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PICOTE

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PIPE REHABILITATION SYSTEMS: HOW DO YOU ENSURE THE SYSTEM WILL WITHSTAND THE RIGOURS OF DAY TO DAY OPERATION AND MAINTENANCE

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INTRODUCTION

PICOTE

- Introduction & Background
- Picote Brush Coating™ System
- WRc Approval
  - High Pressure Water Jetting
  - Abrasion Resistance
- Test Results
- Conclusions
- Summary

BACKGROUND

PICOTE

1999
Innotia Construction and Rehabilitation Business launched in Porvoo, Finland

2008
Began Cured-In-Place (CIPP) Linings. First Picote Miller & Smart Cutter™ developed

2012
Picote Solutions launched. Picote Smart Cutter™ wins ISTT Product of the Year

2014
Picote Twister shortlisted for UKSTT Innovative Product Award

2016
Picote takes over manufacture of all Picote Cleaning Chains

wrc approved PT/431/0918

2018
P-Trap Cutter to launch at WWETT
Picote Brush Coating WRc Approved

2004
Appointed Dakki Coating Franchisee in Finland

2009
First patent application submitted. Picote CIPP Lining inside buildings DN50 – 225 developed further

2013
Picote Solutions, Inc launched in the USA

2015
Picote Maxi Miller launched

2017
Picote Maxi Miller Power+

PICOTE SOLUTIONS HAVE 100+ PATENTS TO DATE

MANUFACTURERS OF HIGH-SPEED CLEANING MACHINES

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PICOTE
LIFE FOR PIPES

Can operate in pipe diameters
DN32 to DN300

Can be used for general unblocking, root cutting, descaling, concrete removal, lateral reinstatement, removing failed linings using specially developed tools such as Chains, Special Drill Heads, Smart Cutter™, Smart Spider, Smart Sweeper and Twisters

Picote machines operate between 500 and 2900 RPM

WRc APPROVED SCHEME

- WRc Approved is an **independent technica**l view on whether a product is **fit to do the job** for which it is claimed **or** a contractor is fit to provide a specified service
- Over the past **20 years** WRc has issued in excess of **400 approvals**.
- Approval range for pipe rehabilitation, pipeline fitting, software, modular build structures, flow control and installer workmanship.
- Have been approved for UK, Europe, North America, Asia and Australasia. http://www.wrcapproved.com/home

WRc APPROVED SCHEME

Straightforward yet robust, based on rigorous audits

Stage 1 Pre Audit Assessment	Stage 2 Audit and Evidence Review	Stage 3 Issue of Certificate
Build a body of information to inform the Assessment Schedule and to gage the initial stat of readiness to proceed with the WRc Approved process	2a Audit Planning 2b Audit of installations instructions and witnessing installations 2c Manufacture and supply chain audit 2d Evidence review	WRc Approved certificate issued valid for 5 years from date of approval Finalised Assessment Schedule A short report of the assessment wrcapproved.com updated with new approved product

- WRc approvals are valid for 5 years.
- After which a re-approval is required, ensuring that your product is still ‘fit for purpose’.
- Further testing may be required in order to comply with any changes to the appropriate standards.

