steel at 23°C (min) and to self	N/mm	3 1	ASTM D 1000
Temperature range application operation	°C	+5 to +50 -20 to +60	-----

TECHNICAL SPECIFICATION

INNER NST-1000

Properties	Unit	NST 1000	Test method
Color	-----	Black	Visual
Thickness total (min)	mm	1	ASTM D1000
Tensile strength (min)	N/mm	5	ASTM D1000
Elongation at break (min)	%	400	ASTM D1000
Cathodic disbandment (max) (diameter)	mm	30	ASTM G8 (method A)
Insulation resistance (min)	$\Omega.m^2$	10^8	EN12068 Annex J
Water absorption (max)	%wt.	0.1	ASTM D570
Water vapor(max)	g/m ² /24hrs	0.3	E 96(METHOD B)
Adhesion to primed steel at 23°C (min) and to self	N/mm	3 1	ASTM D 1000
Temperature range application operation	°C	+5 to +50 -20 to +60	-----

OUTER WRAP

MECCHANICAL PROTECTION TAPES

DESCRIPTION:

NIASHIMI outer tapes are cold applied tapes with overstretch prevention layer in polyethylene and butyl rubber adhesive on one side.

The tapes differ in thickness. Butyl rubber tapes self-amalgamate in the overlap area to form a sleeve-like, water proof and electrically highly insulating coating.

To increase mechanical resistance, corrosion protection tapes can be combined with mechanical protection tapes. Particularly with butyl rubber tapes, this increases resistance to impact and indentation stress.

COMPOSITION:

Backing: stabilized polyethylene

Adhesive: butyl rubber synthetic elastomer- adhesive resin

Practical Properties:

- Provides permanent mechanical protection when applied with inner wrap coating protection corrosion for underground steel pipelines.
- Powerful mechanical protection (EN 12068 - Class C).
- High chemical resistance under severe condition of soil.
- Wide range of application and service temperature.
- Complies with EN-DIN 12068 and AWWAC-214 international standards.
- Outstanding electric property and permanent adhesion.
- Excellent working efficiency by hand or machine.

Areas of Use: As an outer wrap for the metallic protection of inner wrap pipes.
Used in combination with PE tapes (2-ply synthetic tapes)



TECHNICAL SPECIFICATION

OUTER NST-500

Properties	Unit	NST 500	Test method
Color	-----	White	Visual
<i>Thickness total (min)</i>	mm	0.5	ASTM D1000
Tensile strength (min)	N/mm	7	ASTM D1000
<i>Elongation at break (min)</i>	%	400	
Adhesion strength to backing (min)	N/mm	0.5	ASTM D 1000
<i>dielectric strength (min)</i>	KV/mm	22	ASTM D149
Temperature range Application Operation	°C	+5 to +50 -20 to +60	-----

TECHNICAL SPECIFICATION

OUTER NST-625

Properties	Unit	NST 625	Test method
Color	-----	White	Visual
<i>Thickness total (min)</i>	mm	0.625	ASTM D1000
Tensile strength (min)	N/mm	7.5	ASTM D1000
<i>Elongation at break (min)</i>	%	400	ASTM D1000
Adhesion strength to backing (min)	N/mm	0.5	ASTM D 1000
<i>dielectric strength (min)</i>	Kv/mm	22	ASTM D149
Temperature range Application Operation	°C	+5 to +50 -20 to +60	-----

TECHNICAL SPECIFICATION

OUTER NST-750

Properties	Unit	NST 750	Test method
<i>Color</i>	-----	White	Visual
Thickness total (min)	mm	0.75	ASTM D1000
<i>Tensile strength (min)</i>	N/mm	8	ASTM D1000
Elongation at break (min)	%	400	ASTM D1000
<i>Adhesion strength to backing (min)</i>	N/mm	0.9	ASTM D 1000
<i>dielectric strength (min)</i>	Kv/mm	22	ASTM D149
Temperature range Application Operation	°C	+5 to +50 -20 to +60	-----

TECHNICAL SPECIFICATION

OUTER NST-1000

Properties	Unit	NST 1000	Test method
<i>Color</i>	-----	White	Visual
<i>Thickness total (min)</i>	mm	1	ASTM D1000
Tensile strength (min)	N/mm	8	ASTM D1000
<i>Elongation at break (min)</i>	%	400	ASTM D1000
Adhesion strength to backing (min)	N/mm	1	ASTM D1000
<i>dielectric strength (min)</i>	KV/mm	22	ASTM D149
Temperature range Application Operation	°C	+5 to +50 -20 to +60	-----

HAND APPLIED TWO LAYER JOINT WRAP



JOINT WRAP

BUTYL RUBBER COMPOUND BITUMINOUS COMPOUND

DESCRIPTION:

NIASHIMI hand applied 2-ply tapes is with HDPE carrier film and base on butyl rubber & bituminous base adhesive.

