| **Ultrasonic Thickness Measurement report**  **Протокол по результатам проведения ультразвуковой толщинометрии** | | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **JOB DETAILS / РАБОЧАЯ ИНФОРМАЦИЯ** | | | | | | | | | | | | | | | |
| **Client**  Клиент | | | **NCOC N. V.** | | | | | | **Project**  Проект | | | **ESKENE WEST** | | | |
| **Work location**  Место работы | | | **KUT 560** | | | | | | **Control object**  Объект контроля | | | **A1-5600-PW-041-8-A11-HC**  **KE01-A1-560-BU-P-DI-4021-006** | | | |
| **Material**  Марка стали | | | **A333 GR 6, A420/WPL6** | | | | | | **Dimension**  Размер | | | **According to table** | | | |
| **Calibration Temperature**  Температура калибровочного блока | | | **+5°C** | | | | | | **Object Temperature**  Температура объекта контроля | | | **+115°C** | | | |
| **Surface condition**  Состояние поверхности | | | **Coated** | | | | | | **Couplant**  Контактная жидкость | | | **High temperature UT Gel ʺHiTempco"** | | | |
| **Correction factors**  Поправочные факторы | | | **Calculated by 38DL in high temperature mode automatically** | | | | | | **Roughness**  Шероховатость | | | **-** | | | |
| **INSPECTION PROCEDURE / НОРМАТИВНЫЕ ДОКУМЕНТЫ** | | | | | | | | | | | | | | | |
| **Procedure**  Процедура | | **QP-11-UTT-Q01**  **Rev 04** | | | | **Standard for testing**  Стандарт по контролю | | | | **GOST 28702-90** | | | **Standard for item**  Стандарт для ОК | | **ASME B31.3** |
| **EQIPMENT PARAMETERS / ПАРАМЕТРЫ ОБОРУДОВАНИЯ** | | | | | | | | | | | | | | | |
| **Probe, S/N**  Датчик, № | | | | | **D790, №1306596** | | | | **Size**  Размер | | | **11 mm** | | | |
| **Angle**  Угол ввода | | | | | **0º** | | | | **Crystal**  ПЭ | | | **Dual** | | | |
| **Frequency**  Частота преобразователя | | | | | **5 MHz** | | | | **Accuracy**  Точность | | | **± 0,1 mm** | | | |
| **CALIBRATION BLOCK DETAILS / ПАРАМЕТРЫ КАЛИБРОВОЧНОГО БЛОКА** | | | | | | | | | | | | | | | |
| **Calibration Block**  Калибровочный блок | | | | | **Step wedge** | | | | **Calibration Block Range**  Диапазон толщин калибровочного блока | | | **5.0-10-20-40.0 mm** | | | |
| **INSPECTION EQUIPMENT / ОБОРУДОВАНИЕ ИНСПЕКЦИОННОГО КОНТРОЛЯ** | | | | | | | | | | | | | | | |
| **№** | **Equipment**  Оборудование | | | **Manufacture** Изготовитель | | | | **Serial number**  Серийный номер | | | **Certificate**  Сертификат поверке | | | **Expire date**  Дата истечения поверки | |
|  | DL-38 | | | OLYMPUS | | | | 171421601 | | | KZ-01-21-Ж-0169 | | | 01.03.2022 | |
|  | Step calibration block | | | Fizpribor | | | | 3255-20 | | | - | | | - | |
| **Job description:**   1. Echo to echo UT technique was used. 2. UT thickness has been carried out on grid pattern by flow and clockwise. 3. Inspection performed on South, North, West, East, Top, Bottom, Extrados and Intrados sides related to object position**.** | | | | | | | | | | | | | | | |