PICOTE BRUSH COATING™ SYSTEM

wrc approved™
PT/431/0918

DC1000E 100% SOLIDS EPOXY RESIN

PICOTE
LIFE FOR PIPES

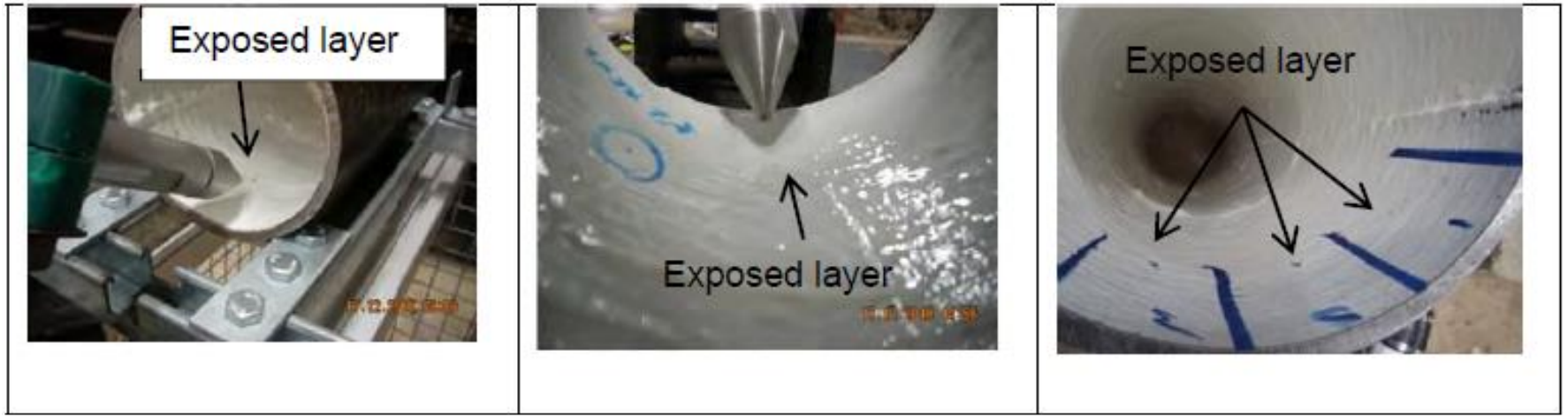
- Dual Colour Epoxy Resin System
- White or Grey in Colour
- Semi Structural System
- Choice of resin depends on the colour of host pipe. (i.e cast iron – 1st coat is white)
- Change colours between coats so operator can see the coating is applied uniformly
- Vary the flow of resin to fill any holes or cracks
- Client can visually see how many coats applied
- Client can be supplied with CCTV showing application of each coat

HIGH PRESSURE WATER JETTING (HPWJ)

- Water Industry Specification (WIS) 4-35-01
- Specification for Thermoplastics Structured Wall Pipes, Joints and Couplers with a Smooth Bore for Gravity Sewers for the Size Range 150-900
- To determine:
  - The Picote Brush Coating™ System resistance to through-wall puncture
  - Whether or not the Picote Brush Coating™ System would de-bond and lift from the host pipe
  - The pass criteria to determine the jetting resistance of the applied coating was selected to be the same as thermoplastic pipes (2600 psi /180 bar)
- The test samples, witnessed by WRc, were made by brush coating a DN150 steel pipe with 5 coats of the DC1000E

TEST METHOD

- Increase the pressure uniformly to 180 bar (2600 PSI) over a time period of not less than 10 seconds but not more than 15 seconds.
- The test pressure was applied to the pipe surface for 120 seconds
- Stop the pump, remove the test piece from the rig, inspect for signs of damage, and record pass or fail.
- The test was repeated 5 times at the test pressure.



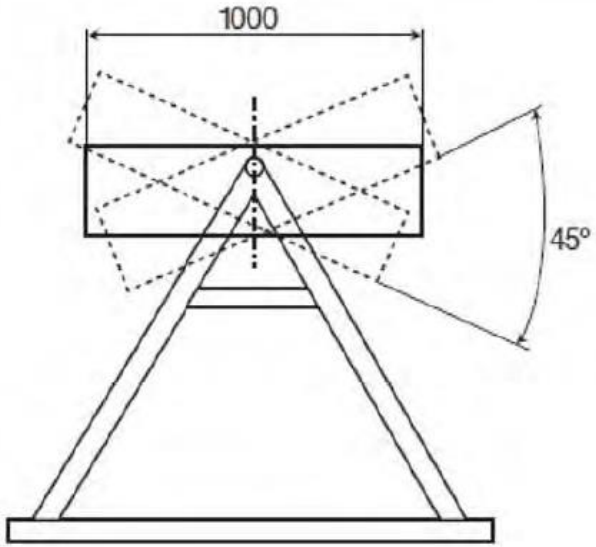
TEST RESULTS

- De-bonding: Testing indicated that the coating could be punctured though there was no lifting or de-bonding beyond the immediate puncture area
- Through-wall puncture: The testing was targeted at the trough within the applied coating. On visual completion of 5 runs at 2600 psi /180 bar the coated pipe was then cut in the hoop direction and within 15 mm of the jetting impact point

