|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PHASED ARRAY ULTRASONIC TESTING REPORT** | | | | | | | | | | | | | | | | |
| **JOB DETAILS** | | | | | | | | | | | | | | | | |
| Client: | | **NCOC N.V.** | | Project: | **ESKENE WEST** | | | | | | Work Location: | | | **PIT pipeline Astrakan-Mangyshlak** | | |
| **JOB DESCRIPTION** | | | | | | | | | | | | | | | | |
| Brief Description of Job: | | | | **Encoded thickness measurement survey of pipeline D6-5000-RW-003-12’’-C56 (pipeline);**  **D6-5000-RW-004-12’’-C56-HC (elbow)** | | | | | | | | | | | | |
| Line No.: | | | | **According to table results and drawings** | | | | | | Location: | | | **Unit 500** | | | |
| Material: | | | | **A333 Gr.6; Stainless Steel** | | | | | | Surface Condition: | | | **Painted** | | | |
| Nominal thickness | | | | **14.3 mm; 4.5 mm (according to UT results)** | | | | | | Diameter | | | **12 inches** | | | |
| Part temperature | | | | **5° C** | | | | | |  | | |  | | | |
| **INSPECTION PROCEDURE** | | | | | | | | | | | | | | | | |
| Procedure No: | | | **QP-11-PAUT-CM-Q01 REV 02** | | | 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-01-1672 | | | | | | 12.09.2019 | |
|  | Step wedge calibration block | | | Olympus | | | 077314 | | - | | | | | | - | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **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) mm** |
| Pulse width | **100 ns** | Averaging | **1** | Ref sensitivity | **+13 dB** | * Calibration Temperature | **5° C** |
| PRF | **Auto** | Velocity | **5890 m/s** | Scan sensitivity | **+3 dB** |
| Probe | **7.5L64** | Wedge | **Short gasket plate 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 |

|  |
| --- |
| **CALIBRATION DETAILS** |
| Calibration on (6,25-12,5-18,75-25) mm step wedge block:  D:\NCOC\SlagCuther Radiation\cal 20mm.JPG  18,67 mm  24,89 mm  6,30 mm  12,46 mm |

|  |
| --- |
| Phased Array inspection was carried out on 12 inch **D6-5000-RW-003-12’’-C56; D6-5000-RW-004-12’’-C56-HC.** The scanning areas are mentioned below. 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 photos 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. |
| **D6-5000-RW-003-12’’-C56 (pipeline); D6-5000-RW-004-12’’-C56-HC (elbow)** |
| D:\NCOC\confined space Asrtakhan-Mangyshtau\схема.JPG |

|  |  |
| --- | --- |
| **DETAILS AND RESULTS** | |
| **Location 1 (0-250)** | |
| D:\NCOC\confined space\pipe.jpg | Data collected with (0-1030) mm on X-axis, (0-250) mm on Y-axis.  Datum 0 in scan axis started at 12 o’clock position and scanned in counter clockwise direction. |
| D:\NCOC\confined space\pipe 0-250 - 9.25.JPG | |
| The minimum thickness of the location 1 (0-250) | |
| D:\NCOC\confined space\pipe 0-250 - 9.25 full.JPG  ***X axis***  ***Y axis*** | |
| Full scan view with the minimum thickness area of the location 1 (0-250) | |

|  |  |
| --- | --- |
| **DETAILS AND RESULTS** | |
| **Location 2 (0-700)** | |
| D:\NCOC\confined space\elb.jpg | Data collected with (0-400) mm on X-axis, (0-700) mm on Y-axis.  Datum point is situated on 70 mm from circumferential weld on elbow extrados side. Scanning starts from point minus 200 mm before Datum 0 and finishes at 200 mm after Datum 0 to proper collection data on elbow extrados. |
| D:\NCOC\confined space\Elb 0-700.JPG | |
| The minimum thickness of the location 2 (0-700) | |
| D:\NCOC\confined space\Elb 0-700 full.JPG  ***X axis***  ***Y axis*** | |
| Full scan view with the minimum thickness area of the location 2 (0-700) | |

**D6-5000-RW-003-12’’-C56 (pipeline); D6-5000-RW-004-12’’-C56-HC (elbow)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Tag number | Description | Ø, inch | Nominal thickness, mm | Location number | Date | Minimum thickness, mm | Maximum thickness, mm | Area of maximum thickness lose | | | | Average thickness, mm |
| Start X | End X | Start Y | End Y |
| D6-5000-RW-003-12’’-C56 | pipe | 12 | 14.3 | Location 1  (0-250) | 08.02.2019 | 9.25 | 14.61 | 100 | 800 | 0 | 250 | 11.93 |
| D6-5000-RW-004-12’’-C56-HC | elbow | 12 | 5.311 | Location 2  (0-700) | 08.02.2019 | 3.42 | 5.31 | -175 | -135 | 0 | 325 | 4.36 |

*Notes:*

1. *Maximum thickness according to UT results.*
2. *PA UT data including coating.*

|  |  |  |  |
| --- | --- | --- | --- |
| Examined by  PA-UT Level II cert. No 1A 164/16 | Name: Dzmitry Kuryanau  expiry date 28.02.2021 | Signature: ........................... | Date: 08 Feb 2019 |
| Approved by  UT Level III cert. No 1A 123/15  PA-UT Level II cert. No. 1A 538/17 | Name: Ihar Shundryk  expiry date: 01.05.2021  expiry date: 30.11.2022 | Signature: ........................... | Date: 08 Feb 2019 |
| Client Representative: |  | Signature: ........................... | Date: ........................... |