The product shall provide high electrical resistivity, corrosive resistance, low moisture absorption and permeability, resist to fungi & bacteria and shall provide an effective bond to the primed steel surface. In addition the tape is compatible with, and provide an effective bond, to the previous applied coating.

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 tapes shall be designed for use with its own primer (P27, P27-B). Both the tapes and the primer shall be supplied and certified by the tape **NIASHIMI** Company.

NOTE:

According to standard IGS-M-TP-14(2), Part 5, The roll sizes, as specified by the purchaser, shall be as follows:

LENGTH	WIDTH
9 m (30')	50 mm (2")
20 m (66')	100 mm (4")
30 m (100')	150 mm (6")
	For hand applied machine



COMPOSITION:

Backing: PE polyethylene

Adhesive:

NST-H1000 Butyl rubber elastomer, hydrocarbon resin
NST- HB1000 Bituminous resin.

Interleaf: Anti adhesive siliconised film.

PRACTICAL PROPERTIES:

- Provide a permanent bond to the primed steel pipes surface.
- Provide protection against chemical electrolytic corrosion for underground pipe lines.

SPECIAL ADVANTAGE:

- Long term, corrosion protection
- High flexibility
- High chemical resistance under server condition of soil.
- Complies with EN 12068 and AWWA C209 international standards.
- Application temperature -20°C up to +60°C.
- Service temperature -20°C up to +50°C.
- Outstanding electrical property & permanent adhesion.
- Flexibility of hand applied tapes or joint wrap tapes for underground pipeline it is suitable for joint of pipe, flanges, elbow, valve & etc.

TECHNICAL SPECIFICATION JOINT WRAP NST-H1000

Properties	Unit	NST-H 1000	Test method
Color	-----	Black	-----
<i>Thickness total (min)</i>	mm	1	ASTM D1000
Tensile strength (min)	N/mm	4	ASTM D1000
<i>Elongation at break (min)</i>	%	200	ASTM D1000
Adhesion strength at 23°C to primed steel to self (min)	N/mm	3 1	ASTM D1000
<i>Dielectric strength (min)</i>	KV/mm	40	ASTM D257
insulation resistance (min)	Ω.m ²	10 ⁹	EN 12068 Annex J
<i>Indentation resistance at 23°C (min)</i>	N.mm ²	10	EN 12068
Cathodic disbandment at 23°C (max) (radius) casa	mm	30	ASTM G8 (method A)
<i>Water absorption (max)</i>	%wt.	0.1	ASTM D570
Impact resistance system (min)	J	15	EN 12068
TEMPERATURE RANGE: APPLICATION OPERATION	°C	+5 to +50 -20 to +80	

TECHNICAL SPECIFICATION

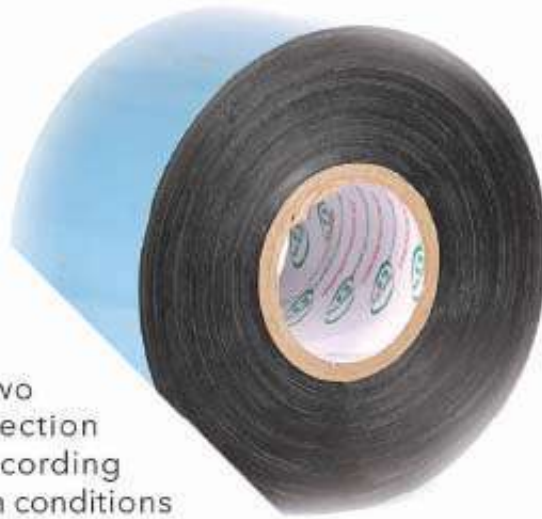
JOINT WRAP NST-HB1000

Properties	Unit	NST-HB 1000	Test method
Color	-----	Black	-----
<i>Thickness total (min)</i>	mm	1	ASTM D1000
Tensile strength (min)	N/mm	4.5	ASTM D1000
<i>Elongation at break (min)</i>	%	250	ASTM D1000
Adhesion strength at 23°C to primed steel to self (min)	N/mm	3 2.5	ASTM D1000
<i>Dielectric strength (min)</i>	KV/mm	40	ASTM D1000
Insulation resistance (min)	Ω.m²	10⁸	EN 12068 Annex J
<i>Indentation resistance at 23°C (min)</i>	N.mm ²	10	EN 12068
Cathodic disbandment (max) at 23°C (radius)	mm	10	ASTM G8 (method A)
<i>Water absorption (max)</i>	%wt.	0.1	ASTM D 570
Impact resistance system (min)	J	15	EN 12068
TEMPERATURE RANGE: APPLICATION OPERATION	°C	+5 to +50 -20 to +60	Manufacture Recommendation

3PLY CO-EXTRUDED TAPE



3PLY CO-EXTRUDED TAPE



DESCRIPTION:

NIASHIMI tape is a 3ply tape with HDPE carrier film & butyl rubber adhesive on two sides. This system for the corrosion protection coating of metal pipes and pipelines according to DIN 30672, EN 12068 for highly corrosion conditions and extreme mechanical with outstanding tape flexibility.

