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| **PHASED ARRAY ULTRASONIC TESTING REPORT** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **JOB DETAILS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Client: | | | **NCOC N.V.** | | | | Project: | | | | **ESKENE WEST** | | | | | | | | | | | Work Location: | | | | **KUT 560** | | | |
| **JOB DESCRIPTION** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brief Description of Job: | | | | | | | **Encoded Thickness Measurement Survey of 8” Line.** | | | | | | | | | | | | | | | | | | | | | | |
| Line No.: | | | | | | | **A1-5600-PW-068-8"-A63-WN** | | | | | | | | Location: | | | | | | | **KUT 560** | | | | | | | |
| Material: | | | | | | | **A 333 Gr.6 , A 420 Gr.WPL6** | | | | | | | | Surface Condition: | | | | | | | **Painted** | | | | | | | |
| Nominal thickness | | | | | | | **7.11 mm (A63)** | | | | | | | | Diameter | | | | | | | **8 inches** | | | | | | | |
| Part temperature | | | | | | | **40° C** | | | | | | | |  | | | | | | |  | | | | | | | |
| **INSPECTION PROCEDURE** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Procedure No: | | | | | **QP-11-PAUT-CM-Q01 REV 01** | | | | | | | 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 | | | | | | Olympus | | | | | | 145414 | | | | | | - | | | | | | - | | | | |
| **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 | | | | **+10 dB** | | | Temperature | | | | **20 °C** | | |
| PRF | | | | **auto** | | | | Velocity | **5890 m/s** | | | | | | | Scan sensitivity | | | | **+6 dB** | | |
| Probe | | | | **Olympus Hydroform** | | | | Wedge | **n/a** | | | | | | | 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) mm step wedge block:    18.71  24.94  6.22  12.45 |

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| **DETAILS AND RESULTS** |
| Phased Array inspection was carried out on 20’’ line **A1-5600-PW-068-8"-A63-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. |
| **A1-5600-PW-068-8"-A63-WN (CML-01,CML-02)**    PIPE  ELBOW  ELBOW |

|  |  |
| --- | --- |
| **DETAILS AND RESULTS** | |
| **CML 1 -ELBOW** | |
| X axis  Y axis | Data collected with (-100 to +100) mm on X-axis, (0-350) mm on Y-axis. Datum point is situated on 20 mm from circumferential weld on elbow extrados side.  Scanning starts from point minus 100 mm before Datum 0 and finishes at 100 mm.  Datum 0 is situated on elbow extrados side to proper collection of data. |
|  | |
| The minimum thickness of the cml -01 -Elbow | |
| ***0 Datum***  ***Y axis***  ***X axis*** | |
| Full scan view with the minimum thickness area of the cml -01 -Elbow | |
| **DETAILS AND RESULTS** | |
| **CML 2-PIPE** | |
| X axis  Y axis | Data collected with (0-700) mm on X-axis, (0-700) mm on Y-axis. Datum point is situated on 20 mm from circumferential weld  Datum 0 is situated on top side and scanned in clockwise direction related to flow. |
|  | |
| The minimum thickness of the cml -01 -Pipe | |
| ***Top side***  ***Y axis***  ***X axis*** | |
| Full scan view with the minimum thickness area of the cml -01 -Pipe | |

|  |  |
| --- | --- |
| **DETAILS AND RESULTS** | |
| **CML 2-ELBOW** | |
| Y axis  X axis | Data collected with (-100 to +100) mm on X-axis, (0-350) mm on Y-axis. Datum point is situated on 20 mm from circumferential weld on elbow extrados side.  Scanning starts from point minus 100 mm before Datum 0 and finishes at 100 mm.  Datum 0 is situated on elbow extrados side to proper collection of data. |
|  | |
| The minimum thickness of the cml-02 -Elbow | |
| ***Y axis***  ***X axis***  ***0 Datum*** | |
| Full scan view with the minimum thickness area of the cml-02 -Elbow | |

***Y axis***

***Y axis***

***Y a***

Result

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Line number | 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 |
| **A1-5600-PW-068-8"-A63-WN** | **CML1** | ELBOW | 8” | 7.11 | 01 Feb 2020 | 8.81 | 9.78 | 0 | 40 | 0 | 350 | 9.29 |
| **CML2** | PIPE | 8” | 7.11 | 01 Feb 2020 | 8.56 | 9.86 | 300 | 550 | 0 | 700 | 9.21 |
| ELBOW | 8” | 7.11 | 01 Feb 2020 | 8.58 | 9.80 | -50 | 0 | 0 | 350 | 9.19 |

*Notes:*

1. *All measurements include coating*

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| Examined by  UT Level III cert. No 300400  PA-UT Level II cert. No. 319659 | Name: Kishore kumar.P  expiry date: 30.03.2023  expiry date: 13.09.2020 | Signature: .......................... | Date: 08 Feb 2020 |
| Approved by  UT L II cert. No 1A 167/17  PA-UT Level II cert. No. 1A 354/18 | Name: Barsukou Raman  expiry date 31.01.2022  expiry date 31.07.2023 | Signature: ........................... | Date: 08 Feb 2020 |
| Client Representative: | ………………………….…. | Signature: ......................... | Date: .................. |