

DPC/HSSRP/Rev. 01

STANDARD PROCEDURE FOR HSS COATING ON FIELD JOINT of 3LPE COATED STEEL PIPE/FITTINGS

Reference Document:

- **3LPE Coating Standard** - DIN 30670:2012
DIN 30672
DIN EN 12068
- **Technical Specification** – XXXXXXXXXXXXXXXXXXXXXXX
- **Customer approved ITP** – XXXXXXXXXXXXXXXXXXXXXXX

SCOPE:

Scope of this document is to list down all the activities related to Heat shrink sleeve field joint coating of 3LPE coated Pipe/Fittings.

- **List of Material Required**

1. **Heat Shrink Sleeve:**

Option 1:

- **SNI EPOXY PRIMER RP09** earlier known as Raychem RPG PRIMER RP09
- **SNI HBPE 80** earlier known as Raychem RPG HBPE 80 Heat Shrink Sleeve

Option 2:

- **COVELANCE S1301 Epoxy Primer**
- **COVALENCE HTLP80 Heat Shrink Sleeve**

➤ **FIELD JOINT COATING PROCEDURE:**

- **Incoming Raw Material Inspection**

1. Inspect the Raw material received for the coating and make sure it is as per the specification and requirement.
2. Store the Coating raw material as per the manufacturer recommendation

- **Visual Inspection & Pre-Cleaning of Field Joint**

1. Carry out visual inspection of field joint to be coated. Make sure it is free from any harmful contamination, dents, and any other defects.
2. Clean entire steel area with suitable method/solvent to make sure that it is free from dust, dirt, moisture, oil/grease, or other contaminants.

- **Abrasive Blasting Process**

1. Measure and record environment conditions, all the blasting and coating activities should be stopped if relative humidity is more than 85% or dew point is less than 3°C from ambient temperature

2. The Field joints are blasted with a combination of steel grit & shots to remove the ill scale and any other impurities from the surface. This gives the required cleanliness as well as the specified anchor pattern.
3. The field joints areas cleaned with dry air to blow away the dust.
4. Inspection of the blasted field joints to be carried out. Check the blasting profile, Dust level and cleanliness of the pipe is in accordance to the ISO standard 8501 and Grade SA 2 ½ . It is ensured that field joint coating is carried out within maximum allowable delay post blast cleaning. If the field joint coating is not carried out within 4 hours of blasting, then it should be blasted again prior to coating.

• **Field Joint Coating procedure**

1. Ensure a bevel angle of 45 degree of the coating at cut back ends of pipe/field joint.
2. Clean up the bare metal of the whole circumferential cutback length area by suitable grinder/wire brush/emery paper and abrade the adjacent 3LPE coating up to length of 50 mm minimum.
3. Thoroughly mix Part B & Part A of Epoxy primer in the ratio of 1:3 until homogeneous flow of the primer is obtained.
4. Preheat (60°C – 90°C) the cleaned area and apply the epoxy primer to the blasted/clean bare steel surface.
5. Wrap the Heat Shrink sleeve loosely around pipe evenly overlapping the adjacent pipe coating by 50 mm or more
6. Ensure sleeve shall be positioned minimum 100 mm from the edge of the 3LPE coating on which the adhesive tie layer has been applied.
7. After Heat Shrink Sleeve is cooled off, adhesive shall be evident on the edges. This means that sleeve has fully confirmed to the field joint.
8. Press the closure patch, centering over the exposed sleeve ends (overlap to each other 50 mm minimum). Heat the closure patch and run a small roller over the closure patch to seal the ends.
9. Start heating the sleeve; begin at the center of the sleeve and heat circumferentially, around the pipe, using a constant up and down motion. Continue heating toward one end of the sleeve, followed by the other.
10. During shrunk down process, wrinkles of the sleeves will start to disappear automatically. Run a small roller over the sleeve to push out any trapped air.
11. If necessary, HSS coating area may be reheated to roll out air.
12. Heat Shrink Sleeve coated joints only handled after it gets cools down to temperature of 60°C or below
13. Carry out visual inspection of heat shrink sleeve coating for surface defects. Check the heat shrink sleeve coating for following things
 - a. The weld bead profile is visible through sleeve
 - b. Ends of the sleeves are firmly bonded with mainline coating and there is no upstanding edges.

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- c. There are no bubbles, punctures, burn holes, there are no entrapment of foreign material underlying coating.
- d. Heat shrink sleeve coating should be smooth in appearance.

14. Check for Holidays, if found then it shall be immediately attended by applying sleeve on the top of problematic area.

• Inspection and Testing

Following tests shall be performed as per the specification/ITP and relevant standard.

