

## Technical Specification

# REPAIR OF TURBINE CROSS UNDER PIPING

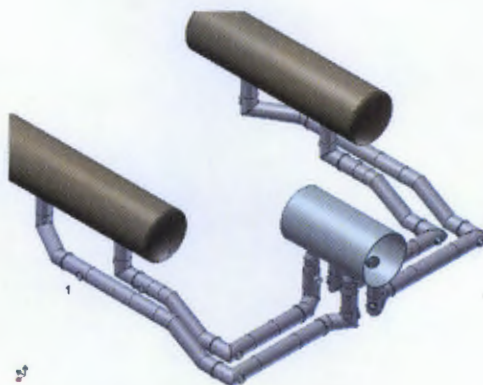
Mod. 1145-MS-L

KRŠKO NUCLEAR POWER PLANT

SP – ES1305

Rev.0

Augmented Quality



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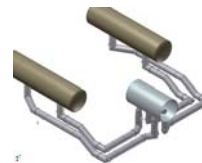
Date: 22/11/2017

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Approval



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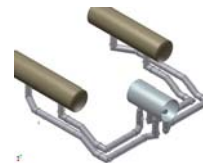
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## 1 BACKGROUND & DESCRIPTION OF PROBLEM

### 1.1 Background

Turbine Cross Under Piping in Nuclear Power Plant Krško (NEK) consists of two parallel loops which are connected to the High Pressure Turbine and Moisture Separator Reheater. Piping is made from carbon steel material. Carbon steel piping that has been affected by erosion/corrosion under single-phase conditions shows evidence of local wall thinning. The most damaged areas occurred around the vertical sections to the high pressure turbine and around the turning vanes to the first turn. Erosion/corrosion is basically a material transport process and a lot of this material finish in steam generators.

Consequently the purpose of this procurement specification is to define the PURCHASER technical and quality assurance requirements for the purchase of Turbine Cross Under Piping repair in KRŠKO Nuclear Power Plant. The overall procurement goal is to obtain quality method or technique for repairing Turbine Cross Under Piping, to solve problems with erosion/corrosion and have capability to operate without problems for 40 years. A long service life and high reliability are especially important for plant availability and economy.

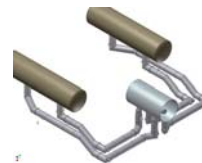
### 1.2 Description of Problem

In outage 2007 in accordance with DMP 585-MS-L and SP-ES-170, rev.1, the four vertical sections to the HP turbine with the most damage areas were repaired. Additionally in outage 2009 the horizontal pipe portions in both C and D sections were repaired by installing a corrosion resistant stainless steel overlay completely fused to the carbon steel base material on the inside pipe surfaces.

The scope of services in outage 2019 shall include all specification requirements, as required to allow NE Krško to perform welding over lay process in turbine Cross Under Piping (CUP).

Service in this phase shall include:

- a.) The repair of the rest complete horizontal pipe portions in both CUP sections C and D, in complete horizontal sections A and B and in four vertical sections to MSR. (See figure 1 in section 5).
- b.) Contractor will also be responsible to prepare a Design Modification Package with all necessary analysis and calculations needed to perform a complete repair of CUP including an additional temporary - safety openings for installation phase on Cross Under Piping. The reason to perform new modification package (DMP) is the fact that inputs in DMP 585-MS-L for first two phases for wall thickness readings given from UT measurements was as 14-15 mm for vertical pipe sections and 16-17 mm for horizontal sections. The actual situation is that such wall thickness values are not on complete CUP



surface circumference but just on local areas. On most horizontal areas the average values of wall thickness measurements is around 18-19 mm or more. And with adding 2.5 mm or more of stainless steel cladding layer on complete pipe surface in Phase 3, an additional weight of cladded layer on CUP can affect CUP supports and MSR/HP turbine nozzles more than was analyzed and calculated in DMP 585-MS-L. New or updated DMP 585-MS-L has to evaluate this new inputs and impacts of the proposed repair in terms of piping, supports and nozzle loads and thus to demonstrate that the repair does not affect the integrity of the equipment (Turbine, MSR nozzles and CUP supports).

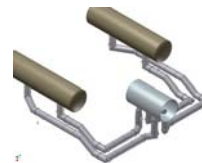
In accordance with this technical specification the contractor shall perform repair of Turbine Cross Under piping with welding over lay process as »turnkey« work.

The Repair of Turbine Cross Under Piping (Phase 3) shall be started in October 2019. The scheduled duration for required services in outage 2019 is about 19 consecutive days. All preparatory works for service shall be done before welding activities started. The design of Turbine Cross Under Piping, its supports and CUP wall thickness measurements has to be verified in the field in outage 2018 and during a preparation of design modification package.

## 2 ABBREVIATIONS & DEFINITIONS

### 2.1 Abbreviations

ASME	American Society of Mechanical Engineers
ANSI	American National Standard Institute
CUP	Cross Under Piping
DMP	Design Modification Package
IP	Installation Package
NEK	Nuklearna Elektrarna Krško (NPP Krsko)
NCR	Nonconformance Report
NDE	Nondestructive Examination
NSR	Non Safety Related
NPP	Nuclear Power Plant
QA	Quality Assurance
RE	Responsible Engineer
TB	Turbine Building
WO	Work Order
HP	High Pressure
MSR	Moisture Separator Reheater
CMTR	Certified Material Test Report



## 2.2 Definitions

- **Contractor** Shall mean a company that is fully qualified to conform to requirements of this specification.
- **Purchaser** Shall mean Nuklearna Elektrarna Krško/ Krško Nuclear Power Plant.
- **Sub-contractor** An organisation, different from the Contractor that the Contractor may use to provide service or materials which the Contractor will use to fulfil in part, his requirements of the purchase order or Contract.
- **Work** Shall mean all equipment and services (including all labour, supervision and management) and all other requirements set forth or necessary to perform the Contract.
- **Turn Key** Turnkey principle shall mean that any scope/obligation (even if it is not specifically indicated in NEK SP-ES-1305) needed to meet the requirements of NEK SP-ES and to make the subject Project physically and functionally complete, shall be considered as Contractor's scope of supply, unless clearly specified in the Contract as Purchaser's scope of supply.
- **Design** Shall mean documentation preparation in accordance with NEK ESP 2.602 and all other relevant procedures of the ESP 2.602 under item 2.0.
- **Design Documents** Specifications and drawings derived from regulatory requirements and/or design, quality assurance, and process requirements for use in the procurement, fabrication, installation, examination and testing; and analyses and reports that substantiate design characteristics or evaluate item performance.
- **Engineering** Shall mean the profession of applying scientific principles to the design, construction, maintenance, and of operation of buildings, equipment and systems.
- **Installation** Shall mean all the activities and measures to successfully install the projects in accordance with the requirements of the NEK procedure ESP 2.619.
- **Procurement** Shall mean the provision of all personnel, techniques, services and tools/equipment necessary or appropriate to successfully complete the Project
- **Project** Shall mean modification 1145-MS-L Repair of Turbine Cross Under Piping.
- **Specification** Shall mean SP- ES1305
- **Turnover package** Shall mean all finalizing activities and documentation submission signifying that the work required by the plant modification packages has been performed, installed and tested in accordance with requirements of the design modification package.





### 3 SCOPE OF SUPPLY

Contractor's Scope of service shall include all required engineering, equipment and manpower, all drawings, materials, tools and parts and the performance of all operations necessary for the repair, inspection and testing of Turbine Cross Under Piping.

The scope of service per this specification involves:

#### 3.1 Engineering scope:

- Preparation of Project Management Manual (PMM) as defined in attachment 1, Project Quality Plan (PQP) and Project Schedule.
- Development of Design Modification Package for Phase 3 per NEK's procedure ESP-2.602 with special attention to evaluate the impacts of the proposed repair (additional weight) in terms of piping, support and nozzle loads and thus to demonstrate that the repair and cladded CUP does not affect the integrity of the equipment (Turbine, MSR nozzles, Expansion Joints, CUP supports, drain lines). As repaired surface will not be left smooth as before welding and because of less pipe diameter in some areas after welding an evaluation of such new conditions in terms of process flow and pressure has also to be evaluated in DMP.
- Performing and evaluating of piping shrinkage and effects on Flexible links with expansion joints due to the heat input during welding.
- Execution of complete Cross Under Piping 3D model for performing the requested analysis.
- Evaluation of creating an additional temporary - safety openings on cross under piping as part of DMP.
- Overall project management, planning, scheduling and reporting. All engineering, design work and planning shall be scheduled in accordance with the overall Project Schedule (see Section 34 SCHEDULE REQUIREMENTS).
- The repair process shall be based upon the Gas Metal Arc Welding technique to deposit a single thick layer of stainless steel alloy (309L) as performed in first two repair phases. The material shall be in compliance with the ASME/ASTM material specification.
- Preparation of all necessary Field Design Change Requests (FDCRs).