The tape completely amalgamates overlap from NST 3PLY tapes.

Also extruded intermediate layer Caused good bonding between carrier film & adhesive layer, which avoid delamination during Service. Moreover, due to the natural of the intermediate layer (a blend of PE & butyl rubber), the tape cross section is characterized by a homogenous transition from butyl rubber to PE & butyl rubber again. It should be mentioned, that the outer adhesive layer in asymmetrical three-ply NST tapes is also be made in a co-extrusion process, which ensure perfect bonding between outer adhesive layer and carrier film.

Cross sectional view of an asymmetrically structured 3ply tape:

- PE - layer
- Inner adhesive layer
- Outer adhesive layer
- Co-extrude intermediate layer between carrier film & inner adhesive layer.

NOTE:

If an only two-ply tape is used for the inner wrap, as can be shown in figure, an interface & potential penetration path for water and oxygen remains in the tape overlap. After some years of operation in incompletely sealed overlaps inevitably lead to spiral corrosion followed by complete undermining corrosion.

On the other hand, no interface with penetration paths remains within a wrapping from high performance three-ply tapes. The outstanding feature of butyl rubber is its ability to self-amalgamate in the overlap areas, resulting in a completely sealed, impermeable and sleeve-tape coating.

3-ply NST tapes are polyethylene-butyl rubber composite tapes and are primarily distinguished by the following characteristics:

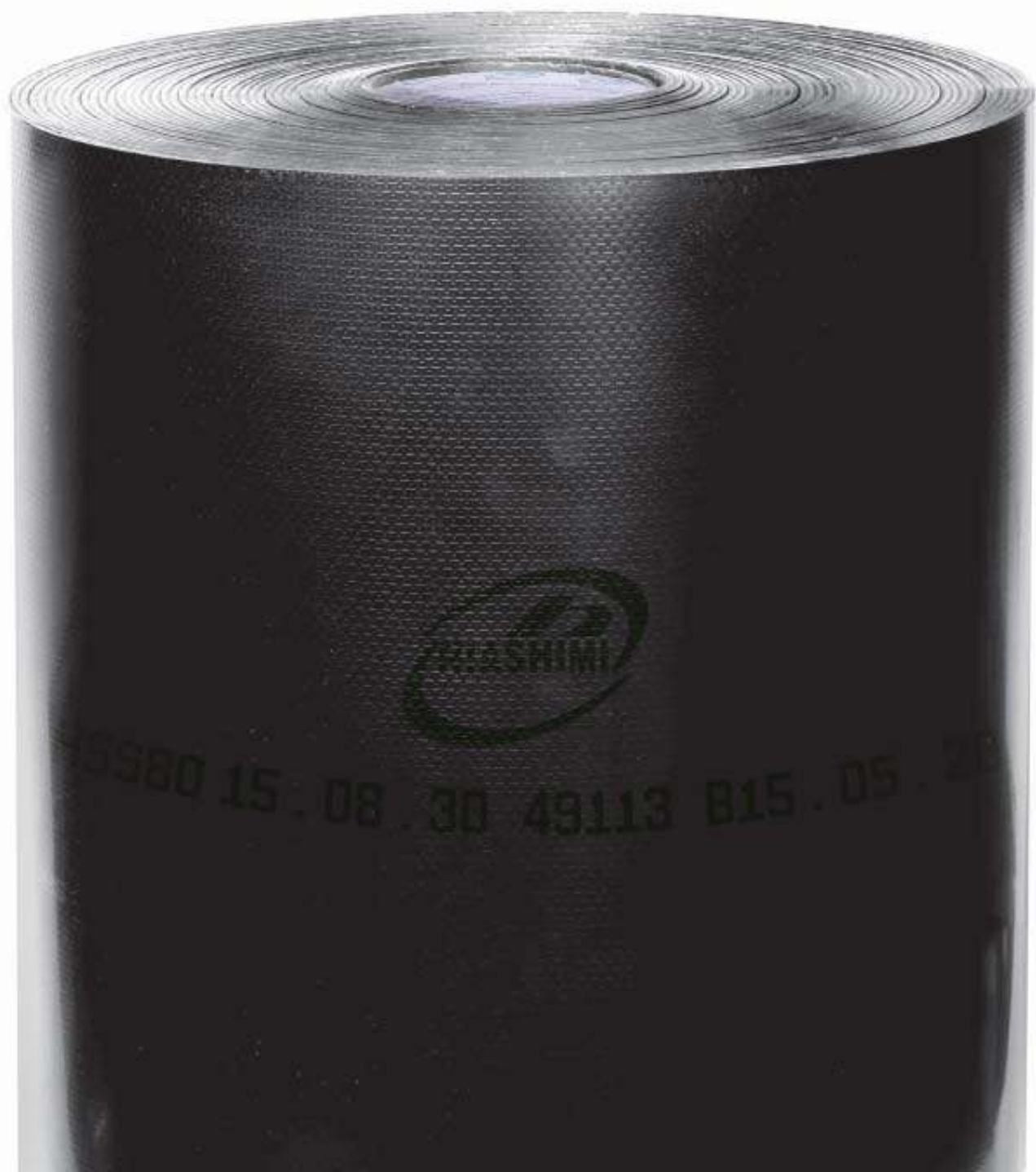
- Can be cold applied
- Self-amalgamating
- Sleeve-like coating
- Maximum mechanical and corrosion protection combined with outstanding tape flexibility
- Exceeds the requirements of stress class C 50 according to EN 12068.
- Resistant to chemicals environments (exceptions: oil/petroleum spirit)
- High electrical insulation.

