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| **PHASED ARRAY ULTRASONIC TESTING REPORT** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **JOB DETAILS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Client: | | | **NCOC N.V** | | | | Project: | | | | **ESKENE WEST KARABATAN** | | | | | | | | | | Work Location: | | | | **EWR** | | | |
| **JOB DESCRIPTION** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brief Description of Job: | | | | | | | **Encoded thickness measurement survey of 6" Line.** | | | | | | | | | | | | | | | | | | | | | |
| Line No.: | | | | | | | **M2-3340-CM-092-8"-A21-WN** | | | | | | | | | Location: | | | | | **Unit 334** | | | | | | | |
| Material: | | | | | | | **Carbon steel – A333 Gr.6** | | | | | | | | | Surface Condition: | | | | | **Painted** | | | | | | | |
| Nominal thickness | | | | | | | **7.11 mm (A21)** | | | | | | | | | Diameter | | | | | **6 inch for tested object** | | | | | | | |
| Part temperature | | | | | | | **20 °C** | | | | | | | | |  | | | | |  | | | | | | | |
| **INSPECTION PROCEDURE** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Procedure No: | | | | | **QP-11-PAUT-CM-Q01 REV 00** | | | | | | | 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 | | | | | | | 103625 | | | | | BK-01-0126 | | | | | 30.01.2019 | | | | |
|  | Step wedge calibration block | | | | | | Olympus | | | | | | | 077314 | | | | | - | | | | | - | | | | |
| **EQIPMENT PARAMETERS** | | | | | | | | | | | | | | | | | | | | | **CALIBRATION BLOCK DETAILS** | | | | | | | |
| Mode | | | | **Tx/Rx** | | | | Filter | | **None** | | | 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) mm** | | |
| Pulse width | | | | **100 ns** | | | | Averaging | | **1** | | | Ref sensitivity | | | | | **+8 dB** | | | Temperature | | | | | **20 °C** | | |
| PRF | | | | **auto** | | | | Focus depth | | **4 mm** | | | Scan sensitivity | | | | | **+4 dB** | | | Correction | | | | | **n/a** | | |
| Probe | | | | **Olympus Hydroform** | | | | Wedge | | **n/a** | | | Couplant | | | | | **water** | | | Accuracy | | | | | **±0.2 mm** | | |
| **SCAN PLAN** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test Ref | | Scan type | | | | Beam type | | | Index offset | | | | | | Start element | | Active elements | | | Minimum angle | | | Maximum  angle | | | | | Angle Step |
|  | | Linear | | | | Compression | | | 30.5 | | | | | | 1 | | 64 | | | 0 | | | 0 | | | | | 1 |

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| **CALIBRATION DETAILS** |
| Calibration on (6.25-12.5-18.75-25) mm step wedge block: |

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| **DETAILS AND RESULTS** |
| Phased Array inspection was carried out on 6 inchLine M2-3340-CM-092-8"-A21-WN. 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. |
| **M2-3340-CM-092-8"-A21-WN isometry**  **Locations:**   1. Straight pipe (6 inch). 2. Straight pipe (6 inch). |

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| --- | --- |
| **DETAILS AND RESULTS** | |
| **Location No 1** | |
|  | Data collected with (0-1300) mm on X-axis, (0-500) mm on Y-axis. Datum 0 in scan axis started at external top at 0 o’clock position and scanned in clockwise direction. |
|  | |
| The minimum thickness of the location 1 | |
| ***X axis***  ***Y axis*** | |
| Full scan view with the minimum thickness area of the location 1 | |

***Y axis***

|  |  |
| --- | --- |
| **DETAILS AND RESULTS** | |
| **Location No 2** | |
|  | Data collected with (0-1300) mm on X-axis, (0-500) mm on Y-axis. Datum 0 in scan axis started at external top at 0 o’clock position and scanned in clockwise direction. |
|  | |
| The minimum thickness of the location 2 | |
| ***X axis*** | |
| Full scan view with the minimum thickness area of the location 2 | |

| P&ID | Ø, inch | Nominal thickness, mm | Location number1 | Minimum thickness, mm2 | Maximum thickness, mm2 | Area of maximum thickness lose, mm3 | | | | Average coating thickness, mm4 |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Start X | End X | Start Y | End Y | Minimum thickness without coating, mm | Maximum thickness without coating, mm | Average thickness without coating, mm |
| M2-3340-CM-092-8"-A21-WN | 6 | 7.11 (A21) | 1 | 7.66 | 9.28 | 220 | 290 | 0 | 160 | 0.55 | **7.11** | 8.73 | 7.92 |
| M2-3340-CM-092-8"-A21-WN | 6 | 7.11 (A21) | 2 | 7.1 | 9.17 | 195 | 240 | 360 | 440 | 0.53 | **6.57** | 8.64 | 7.61 |

*Notes:*

1. *L – left; R – right; T – top; B – bottom.*
2. *According to PA UT corrosion mapping including coating.*
3. *A1, A2 etc. area number.*
4. *Measurement was done by* [*ultrasonic thickness gauge*](https://www.multitran.ru/c/m.exe?t=1122254_1_2&s1=%F3%EB%FC%F2%F0%E0%E7%E2%F3%EA%EE%E2%EE%E9%20%F2%EE%EB%F9%E8%ED%EE%EC%E5%F0) *38DLPlus.*

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| APPROVALS: | | | |
| Operator  UT Level II Cer.No. 403 | Damir Dosbatyrov  cer.exp date: 14.05.2018 | Signature: ........................... | Date: 17 Feb 2018 |
| Supervisor  UT Level III cer. No 1A 123/15 | Shundryk Ihar  cer.exp date: 01.05.2021 | Signature: ........................... | Date: 17 Feb 2018 |
| PA-UT Level II cer. No. 1A 538/17 | cer.exp date: 30.11.2022 |
| Client Representative: | :………………………….…. | Signature: ........................... | Date: ........................... |