#### 3.2 Procurement Scope:

- Procurement of all necessary material, equipment and tools for execution of all IP requirements including welding filler material.
- Procurement of new Cross Under Piping supports - if confirmed by piping analysis (additional weight of repaired piping).



### 3.3 Installation scope:

- Site walk-down in CUP in outage 2018, acquisition of data (measuring of CUP wall thickness) and preparation of walk-down report.
- Development of Installation package with all documentation requested by this specification based on the DMP and per NEK's procedure ESP-2.619. The scope of the installation work described in this specification shall be completed within a period of 19 days, see Section 34 of this specification.
- Welding process and welders qualifications on CUP mockup.
- To assure all equipment, tools, materials, manpower, testing and inspection and other services necessary for the completion of the Scope of Work, even if not expressly included in the Installation Package, except to the extent specifically included in NEK's scope of supply.
- Definition of scaffolding requirements for service.
- Usage of adequate ventilation during work to prevent accumulation of toxic materials, combustible gases or oxygen deficiency. During of all phases of welding and working in cross under piping a rescue team (two permanent fireman) with first aid equipment shall be present.
- Transport and unloading of welding and other equipment on TB107 per NEK requirements.
- FME Control (Foreign Material Exclusion). Installation of debris dams to preclude foreign material entering into the turbine equipment or MSR and into any branch pipe connections.
- Surface preparation (sponge blasting of the entire pipe inner surfaces and grinding of existing stainless steel repair patches).
- Performing welding in Turbine Cross Under Piping (SS weld cladding overlay) with semi-automatic GMAW machines.
- Grinding and brushing welding surface to remove all weld spatter, weld slag and other residue on repaired surface. The repaired surface should be left smooth as much as possible.
- Performing inspection and testing after work completed as required by Section 15 of this specification.
- The Contractor shall ensure that the Project is implemented on schedule and within budget, while meeting quality and safety.
- During implementation of project the Contractor shall organize his activities on TB el. 107 on such way than will allow performing other NEK regular outage activities.
- Cleaning working area during installation activities and final clean up.

### 3.4 Project completion:

- Preparation of QA documentation package As-build documentation and Final Documentation Package – Turnover package.





Field Work in this phase shall include:

- Weld overlaying of the complete rest not repaired horizontal pipe portions in both CUP sections C and D, complete horizontal CUP sections A and B and all four vertical sections to MSR (see figure 1 in Section 5). The length of not repaired Turbine Cross Under piping and what is in the scope of this phase is about 95 m (see drawings in Appendix 45.3).

In preparation of all needed documentation contractor shall use its engineering experience demonstrated on other Nuclear Power Plants concerning Turbine Cross Under Piping repairs to meet requirements defined for such facilities.

Nothing shall relieve the Contractor of the responsibility to perform, in addition to the established scope, analyses, tests, inspections and other activities that through the process become necessary to ensure that the design and materials, as well as the product quality, shall be satisfactory for the intended service, or as may be required by common usage or good practice.

As a part of the proposal the Contractor shall identify and describe the organization under which the work will be performed, identify the resources (number and types of personnel with their background and experience on similar projects) available to carry out the work associated with the scope of service. The Contractor shall also identify the executive who will have the responsibility and authority for completion of the work scope.

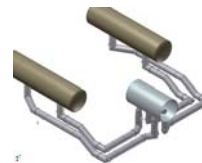
## **4 SAFETY CLASSIFICATION OF CONTRACTED WORK**

This work is classified as Augmented Quality.

## **5 DESIGN INPUTS**

The Contractor shall prepare all inputs and documents to successfully perform repair of Turbine Cross Under Piping per NEK procedures ESP-2.602 Rev.7, " Plant Design Modification" and ESP- 2.619 Rev.3, " Preparation of Installation Packages". DMP 585-MS-L for first two phases shall be also used for inputs for preparation of new DMP.

The repair of Turbine Cross Under piping shall be performed with erosion resistant weld overlay process. This process is providing the best solution for the erosion/corrosion issues. The process to be utilized for weld cladding overlay shall be GMAW (Gas Metal Arc Welding) to deposit a single at least 1 mm thick layer of stainless steel alloy (309L).



Turbine Cross Under Piping is located in TB on elevation 107. This piping is connected on High Pressure Turbine and Moisture Separator Reheater as shown on figure 1.

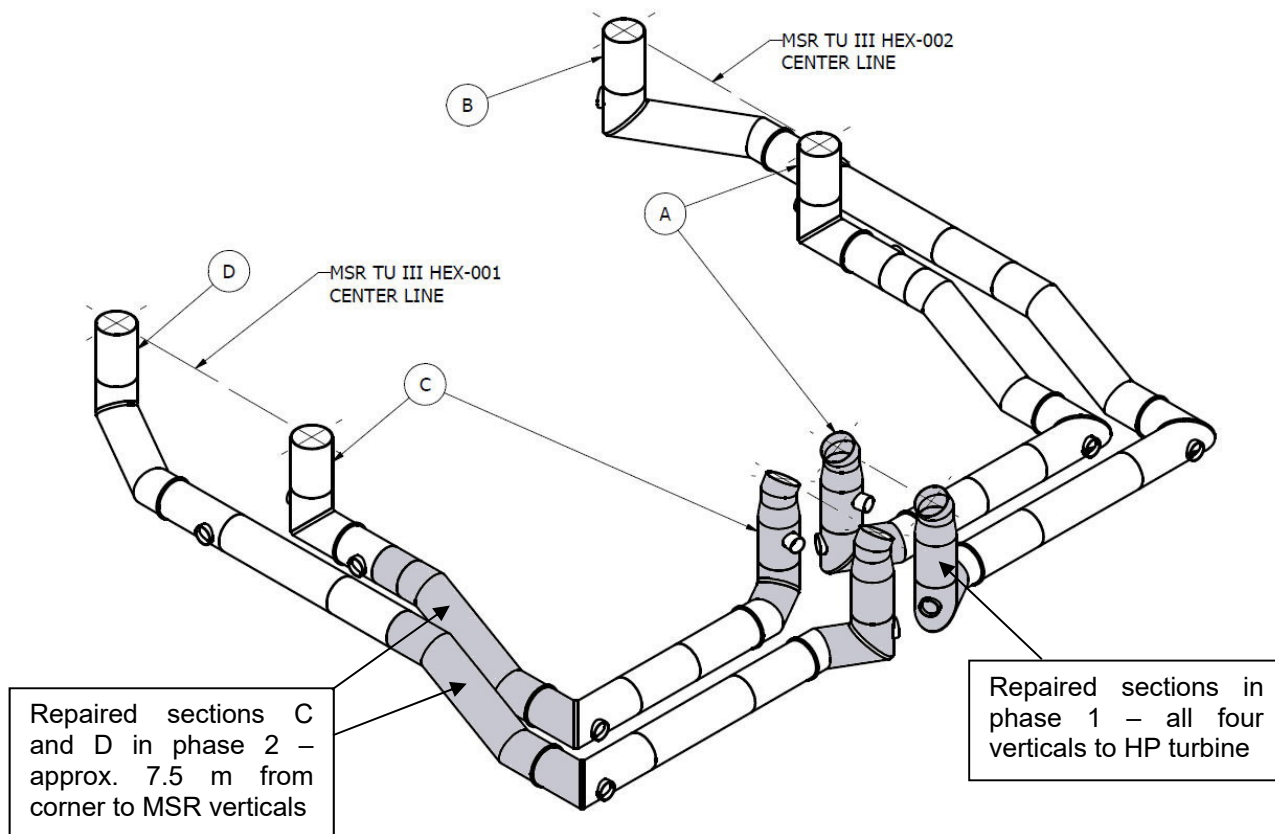


Figure 1: Cross Under Piping – section from drawing EDSK437563C

Turbine Cross Under Piping is most probably (lack of original documents) made of ASTM 515 Grade 65 material (ASME IX P1- carbon steel) as was already concluded in DMP for first phases.

Wall thickness measurement results obtained from the regular In Service Inspections under the erosion-corrosion program are between 18-19 mm for non-repaired portions of CUP. For details see QC report QD4-RE16-044 (attachment 45.2) where are actual results from last outage in 2016.