Sr. No	Test Details	Required Value	Frequency	Remarks
1. Abrasive Blasting				
1	Degree of Cleanliness	SA 2 ½	Each Joint	
2	Anchor Pattern of blasted Pipes	50 µm to 70 µm	Each Joint	
3	Dust Level Check	Rating 2 or Class 2	Each Joint	
4	Visual Inspection	No harmful defects	Each Joint	
5	Time delay of Coating	Maximum 4 Hrs	Each Joint	
2. Coating Application				
1	Temperature before primer and Heat shrink sleeve coating application	60°C to 90°C	Each Joint	Monitoring of Temperature
3. Inspection after Coating				
1	Visual Inspection	Air void Free and smooth coating	Each Joint	
2	Pinhole Detection Test	No Holiday	Each joint	
3	Thickness of HSS Coating	2 to 2.5 mm	10 locations on each joint	
4	Adhesion/Peel Strength Test at 23° C	Minimum 120 N/cm	Once per Order	

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RECORD:

- Prepare a detailed report which has details of all the HSS Field joint coating activities carried out e.g. Pipe/fittings Number, Date of Repair, Verification record, Heat Number, Coating Number and details of repair material used etc.

HANDLING AND STORAGE OF COATED PIPES & FITTINGS:

- Coated pipes/fittings shall be handled by means of slings and belts of proper width. Metallic hooks and slings if used shall be only at the ends and shall not touch the coating during handling or taking off the slings.
- Coated pipes/fittings shall be stacked completely clear from the ground and on wooden or rubber lined metallic supports with a width of 50 mm or above. Stacks shall consist of limited number of layers such that the pressure exercised by the pipe's own weight does not cause damages to the coating. Stacks shall be suitably secured against falling and shall consist of pipe sections having the same diameter and wall thickness. Both ends should be covered with suitable end protection material such as end caps or bevel end protector.
- All Items shall be dry, clean, and free from moisture, dirt and loose foreign materials of any kind
- End shall be suitably protected, and protectors shall be securely and tightly attached with the pipes,
- Weld bevels shall be free from dirt, oil, grease, scale, rust & other foreign materials

DPC/MRP/Rev. 03

STANDARD PROCEDURE FOR COATING, HANDLING,

STORAGE AND TRANSPORTATION OF 3 LAYER HIGH DENSITY POLYETHYLENE COATING ON STEEL PIPES & FITTINGS AS PER DIN 30670:2012

Reference Document:

- 3LPE Coating Standard - DIN 30670 2012
- Technical Specification - XXXXXXX
- Customer approved ITP – XXXXXXX

SCOPE:

Scope of this document is to list down all the activities related to 3LPE coating on C.S. Pipes

*** RAW MATERIAL REQUIRED:**

- Grit/Shots/Garnet
- Fusion Bonded Epoxy Powder – M/s JOTUN's - JOTAPIPE AC 1003
- Polyethylene Grafted Adhesive Powder – M/s MPB Srl Italy's – CCOESIVE L8.92.8 (u) P
- High Density Polyethylene Powder – M/s United Polycoat's – UPA 003

*** 3LPE COATING MANUFACTURING PROCEDURE:**

- **1 Incoming Raw Material Inspection**
1. Inspect the Raw material received for the coating and make sure it is as per the specification and requirement.
 2. Store the Coating raw material as per the manufacturer recommendation
 - **Incoming Bare Pipe Inspection**
1. Inspect the received bare pipes for any visual defects, note down the marking details mentioned on the pipes. It should match the details mentioned in the MTC's and IRN of bare pipes. Write down the heat number and pipe number on the internal surface of the pipes with permanent marker to maintain the traceability post blasting.
 - **Abrasive Blasting Process**
1. The pipes to be coated are checked for any signs of oil or grease contamination. If these are found, then the pipes are washed with water and mild detergent. Measure and record environment conditions, all the blasting and coating activities should be stopped if relative humidity is more than 85% or dew point is less than 3°C from ambient temperature
 2. The pipes are then put on the pipe trolley outside the blasting unit. The pipe is taken in the blasting unit and blasted with a combination of steel grit & shots or Garnet in case of non-ferrous pipes. This gives the required cleanliness as well as the specified anchor pattern.
 3. The pipe is cleaned with dry air to blow away the dust.

4. Inspection of the blasted pipe to be carried out. Check the blasting profile, surface salt level, Dust level and cleanliness of the pipe is in accordance to the ISO standard 8501. It is ensured that pipe is taken for coating within maximum allowable delay post blast cleaning. If the pipe is not taken for coating within 2 hours of blasting, it is sent for re-blasting

- **3 Layer Polyethylene Coating Process**

1. The blasted pipe is heated to the coating application temperature (205-240° C) with flame heating (oxygen-fuel burners). The oxygen to fuel ratio is maintained to ensure no carbon is deposited on the pipe. During this process, temperature is continuously monitored to ensure, it is within the required process parameters.
2. The preheated pipe is then partially coated by the 3 coating layers one by one with as per below details.

the 3 layers are:

Layer 1: This is the corrosion protective layer. This layer is of fusion bonded epoxy which offers very good corrosion protection. The fusion bonded epoxy being polar material, bonds firmly to the blasted steel surface. This layer is typically 150 – 250 microns thick DFT.