TECHNICAL SPECIFICATION

3PLY NST-800

Properties	Unit	NST 3ply	Test method
Thickness total	mm	0.8±0.05	ASTM D1000
<i>Tensile strength at break (min)</i>	N/mm	10	EN 12068 Annex A
Elongation at break (min)	%	600	EN 12068 Annex A
<i>Cathodic disbandment (max) at 23°C</i>	mm	15	EN 12068 Annex K
Dielectric strength(min)	KV/mm	30	ASTM D149
<i>Specific electrical insulation resistance (min)</i>	Ohm.m ²	10 ⁸	EN 12068 Annex j
Water absorption max	%wt.	0.1	ASTM D570
<i>Adhesion strength at 23°C (min) to primed steel</i>	N/mm	12 24	EN 12068 Annex B,C
Adhesion strength at 50°C (min) to primed steel	N/mm	1.5 3	EN 12068 Annex B,C
<i>Thermal ageing resistance ratio of - Tape strength - Elongation at break - Peel strength layer to layer - Peel strength to pipe surface</i>	-----	1.25≥S100/S0≥0.75,S100/S70≥0.8 1.25≥E100/E0≥0.75,E100/E70≥0.8 P100/PT≥0.75,P100/P70≥0.8 A100/AT≥0.75,A100/A70≥0.8	EN 12068 Annex E
Saponification value Carrier Film and adhesive (max)	mg KOH/g	25	EN 12068 Annex L
<i>Lap shear strength at 50 °C (min)</i>	N/mm ²	0.05	EN 12068 Annex D
Peel strength to pipe surface at 23 °C after 28 days hot water immersion test at 50 °C (min)	N/mm	0.4	EN 12068 Annex B
<i>Indentation resistance at 50 °C - Holiday detection</i>	---	Pass	EN 12068 Anne G
Impact resistance system(min)	J	15	EN 12068
TEMPERATURE RANGE:			
APPLICATION OPERATION	°C	+5 to +50 -20 to +60	Manufacture Recommendation

HEAT-SHRINKABLE SLEEVES



HEAT SHRINKABLE SLEEVES

THE PRINCIPLES OF HEAT-SHRINKING:

Heat-shrinkable materials consist of an external backing made of extruded and cross-linked polyolefin and an internal adhesive made of thermoplastic material. The shrinkage of the backing instils a level of circumferential compression in the coating that supplements the bonding of the sleeve to the pipe surface.

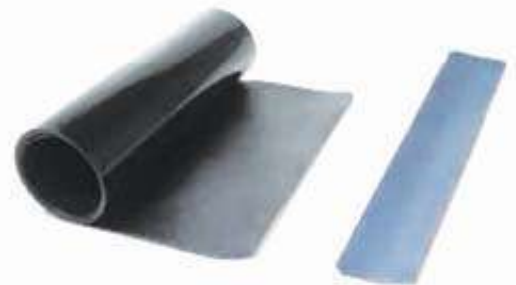
NIASHIMI HSS-80 field-joint coating system is the toughest field applied coating systems available. The coating system consisted of solvent free high performance epoxy, adhesive base copolymer and modified cross-linked polyethylene, is designed to replicate the structure and meet the performance of mill-applied three-layer PE coatings.

The coatings are compatible with all commonly used pipe coatings including Polyethylene, Coal tar enamel, and fusion-bonded epoxy.

The system is designed to be applied with minimum preheating of the pipe. By far the majority of the girth welds Worldwide on three-layer coated pipes, diameters up to 100" (DN2500), have been coated with HSS-80.

During installation, the epoxy is applied to the prepared pipe surface (Sa 2 1/2) and the heat-shrinkable sleeve is immediately wrapped around the joint over the wet epoxy.

Heat is then applied to the sleeve which shrinks to form a tight fit around the joint. While curing, the epoxy forms strong mechanical and chemical bonds to the pipe surface & to the copolymer adhesive layer. The radiation cross-linked outer layer forms a tough barrier against mechanical damage and moisture transmission.