Design and operating conditions are as follows:

- Design conditions:
  - Pressure = 250 psig = 17.2 bar
  - Temperature = 420 °F = 215 °C

Uprated operating steam conditions as given in paragraph 5.2 of SSR-NEK-9.10.3, rev 4, Krško Modernization – UPR, Turbine Generator Mechanical Analysis, and May 2000:

- Pressure = 147 psig = 10.1 bar



- Temperature = 357 °F = 180 °C
- Steam Velocity = 141 feet per second = 43 m/s

All details about design inputs are collected in DMP 585-MS-L for previous repair phases and documents:

- EDAM/07/478/R - Krsko HP Turbine to MSR Crossunder Piping WeldOverlay Repair: Evaluation of Repair Impacts for Design Modification Package (Mod. 585-MS-L)
- WB-CN-ENG-07-1 – Krško HP Turbine to MSR Crossunder Piping Weld Overlay Repair: Evaluation of the Repair Impact on Piping Loads

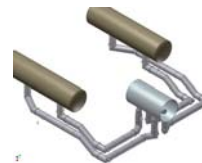
## 6 APPLICABLE NEK- CONTRACTOR DESIGN CONTROL PROGRAM

A Contractor design control program shall be performed in observing requirements from applicable NEK ADP and ESP procedures and quality program requirements for performing engineering services. Any design changes required to perform service will be approved by NEK and NEK's design control program.

The procedures primarily applicable to the scope described herein include but not limited to the following:

- ESP-2.602 Plant Design Modification
- ESP-2.605 Design Analyses and Calculations
- ESP-2.619 Preparation of Installation Packages
- ESP-2.624 Design Impact Evaluation
- ESP-2.301 TS Changes and Licensing Amendments
- ESP-2.607 Design Verification
- ED-1 Design Modification Control Program
- ED-2 Document Control Program
- ED-15 Configuration Control Program
- ADP-1.2.116 Nadzor dokumentov v NEK
- ADP-1.2.003 Plant Design Modification and Control Process
- MD-23 Risk Assessment (Celovito upravljanje tveganj)
- QD-1 Quality Assurance Plan
- QS 610 Generic Quality Assurance Program Requirements

The contractor shall have or prepare a Project Guidelines to describe how work for NEK is effectively controlled to implement NEK Design Control Procedures. The guidelines should address the interfaces between NEK and the Contractor in such areas as design input, document preparation, control, review and verification and records turnover. Documents pertaining to this section shall be made available to NEK for acceptance.



## 7 APPLICABLE CODES, STANDARDS, DESIGN CRITERIA and REFERENCES

It is the Contractor's responsibility to comply with International laws, and local ordinances of the place of installation and properly apply the codes, standards, laws and regulations specified herein, in the design and documentation for Turbine Cross Under pipe repair Work. Where a conflict exists between codes, standards and this specification, the Contractor shall bring the conflict to PURCHASER'S attention along with the proposed resolution for approval.

The following codes and standards apply to the service covered by this specification:

### Standards

ASME B 31.1	Power Piping Code
ASME B&PV Code –II Ed. 2004	Material Specification
ASME B&PV Code –IX Ed. 2004	Welding and Brazing Qualifications
ASME B&PV Code, Section V, "Nondestructive Examination"	
AWS Structural Welding Code	
ASME PCC-2-2015 (Article 2.11))	

### Slovenian Regulations

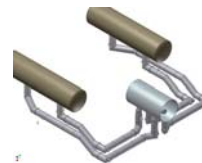
- Zakon o varnosti in zdravju pri delu (ZVZD-1), Ur. l. RS 43/11(Law on Safety and Health at Work)
- Odredba o varnosti strojev (Ur. l. RS št. 52/00 in 57/00, Decree on machinery safety)
- Zakon o varstvu pred požarom, Ur.l. RS 3/07, 9/11
- Pravilnik o požarni varnosti v stavbah, Ur.l. RS 31/04, 10/05, 83/05, 14/07

### NEK Specifications

G-360A Tech. Spec. Fabrication and Installation of Non Safety Class Piping  
G-375A Tech. Spec. Piping Line Specifications Non-safety Class Piping  
SP A322 - Painting Exterior And Interior Surfaces Of Sec. Plant and Equipment

### NEK Administrative Procedures

- ADP 1.0.131 Organizacija izvedbe modifikacije (Development of modifications)
- ADP 1.1.033 Varnost in zdravje pri delu v NEK (Health and safety at work at NEK)



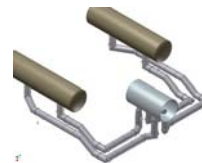
- ADP 1.1.051 Vstop, izstop in gibanje v tehnološkem delu NEK (Entry, exit and mov. within the technological part of the NPP)
- ADP 1.1.016 NEK Document Control Program
- ADP 1.1.101 Preprečitev vnosa tujkov (FME program)
- ADP 1.1.105 Priročna skladišča in kontrolirano odložena oprema (Temporary storage and controlled deferred Equipment)
- ADP 1.1.125 Izvedba delovnega naloga (Working order process)
- ADP 1.2.003 Plant Design Modification and Control Process
- ADP 1.3.004 Osamitev in označevanje sistemov / naprav (Tagging)
- ADP 1.3.013 Kontrola ključev (Key control)
- ADP 1.4.022 Prevoz, skladiščenje, rokovanje in notranji transport (Storage, handling and internal transport)
- ADP 1.14.202 Normativi osebnih zaščitnih sredstev (Standards of personal protective equipment)
- ADP-1.1.101 Preprečitev vnosa tujkov
- TD-6 PROGRAM POŽARNE ZAŠČITE - POŽARNI RED

#### **NEK – Engineering Procedures**

- ESP-2.113 EAM MECL equipment numbering system
- ESP-2.601 CDP Preparation
- ESP-2.602, Plant Design Modifications
- ESP-2.604, Design Considerations, Basis and Input
- ESP-2.605, Design Analysis and Calculations
- ESP-2.607; Design Verification
- ESP-2.609 Field design Change Request
- ESP-2.611, Document Turnover and Closeout
- ESP-2.613, CAD Drawing Control of Scanning, Conversion or Revision Process
- ESP-2.617, Material and Equipment Specification
- ESP-2.618, System Design Description
- ESP-2.619, Preparation of Installation Packages
- ESP-2.624, Design Impact Evaluation

#### **NEK Fire Protection Procedures:**

- FPP 3.7.002 Postopanje v primeru požara
- FPP-3.7.004 Kontrola vnosa gorljivih snovi
- FPP-3.7.005 Naloge požarne straže
- FPP-3.7.006 Dovolilnica za dela s toplotnimi učinki
- FPP-3.7.007 Ravnanje z vnetljivimi plini in tekočinami
- EIP 17.044 Nudenje prve pomoči in prve medicinske pomoči v primeru nezgode v NEK



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### Other applicable documents

- DMP 585-MS-L (Phase 1 and 2)
- NEK Fluid System Diagram D-302-012 (Main Steam)
- NEK Piping layout Drawings E-004-054, E-004-351, E-004-360, E-004-361, E-004-363
- MAIN STEAM SYSTEM Final System Design Description

Westinghouse Electric Corporation drawings:

- 745J835; PPG STM XNDR RH A B FFE (sheet 1 and 2)
- 888C047; XNDR PIPE SUB ASSY
- 887C619; PIPE
- 887C501; SUPP XNDR PPG A B
- 4680D58, HGRS XNDR PPG ABFFE
- 741J777; Turbine generator Outline drawing, rev.2, sheet 1&2
- 4618D737; MSR Outline drawing
- CUP drawings: EDSK437563C, EDSK437564C, EDSK437565C, EDSK437566C, EDSK437567C, EDSK437568C, EDSK437569C

The Contractor may require controlled copies of the above-mentioned documents from NEK.

## 8 IDENTIFICATION OF AFFECTED SYSTEM(S)

- Main Steam (MS)

## 9 IDENTIFICATION OF AFFECTED EQUIPMENT

The affected equipment, which are or may be affected by this scope of work includes but is not limited to the following:

- Turbine Cross Under Piping
- Connections to the 18" EX pipe
- 1,5" and 2" shell drains and vents connections to valve: 20357, 20358, 20359, 20360, 20313, 20179, 10180, 20311, 20312, 20177, 20178, 20310.
- Impacted CUP supports, CUP Flexible Joints
- Other possible interference

## 10 SUPPLEMENTAL DATA

The NEK is located on the northern bank of the Sava River, approximately 2 km southeast of the town of KRŠKO in the east-southeast part of the Republic of





Slovenia. The site is on the northwestern brim of an alluvial valley surrounded by hills varying in relative elevation from 200 m to 700 m. The ground surface elevation of the site is 155.20 m above sea level.