Layer 2: This layer is the copolymer adhesive. The copolymer adhesive is a maleic anhydride grafted polyethylene compound. This material has good chemical bonding to the fusion bonded epoxy. This layer is typically 200-300 microns thick.

Layer 3: This layer is for physical protection and consists of polyethylene. Since the copolymer adhesive and polyethylene are similar, they bond well with each other. The thickness of this layer can be customized according to customer needs.

Care is taken to ensure that the time gap between two successive layers is maintained as per the raw material manufacturer's specifications. Also, pipe number, Coating number & heat number mentioned on the internal surface of the pipes should not get worn out during blasting and coating process.

The total composite thickness required on different diameters of pipes as per DIN 30670 type S-n are as follows:

Sr. No.	Diameter Range (Nominal diameter in mm)	Total composite 3LPE coating thickness in mm
1	Up to DN 100 mm	1.8
2	Over DN 100 up to DN 250	2.0
3	Over DN 250 to below DN 500	2.2
4	From DN 500 to below DN 800	2.5
5	From DN 800 and above	3.0

3. Cutback is taken on both sides for onsite welding should be maintained at 150 mm for all pipe sizes
4. The relevant testing shall be carried out as per the approved Specification and DIN 30670 on pipes

- **Details of Testing Activities during manufacturing of 3LPE Coated C.S. Pipes**

Details of testing carried out are as follows

Sr. No	Test Details	Required Value	Remarks
1. Raw Material Inspection		As per Manufacturer's recommendation	
2.	Inlet Inspection of Bare Pipes	As per approved ITP and DIN 30670	
3. Abrasive Blasting Process			
1	Degree of Cleanliness	SA 2 ½	
2	Anchor Pattern of blasted Pipes	50 µm to 70 µm	
3	Salt Contamination Check	2 µg/cm ²	
4	Dust Level Check	Rating 2 or Class 2	
5	Visual Inspection	No harmful defects	
6	Time delay of Coating	Maximum 2 Hrs	
4. Coating Application			
1	Temperature before FBE application	205°C to 240°C	Monitoring Temperature
2	Adhesive cure Temperature	180 °C to 220 °C	
3	Polyethylene cure Temperature	190 °C to 240 °C	
4	FBE Layer Thickness	Minimum 150 µm	
5	Adhesive Layer Thickness	Minimum 200 µm	
5. Inspection after Coating			
1	Bond Strength Test @ 20+/- 5° C	Min. 70 N/cm	
2	Bond Strength Test @ 70+/- 5° C	Min. 30 N/cm	
3	Impact strength test @ 23 +/- 2° C	7 J/mm	
4	Indentation Test @ 23° C	Maximum 0.2 mm	

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5	Indentation Test @ 70° C	Maximum 0.3 mm	
6	Percentage Elongation Failure at 23° C	Minimum 300%	
7	Cathodic disbondment @ 65° C & 48 h	Maximum 7 mm	
8	DSC Test (% Cure FBE)	$\Delta T_g \leq 5^\circ\text{C}$	
9	MFR 190 °C/2,16 kg - g/10min	>0.25 g/10min	
10	Pinhole Detection Test	No Holiday @ 25Kv	
11	Dry Film Thickness of 3LPE Coating	As per DIN 30670	

5.Coating Material Test Certificate shall be prepared as per EN 10204 3.1

* **PROCEDURE FOR MARKING, HANDLING, TRANSPORTATION AND STORAGE OF 3LPE COATED PIPES:**

- Transfer the recorded marking from pipe mill and add the details of coating on the 3LPE coated pipes as shall be as follows

PIPE MANUFACTURER:

PIPE GRADE:

PIPE SIZE:

PIPE NUMBER:

HEAT NUMBER:

COATING NUMBER:

CUSTOMER NAME:

COATING DETAILS:

COATING MANUFACTURER:

PROJECT NAME:

- 3LPE coated pipes shall be handled by means of slings and belts of proper width. Metallic hooks and slings if used shall be only at the ends and shall not touch the coating during handling or taking off the slings.
- 3LPE coated pipes shall be stacked completely clear from the ground and on wooden or rubber lined metallic supports with a width of 50 mm or above. Stacks shall consist of limited number of layers such that the pressure exercised by the pipe's own weight does not cause damages to the coating. Stacks shall be suitably secured against falling and shall consist of pipe sections having the same diameter and wall

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thickness. Both ends should be covered with suitable end protection material such as end caps or bevel end protector.