The Structure of Heat Shrinkable Sleeve (HSS-80 Field-Joint Coatings)

Construction: Three-layer system

First layer: Liquid epoxy, solvent-free two-component.

Second layer: High shear strength copolymer adhesive. (hot melt base)

Third layer: Radiation cross-linked, high density polyethylene PCI
(Permanent Change Indicator)

Solvent Free Epoxy:

Epoxy primer is used in a HSS-80 coating system for superior corrosion protection of field welded joints of steel pipes.

ADHESIVES:

Adhesive is a polymeric compound that applied to the sheet. The adhesive is the key to ultimate performance of the installed system, which is different adhesive types will be specified depending on the pipeline operation condition.

The adhesive has different task. it must be adheres to sleeve and steel in the cut back and mainline coating , it resist against shear forces imparted by soil pressure after the pipeline is buried and provides long term corrosion protection to the steel .

The choice of which adhesives to use, is based on the pipeline design and operation condition.

Coatings are cross-linked, heat-shrinkable materials based on polyethylene, applied without primer, which can be further subdivided into mastic-adhesive based, typically with a low design temperature of up to 50 °C, coatings cross-linked heat-shrinkable material based on polyethylene applied with a liquid epoxy primer, with a design temperature of up to 80 °C.



BACKING:

The plastic material are composed of extremely long molecular chains in a random arrangement. Their strength depends upon the Distance crystalline natural between the molecular and the molecular structure. In fact, it is the crystal that contributes most of the strength.

As the thermoplastic is heated to above its crystalline melting point (120°C), the crystal disappears. The molecules can then easily slip past each other, so that material flows.

During the investigation of atomic energy , the important discovery was made that exposure of some plastic material to high energy penetrating radiation can cause permanent cross linked of adjacent molecular. This linking results in the chemical bonding of the plastic structure in to a new three dimension matrix.

Once a material has been cross linked, it will not melt or flow at any temperature. When heated, the crystals disappear as before, but no flow or shape change occurs because the cross linked act as ties between the molecules.

However, the structure remains elastic, when the crystal is melted; the material behaves like a rubber. Products that have been radiation cross linked exhibit perfect elastic memory. They can be supplied in a deformed or expanded condition.

When heated, they shrink, for example, to tightly enclose an object over which they have been placed. After extruding the thick sheet, it is taken on the beam where it is passed under a unit that subjects the sheet to electron irradiation.

The irradiation process cross-links the polyolefin. This improves the molecular structure such that the polyolefin will work as part of heat-shrinkable sleeve and provide the required level of mechanical protection while in-service.

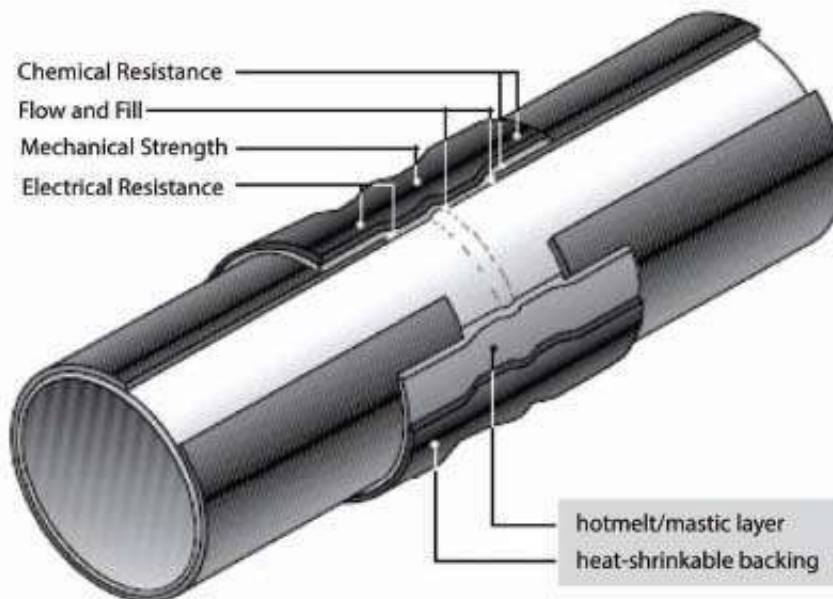
It makes the polyethylene perform more like a tough, heat-resistant, elastic material, than like a plastic material. After cross-linking, the sheet is stretched by feeding it in to a machine that heat it up, stretched it and cools it down. Because the sheet has been cross-linked, after stretching, it will want to recover to its original length when re-heated.