| Flow direction  0  100  200  300  400  500  600 | | | | | | | 500  400  300  200  100  0  Flow direction | | | | | Flow direction  South  North  100  Horizontal  Vertical  300  200  0 | | | |
| **Notes** / Примечания:  N/A - no access. | | | | | | | | | | | | | | | |

| **INSPECTION RESULTS / РЕЗУЛЬТАТЫ КОНТРОЛЯ** | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Line / Tag N / Номер** | **Item description/**  **Участок контроля** | **Section number/**  **Номер сечения** | **Diameter, inch /**  **Диаметр, дюйм** | **Nominal thickness, mm/**  **Номинальная толщина, мм** | **South, mm/**  **Юг, мм** | **North, mm /**  **Север, мм** | **West, mm /**  **Запад, мм** | **East, mm /**  **Восток, мм** | **Top, mm /**  **Верх, мм** | **Bottom, mm /**  **Низ, мм** | **Extrados, mm /**  **Внешний радиус, мм** | **Intrados, mm /**  **Внутренний радиус, мм** |
| **A1-5600-PW-041-8''-A11-WN KE01-A1-560-BU-P-DI-4021-006** | CML-1  Elbow | 1 | 8 | 8.18 | 7.53 | 6.96 | - | - | - | - | **6.71** | 7.36 |
| 2 | 7.77 | 7.35 | - | - | - | - | 6.85 | - |
| 3 | 7.27 | 6.81 | - | - | - | - | - | 7.07 |
| 4 | 7.35 | 6.96 | - | - | - | - | 6.77 | - |
| 5 | 7.41 | 7.03 | - | - | - | - | 6.82 | 6.98 |
| CML-2  Pipe | 1 | 8 | 8.18 | **7.67** | 7.76 | - | - | 8.59 | 8.32 | - | - |
| 2 | 7.83 | 8.04 | - | - | 8.62 | - | - | - |
| 3 | 7.85 | 7.67 | - | - | 8.58 | 8.33 | - | - |
| CML-3  Elbow | 1 | 8 | 8.18 | - | - | - | - | 7.13 | 7.43 | 6.97 | 6.69 |
| 2 | - | - | - | - | 7.25 | 7.05 | 7.13 | - |
| 3 | - | - | - | - | 7.15 | 7.49 | 7.07 | 6.71 |
| 4 | - | - | - | - | 7.61 | 7.34 | 7.10 | - |
| 5 | - | - | - | - | 7.39 | 7.36 | 7.14 | **6.79** |
| CML-4  Pipe | 1 | 8 | 8.18 | - | - | 7.49 | 7.13 | 7.71 | 7.07 | - | - |
| 2 | - | - | 7.72 | 7.35 | 7.86 | 7.69 | - | - |
| 3 | - | - | 7.75 | 7.83 | 7.69 | 7.22 | - | - |
| 4 | - | - | 7.50 | 7.65 | 7.84 | 7.88 | - | - |
| 5 | - | - | 7.41 | 7.22 | 7.89 | 7.19 | - | - |
| 6 | - | - | 7.15 | 7.26 | 7.13 | 7.52 | - | - |
| 7 | - | - | 7.96 | 7.59 | 7.45 | 7.08 | - | - |
| 8 | - | - | 7.79 | 7.68 | 7.08 | 7.45 | - | - |
| 9 | - | - | 7.36 | 7.94 | 7.42 | **7.04** | - | - |
| 10 | - | - | 7.07 | 7.81 | 7.72 | 7.46 | - | - |
| 11 | - | - | 7.65 | 7.54 | 7.85 | 7.32 | - | - |
| 12 | - | - | 7.25 | 7.19 | 8.05 | 7.45 | - | - |
| 13 | - | - | 7.74 | 7.76 | 7.86 | 7.31 | - | - |
| 14 | - | - | 7.61 | 7.53 | 7.13 | 7.10 | - | - |
| CML-5  Elbow | 1 | 8 | 8.18 | - | - | 7.35 | 7.16 | - | - | 7.89 | 7.14 |
| 2 | - | - | 7.39 | 7.14 | - | - | 7.55 | - |
| 3 | - | - | 7.36 | 7.76 | - | - | 7.44 | 7.19 |
| 4 | - | - | 7.24 | 7.71 | - | - | 7.45 | - |
| 5 | - | - | 7.34 | 7.32 | - | - | 7.56 | **7.07** |