- The trucks used for transportation shall be equipped with adequate pipe supports. Minimum two supports shall be provided at the bottom and either side of the walls. The supports shall be wooden, or rubber lined metallic supports with a width of 50 mm or above. The rubber protection must be free from all nails and staples where pipes are in contact. Slings or non-metallic straps shall be used for securing loads during transportation.
- All Items shall be dry, clean and free from moisture, dirt and loose foreign materials of any kind
- End shall be suitably protected, and protectors shall be securely and tightly attached with the pipes,
- Weld bevels shall be free from dirt, oil, grease, scale, rust & other foreign materials

Jotapipe AC 1003

PRODUCT DESCRIPTION

This product is a fusion-bonded epoxy designed as an anti-corrosion coating for pipelines. The product is available in a choice of reactivities to ensure suitability as both a stand-alone FBE and a primer in multi-layer polyolefin systems.

Operating conditions

This product is suitable for pipelines operating at continuous temperatures up to 98 °C (208 °F). However, product performance including maximum operating temperature can depend on plant application, pipe configuration, coating system and local field conditions.

POWDER PROPERTIES

Property	Standard	Result
Cure time	CSA-Z245.20-10 (12.1) Jotapipe AC 1003 15S Jotapipe AC 1003 21S Jotapipe AC 1003 35S	< 30 seconds < 60 seconds < 110 seconds
Gel time	CSA-Z245.20-10 (12.2) Jotapipe AC 1003 15S Jotapipe AC 1003 21S Jotapipe AC 1003 35S	12-18 seconds 18-24 seconds 27-40 seconds
Moisture content	CSA-Z245.20-10 (12.4B)	Below 0.50 % (at time of manufacture)
Particle size	CSA-Z245.20-10 (12.5)	2.0 % max retained on 150 µm (100 mesh) 0.2 % max retained on 250 µm (60 mesh)
Density	CSA-Z245.20-10 (12.6)	1350-1500 g/l
Thermal characteristics	CSA-Z245.20-10 (12.7) Inflection point	T _{g1} = 54-70 °C (129-158 °F) T _{g2} = 98-110 °C (208-230 °F) ΔH = 30-60 J/g

Storage

When stored at a maximum 25 °C (77 °F), a shelf life of 12 months is obtained from the date of manufacture.

APPLICATION

Powder application

Application conditions depend on such factors as specification, plant capability and pipe characteristics.

Application conditions	Typical application temperature	Typical film thickness
As a stand-alone coating	232-250 °C (450-482 °F)	300-500 µm (12-20 mils)
As a primer	205-240 °C (400-464 °F)	150-500 µm (6-20 mils)

Evaluations show that thicker films can enhance service capabilities.

Please refer to the relevant Application Guide for guidelines on the factory application of this product.

PERFORMANCE

Property	Standard	Result
Cathodic disbondment	CSA-Z245.20-10 (12.8) 24 hours, -3.5 V, 65 °C (149 °F) 28 days, -1.5 V, 20 °C (68 °F)	3-4 mm radius average 3-4 mm radius average
Flexibility	CSA-Z245.20-10 (12.11) 3.0° PPD at -30 °C (-22 °F)	Pass
Impact resistance	CSA-Z245.20-10 (12.12)	> 1.5 J
Strained polarization	CSA-Z245.20-10 (12.13) 28 days	Pass / No cracking
Adhesion	CSA-Z245.20-10 (12.14) 24 hours, 75 °C (167 °F) 28 days, 75 °C (167 °F)	Rating 1-2 Rating 1-2

The performance of the coating is based on 300-400 µm thick film applied as a stand-alone FBE on 6 mm steel plates which have not been chemically pretreated. These are typical results and should not be viewed as a product specification.

Repair system

Jotapipe RC 490

Disclaimer

The information in this document is given to the best of Jotun's knowledge, based on laboratory testing and practical experience. Jotun's products are considered as semi-finished goods and as such, products are often used under conditions beyond Jotun's control. Jotun cannot guarantee anything but the quality of the product itself. Minor product variations may be implemented in order to comply with local requirements. Jotun reserves the right to change the given data without further notice.

Users should always consult Jotun for specific guidance on the general suitability of this product for their needs and specific application practices.

If there is any inconsistency between different language issues of this document, the English (United Kingdom) version will prevail.



TECHNICAL SPECIFICATION

COESIVE® L8.92.8 (u) P

Grafted Polyethylene Adhesive for Steel Pipe Coating in Powder

Description	Coesive® L8.92.8 (u) P is a maleic anhydride grafted polyethylene adhesive, supplied in powder form, natural color. The polar groups grafted on the polymer backbone offer excellent adhesion to polar materials i.e.: epoxy resins, aluminium and polar polymers.
Commercial Name	Coesive® L8.92.8 (u) P
Application	Coesive® L8.92.8 (u) P is recommended for use as an adhesive layer in typical three layer PE (3LPE) coating application for steel pipes.
Produced by	Industrie Polieco – MPB Srl. Via E. Mattei 49 25046 Cazzago S. Martino (Brescia) Italy Phone +39 030 7241521 Fax +39 030 7721928 http:// www.mpb.it email: commerciale@mpb.it