PRODUCT FEATURES:

- Fully resistant to shear forces induced by soil and thermal movements.
- Sleeve applied over wet epoxy, allowing fast installation and formation of strong mechanical & chemical bonds.
- Superior cathodic disbondment and hot water immersion resistance.
- Fully reconstructs 3-layer coating at all girth welds for continuous & homogeneous performance on Pipelines coated with 3-LPE
- Dimpled backing provides a "permanent change" indicator for application of heat.
- Low preheat requirements

ADVANTAGES:

- The HSS-80 is tough & lasts as long as a 3-layer, factory applied coating.
- Allows fast application combined with high performance.
- Offers the optimum barrier protection against corrosion.
- HTLP systems allow three layer coated pipelines to have a virtually monolithic coating system.
- Dimpled backing allows easy post-heat inspection and offers a reliable inspect ability at any time.



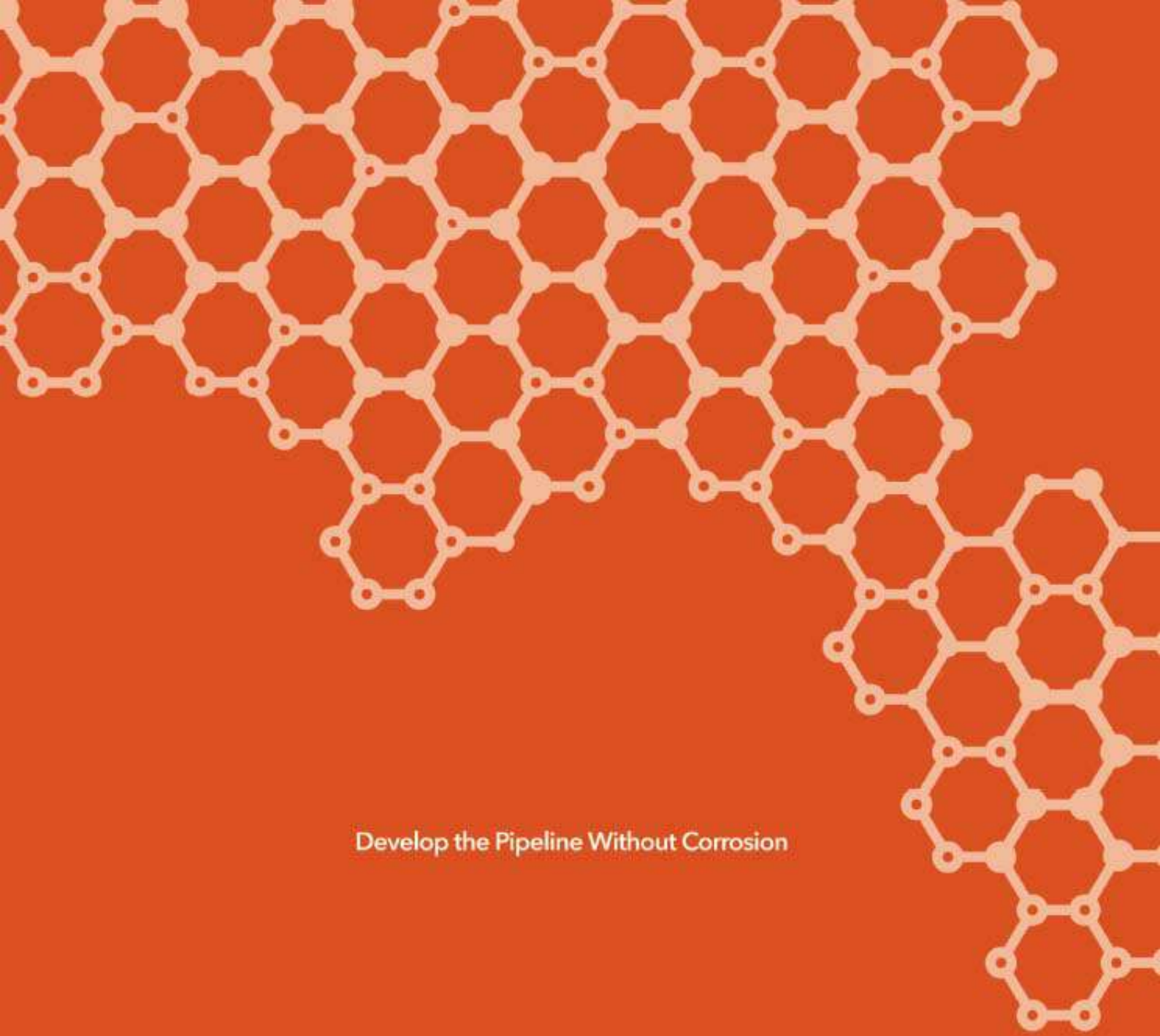
Properties	Unit	HSS 80	Test method
Total thickness as installed (min)	mm	2.9	ASTM D1000
Hardness (min) / 23°C	shore D	50	ASTM 2240
Impact resistance (min)	J	15	ISO21809-3 Annex D
Ring and ball softening point of adhesive , min	°C	110	ASTM E 28
Peel strength to pipe surface and factory coating (min) 23 °C 80 °C	N/mm	8 0.5	ISO 21809-3 Annex H.1
Peel strength @ 10 mm/min to pipe surface and to factory coating after 28 days hot water soak test at 80 °C , min	N/mm	2.5	ISO 21809-3 Annex H Annex I
Cathodic disbandment resistance (max) 23 °C 80 °C	mm	5 10	ISO 21809-3 Annex G
Lap shear strength to pipe surface and factory coating at 80 °C (min)	N/mm ²	0.2	ISO21809-3 Annex I
Specific electrical insulation resistance (min)	ohm.m ²	10 ¹⁰	EN 12068 Annex J
Ultimate elongation (min)	%	400	ASTM D 638
Heat aging , 21 days at 150 °C (min)	%	200	ASTM D 638
Heat shock , 4 hours at 225 °C	Visual	No cracking , flow or dripping	ASTM D 2671
Thermal aging 100 days at Tmax+20 °C followed by - elongation @ break - peel strength to pipe surface	-	1.25≥E100/E0≥0.75 ,E100/E70≥0.8 A100/AT≥0.75 , A100/A70≥0.8	EN 12068 Annex E
Indentation resistance pressure -at 23 °C -at 80 °C - holiday detection or residual thickness	N/mm ² mm	10 10 Pass 0.6	ISO21809-3 Annex E
Ultraviolet irradiation resistance ratio of elongation at break	-----	1.25≥EX/E0≥0.75	EN 12068 Annex F
Soil stress creep resistance , 24 hours at 80 °C , max	mm	2.5	TP 206 (see Annex B)