| CML-6  Pipe | 1 | 8 | 8.18 | 7.83 | 7.64 | 7.57 | 7.59 | - | - | - | - |
| 2 | **7.09** | 7.88 | 7.17 | 7.25 | - | - | - | - |
| 3 | 7.52 | 7.97 | 7.66 | 8.03 | - | - | - | - |
| 4 | 7.89 | 7.85 | 7.08 | 7.55 | - | - | - | - |
| 5 | 7.90 | 7.56 | 7.53 | 7.21 | - | - | - | - |
| 6 | 7.46 | 7.91 | 7.12 | 7.84 | - | - | - | - |
| 7 | 7.51 | 7.70 | 7.49 | 7.67 | - | - | - | - |

| **Inspection results** | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Line / Tag N** | **Item** | **Spot check** | **DIA(ᴓ) ×**  **Nom. mm** | **0** | **100** | **200** | **300** | **400** | **500** | **600** |
| **A1-5600-PW-041-8-A11-HC**  **KE01-A1-560-BU-P-DI-4021-006** | CML-12-1  Pipe | 0 | 8 x 8.18 | 7.10 | 7.29 | 7,09 | 7.62 | 7.06 | 7.15 | 7.14 |
| 100 | 7.36 | 7.33 | 6.86 | 7.30 | **6.39** | 7.17 | 6.89 |
| 200 | 7.24 | 7.03 | 7.04 | 7.34 | 7.09 | 7.36 | 7.49 |
| 300 | 7.87 | 7.03 | 6.99 | 7,91 | 7.16 | 7.51 | 6.98 |
| 400 | 7.49 | 7.07 | 7.21 | 7.77 | 7.79 | 7.12 | 7.01 |
| CML-13-1  Elbow | 0 | 8 x 8.18 | 5.49 | 6.00 | 5.62 | 5.52 | 5.16 | **4.88** | 5.29 |
| 100 | 6.44 | 6,11 | 6.10 | 5.47 | 5.45 | 5.20 | 6.09 |
| 200 | 6.49 | 5.71 | 5.69 | 5.27 | 5.33 | 5.47 | 6.25 |
| 300 | 6.69 | 5,94 | 5.89 | 5.51 | 5.56 | 5.44 | 5.93 |
| 400 | - | - | 5.63 | 5.46 | 6.15 | 6.14 | 7.85 |
| 500 | - | - | - | 5.69 | - | - | - |
| 600 | - | - | - | 5.60 | - | - | - |
| CML-14-1  Pipe | 0 | 8 x 8.18 | 7.19 | 7.27 | 6.74 | 6.49 | 7.03 | 7.24 | 7.69 |
| 100 | 7.47 | 7.40 | 7.07 | **5.90** | 7.06 | 6,97 | 7.49 |
| 200 | 7.47 | 7.25 | 6.90 | 6.10 | 6,98 | 7.75 | 7.27 |
| 300 | 7.36 | 6.92 | 6.79 | 6.71 | 6.70 | 7.16 | 6.93 |
| 400 | 7.54 | 7.04 | 6.63 | 6.59 | 6.27 | 7.52 | 7.48 |
| 500 | 7.78 | 6,99 | 6.88 | 7.43 | 7.27 | 7.71 | 7.57 |
| CML-15-1  Elbow | 0 | 8 x 8.18 | 6.04 | 6.19 | 5.19 | 5.91 | 6.30 | 5.75 | 5.97 |
| 100 | 7.66 | 7.17 | 6.99 | 6.43 | 5.59 | 6.16 | 7.46 |
| 200 | 6.16 | 6.29 | 6.83 | 6.53 | 7.26 | 6.79 | 6.83 |
| 300 | 5.71 | 6.11 | 6.10 | 6.44 | 6.90 | 6.02 | 5.88 |
| 400 | **4.60** | 6.59 | 5.90 | - | - | 6.76 | 5.81 |
| 500 | 5.22 | 5.94 | - | - | - | - | 5.67 |
| 600 | 4.64 | - | - | - | - | - | - |
| CML-16-1  Elbow | 0 | 8 x 8.18 | 7.23 | 7.53 | 7.29 | 7.69 | 7.42 | 7.43 | 7.12 |
| 100 | 7.57 | 7.57 | 6.46 | 7.49 | 7.19 | 8.24 | 8.29 |
| 200 | 7.21 | 7.52 | 6.80 | 7.33 | 6.92 | 7.33 | 7.69 |
| 300 | 7.15 | 6.83 | 7.19 | 7.42 | 6.42 | 6.23 | 7.28 |
| 400 | 6.63 | 6.37 | 6.78 | - | - | 6.59 | 6.47 |
| 500 | 6.29 | 6.52 | - | - | - | - | 6.65 |
| 600 | **6.19** | - | - | - | - | - | - |
| CML-18-1  Elbow | 0 | 8 x 8.18 | 7.03 | 7.38 | 7.37 | 6.99 | 7.07 | 7.47 | 7.04 |
| 100 | 7.07 | 7.18 | 6.90 | 6.80 | **6.16** | 7.40 | 7.21 |
| 200 | 7.12 | 7.41 | 6.59 | 6.79 | 6.70 | 7.33 | 7.13 |
| 300 | 7.23 | 7.04 | 6.99 | 7.01 | 6.87 | 7.29 | 6.90 |