Physical Properties

Properties	Units	Range Values ¹⁾	Test Methods
Density @ 23°C	g/cm ³	0.910 – 0.920	ISO 1183 – ASTM D1505
Melt Flow Rate (190°C/2.16 kg)	g/10 min	2.5 – 4.5	ISO 1133 – ASTM D1238
Maleic Anhydride Content	-	1.15	Internal method IST 222 – MAH index (FT-IR)
Tensile Stress @ Yield (23 ± 2°C)	MPa	≥ 8	ISO 527 – ASTM D638 ²⁾
Tensile Stress @ Break (23 ± 2°C)	MPa	≥ 20	ISO 527 – ASTM D638 ²⁾
Tensile Strain @ Break (23 ± 2°C)	%	≥ 600	ISO 527 – ASTM D638 ²⁾
Brittleness temperature	°C	≤ -70	ASTM D746
Vicat Softening Temperature A50 (10N)	°C	≥ 100	ISO 306 – ASTM D1525
Water Content	%	≤ 0.1	ISO 15512

1) Above range values should not be used for specification purposes. Coating plant processing and application conditions can affect the final material properties. Applicator is responsible for final control and determination of the final coating properties.

2) Compression moulded test specimen (2 mm) prepared according ISO 1872-2, test specimen type IV according ASTM D 638, strained at 50 mm/minute

Powder Particle Size Distribution	Unit	Nominal Values ¹⁾	Test Method
> 500 µm	%	≤ 5	ASTM D1921
> 150 µm and < 500 µm	%	≥ 80	

1) Above nominal values should not be used for specification purposes.



Quality System
ISO 9001
Certificate n°
LRC 0261495



Environmental System
ISO 14001
Certificate n°
LRC 6006940

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Processing/Application Recommendations

Coesive® L8.92.8 (u) P should be applied by electrostatic powder spray.

The processing conditions mentioned below are recommendations and might be adapted to the specific equipment used. Detailed recommendations can only be made when equipment and application are known. Please contact Industrie Polieco – MPB Srl. for more information.

Pipe surface temperatures 180°C - 220°C

Coesive® L8.92.8 (u) P must be applied within gel time of FBE.

Specifications

Coesive® L8.92.8 (u) P is intended to meet the requirements of the following national and international standards, when used in combination with compatible epoxy powders (FBE), **Luxene® polyethylene compounds** and if correct process, application and quality control procedures are implemented by applicator.

NF A 49710

DIN 30670

CAN/CSA Z245.21

ISO 21809-1

Storage

Coesive® L8.92.8 (u) P shall be stored indoor, in dry conditions at temperatures between -10°C and +50°C, protected from UV-light in closed (original) packaging. Improper storage can initiate degradation which can have a negative influence on the physical properties of this product. Shelf life is 12 (twelve) months from the production date. Please refer to the Inspection Certificate. It is also recommended to not stack pallets as this can affect flow properties of powder during application.

Safety

Coesive® L8.92.8 (u) P is not classified as a dangerous material. Material Safety Data Sheet is available on request. Please contact Industrie Polieco – MPB Srl. for more information.

Packaging

Coesive® L8.92.8 (u) P standard packaging

20 kg bags on pallet – 500 kg

500 kg big bags on pallet

Disclaimer

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Quality System
ISO 9001
Certificate n°
LRC 0261495



Environmental System
ISO 14001
Certificate n°
LRC 6006940

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UNITED POLYCOATS

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Technical Data Sheet

United Polycoats UPA 003

Description

UPA 003 is a black coloured high density polyethylene compound in powder form that contains finely dispersed carbon black which helps to impart excellent weathering properties.

Applications

UPA 003 is recommended as a top coat for standard three layers PE coating system used in steel pipe coating for natural gas, oil, chemical liquids, water, etc. It is designed for use as a top-coat in 3-layer pipe systems with conventional grafted polyethylene adhesive.

Specifications

UPA 003 is intended to fulfil following National and International standards, when appropriate industrial manufacturing standard procedures are applied and a continuous quality system is implemented and when used in combination with a compatible grafted polyethylene adhesive and fusion bonded epoxy.

NFA 49710
DIN 30670 S
CAN/CSA-Z245.21
ISO 21809-1

Physical Properties

Property	Reference Test Method	Unit	Typical Value
Melt Flow Rate (190°C/2.16 kg)	ASTM D 1238	g/10 mins	5.4
Density	ASTM D792	kg/m ³	945
Carbon Black content	ASTM D1603	%	2.35
OIT in Oxygen at 210° C	ASTM D3895	mins	56
Tensile Strength	ASTM D638	MPa	>26
Elongation at Break	ASTM D638	%	>600
Powder Particle Size	ASTM D 1921	µm	< 300
ESCR, F ₂₀	ASTM D1693	hours	>1000
Melting Point	ASTM D 3417	° C	129
Hardness	ASTM D 2240	Shore D	>62
Vicat Softening Point	ASTM D 1525	° C	114
Shelf life		Month	24.