## 10.1 NEK Documents

The design inputs from the following NEK documents will be available upon request:

- USAR (Updated Safety Analysis Report) Rev. as effective on contract date.
- Construction Drawings
- Gilbert Associates Inc.(GAI)
- D 302 ... Flow Diagrams
- E 304 ... Piping Systems
- E 415 ... Structural and Civil

## 11 DOCUMENT SUBMITTAL

### 11.1 BID Phase

**NOTE:** During the bidding process the term Contractor shall be considered as Bidder.

The bidding documentation shall consist of the following chapters:

1. Technical proposal with sufficient explanation of technical solution for the specified work in this phase of CUP Repair
2. Related drawings
3. Project Schedule
4. Project Management Manual (See. Appendix 45.1) and PQP.
5. List of used standards.

**NOTE:** Contractor can mark bidding documentation as proprietary; everything can be marked as proprietary except the price per item, number of items to be delivered and total price.

Contractor shall state its compliance to this specification as a whole or in part and specify any and all other proposed approach to fulfill specific requirements. Detailed instruction about the preparation of the Bid is described in the document "Instructions to Bidders".

Within the proposal potential Contractor shall submit Detailed Contractor Approach to Work describing technical solution and how the scope is understood. Compliance with the Technical Specification shall be also delivered within the



proposal demonstrating the compliances/non-compliances with the NEK requirements.

Within the proposal a separate technical proposal is expected which will describe the way how the Contractor understand the NEK requirements and scope of this specification. Technical proposal shall be based on the set of the individual Design modifications per ESP-2.602 as described in Section 3.

The Contractor shall furnish adequate information to the Purchaser to evaluate the Contractor's proposed design.

### **Project Execution Phase**

All document deliverables shall be submitted in two versions as a minimum: for NEK review and FINAL version to be approved by NEK, see also paragraph 28. All documents for review shall be delivered to NEK in one hard copy (paper) and one soft copy (pdf files structured with bookmarks and active cross reference links). All final documents shall be delivered in three hard and soft copies (CD with files in format as applicable: structured pdf, MS Word, Excel, Access, AutoCAD).

The documents shall be formatted in files and printed as hardcopies in A4, A3, or A2 sizes only. The exceptions could be related only to the revisions or mark-ups of the existing NEK drawings that could be formatted in different (larger) formats. In addition to the DMP Project documentation that shall be delivered as a structured set of pdf files, Contractor shall deliver the following documents (potentially to be revised in future), in their original file format that can be revised by NEK when and if needed (two copies of files on transportable media – CD are sufficient):

- Textual parts of Procurement Specification, DMP in MS Word.
- Drawings in AUTOCAD (ACAD dwg format file) or Bentley software.
- Spread sheets in Excel.

All the submitted documents shall bear at least the following identification:

- Contractor's Name.
- Date of issue.
- Document number.
- Revision number.
- NEK's Order Number.
- NEK's Specification Number.

Final drawings shall be prepared in a form required by NEK procedure ESP-2.613 and shall be ready to be entered to NEK Document Control Module.



Design Modification Package shall be prepared in accordance with the requirements of ESP 2.602, including all other applicable ESD procedures (acc. to Sect. 7). Contractor shall prepare DMP according to NEK procedure ESP-2.602, Plant Design Modifications for NEK review and approval. DMP shall be reviewed and approved by NEK prior to the installation. Before the submittal to NEK for review, the preliminary DMP shall be subject to an independent review cycle organized and implemented by Contractor. This independent review may be performed by the Contractor, or by involving the Subcontractors. After the resolution of all the comments as well as corrections related to the results of independent review cycle are implemented, the preliminary DMP shall be submitted to NEK for review. The need for expeditious changes to the "Approved for implementation" DMP shall be covered by the FDCR (Field Design Change Request) document prepared in accordance with NEK procedure ESP-2.609. FDCRs will cover the problems identified during installation that require correction of the DMP. They will not cover new design requirements defined after the acceptance of the original DMP. DMP shall be developed as described in section 3 of this specification.

#### **Engineering Documents for NEK review and approval:**

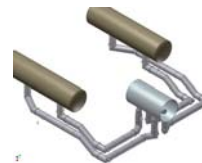
- a) Project Management Manual
- b) Project Quality Plan
- c) Monthly Progress Report (for information)
- d) Walk-down report
- e) Installation & Inspection Plans
- f) As-Built Drawings
- g) Revised NEK documentation

All documents, available in soft media, shall be delivered to NEK in hard and soft copy. The documents available in hard copy only should be scanned and delivered in PDF format, if requested by NEK.

#### **General Requirements**

All documents (including drawings, graphs ...) submitted shall be in the form of hard copies and electronic media. Hard copies shall be in the form of three good quality full-size reproducible and three good, sharp, black and white, direct-contact prints of the Contractor's original drawing. Electronic media shall be in a format fully compatible with the following software:

- Word Processing: Word versions©
- Spreadsheet: EXCEL©
- Computer-aided Drafting: AutoCAD©
- Planning & Scheduling: PRIMAVERA© or MS Project



Additional details shall be defined between Contractor and Purchaser (like paper format A4, "dictionary" for Primavera software, etc.) after Contract award. The Contractor shall furnish a complete set of the drawings.

- a) A black line reproducible and hard copy of each drawing shall be submitted with the transmittal stating the application and drawing status. A unique drawing number shall be defined by NPP Krško.
- b) The outline drawings shall provide sufficient outline dimensions to permit arranging the space in the plant to accommodate the installation and maintenance of the newly installed equipment. As a minimum, the outline drawings shall provide overall dimensions, foundation mounting details, including size and orientation of integral support structure, and all other interfaces that will require connecting in the field. These physical outlines must clearly indicate any differences in the size and space requirements as compared to the as-installed equipment. For maintenance purposes, the access for repair shall be indicated.
- c) Detailed drawings shall contain information as to materials and process specifications, materials ordering and procurement specifications.

The Contractor shall also furnish all testing procedures related to modified systems. Two sets of the Final Documentation shall be submitted to Purchaser in a collected delivery two months after Operational Delivery and irrespective of the fact that individual documents of the Final Documentation were submitted to the Purchaser in an earlier stage. The Final Documentation is required to contain at least, the following:

- a) The Documentation of the Technical Supervision and Testing, which will be approved by the Purchaser before the insertion into the Turn Over Package (TOP). One of the sets of these documents shall be original carrying the original signatures.
- b) The "As-Built" drawings.
- c) The Updated NEK Technical Specification.
- d) The Updated Safety Analysis Report.
- e) The Technical Manuals.

To the extent any document required to be included in the Final Documentation has not been subject to review and approval by Purchaser, the Contractor shall arrange for such review and approval prior to its insertion in the Final Documentation set.

## 12 PERFORMANCE REQUIREMENTS

See Chapter 3.



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## 13 MATERIAL REQUIREMENTS

### 13.1 Approved Materials

1. Material selection not specifically identified herein shall be the sole responsibility of the Contractor. This does not relieve the Contractor from responsibility for compliance with the applicable codes and standards. Materials shall be compatible with each other for corrosion resistance due to galvanic effects, erosion resistance, and mechanical strength and weld ability as applicable.
2. The Contractor shall provide a complete list of materials used in this project. The materials shall be in compliance with the appropriate ASME Code or ASTM material specification.

### 13.2 Unapproved Materials

1. Asbestos shall not be used in any components.
2. Teflon tape and parts containing unacceptable levels of halogens shall not be used. Plastic wrap shall meet the qualifications of Regulatory Guide 1.38.
3. Mercury and other low melting point alloys shall not be used

## 14 FABRICATION AND ASSEMBLY

### 14.1 Welding

1. All aspects of welding shall be in accordance with the Contractor's approved Certificate of Compliance, Contractor's approved quality assurance program, and the applicable codes and standards defined in Section 7 APPLICABLE CODES, STANDARDS, DESIGN CRITERIA and REFERENCES.
2. All welding, welding procedures and qualifications, and welder qualifications shall be in accordance with the applicable ASME or AWS code, respectively.
3. Documentation for all weld filler material used in CUP repair shall be furnished to the Purchaser as part of the final certification package with a CMTR.



4. Weld surfaces shall be suitable for the UT wall thickness measurement to be performed.

## 15 INSPECTIONS & TEST

The Contractor shall ensure that services, equipment and parts furnished under this Specification conform to the procurement requirements stated and are suitable for the purposes outlined herein. The Contractor shall satisfy the test and inspection requirements of design documents, as well as the specific test and inspection requirements delineated herein.

