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| **PHASED ARRAY ULTRASONIC TESTING REPORT** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **JOB DETAILS** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Client: | | | **NCOC N.V** | | | | Project: | | | | **ESKENE WEST KARABATAN** | | | | | | | | | | Work Location: | | | | **Oil-Tr1** | | | |
| **JOB DESCRIPTION** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Brief Description of Job: | | | | | | | **Encoded Thickness Measurement Survey of ‘T’ component.** | | | | | | | | | | | | | | | | | | | | | |
| Line No.: | | | | | | | **A1-2001-RO-010-24”-A11-HC** | | | | | | | | | Location: | | | | | **Oil-Tr1** | | | | | | | |
| Material: | | | | | | | **Carbon steel – A420/WPL6** | | | | | | | | | Surface Condition: | | | | | **Painted** | | | | | | | |
| Nominal thickness | | | | | | | **9.53mm** | | | | | | | | | Diameter | | | | | **24”** | | | | | | | |
| Part temperature | | | | | | | **42 °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 | | | | | **+0 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 |
| Legend: N/A-Not applicable | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| **CALIBRATION DETAILS** |
| Calibration on (6.25-12.5-18.75-25) mm step wedge block: |
| **DETAILS AND RESULTS** |
| A Phased Array inspection was carried out on ‘T’ component for the area of 9-12-3 0’çlock positions. All areas were scanned in increments of 50mm giving an overlap of approx. 11mm and Varied in length and shape to maximise the area covered around the restrictions. (see photos). The datum points are shown in photos for clarity.  Data collected with (0-900)mm on X-axis, (0-700)mm on Y-axis in clockwise direction with respect to the flow. Datum 0 in scan axis started from 9 o’clock position which is on South side.  These areas were clearly marked with permanent marker and photographed to ensure accurate repeatability.  The surface condition was good with Minimal loss of Data due to paint peel off on the surface.  The lowest measurement was 13.81mm, refer screenshot.  **Minimum thickness observed:**    As per the above screenshot of A-C-S view , minimum thickness observed is 13.81 mm.  Maximum thickness observed is 15.37mm  The average value calculated by adding minimum and maximum values and divided by number of counts. |

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| |  | | --- | | **The C Scan** | | The C Scan is a digital representation of a series of points measured ultrasonically and placed together using software to build a picture to help us understand the data.The data is gathered by pushing an encoded probe over the full length and width of the area to be surveyed from a specific datum to give us an accurate map.  In this case the datum is as follows.  Datum  Y Axis  X axis  End View (section through pipe)  The Datum point is marked on ‘T’ and has been clearly photographed to allow accurate repeatability and consistency. | |

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| **SITE IMAGES** |
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| **RESULTS COMPARISION** |
| |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | S. No | Technique | Inspection Date | Min  (mm) | X  (mm) | Y  (mm) | Average (mm) | | 1 | PAUT | 23-08-2017 | 13.79 | 792-870 | 110-197 | 14.58 | | 2 | UT | 30-11-2017 | 13.81 | 792-870 | 110-197 | - | | 3 | PAUT | 26-02-2018 | 13.81 | 792-870 | 110-197 | 14.58 |   \*Minimum thickness observed at random spots in the mentioned area.  UT-MAT  FLOW    weld  12  9  3  DATUM 0  DATUM 700  6  Fig: Typical image of the minimum thickness observed location.  Notes:  According to PA UT corrosion mapping, results are including coating. |

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| APPROVALS: | | | |
| Operator  UT Level II Cer.No. 403 | Damir Dosbatyrov  cer.exp date: 14.05.2018 | Signature: ........................... | Date: 26.02.2018 |
| Supervisor  UT Level III cer. No 225809 | Adinarayana Malavathu  cer.exp date: 30.04.2019 | Signature: ........................... | Date: 26.02.2018 |
| PAUT L II cerNo. E012S22820580 | cer.exp date: 22.03.2022 |
| Client Representative: | :………………………….…. | Signature: ........................... | Date: ........................... |