UNITED POLYCOATS

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Processing Techniques

Spraying

UPA 003 is applied by air pressure spray processing technique, after spraying adhesive powder onto the steel pipe or sprinkling the powder onto the adhesion layer. The steel pipe must have enough temperature and time to melt the powder and form a uniform layer. The actual conditions will depend on the type of equipment used and the size of the pipe. The temperature of application shall be between 190-240 °C.

Packaging & Storage

1. Packed in 20kg plastic bags.
2. Store in a dry, cool and ventilated environment; avoid direct exposure to water and strong light. Avoid bulk package and securely wrap the unused part.
3. Shelf Life: two years.

Safety

The product is not classified as a dangerous preparation. The equipment should be grounded in case of any dust explosion caused by dust and fines produced during handling and transportation. Avoid Inhalation as it can irritate respiratory tract. Good ventilation is necessary as a small amount of smoke may be generated during processing.

Recycling

The product is suitable for recycling using modern methods of shredding and cleaning. In-house production waste should be kept clean to facilitate direct recycling.

For detailed information on various aspects of safety, recovery and disposal of the product, contact your nearest sales representative.

Disclaimer

The product(s) mentioned herein are not intended to be used for medical, pharmaceutical or healthcare applications and we do not support their use for such applications.

To the best of our knowledge, the information contained herein is accurate and reliable as of the date of publication, however we do not assume any liability whatsoever for the accuracy and completeness of such information.



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No liability can be accepted in respect of the use of United Polycoats' products in conjunction with other materials. The information contained herein relates exclusively to our products when not used in conjunction with any third party materials

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DPC/3LPERP/Rev. 03

STANDARD PROCEDURE FOR REPAIR,

OF 3 LAYER HIGH DENSITY POLYETHYLENE COATING ON STEEL PIPE/FITTINGS AS PER DIN 30670:2012

Reference Document:

- **3LPE Coating Standard** - DIN 30670 2012
- **Technical Specification** – XXXXXXXXXXXXXXXXXXXX
- **Customer approved ITP** – XXXXXXXXXXXXXXXX

SCOPE:

Scope of this document is to list down all the activities related to repair of 3LPE coating on Pipe & Fittings

List of Repair Material Required

1. **HDPE Powder of same grade**

The coating materials that are used for repairing defects shall satisfy two conditions.

2. They shall be suitable for protecting onshore and offshore pipelines/fittings under the required service conditions.
3. They shall be compatible with polyethylene coating which has been applied.

➤ COATING REPAIR PROCEDURE:

- Steel Pipe and fittings with localized defects (porosity, surface defects) as well as those which have been subjected to destructive control tests in accordance with this standard shall be repaired.
- Pipe/Fittings showing porosities or small damage not picked up during holiday test and having a surface less than 50 cm² per m² shall be repaired by heating and spraying polyethylene powder material of same quality and grade.

Repairs if any observed greater than 50 cm²/m² will be referred to customer for further course of action.

- After Repair, pipe/fitting shall be verified in accordance with Annex E of DIN 30670

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Detailed Steps for Repairing of 3LPE Coated Pipe/Fittings:

- The area of pipe under repairing shall be cleaned by water to remove dirt and dust present on the surface of the coated Pipe/Fittings.
- Abrade the polyethylene topcoat by wire brush.
- Heat the surface to a temperature until the polyethylene melts.
- Apply polyethylene powder of same grade and quality which is used for coating on the damaged area.
- If Post curing or water quenching is required, shall be done until the PE powder melts and forms a uniform layer.
- After Repair, pipe shall be verified in accordance with Annex E of DIN 30670

Record:

- Prepare a detailed report which has details of all the repairing activities carried out e.g. Pipe/fittings Number, Date of Repair, Verification record, Heat Number, Coating Number and details of repair material used etc.

DPC/QP/LECRP Rev. 00

STANDARD PROCEDURE FOR REPAIR OF INTERNAL & EXTERNAL EPOXY COATING ON PIPES/FITTINGS

Reference Document:

- **Technical Specifications:** XXXXXXXXXXXXXXXXXXXX
- **Customer Approved ITP:** XXXXXXXXXXXXXXXXXXXX

SCOPE:

Scope of this document is to list down all the activities related to and to *describe detailed step by step procedure* for repair of Epoxy coated Pipes/Fittings.

The coating materials that are used for repairing defects shall satisfy following two conditions.

1. They shall be suitable for protecting material under the required service conditions
2. They shall be compatible with existing epoxy coating which has been applied.