Inspections and tests will be completed on affected structures and equipment to ensure compliance with the design, safety, operation, and performance criteria. This scope of work includes:

- a. Final Visual Inspection on entire pipe ID. The acceptance criteria for VT are per ASME B31.1 paragraph 136.4.2 as applicable.
- b. Perform Liquid Penetrant Test on selected and mutually agreed welding areas to check if there are discontinuities such as cracks, pores and porosity.
- c. UT test shall be performed to measure required weld thickness and verify adhesion on selected and mutually agreed areas. A minimum of 1 (one) mm of weld thickness is required
- d. Service Testing on System Operating Parameters (ASME B31.1).

### Nondestructive test requirements

Only personnel qualified and certified in accordance with the latest edition of SNT-TC-1A shall perform NDE. Only personnel certified as Level II or III shall interpret the results of examinations.

Procedures for NDE examination of welds shall be prepared by the Contractor and submitted to the NEK for approval prior to implementation. All procedures shall be included in installation package.

## 16 QUALIFICATION, PARTS CLASSIFICATION & DOCUMENT TRACEABILITY REQUIREMENT

Turbine Cross Under Piping is classified as Non-nuclear safety related system.





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## 17 SPECIAL REQUIREMENT

### 17.1 Health and Safety

The Contractor shall manage and be responsible for the performance of the safety services scope of supply for all the work performed within the Project.

The Purchaser shall be provided with unrestricted access to the Contractor's facilities and safety records for the purpose of auditing the Contractor's safety program.

All persons employed by the Contractor, agents, subcontractors, or other persons for which the Contractor has responsibility, shall perform work under the direction of the Contractor's health and safety program. All persons shall be instructed in and be familiar with safety rules and regulations applicable to the work being performed.

The Contractor shall have sole responsibility for ensuring that such persons are so informed and that safe work practices are followed.

Contractor should take all responsibilities also for its subcontractor to include them into health and safety program.

Other Services and Hardware supply include provision of all miscellaneous services not defined elsewhere in this Specification that are necessary to accomplish the Turbine Cross Under Repair Project.

## 18 CLEANING

Foreign material includes grit, metal, particulate matter, oil slag, scale, rust, fibre, and designated detrimental material, which can obstruct operation of hardware or cause wear or erosion. Presence of such material shall be avoided. Necessary precautions shall be provided to maintain the cleanliness as high as possible during surface preparation and cladding application.

Piping shall be cleaned utilizing cleaning equipment. Prior to debris dam removal, the piping shall be cleaned utilizing vacuum cleaners, manual brushing and wiping to restore the piping to the as -found cleanliness level. At this point Quality control personnel shall inspect the piping system and then provide the approval to remove debris dams. After this, piping system shall be inspected to verify final cleanliness. No foreign material is allowed to be left in pipe.



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## **19 CORROSION PROTECTION/COATING**

Corrosion protection/painting shall be performed respecting compatibility of applied products tom NEK approach for secondary plant equipment (see Paragraph 7).

Coatings that are damaged in handling shall be removed and repaired. Coated members shall not be loaded for shipment or shipped until dry. Coated members shall be handled, stacked, and transported in a manner that does not damage the coating.

## **20 MARKING AND IDENTIFICATION**

The Contractor shall establish and maintain a system for the identification and control of materials, parts, and components, and partially fabricated assemblies. These measures shall ensure that identification of the item is maintained by heat number, lot number, part number, serial number, or other appropriate means, either on the item or on records traceable to the item throughout installation, shipment, and use of the item.

## **21 PACKAGING, HANDLING & STORAGE**

### **21.1 Packing and handling**

The equipment needed for Turbine Cross Under Repair shall be prepared for shipment and on-site storage in accordance with the Contractor/subcontractor's standard procedures. All parts shall be packed in such a way that they are protected against contamination, deformation or damage during shipment, handling and storage. Each package shall be marked to allow quick identification.

## **22 SOURCE INSPECTION/SURVEILLANCE NOTIFICATION**

The Contractor shall officially notify about project "hold" and "witness" points according to the installation and inspection plan. Notification time shall be 14 calendar days ahead of anticipated occurrence.

## **23 NONCONFORMING MATERIALS**

Departures from requirements stated either in this specification, related codes standards and practices and documents supporting the execution of works under this specification shall be treated as nonconformance's and reported to the Purchaser's attention.



Nonconformance's to be reported for approval by the Purchaser are all those nonconformance's which cannot be brought within requirements by rework.

## 24 SPECIAL HANDLING

Contractor shall prepare instruction/procedures for handling the equipment which will be used within Turbine Cross Under Piping repair project.

## 25 SHELF LIFE

The Contractor shall not ship any item, which has less than one year remaining shelf life at the time of shipment. The Contractor shall provide shelf life data by expiration date.

## 26 10CFR21 REPORTING

Provisions of 10CFR21 does not apply to this order.

## 27 COMMERCIAL GRADE ITEM DEDICATION

NEK do not expect Commercial Grade Dedication process during Turbine Cross Under Piping repair Project.

## 28 SUPPLIER DOCUMENTATION REQUIREMENTS

The Contractor shall provide the following deliverables which shall be sent to the NEK Project Manager.

<u>Deliverable Item</u>	<u>Number of Copies</u>
Project Management Manual, Project Quality Plan	2
Monthly status report for the Work being performed on project	1
Preliminary analyses report(s), calculations, drawings and other relevant DMP documents	2
Walk down report	2
Design Modification Package on Review	3




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Final Modification Package	3
Installation Package for Review	2
Installation Package, Final	2
Installation material CMTR's including consumables	1
Final Documentation (As-built, TOP)	1

All above documents shall be also provided as electronic pdf/doc/dwg files on CD/DVD media.

## 29 REPAIR RECORDS

A record system shall be established and maintained by the Contractor to provide documentary evidence of the quality of items and activities affecting quality. The quality assurance (QA) records shall include the results of reviews, inspections, tests, monitoring of work performance, nonconformances and material analyses. Records shall as a minimum identify the inspector or data recorder, inspection date, scope of inspection, type of observation, procedures used, results, acceptability, and actions taken with deficiency noted and shall conform to the requirements.

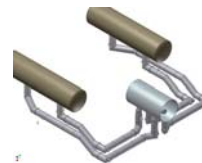
All repair records shall be delivered to the Purchaser.

## 30 SHIPPING REQUIREMENTS

The Contractor shall provide packaging and shipping methods for protection from the effects of temperature extremes, humidity and in transit shocks. The NEK's authorized source inspector has the right to hold shipment if purchase order requirements are not met. The Contractor is responsible to get all permissions for transportation of the equipment.

The packaging procedure shall take into account the method of transportation to be used, as well as possible storage duration and storage environment.

Protection of internal cleanliness shall be achieved by sealing all openings with plugs, caps or covers. Internals shall be protected against moisture during shipment and storage by suitable means. Coated equipment shall be handled in such way to prevent damage to the coating.



Prior to the shipment, the Contractor shall contact Purchaser's Representative to confirm shipping arrangements. All pieces of equipment, boxes, cartons, etc., shall have a waterproof identification label attached with the following information:

Purchaser:

Nuclear Power Plant Krško  
Vrbina 12, 8270 Krško, SLOVENIA  
Turbine Cross Under Repair Project  
Attn: NEK Commercial Department representative – not yet defined

CONTENTS: Contents Description (Provide reference to Purchase Order)

The Contractor shall include packing list identifying each item or assembly shipped.

### **31 VENDOR TECHNICAL MANUAL AND REGISTERED UPDATES**

Vendor technical manual does not apply to this order.

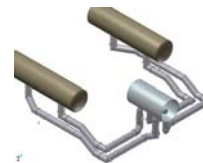
### **32 TRAINING**

Training program does not apply to this order.

### **33 REVIEW & VERIFICATION OF WORK**

The Contractor\* is required to perform a detailed "line-by-line" checking operation, review and/or verification of the changed portion of all documents in the Plant Design Modification package per ESP-2.607. The Contractor shall provide distinct evidence that such a review was conducted by presenting with the DMP package for NEK review, a set (copy) of checked drawings and documents that have been marked up and would indicate that: all design inputs and design outputs agree, calculation equation references and quantitative formulas have been checked, and various drawings have been checked against each other for continuity and overall agreement.

The Contractor shall provide a copy of all directly available and releasable reference documents (pages) used in calculations as an appendix to the calculation or design input documents so that the NEK review of the Contractor's review process can be expediently performed. Contractor's proprietary documents that are classified as non-releasable may be made available for consultation by Purchaser and regulatory authorities on a case-by-case basis.



The contractor is also required to perform a detailed checking review and/or verification of the Installation Package and its associated documents.

