Project	Site Owner:	FTPS	
	Location:	Storage following delivery	
	Contract No:		
Document Review & Issue	Produced By	I Harding	Date: 26.10.23
	Reviewed By:	D Frazer	
	Comments: (If applicable)	Change to	
	Issued To:		
		Signature:	Date:
Type Of Operation	Type of Operation:	Standard	
	Date and Duration of Operation:	From January 2021 onwards	
	Details of Operations:	Assessing and applying suitable repair procedures to main line coatings (MLC)	
	Details of Site / Location:	Lay down areas, including the pipe route during laying operations	
	Details of Working Area:	Hardstanding dockside, pipe lay down and pipe easement	
	Details of Lifting Appliances:	Machinery used for the manoeuvring of pipework may be required at various locations to provide access to MLC that requires a repair.	
Personnel	MLC Repair Co-ordinator:		
	Appointed Persons:		
	Supervisor:		
	Name of Inspector[s]		

SEQUENCE OF ASSESSMENT

°Main Line Coating according to DIN 30 670

- Main Line Coatings can be damaged during transit between the pipe mill and the final installed position. Transportation is often over many miles and can involve sea and road freight with transshipping between modes of transport.
- MLC are applied to steel longitudinally welded, spirally wound and seamless pipes to provide mechanical, thermal and chemical loads.
- Three Layer Polyethylene Coatings (3LPE) are applied in factory according to DIN 30 670 N-n.
  - Epoxy resin primer applied as a powder
  - PE adhesive applied as either a powder or by extrusion
  - Extruded PE outer layer applied as a sleeve or sheet
- The designation 'N' for the coating defines a pipeline operating range of -20°C to +60°C
- The designation 'n' for the coating defines the coating thickness for the 3LPE.
  - Epoxy resin primer to 60µm
  - PE adhesive to 140µm
  - Outer PE to 3mm / 2.7mm across the weld seam.
- The thickness of the finishes 3LPE coating may be less than the minimum thickness locally as long as the size does not exceed 5cm² per 1m length of pipe. Any low spots must not be below 10% of the specified minimum.
- Other coatings that can be repaired using Canusa repair products include PU, PP, FBE. See data sheet details.
- PU coatings are applied to a minimum 500µm, nominal 1000µm and up to 1500µm.
- See data sheets with regards to storage conditions.

°Field assessment of MLC

Classification of defects identified by spark test:

Areas identified by a spark test should be investigated further. Some areas will be also be identified with a visual observation.

The size and type of defect should be recorded. The classification of defects is:

1) Thinning of the MLC to less than the specified minimum allowable according to QTIP, less 10%.
2) Thinning of the MLC to 1mm
3) Thinning of the MLC to less than 1mm or through to the steel

MLC thickness can be measured using commercially available thickness gauges.

Class 1 – no action required assuming the size does not exceed 5cm² and there are no defects within 1m length of pipe.

Class 2 – mastic filler or melt stick repair.

Class 3 – mastic filler or melt stick repair with CRP repair patch.

Repair Procedures

For all procedures the surface area preparation should follow the following steps:

Cut away any jagged edges using a sharp knife to provide a smoothed profile.

Using a power wire brush or manual wire brush, roughen the coating over and adjacent to the area to be repaired so as to provide a key for mastic filler or melt stick to attach to.

If the area to be repaired is Class 4 then a finish of St3 is recommended – do not polish the steel. St3 is classified as “near white metal”.

Using U Pol System 20 slow degreaser, wipe the area clean.

Using a naked flame with a minimum 2.5” inch diameter head and a moderate flame, gently heat the area to 70°C. It is suggested that a maximum temperature of 90°C is reached so as to avoid the possibility of damaging the main line coating. This will raise the surface area above the dew point.

Rain and wind can affect the quality of the installation and it is recommended that a cover is used to protect against inclement weather.

There is no requirement to monitor humidity or moisture content of the atmosphere.