➤ **COATING REPAIR PROCEDURE:**

- Steel Pipes/Fittings with localized defects (porosity, surface defects) as well as those which have been subjected to destructive control tests in accordance with this standard shall be repaired.
- Pipes/Fittings showing porosities or small damage and picked up during holiday test and having a surface area less than 50 cm² per m² shall be repaired by applying additional coat of same epoxy paint.
- Defects or holidays of size exceeding above mentioned area and/or if damaged reached till base metal, then repairing of Pipes/Fittings shall be performed by re-blasting and coating to be carried out again.
- After Repair, pipe/fitting shall be verified for visual, holiday and thickness measurement test.
- The area of the porosity and small areas of damaged coating, together with the adjacent coating, shall be thoroughly abraded with a wire brush to remove all corrosion products.
- All large, damaged areas shall be cleaned by a blast cleaning technique; the coating around the area to be repaired shall be lightly abraded for at least 10 mm from the perimeter of the exposed substrate.
- Where the metal substrate is visible, it shall be cleaned in accordance with EN ISO 8501-1, Sa 2 ½ standard.
- All dust, corrosion products and loose coating shall be removed.
- The surface of the component shall be maintained in a dry condition during application of the repair material.

➤ **Record:**

- Prepare a detailed report which has details of all the repairing activities carried out e.g. Pipe/fitting Number, Date of Repair, Verification record, Heat Number etc and details of repair material used etc.

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PROJECT

Standby SRU & Additional Tanks IOCL- Paradip Refinery

Vendor Name: M/s. Daksha Pipes & Coatings

Customer Name: M/s Bharat Heavy Electricals Ltd, Hyderabad.

EPC: M/s Technip India Pvt. Ltd.

End User: Indian Oil Corporation Ltd. Paradeep

Purchase Order No.: XXXXXXXXXXXX

Approved ITP Document Number: XXXXXXXXXXXX

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DPC/QP/LECP Rev. 00

**STANDARD PROCEDURE FOR SURFACE PREPARATION, INTERNAL/EXTERNAL EPOXY COATING ON
PIPES & FITTINGS AND STORAGE, HANDLING, TRANSPORTATION REQUIREMENTS FOR EPOXY
COATED PIPES**

Reference Document:

- **Technical Specifications:** 1. *ISO 8501-1(1988) OR SIS-05-5900*
2. *SSPC-SP-10 or NACE No.2*
- **Customer Approved ITP:** Internal Glass Flake Epoxy Coating - XXXXXXXXXXXXXXX

SCOPE:

Scope of this document is to list down all the activities related to and to *describe detailed step by step procedure for SA 2 ½ grit blasting & Internal Epoxy Coating on pipes/fittings* for BHEL's IOCL, Paradeep Refinery's Standby SRU & Additional Tanks Project.

PROCEDURE:

NOTE: *Before starting of actual production. PQT shall be perform on the sample plate. This plate shall be used for Shore D Hardness Test and Pull Off Adhesion Test.*

1. *Inspect the grit, paints, and other material when it arrives to make sure that received material is as per the specification & with relevant test certificate.*
2. *If pre-cleaning of pipes/fittings is required, it will be carried out prior to grit blasting with suitable chemical/Solvent.*
3. *Check compressor air and make sure that it is free from Moisture & Check compressor air pressure is as per the requirement.*
4. *Load moisture free grit in the hopper. (use suitable grit for achieving finish of SSPC-SP 10 standard (NACE No.2) with anchor profile of 2.0 to 3.0 mills.)*
5. *Test Certificate from the grit manufacturer should be presented whenever it is required.*
6. *Measure and record the Substrate temperature, Humidity with suitable calibrated instruments and calculate the dew point. If Humidity measured is more than 85 % and/or difference between Dew point temp & ambient temp is less than 3° C then stop the blasting application.*
7. *The pipe/fittings shall be blast cleaned to SA 2 ½ or Nace No 2 or **SSPC SP -10** – near white metal blasting with anchor profile of 50 µm to 75 µm.*
8. *Measure surface profile with Needle Profile gauge and Surface comparator, if profile of 50 µm to 75 µm and required cleanliness is not achieved as per NACE NO 2/SSPC SP-10 or SA 2 ½ after grit blasting, then repeat the step 6,7*