The Customer (NEK) shall review and approve the deliverables of all tasks, namely:

- Installation Package

The Contractor shall provide independent verification of the Installation Package.

The quality of the Cladding shall be demonstrated through qualification of the welding process/procedure itself and the analysis of the equipment performance during cladding application. The proper adhesion of the cladding to base metal and thickness of 1 mm minimum shall be verified through welding process/procedure qualifications

\*Main Contractor cannot delegate this task to the subcontractor involved in preparation of the DMP.

### 34 SCHEDULE REQUIREMENTS

In order to comply with the objective of full implementation of the modification the following Schedule completion activities/milestones are considered.

**Table 1:** Schedule requirements

No.	Description	Duration (months)
<b>Turbine Cross Under Repair – Phase 3</b>		
1	Contract awarded	T <sub>0</sub>
2	PMM and PQP submittal	T <sub>0</sub> +2
3	Design Inputs submittal	T <sub>0</sub> +4
4	Walk Down on NEK site	Outage 2018 - April
5	Delivery of DMP on NEK review	T <sub>0</sub> +8
6	Delivery of Final DMP on NEK approval	T <sub>0</sub> +10
7	Delivery of IP on NEK review	T <sub>0</sub> +12
8	Delivery of final IP on NEK approval	T <sub>0</sub> +14
9	Preservice Review meeting	T <sub>0</sub> +16
10	Preparatory work	One month before outage 2019
11	Field Work on Turbine Cross Under Piping*	Outage 2019 - October
12	As Build, TOP	Outage + 3 months

\* The scope of the installation work described in this specification shall be completed within a period of 19 days currently scheduled for start at October 5<sup>th</sup>, 2019. The actual date will be known one month before service start. While plant conditions could result in an advance or slip in schedule, this is not known or anticipated at this time.





NEK will review and comment DMP and IP within four weeks, and the final DMP and IP shall be issued in an additional four weeks.

The Contractor shall have in their possession all materials and its associated documentation at least one month before the work is scheduled to start. NEK will review Contractor materials and documentation before installation.

Final Documentation Package (TOP) shall be prepared upon the service completion and hand over to NEK.

### **35 STATUS REPORTING REQUIREMENTS**

The Contractor shall provide written status reports on a monthly basis for the Work being performed in order to provide schedule update to NEK.

The Contractor shall provide progress updates on all activities being worked in terms of either percent % progress to date.

Status report shall address in summary form the accomplishments for that period. The status reports are expected to contain information if scheduled activities started, not started, completed and not completed since last reporting period and an explanation of why the scheduled starts and completions are not following the schedule.

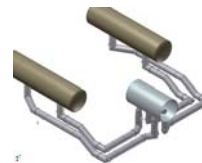
During the outage activities, a daily oral reporting is requested and a weekly written report covering the progress and significant events during the reporting period.

### **36 WORK OR INFORMATION TO BE PROVIDED BY NEK**

Contractor shall define required documents/information needed to perform the scope of work specific to NEK. The usage of this information by the Contractor will be restricted according to specific instructions provided by NEK.

The Purchaser will provide:

- a) All interface information with any plant activities related to this project
- b) Site Safety and Access Training (General Employee Training)
- c) Electrical power connections (220/400 V 3 phase, 50 Hz) and pneumatic (air) supply.



- d) Site access for Contractor
- e) Scaffolding for execution of this project
- f) DMP 585-MS-L (first two phases) and available design documents
- g) Existing Plant Drawings, documents and analyses required to perform the scope of service per this specification
- h) Copies of NEK procedures requested by Contractor
- i) Review and approval of Contractor's DMP and IP
- j) Preparation of Work Orders and assurance of necessary work conditions
- k) Supervision of post maintenance test on operational system parameters
- l) Review and acceptance of Contractor's Final Documentation (TOP)

Whenever Purchaser approval is required in this specification for submittals, procedures, methodologies, approaches or options, such approval shall be provided in writing or if provided orally shall be confirmed in writing.

The Purchaser will:

- a) Designate a Project Manager for this project
- b) Perform preliminary and final design documentation review and approval within 4 (four) weeks.

Approvals & Inspections - the Purchaser's Project Controls scope includes the provision of personnel, supplies, facilities, software, and equipment necessary to perform all cost and schedule functions for the overall Project.

### **37 CHANGES of WORK SCOPE**

Generally no change in the work scope or this Specification Requirements is expected.

If something else appear The Contractor shall identify any departure from this Specification Requirements that could cause an impact on the Contractor's cost or schedule of the project. The Contractor shall not proceed with a change in the scope of the Work until written approval has been authorized by NEK.

### **38 RECORDS**

The Contractor shall turn all reproducible drawings and other documents such as any changes to plant procedures, equipment technical specifications, USAR updates, and reviewers checked drawings and documents over to the ING.



All documents have to have unique identification number with revision and need to be sorted into group and subgroup. Details have to be explained in to the PMM.

A records system shall be established and maintained by the Contractor to provide documentary evidence of the quality of items and activities affecting quality. The quality assurance (QA) records shall include results of reviews, inspections, tests, audits, monitoring of work performance, nonconformances etc. Records shall, as a minimum, identify the inspector or data recorder, date inspection was performed, type of observation, procedures used, results, acceptability, and action taken with any deficiencies noted.

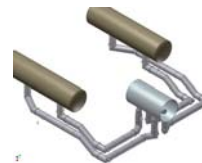
Additional records or supporting data shall also be maintained. All quality verification records, procedures, and qualifications shall identify the item or activity involved.

These records shall be retrievable and available for examination. One copy of all documents (including computer software - validation reports and any referenced documents) required by this Specification, applicable regulations, codes and standards, or generated as a result of the Contractor's QA program shall be transferred to the Purchaser.

Responsible persons for generating, completing, or reviewing records shall ensure that the following requirements are met:

- a. Ensure Records are technically correct in accordance with applicable procedures.
- b. Ensure Records are complete including all attachments. Records shall be reviewed to ensure all required data, i.e., signatures, dates, etc., have been completed or marked "Not Applicable" (N/A) as required.
- c. Ensure corrections to data have been made properly. Corrections to data shall include the date and the identification of the person authorized to make the correction. Examples of corrections are line through, write overs, white-out, correction tape and any other correction method. This is required anytime when record data (numbers, or the meaning, intent, or integrity of a record) is affected by a correction. This is not required for other information that is not considered data.
- d. Ensure that records are legible - can be clearly read and suitable for microfilming. The original of all records should be transmitted to the Purchaser as the record. If a record is not legible one of the following methods shall be met:

The illegible area of the record shall be enhanced by tracing or writing the information clearly on the record or by submitting additional information for



clarification of the illegible area. The Contractor person authorized to perform this function shall initial and date the area enhanced or clarified.

If the record cannot be enhanced, the records shall be marked "Best Copy Available", and the marked record shall be initialed and dated by the responsible organization's supervisor or designee.

## 39 ORGANIZATIONAL CONTACT

Purchaser contact persons:

Robert Rostohar, Project Manager

- Phone: + 386 4802 948
- E-mail: robert.rostohar@nek.si

Commercial items are to be addressed to the NEK Commercial Department representative, which is not yet confirmed.

## 40 CONTRACTOR'S TECHNICAL APPROACH to the WORK

### CONTRACTOR Responsibilities

The Contractor responsibilities (scope of work description and scope of supply) are specified in Section 3 of this Specification. Additionally, this Specification also provides requirements which Contractor must follow in the work mainly specified in Section 5.

Work includes furnishing all craft labour, craft labour supervision, techniques, and tools/equipment necessary to implement welding in Turbine Cross Under Piping and other work as described in this Specification.

The Contractor shall be completely responsible for the complete scope of supply (defined in section 3) except for activities which are specified as 'NEK Responsibilities' (section 36) defined /agreed between contractor and NEK.

The Contractor shall be responsible for the following resources:

- a. All craft labour required to physically performing the work. This labour force shall possess skills to perform the work on Turbine Cross Under piping repair. Welders and welding operators shall be qualified in accordance with Section IX of the ASME Code. Welders shall only weld in position for which they have qualified. Each welder's certificate of qualification shall be in the possession of the SUPPLIER/SUBCONTRACTOR and shall be available upon request.



- b. Craft labour supervision. Labour supervision shall possess sufficient skills and experience to competently provide day-to-day direction to the craft labour in the performance of the work.
- c. Field Engineering. Contractor's field personnel shall be capable, qualified, and able to perform the duties required to the satisfactory resolution of field problems and preparation of FDCRs.