Class 2: Melt Stick Method

Equipment required: Solvent cleaner U Pol System 20 slow degreaser, Lint Free Cloth, Canusa Melt Stick, Gas Burner, heat resistant Gloves, Spatula & Mechanical Wire Brush.

Heat the end of the Melt Stick until it becomes molten and fill the area that is damaged. Smooth with a spatula while the repair material is still fluid.

It is recommended that a minimum two hours is allowed before the area repaired is tested according to the agreed criteria. There is no minimum or maximum temperature but higher temperatures could affect the results of kV testing.

Class 3: Canusa Repair Patch Kits (RPK)

There are two sizes of repair patch available; 150x150mm and 300x300mm. The area of application should measure at least 50mm less than the patch size so as to provide a minimum 50mm of “good” coating to the edge of the repair patch.

Equipment required: Gas Burner, Lighter, Pair of Gloves, Knife, Solvent, Lint Free Cloth, Spatula, Mechanical Wire Brush, Canusa RPK, mastic filler and/or Canusa melt stick.

Following the surface preparation fill the damaged area with the mastic filler material (or if repairing a pull test, replace the pulled PE backing) until flush with the surrounding sleeve or use melt stick to fill the area.

Check the surface temperature is 70°C and warm if not.

Take the Canusa Repair Patch and remove the plastic backing, place in palm of gloved hand and heat the side from which the backing has been removed until mastic becomes

activated, (it will go from a matt finish to a glossy finish.) **Wear heat resistant gloves when carrying out his procedure.**

Place the patch adhesive side down over the area to be repaired ensuring a minimum 50mm onlap to “good” coating. Heat with the gas flame, making sweeping movements so as to ensure even heating.

Use a J Roller to help ensure all the patch is in contact.

Continue with the heating and roller action until the mastic oozes out of the edge of the Canusa Repair Patch. Additionally the roller can be used to force out any air pockets. As soon as the mastic starts to appear, stop applying heat.

Visually inspect the patch to check that the adhesive is flowing from all edges, that there are no air gaps, that the patch is in full contact with the MLC and that there are no holes in the backing.

It is recommended that a minimum two hours is allowed before the area repaired is tested according to the agreed criteria. There is no minimum or maximum temperature, but higher temperatures could affect the results of kV testing.

Note - Joint Cover Method

For large single area of damage exceeding 250mm x 250mm, where damage is superficial or down to the steel a larger repair patch or full sleeve repair can be used to repair coatings. Additionally, multiple sleeves can be applied as a technique called “shingling” or overlapping to repair large areas that have been damaged.

Please refer to the specific method statements for field joint cover and shingling of sleeves for further information.

Inspection of repairs

There are no specific destructive field tests that can be applied to field repairs as detailed above. It is recommended that the following checks are followed:

Visual checks to establish that the mastic is flowing from all edges of the repaired area, that the repair patches are in full contact with the MLC, there are no air pockets and that the backing of the patch or sleeve is not damaged.

Holiday detection can be carried out once the repaired area has cooled for a minimum 2 hours but recommended 24 hours at a maximum 15kV and the coating thickness measured to show that the repaired area is to the minimum allowable thickness. Higher voltage could introduce a pin hole to the repaired area.

Recording of repairs

It is recommended that for each repair the following is recorded:

1) The type of repair and the pipe number
2) The size of the repair (with photograph and scale)
3) Recording of the temperature and general weather conditions
4) Confirmation check of the surface preparation steps being correctly followed
5) Batch numbers for the repair products used
6) Final visual checks
7) 15kV spark test pass – if required as part of the client's processes
8) Thickness measurement

It is good practice to make a note of the serial number of any testing equipment used and the calibration certification.

Assuming correct storage of materials, Canusa product's have no minimum shelf life unless specified on individual packaging.

Repair Report	**Report No**
Date	
Operative	
Company	
Location	
Pipe No	
Diameter	
Class of Defect	**Comments**
Class 1	
Class 2	
Class 3	
Canusa Batch Numbers	
CRP-O	
Melt stick	
Mastic filler	
Retest Data	**Pass/Fail**
Visual	
15 kV	
Thickness	