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9. *Make sure that blasted surface of pipe/fittings is free from mill scale, dirt, rust, scale, corrosion products, grease, moisture, dust and any traces of blasting material or foreign matter etc. by careful usage of wired brush/ compressed air or vacuum.*
10. *Surface should be thoroughly checked for chloride contamination Brestle test kit or other international standard methods and making sure that maximum chloride level is not more than $2 \mu\text{g}/\text{cm}^2$*
11. *Review Paint Data Sheet provided by paint manufacturer and make sure that it has got required shelf life.*
12. ***Before application Paint shall be stirred or agitated until completely mixed by using mechanical/electrical portable mixer. Materials shall not be used or mixed into a new batch after recommended pot life has been exceeded. Materials shall be used on a first is first out basis.***
13. ***Paint Mixing ratio for Internal Epoxy coating is 3:1 (A to B in volume)***
14. *Inspect the Paint and make sure that it is as per the customer's requirement.*
15. *Measure and record the Substrate temperature, Humidity with suitable calibrated instruments and calculate the dew point. If Humidity measured is more than 85 % and/or difference between Dew point and ambient temp is less than 3°C then stop the coating procedure.*
16. *Make sure that all pipe/fitting sections shall be masked properly where coating is not required.*
17. *For Internal Glass flake epoxy coating Apply 2 coats of ambient temperature curing Glass flakes reinforced solvent free type, liquid epoxy with polyamine adduct coating about $400 \mu\text{m}$ per coat thereby achieving with minimum permissible DFT of $800 \mu\text{m}$ on external surface of pipes/fitting **over coating interval of minimum 8 hrs at 30°C and a maximum interval of 24 hrs. to a dry film thickness (D.F.T) of 0.8mm by airless spray equipment and/ with help of brush and roller.***
18. *Measure Wet film thickness and dry film thickness of paint, if required thickness is not achieved then repeat step 11 to step 15 until desired thickness is achieved.*
19. *Carry out the visual inspection of coating to make sure that coated surface is uniform and its free from any runs. Drips or sagging.*
20. *Carry out Holiday test as per NACE SP0188 standard to make sure that painted surface is free from pinhole **by setting up the unit to provide a voltage as per paint manufacturer recommendation for per micron of coating thickness and shall be set by detecting a deliberate pin hole in the coating at a location where the coating is at least 0.5mm thick. The detector shall be calibrated at least twice per shift.***
21. *Measure and record the Dry Film Thickness as per SSPC PA 1/SSPC PA-2 of applied paint.*
22. ***All pipe shall be left out with a 50mm cut back on both the ends without internal glass flake epoxy coating. On this cut back area apply 1 coat of welding grade inorganic zinc silicate primer for a temporary protection.***
23. ***Carry out Shore D Hardness Test in accordance with ASTM D 2240 and Pull Off Adhesion Test as per ASTM D 4541 on the sample plate.***
24. *If everything looks good, then get it inspected/approved by the TPI/client.*

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PRECAUTIONS:

1. *Wear PPE (Safety shoes, Safety goggles, Safety mask, Hand gloves) throughout the operation.*
2. *Airless spray-painting/Brush & roller used for coating and repairs.*
3. *In case of any repairs, same shall be attended as per BHEL's approved repair procedure.*
4. *Make sure that no area of pipes/fittings gets damaged while blasting & coating.*
5. *Before actual Coating application on the pipes/fittings surface a test patch is applied & inspected for Runs, Drips & Gel time as well as Tack free timing.*

*** PROCEDURE FOR MARKING, HANDLING, TRANSPORTATION AND STORAGE OF EPOXY COATED PIPES:**

- *Transfer the recorded marking from pipe mill and add the details of coating on the EPOXY coated pipes as shall be as follows*

PIPE MANUFACTURER:

PIPE GRADE:

PIPE SIZE:

PIPE NUMBER:

HEAT NUMBER:

COATING NUMBER:

CUSTOMER NAME:

COATING DETAILS:

COATING MANUFACTURER:

- *EPOXY coated pipes shall be handled by means of slings and belts of proper width (min. 60mm) which should be made of non – abrasive /non-metallic materials.*

Metallic hooks and slings if used shall be only at the ends and shall not touch the coating during handling or taking off the slings. Use of round sectional slings is prohibited.

- *EPOXY coated pipes shall be stacked completely clear from the ground at least 300mm , so that the bottom row of pipes remains free from any surface water and on wooden or rubber lined metallic supports with a width of 50 mm or above. Stacks shall consist of limited number of layers such that the pressure exercised by the pipe's own weight does not cause damages to the coating. Stacks shall be suitably secured against falling and shall consist of pipe sections having the same diameter and wall thickness. Both ends should be covered with suitable end protection material such as end caps or bevel end protector.*

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- *Coated pipes and fittings may be stacked by placing them on ridges of sand free from stones and covered with a plastic film or on wooden supports provided with suitable cover. This cover can be of dry, germ free straw covered with plastic film, otherwise foam rubber may be used. The supports shall be spaced in such a manner as to avoid permanent bending of the pipes.*
- *The trucks used for transportation shall be equipped with adequate pipe supports. Minimum two supports shall be provided at the bottom and either side of the walls. The supports shall be wooden, or rubber lined metallic supports with a width of 50 mm or above. The rubber protection must be free from all nails and staples where pipes are in contact. Slings or non-metallic straps shall be used for securing loads during transportation.*
- *All Items shall be dry, clean, and free from moisture, dirt and loose foreign materials of any kind*
- *End shall be suitably protected, and protectors shall be securely and tightly attached with the pipes.*
- *Weld bevels shall be free from dirt, oil, grease, scale, rust & other foreign materials*

Thanking you,

For M/s Daksha Pipes & Coatings



Mr. Pratik J. Shah

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