REFERENCE	PRESSURE	LAYERS EXPOSED	PASS / FAIL
1	180 BAR / 2600 PSI	4	PASS
2	180 BAR / 2600 PSI	3	PASS
3	180 BAR / 2600 PSI	3	PASS
4	180 BAR / 2600 PSI	4	PASS
5	180 BAR / 2600 PSI	3	PASS

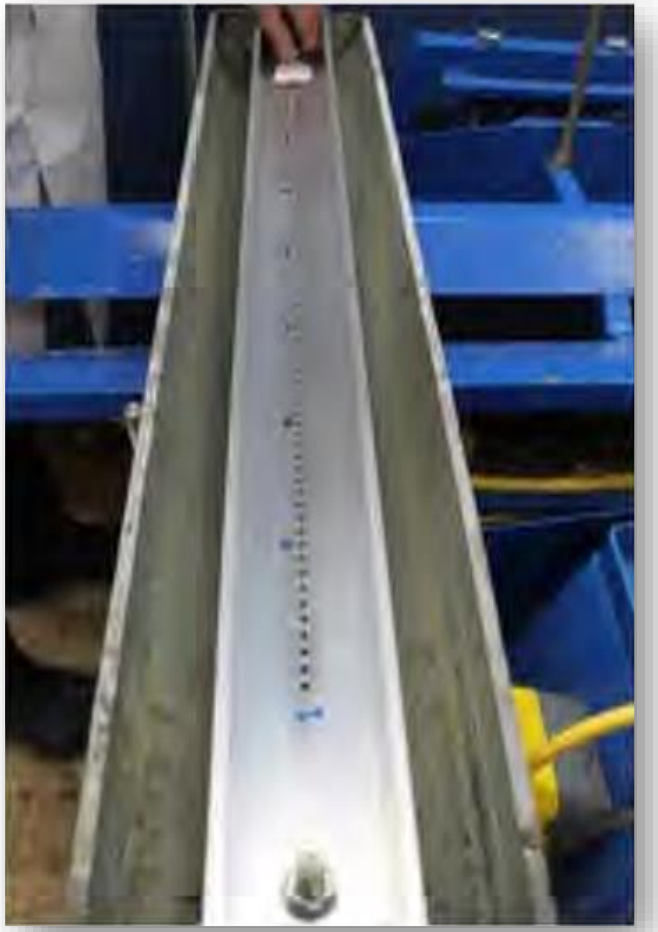
DARMSTADT ABRASION TEST

- Carried out in accordance with BS EN 295-3, Vitrified Clay Pipe Systems for Drains and Sewers, Test Methods
- The abrasion test is the standard test method used to assess the resistance of vitrified clay, concrete and PVC drain and sewer pipes to abrasion by sediments
- Also used a general abrasion test for CIPP liner, pipe coatings etc



TEST METHOD

- Test solution was a mix of sand, gravel and water
- The sediment fraction was a blend of natural unbroken round grained quartz silts, sands and gravels
- Grain size up to 15mm
- Tap water was added to a depth of 38mm from pipe invert
- 70 measurements were taken before and after testing
- Test was run for 100,000 tip cycles