The Contractor shall supply, maintain and properly store all tools, welding filler material and welding equipment to be used in performance of the work such to avoid damage or deterioration. Welding equipment prior work shall be checked and inspected for operability. Runs of hoses, cables, and piping associated with the Contractor's activities will be arranged so that no fire or safety hazards exist. Placement of these runs will be coordinated between the NEK and Contractor prior to installation.

The Contractor shall perform all work in quality manner in compliance with the diagrams, drawings, plans, specifications, procedures, and codes applicable to the scope of supply.

The Contractor shall be responsible for reporting and evaluating the "as-found" condition of equipment and commodities prior to repair start.

The Contractor shall be responsible for material handling.

The Contractor shall prepare and maintain welding diaries and include them in the Final Documentation Package.

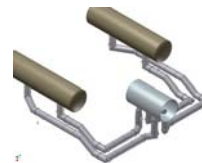
The Contractor shall be responsible for all testing and inspections required prior to restore affected system to operation.

The Contractor shall be responsible for protecting any permanent plant systems and commodities that may be encountered in the course of performing the related scope of work. Any systems or equipment that incur damages shall be replaced by the Contractor at no additional increase in cost to the NEK.

The Contractor shall be responsible to provide a rescue team of two firemen as per Slovenian regulation for work in confined space locations. It is also responsible to provide training for fire watches in confined space locations.

Contractor's personnel shall use the personal protective means and protective equipment. It is obligatory to wear helmet, protective clothes, protective shoes and protective glasses.

The Contractor is responsible to provide safety and isolation transformers for protection against electrical hazards for work in confined space. All electrical equipment must be inspected for operability and protected from mechanical damages.



During the work all the time man-way watch is needed and also monitoring the gas content on working area (use of gas meters and O<sub>2</sub> monitor). Near working area must be extinguisher.

The Contractor shall be responsible for preparation of Safety precaution program for this project. Contractor personnel which perform outage works in NPP Krško are obliged to consider Safety precaution program and follow the regulations of Safety and Health at Work (Official Gazette of RS 56/99) and prescription covering Safety and Health at Work and internal Act of NPP Krško Industrial Safety.

## **41 ACCESS TO CONTRACTOR FACILITY AND DOCUMENTS**

The Contractor will provide access to the Contractor's and authorized sub-contractor's facilities to the NEK personnel who are engaged in the work for the purpose of reviewing the quality and the amount of the work being performed.

## **42 SUBCONTRACTED WORK**

All Subcontractors shall be listed in the Proposal. If the selected Contractor after Contract signature wants to change or select a new sub-supplier, this is subject to NEK approval.

The Contractor shall impose to its Subcontractors the requirements of this Specification. The Contractor shall ensure that all Subcontractors meet the requirements of this Specification.

Since the Contractor retains full responsibility for all aspects of Subcontractors performance (including quality and schedule) the Contractor shall ensure that adequate and periodic audit and surveillance of the Sub supplier is maintained. NEK's right of access to the Contractor's Subcontractors' facilities for the purpose of inspection or audit shall be imposed by Contractor's documents.

The Contractor has to engage qualified companies with a proven experience record of development of Design Modification Packages in accordance with NEK procedures.

Such qualified companies (subcontractors) shall ensure support in the engineering phase and installation phase with response time less than eight (8) hours to ensure timely preparation and processing potential FDCR (Field Design Change Request) per NEK ESP-2.609 procedure.

All subcontractors need to be qualified by Contractor. They shall also have experience/references on same or similar work performed on nuclear power plant(s).





The Contractor or his subcontractor shall not subcontract any portion of the Work without the written approval of the Purchaser.

## **43 QUALITY ASSURANCE REQUIREMENTS**

### **43.1 Contractor's Quality System**

The contractor will ensure that contractual quality-related requirements are fulfilled using his own quality management system, which complies with ISO 9001, and with relevant requirements from QA specification NEK QS 610, rev.1, Generic Quality Assurance Program Requirements.

### **43.2 Quality Manual**

Contractor's Quality Manual review and acceptance by the Purchaser shall be a prerequisite for selection of a Bidder as a Contractor. The Contractor shall implement and maintain this program while carrying out the requirements of this specification; all proposed changes to the program shall be submitted to, and approved by, the Purchaser prior to implementation.

### **43.3 Contractor's Responsibilities for Sub-contractors**

The Contractor has following responsibilities regarding its Subcontractors:

- a) The Contractor shall ensure that all potential sub-contractors meet the applicable requirements of this Specification.
- b) The Specification requirements for procedure submittals shall apply to Sub-Contractors for services not performed by the Contractor. The Contractor shall first review subcontractor's procedures to ensure compliance with the Specification requirements, submit these procedures, and obtain the Purchaser's acceptance in writing prior to performance of subcontractor's work. The Contractor's procedure may be used at the Subcontractor's facilities if necessary.
- c) The Contractor shall ensure that the subcontractor is aware of all activities that the subcontractor will be required to perform, and shall identify activities that require the presence of the NEK Representative. The Contractor shall ensure that NEK Representative has the right of access to subcontractor's facilities and documents needed to perform audits, inspections or witness tests.



- d) The Contractor shall retain full responsibility of the subcontractor work, supervise quality and document such facts in the Final Documentation Package.
- e) In case where subcontractor does not meet required Quality program from Specification, Contractor shall the right to impose additional QA clauses and perform surveillance activates and/or Sub-contractor shall adopt Contractor QA Program for the performance of their activities.

#### **43.4 Inspections**

The number of NEK inspection and audit visits related to this Project are not expected to be limited to specific number. Also, NEK is not expected to cover additional costs due to inspection and audit performance.

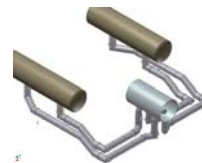
#### **43.5 Notification Points**

The Purchaser shall have the right to establish notification points for which the Contractor shall give prior notification to the Purchaser. In addition, the Purchaser may establish temporary notification points if necessary to ensure resolution of temporary quality problems. Notification for Witness or Hold points require the receipt of notification at least ten (10) working days in advance of the scheduled time of performance. Alternatively, if there is a resident NEK Representative, the schedules may be submitted in advance to the NEK Representative identifying the activities which have been designated as notification points in the Inspection Plan. The Purchaser may require that activities performed without proper notification is repeated for NEK Representative observation at the Contractor's expense.

The NEK Representative will witness the 'Hold Point' events or will authorize the Contractor to proceed without Purchaser's witnessing of the event. 'Witness Point' events can proceed without witnessing or written waiver if proper notification has been given.

#### **43.6 STOP/Hold Points**

When Contractor or Purchaser Responsible Inspector has any concerned about some non-confirming condition found by the test and inspection specified herein, the Inspector shall have the right to call for inappropriate supplementary nondestructive test. Acceptance criteria for any supplementary testing will be defined agreed prior to performing tests and inspections. Non-acceptable results will be dispositioned and corrected, and the subject test repeated in accordance with Contractor quality program requirements.



## **43.7 Documentation**

### **43.7.a Records Systems**

A record system shall be established and maintained by the Contractor to provide a documentary evidence of the quality of performed activities. Records shall, as a minimum, identify the Purchaser's name, Purchaser's order number, inspector or data recorder, inspection date, type of observation, procedures used, results, acceptability, and action taken with any deficiencies noted. Records of inspection shall also include identity of drawings and procedures utilized, along with the revision level. All quality verification records, procedures, and qualifications shall be identifiable to the activity involved.

### **43.7.b Contractor's Documentation**

QA & QC documents are a deliverable item. The Contractor's Quality Control Representative shall approve them, and then present them to the Purchaser for review and approval. Documentation to be transmitted shall be adequately packaged, protected, and secured to ensure it will arrive undamaged.

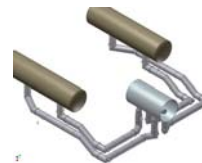
Each page of each document submitted shall be clearly identified by the Purchaser's name, purchase order numbers, equipment description and specification identification, and the Contractor's name and address. Page numbers (e.g. 1 of 5, 2 of 5, etc.) are required on tables of contents detailing attached pages. Each individual document shall be legible and shall have reproducible microform capability. No information shall be recorded closer than 20mm to the binding edge or closer than 6mm to any other edge of the paper. Also, the approval status shall be clearly identified on each document.

All records required by this specification, applicable regulations, or codes and standards, or generated as a result of the Contractor's QA program shall become part of NPP Krško QA Records. The Purchaser shall be notified in advance if, at any future date, Contractor should plan to destroy any records. At the discretion of the Purchaser, all quality assurance records and documentation related to this specification shall be transferred to the Purchaser.