TECHNICAL SPECIFICATION

EPOXY BASE & HARDENER



Properties		Typical
Color		BLACK
Weight solids		100%
Flash point	Part A Part B	>140 °C >115 °C
Density	Part A Part B	1.45 1.00
Pot life (min)	@20 °C @40 °C	60 min 20 min
Shelf life		2 years out of direct sunlight. Shelf life will be lesser at higher temperatures
Flash point	Part A Part B	145°C 118°C
Typical coverage		6.0 sq.m /lit or 23 sq.m /US gallon. this is coverage is based on 100-150 microns or 4-6 mils average thickness
Typical thickness		100-150 micron (4-6 mils)



Develop the Pipeline Without Corrosion



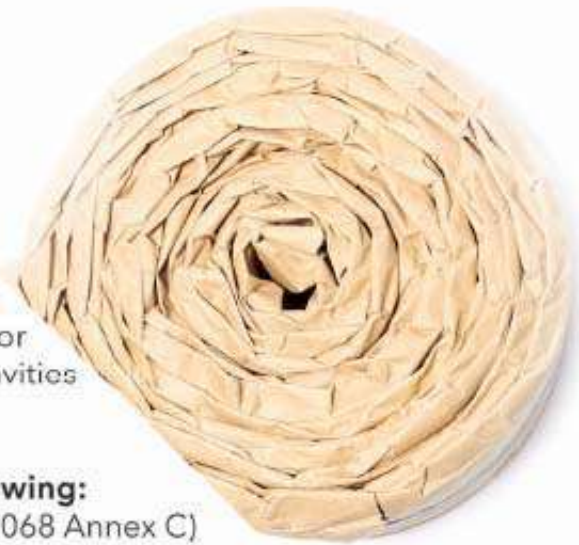
Manufacturing & Trading Co.

FILLER MASTIC



FILLER MASTIC

Mastics, is base of rubber extended semi crystalline adhesive. It dues to their permanently visco- elastic qualities, is particularly suited for long term corrosion protection as a filler for cavities in metallic structures.



The filler mastic physical properties as following:

Peel strength at 23 °C, min: 3 N/mm (EN 12068 Annex C)

Lap shear strength at 23 0C, min: 0.25 N/mm² (EN 12068 Annex D)

Softening point, min: 100 0C (ASTM E 28)

Performance	EN 12068 CLASS 30- ISO 21809-3
Soil stress restriction	None
Max operation temperature	30 °C (86 °f)
Max preheat temperature	50 °C (122 °f)
Recommended pipe preparation	St 2.0 - St 3.0

BENEFIT:

- Central adhesive never dried, cover the welded steel surface and overlap adjacent part to seal and construct the effective corrosion protection.
- Mastic adhesive covered on both sides of pipeline coating and sealing corrosion to proof water and other corrosive into the steel surface. Meanwhile, high-performance mastic adhesive supply the coating with excellent property such as lap shear strength and peel strength.
- The whole coating system is anti-puncture & self-healing, ignore the damage of cathodic disbandment in service life.

SHELF LIFE:

2 years, under correct storage condition as follow:

- To ensure maximum performance, store products in a dry, ventilated area.
- Keep products sealed in original cartons and avoid exposure to direct sunlight, rain, snow, dust or other adverse environmental elements.
- Avoid prolonged storage at temperature above 40°C or below -20°C.
- Product installation should be done in accordance with local health and safety regulation.