| 400 | 7.50 | 7.60 | 7.81 | - | - | 7.40 | 7.08 |
| 500 | 7.68 | 7.47 | - | - | - | - | 7.20 |
| 600 | 7.66 | - | - | - | - | - | - |
| CML-19-1  Pipe | 0 | 8 x 8.18 | 8.96 | 8.87 | 8.47 | 8.70 | 9.16 | 8.34 | 8.86 |
| 100 | 8.28 | 9.06 | 8.52 | 8.51 | 8.69 | 8.51 | 8.36 |
| 200 | 8.79 | 8.91 | 8.87 | 8.72 | 8.60 | 9.03 | 8.45 |
| 300 | 8.71 | 8.23 | 8.27 | 8.36 | 8.15 | 8.37 | 9.01 |
| 400 | 8.77 | 8.53 | **7.87** | 7.94 | 8.23 | 8.32 | 8.68 |
| 500 | 8.36 | 8.51 | 8.59 | 8.01 | 8.77 | 8.85 | 9.03 |
| CML-20-1  Elbow | 0 | 8 x 8.18 | 6.09 | 6.49 | 6.32 | 6.69 | 6.54 | 6.67 | 6.31 |
| 100 | **5.80** | 6.99 | 6.23 | 7.11 | 7.32 | 7.51 | 6.59 |
| 200 | 6.40 | 7.19 | 6.93 | 7.44 | 7.64 | 7.89 | 7.68 |
| 300 | 5.92 | 6.79 | 6.92 | 7.52 | 7.28 | 7.29 | 7.51 |
| 400 | 6.45 | 6.39 | 6.98 | - | - | 7.87 | 7.78 |
| 500 | 6.96 | 7.24 | - | - | - | - | 7.90 |
| 600 | 6.63 | - | - | - | - | - | - |

| **Inspection results** | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Line / Tag N** | **Item** | **Spot check** | **DIA(ᴓ) ×**  **Nom. mm** | **0** | **100** | **200** | **300** | **400** | **500** | **600** |
| **A1-5600-PW-041-8-A11-HC**  **KE01-A1-560-BU-P-DI-4021-006** | CML-21-1  Elbow | 0 | 8 x 8.18 | 6.99 | 7.43 | 7.33 | 7.13 | 7.07 | 7.71 | 7.27 |
| 100 | 7.12 | 7.06 | 7.06 | 6.85 | 6.83 | 7.43 | 7.17 |
| 200 | 7.44 | 7.14 | 6.72 | **6.68** | 7.17 | 7.51 | 7.20 |
| 300 | 7.34 | 6.76 | 7.29 | 7.15 | 6.96 | 7.58 | 7.21 |
| 400 | 6.87 | 7.37 | 7.29 | - | - | 7.46 | 7.10 |
| 500 | 7.02 | 7.33 | - | - | - | - | 7.16 |
| 600 | 7.56 | - | - | - | - | - | - |
| CML-17-1  Tee  (Horizontal) | 0 | 8 x 8.18 | 10.09 | 8.95 | 9.79 | 10.49 | 10.38 | 10.85 | 9.39 |
| 100 | - | 7.80 | 9.12 | 9.55 | 11.69 | 9.92 | 8.73 |
| 200 | - | **7.28** | 8.86 | 9.47 | 9.82 | 9.41 | 8.65 |
| 300 | 9.27 | 8.55 | 9.05 | 10.24 | 10.25 | 9.52 | 9.54 |
| CML-17-1  Tee  (Vertical) | 0 | **6.43** | 6.60 | 6.45 | 7.87 | 7.07 | 6.69 | 6.79 |

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| Examined by / Контроль провёл: | | Approved by / Протокол утвердил: | | Client representative /  Представитель клиента | |
| Name / ФИО | Sarul Pavel | Name / ФИО | Kuryanau Dzmitry | Name / ФИО |  |
| Signature / Подпись |  | Signature / Подпись |  | Signature / Подпись |  |
| Date / Дата | 08.12.2021 | Date / Дата | 08.12.2021 | Date / Дата |  |
| Cert. № /  № серт-та | UT L III cert. No 451C-20  expire date: 05.03.2023 | Cert. № /  № серт-та | UT L II cert. No 2B 230/20  expiry date 31.05.2025 | Cert. № /  № серт-та |  |

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| Annex 1 / Приложение 1  Inspection Drawing / Схема контроля |
|  |
| **A1-5600-PW-041-8''-A11-WN KE01-A1-560-BU-P-DI-4021-006** |
|  |
| **A1-5600-PW-041-8''-A11-WN KE01-A1-560-BU-P-DI-4021-006** |