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| **PHASED ARRAY ULTRASONIC TESTING REPORT** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **JOB DETAILS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Client: | | | **NCOC N.V.** | | | | Project: | | | | | **ESKENE WEST** | | | | | | | | | | | Work Location: | | | | **OSF** | | | |
| **JOB DESCRIPTION** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brief Description of Job: | | | | | | | **Encoded Thickness Measurement Survey of 12" & 10” Line.** | | | | | | | | | | | | | | | | | | | | | | | |
| Line No.: | | | | | | | **M2-4000-CM-021-10”-A21-HC**  **M2-4000-CM-026-12”-A21-HC** | | | | | | | | | Location: | | | | | | | **Unit 400**  **M2-400-GB-302 (inlet/outlet)** | | | | | | | |
| Material: | | | | | | | **Carbon steel – A333 Gr.6** | | | | | | | | | Surface Condition: | | | | | | | **Painted** | | | | | | | |
| Nominal thickness | | | | | | | **9.52 mm (A21)** | | | | | | | | | Diameter | | | | | | | **12 & 10 inch** | | | | | | | |
| Part temperature | | | | | | | **20°C** | | | | | | | | |  | | | | | | |  | | | | | | | |
| **INSPECTION PROCEDURE** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Procedure No: | | | | | **QP-11-PAUT-CM-Q01 REV 03** | | | | | | | | In accordance with: | | | | | | **ASME sec V** | | | | In accordance with: | | | | | | **Client Specification** | |
| **INSPECTION EQUIPMENT** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S. No | Equipment/  Material Name | | | | | | | | Manufacturer | | | | | Serial No | | | | | | Calibration certificate No | | | | | | Calibration Expiry date | | | | |
|  | OmniScan MX2 | | | | | | | | Olympus | | | | | 103704 | | | | | | BK-01-2110 | | | | | | 12.09.2020 | | | | |
|  | Step wedge calibration block 2212M | | | | | | | | Olympus | | | | | 1454 14 | | | | | | - | | | | | | - | | | | |
| **EQIPMENT PARAMETERS** | | | | | | | | | | | | | | | | | | | | | | | | **CALIBRATION BLOCK DETAILS** | | | | | | |
| Mode | | | | **Tx/Rx** | | | | Filter | | **4.0-12.0 MHz** | | | | | | | Points quantity | | | | **640** | | | Cal block | | | | **Step wedge** | | |
| Frequency | | | | **7.5 MHz** | | | | Rectifier | | **FW** | | | | | | | No of elements | | | | **64** | | | Material | | | | **CS** | | |
| Energy | | | | **40 V** | | | | Video filter | | **On** | | | | | | | Element pitch | | | | **1 mm** | | | Range | | | | **(6.25-25.0) mm** | | |
| Pulse width | | | | **100 ns** | | | | Averaging | | **1** | | | | | | | Ref sensitivity | | | | **+10 dB** | | | Temperature | | | | **20°C** | | |
| PRF | | | | **Auto** | | | | * Wedge | | * **Short gasket plate hydroform** | | | | | | | Scan sensitivity | | | | **+3 dB** | | |
| Probe | | | | **Olympus Hydroform** | | | | Couplant | | | | **Water** | | | Accuracy | | | | **±0.1 mm** | | |
| **SCAN PLAN** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test Ref | | Scan type | | | | Beam type | | | | | Index offset | | | | Start element | | | Active elements | | | | First Element | | | Last Element | | | | | Element Step |
|  | | Linear | | | | Compression | | | | | 30.5 | | | | 1 | | | 64 | | | | 1 | | | 64 | | | | | 1 |

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| **CALIBRATION DETAILS** |
| **Calibration on (6.25-12.5-18.75-25.0) mm step wedge block:**  **O:\Production Operations\Operations Technical\TC&I\12 NDT\D.Kuryanau\gas trunk line\scans\cal CS 25mm.JPG**  18.74  24.96  6.28  12.53 |

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| **DETAILS AND RESULTS** |
| Phased Array inspection was carried out on 12 inch M2-4000-CM-026-12”-A21-HC (outlet) and 10 inch M2-4000-CM-021-10”-A21-HC (inlet). The scanning areas are mentioned below for each location. All areas were scanned in increments of 50 mm giving an overlap of approx. 11 mm and varied in length and shape to maximise the area covered around the restrictions. The datum points are shown in schemes for clarity. These areas were clearly marked with permanent marker to ensure accurate repeatability. The surface condition was good with Minimal loss of Data due to paint peel off on the surface. |
| M2-4000-CM-026-12”-A21-HC |

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| **DETAILS AND RESULTS** |
| M2-4000-CM-021-10”-A21-HC |

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| **DETAILS AND RESULTS** | |
| **Location 1** | |
|  | Data collected with (0-1050) mm on X-axis, (0-400) mm on Y-axis. Datum 0 in scan axis started at external top at 12 o’clock position and scanned in clockwise direction. |
| O:\Production Operations\Operations Technical\TC&I\12 NDT\D.Kuryanau\OSF\Chill\302 loc1.JPG | |
| The minimum thickness of the location 1 | |
| O:\Production Operations\Operations Technical\TC&I\12 NDT\D.Kuryanau\OSF\Chill\302 loc1 c.JPG  ***Bottom Side***  ***Top Side***  ***Top Side***  ***X axis***  ***Y axis*** | |
| Full scan view with the minimum thickness area of the location 1 | |

|  |  |
| --- | --- |
| **DETAILS AND RESULTS** | |
| **Location 2** | |
|  | Data collected with (0-900) mm on X-axis, (0-300) mm on Y-axis. Datum 0 in scan axis started at East side of pipe and scanned in counter clockwise direction. |
| C:\Users\TEMP.NCOC.014\Desktop\New folder\302.JPG | |
| The minimum thickness of the location 2 | |
| C:\Users\TEMP.NCOC.014\Desktop\New folder\302 c.JPG  ***West Side***  ***East Side***  ***East Side***  ***Y axis***  ***X axis*** | |
| Full scan view with the minimum thickness area of the location 2 | |

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| Location number | Description | Ø, inch | Nominal  thickness, mm1 | Date | Minimum thickness, mm | Maximum thickness, mm | Area of maximum thickness loss, mm | | | | Average thickness, mm |
| Start X | End X | Start Y | End Y |
| 1 | Straight | 12 | 9.52 (A21) | 26 Sept 2019 | 8.44 | 12.11 | 400 | 750 | 0 | 400 | 10.27 |
| 2 | Straight | 10 | 9.52 (A21) | 02 Oct 2019 | 8.33 | 11.18 | 600 | 850 | 100 | 250 | 9.75 |

*Notes:*

1. *All measurements include coating.*

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| Examined by  PA-UT Level II cert. No 1A 164/16 | Name: Dzmitry Kuryanau  expiry date: 28.02.2021 | Signature: .......................... | Date: 02 October 2019 |
| Approved by  UT Level III cert. No 2B 189/16  PA-UT Level II cert. No. 1A 110/16 | Name: Klindukhou Viachaslau  expiry date: 31.05.2021  expiry date: 31.12.2020 | Signature: ........................... | Date: 02 October 2019 |
| Client Representative: | ………………………….…. | Signature: ......................... | Date: .................. |