REPAIR PATCH MELTING STICK



REPAIR PATCH MELTING STICK



The repair patch shall be an irradiated (electron beam) cross linked high density Polyethylene backing coated internally with a high temperature, high melting point Semi crystalline thermoplastic adhesive, which is applied over the filler mastic covering the damaged area. The backing layer of repair patch shall be thermally stabilized and ultra violet resistance.

- **FIRST LAYER:** copolymer hot melting adhesive
- **SECOND LAYER:** radiation cross link, high density polyethylene
- **MELTING STICK:** is made of hot melt adhesive same with first layer of CRP*

*CRP: repair patch construction 2-layer

PHYSICAL PROPERTIES OF REPAIR PATCH MATERIAL:

	<i>Properties</i>	<i>Requirements</i>	<i>Units</i>	<i>Test method</i>
Adhesive	Thickness	0.65	Mm	ASTM D 1000
	Softening point	100	°C	ASTM E 28
	Lap shear at 80	0.07	N/mm	EN 12068 ANNEX D
Backing	Thickness	0.75	Mm	ASTM D 1000
	Tensile strength	17	Mpa	ASTM D 638
	Elongation at break	400	%	ASTM D 638
	Hardness	50	Shore D	ASTM D 2240
	Abrasion resistance	50	Mg	ASTM D 1044
	Impact resistance at 23 °C	15	J	EN 12068 ANNEX H
	Indentation resistance at 80 °C	10	N/mm ²	EN 12068 ANNEX G
Patch	Peel strength to pipe surface	4	N/mm	EN 12068 ANNEX C
	Water absorption	0.05	%	ASTM D 570
	Peel strength 28 days	2.5	N/mm	ISO 21809-3 ANNEX I
	Heat shock on the backing ,225 °C 4 hours	No dripping, flowing or cracking	Visual	ASTM D 2671

NIAPE100 – SOLVENT FREE POLYAMINE CURED EPOXY

DESCRIPT:

NIAPE100 is a two components, solvent free polyamine cured, epoxy coating with non-toxic ingredients.

RECOMMENDED USE:

For protection of industrial and food tankers, marine tankers, concrete and metal tanks, gas and water tubes.

OUTSTANDING CHARACTERISTICS:

- Good chemical resistance
- Excellent water resistance
- Good abrasion resistance
- Good mechanical resistance

PHYSICAL CONSTANTS:

Finish	Gloss
Color	Light green
Volume Solids	99±1%
Specific Gravity	1.45±0.1 gr/cm
Flash Point	26°C
Recommended D.F.T	400-450 microns
Theoretical Coverage	2.0-2.4 m ² /lit; 1.4-1.6 m ² / kg
Practical Coverage	Depends on loss factor
Touch Dry	3 hrs. at 20°C; 2 hrs. at 35°C
Hard Dry	1 week at 20°C; 5 days at 35°C
Thermal resistance	Continuous 120°C Non-continuous 140°C
Shelf life	12 months at 20°C

APPLICATION DETAILS:

Application Method	Hot airless spray, Brush (for small surfaces)
Application Temperature	10-40°C
Mixing Ratio	99±1%
Specific Gravity	2A (base) : 1B (Hardener) By volume
Thinner/Cleaner	NIA SOLV 100
Pot Life	90 min. at 20°C
Recoat Interval	Min 8 hrs. ; Max 72 hrs.

DESCRIPT:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult **NIASHIMI** Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

SURFACE PREPARATION:

- Steel should be blast cleaned in situ to at least ISO-Sa2½
- Blasting profile 50 - 100 µ
- Steel must be free from rust, scale, shop primer and any other contamination
- The substrate must be perfectly dry before and during application

APPLICATION CONDITIONS:

- Substrate temperature during application and curing should be above 5°C
- Substrate temperature during application and curing should be at least 3°C above dew point.
- Temperature and humidity should be measured in the vicinity of the substrate.

INSTRUCTION FOR USE:

- All equipment shall be clean before use.
- Warm component A (base) almost 60°C.
- Warm component B (hardener) almost 45°C.
- The temperature of the mixed base and hardener should preferably be above 45°C
- The consumption depends on temperature, type of equipment and coating thickness.

NOTES: NIAPE100 IS FOR PROFESSIONAL USE ONLY.
ISSUED BY: **NIASHIMI** TRADING & PRODUCING CO.

STORAGE OF COATING MATERIAL

- The material shall be stored under a covered, good circulated shelter.
- The optimum coating storage temperature shall be between 5°C to 35°C continuously. The store those coating directly under sunshine strictly should be avoided.
- Maximum 4 cartons (coating tape roll) are allowed to be placed in one column.
- The same condition shall be considered for **NIASHIMI** primers.
- The primer shall be kept strictly far from any open flames or extensive heat source.