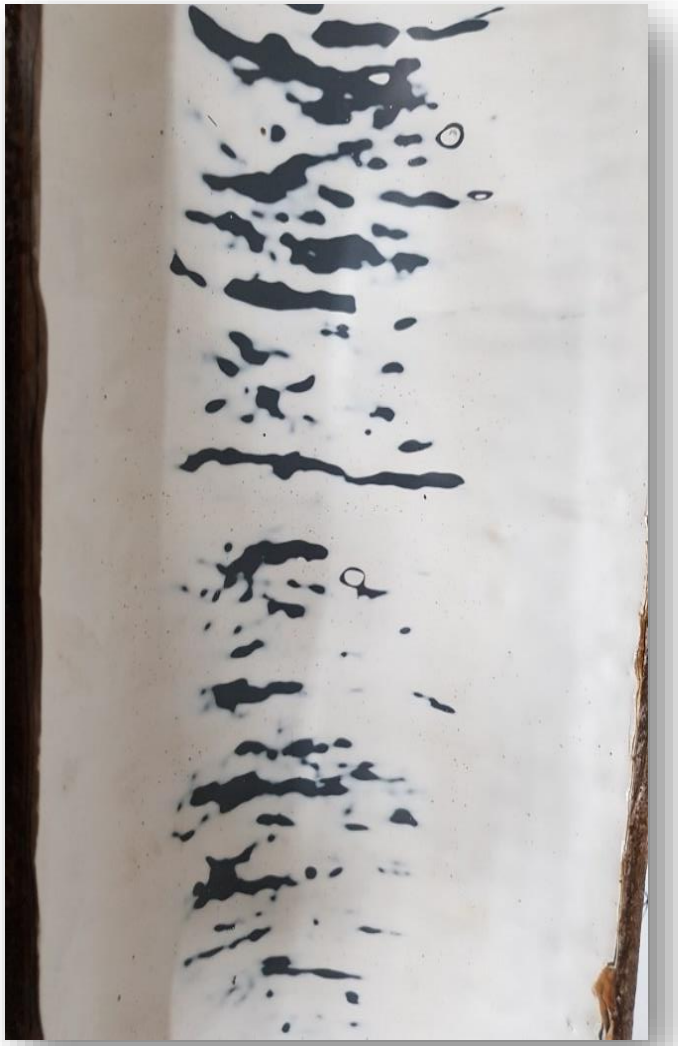
TEST CRITERIA

- There is no pass or fail threshold for this type of test apart from typical wear values for vitrified clay pipes of 0.2mm to 0.5mm
- It was agreed to apply the following criteria for non-vitrified clay materials:
  - Through wear of the coating to the host pipe
  - Delamination of the coating from the sample surface
  - Damage to the protective coating to an extent that it will fail to give the intended protection
- The equipment rocks the test sample in the longitudinal direction through 45 degrees causing the test medium to travel end to end along the invert of the test sample producing an abrasive action

TEST RESULTS

- The test sample completed the 100,000 test tip cycles
- The AVERAGE wear value was 0.44mm
- The MAXIMUM wear value measured was 1.23mm
- The LOWEST wear value measured was zero
- The results were in the range of 0.2mm to 0.5mm referenced for vitrified clay abrasion resistance

It was noted that the brush coating technique leaves a ridged finish. Smoothing of the raised ridges occurred with the top layer of white worn through to the previous applied grey coat



CONCLUSIONS - HPWJ

- The high pressure water jetting test showed that a minimum of 5 coats would need to be applied to the pipe to withstand a jetting pressure of 180 Bar (2600 PSI) as required by Water Industry Specification (WIS) 4-35-01 and demonstrated that:
    - There was no lifting or de-bonding beyond the immediate puncture area
    - The jetting resistance of the Picote Brush Coating™ System was the same as thermoplastic pipe systems

CONCLUSIONS – RESISTANCE TO ABRASION

The Darmstadt test demonstrated that:

- The coating wear value is within the range quoted in EN 295-3 for vitrified clay pipes
- No failure of the coating through to the host pipe was observed
- No delamination of the coating layers was observed
- The coating remained fully adhered to the host pipe and previous layers of coating

The Picote Brush Coating™ System is considered to have passed the abrasion resistance test when compared to vitrified clay pipes and significantly lower than the abrasion characteristics of asbestos cement, concrete and fibre glass reinforced pipes

SUMMARY

Overall the testing regime undertaken by WRc as part of the WRc Approved Scheme demonstrated that the Picote Brush Coating™ System could withstand the long term rigours of day to day operation and maintenance as a semi-structural repair

PT/431/0918