### **43.7.c Deviation/Change Requests**

The Contractor has to have established and implemented the control of design and licensing interfaces (internal and external) including:

- a) Identification of interfaces in writing (responsible organization, person),



- b) Organization responsibilities for documents (review, approval, release, distribution, revision...),
- c) Transmittal of design and license information in written (status of information, complete, incomplete item, further evaluation required, for review, for approval...)

Any deviations or design changes which are not fully in accordance with the technical or quality assurance requirements of the procurement documents and which the Contractor desires to accept, must be accepted by the Purchaser. Any such deviation request must be made in writing by means of a Deviation/Change Request Form submitted to the Purchaser for acceptance prior to continuing work.

## 44 NEK PROPRIETARY DATA

NEK proprietary data are defined in the Contract. Refer to General Terms and Conditions proprietary-related paragraph.

All developed documentation related to Technical Security shall be treated as Safeguard information. Within the draft of the PMM the method (procedure) to handle the documentation with the Safeguard information shall be prescribed. Documents with such information shall become the confidential mark and their distribution and revision shall be done not to violate the Confidentiality policy and to limit their distribution only to the personnel qualified and responsible for their usage. Prior to the delivering of the existing drawings required for the preparation of the Design Modification packages the NEK will mark such type of drawings. On the other hand for the new drawings with such confidential content that shall be done by the Contractor based on the Criteria from the PMM. See also reference ADP-1.8.002 Document Security. The confidentiality policy is applicable for the documents related to the Remote Shutdown, Transfer to the control capabilities from one to other location etc.

## 45 APPENDIX

- 45.1 PMM Template
- 45.2 NEK wall thickness measurement report from outage 2016; QC poročilo: QD4-RE16-044
- 45.3 CUP drawings: EDSK437563C, EDSK437564C, EDSK437565C, EDSK437566C, EDSK437567C, EDSK437568C and EDSK437569C



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#### **45.1 PMM Template**

Proposed PMM template is added as a separate document to this Specification.



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**45.2 NEK wall thickness measurement report from outage 2016; QC poročilo: QD4-RE16- 044**



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**45.3 CUP drawings: EDSK437563C, EDSK437564C, EDSK437565C, EDSK437566C, EDSK437567C, EDSK437568C and EDSK437569C**



# NUCLEAR POWER PLANT KRŠKO

Project Modification \_\_\_\_\_

*Project Name*

*Contractor Logo*



## PROJECT MANAGEMENT MANUAL (PMM)

Rev 0

	Name	Org. Unit	Signature	Date
Approved by (NEK):	_____	_____	_____	_____
Approved by ( )	_____	_____	_____	_____
Reviewed by:	_____	_____	_____	_____

"This document contains proprietary information. It is submitted in confidence and is to be used solely for the purpose for which it is furnished and returned upon request. This document and such information is not to be reproduced, transmitted, disclosed, or used otherwise in whole or in part without written authorization."

## 1. REVISION CONTROL LOG

[illegible]

## 2. CROSS-REFERENCES

- Project Quality Plan for Project \_\_\_\_\_



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#### 4. ABBREVIATIONS, PURPOSE AND APPLICABILITY OF THE DOCUMENT

Abbreviation	Description
AC	Award of Contract
AIL	Action item list (list with major issues which need to be resolved)
Contract PM	Contract Project Manager
CHO	Change order
CPM	Commercial Project Manager
DCM	Document Control Management (by NEK)
DC	Document controller
DMP	Design modification package
DOR	Date of Release
IPS	Integrated Project Schedule
MPR	Monthly Project Report
MS	Microsoft (applicable in respective software products)
mths	months
NEK	Nuklearna Elektrarna Krsko
NPP	Nuclear power plant
OPS	Overall Project Schedule
PDR	Problem / Deficiency Report
PG	Power Generation
PM	Project Manager
PMM	Project Management Manual
PQP	Project Quality Plan
PQST	Project QST
PSC	Project Steering Committee
QA	Quality Assurance
QC	Quality Control
QIR	Quality incident report
QMM	Quality Management Manual
QST	Quality assurance specification turbo generators
SPWAR	System Performance Warranty Action Report
tbd	To be decided
TPM	Technical Project Manager
TTL	Technical Team Lead
wks	weeks



Workflow	predefined sequence of activities within the project-organization
WP	Work-package
PS	Project Scheduler

#### Enclosure 1: List of abbreviations and definitions

### 4.1. PURPOSE AND APPLICABILITY

The PMM serves as guidance for the project implementation from Award of contract until the end of warranty period. It does not limit nor change in any form contractual requirements.

The PMM is worked out in close cooperation between NEK and **Contractor** for ensuring a fertile, effective and efficient cooperation for achieving the projects goals for both parties benefit. The PMM is approved by **Contractor** and NEK Project Managers.

The PMM will be reviewed, which means changed and replenished, during the project course for following exemplary reasons:

- Some data is not yet available (e.g. certain handling procedures, FAT procedure). They will be referred to as soon as available.
- Changes in workflows or organization, especially the design of software which is used during the project for correspondence and filing (share-point-platform) often triggers new revisions because of customization.
- Contract/ scope changes (e.g. optional scope)

### 4.2. RELATION TO OTHER DOCUMENTS

The three most important guidelines for project implementation are the PMM, the PQP and the IPS.

All overall *Contractor* quality related issues are part of the offer as a QMM 602. The PQP (Project Quality Plan) is more project-specific and shows quality related activity during the entire project course with referenced procedures and standards. The PMM however shows document deliverables which are linked to the PQP. Referenced documents which are necessary for project controlling and implementation, e.g. Problem / deficiency reports, are explained and attached. Processes which are more into the details of non-conforming products are described in the PQP. The PDR and SPWAR can be seen as the main interface between the **Contractor** internal quality processes and NEK processes.

## 5. PROJECT DESCRIPTION

**To be fulfilled by the Contractor**

### 5.1. PROJECT SCOPE

**To be fulfilled by the Contractor**

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The Scope of the project is described in SP-E [REDACTED] in detail.

## **5.2. PHASES OF PROJECT**

Single phases of the project are:

1. Design and Engineering
2. Material procurement (if applicable)
3. Manufacturing (if applicable)
4. Transport (if applicable)
5. Assembly at NEK-site (if applicable)
6. Lifting (if applicable)
7. Erection, Commissioning & Testing (if applicable)
8. Trial run (if applicable)
9. Hand-over  
referring to documentation and other details (e.g. spare parts)
10. Warranty period (separately for main contract and CHO)

The project phases are visible in the monthly provided integrated project schedule, taking the above mentioned phases into account.



Category	Aspect	Improvement	Previous situation
Organization	Meetings of Project Steering Committee		
	PSC Members		
	Quality management within the project		
	Communication		
	Personnel, intercultural understanding		
Project management	Project management personnel and location of PMs		
	Requirement management		
	Outage planning		
Quality management	Understanding of quality requirements on both sides		
	Supplier management (control of suppliers)		

**Enclosure 2: Project phases**

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## **6. PROJECT ORGANIZATION**

### **6.1. PROJECT TEAMS**

**Enclosure 3: Project Team NEK**

**Enclosure 4: Project Team Contractor**

**Enclosure 5: Project Organizational - Chart Contractor**

**Enclosure 6: Project Organization - Chart NEK**

#### **6.1.1. SITE TEAM**

During the implementation of the project, the Site Project Manager is the main point of contact for NEKs Project Manager and Site Manager. This revision of the PMM will be amended with details of the site team as well as the site organization as soon as the team is assigned.

### **6.2. PROJECT STEERING COMMITTEE**

#### **6.2.1. PURPOSE AND GOALS**

The Project Steering Committee (PSC) supervises the work of the Project Management. The Project Management reports in regular PSC-meetings on project progress and critical issues if existing. It is comprised of management personnel from NEK and the Contractor as shown in below Enclosure 7: Project Steering Committee.

**Enclosure 7: Project Steering Committee**

#### **6.2.2. PSC-MEETINGS**

Meeting-Period: every 2-3 weeks. Initial meeting to be called by NEK, officially communicated approximately 2 weeks prior to the meeting date (please see Enclosure 8: Project-meetings and characteristics).



Agenda: To be created by NEK and the **Contractor** Project Managers. The proposal has to be sent to all members well in advance (two weeks) of the date for commenting and approval.

Location: The meeting will be hosted alternating by NEK and the **Contractor** on locations of their choice taking travel conditions and requirements for meeting purposes for all members into account.

Minutes of meeting: Minutes will be prepared by hosting PM directly in the meeting for common approval and signature afterwards. They will be signed by NEK and the **Contractor** managers.

### 6.3. PROJECT MEETINGS AND CONFERENCES

Name	Tasks and purposes	Owner	Attendants	Frequency	Invitation due date by owner
PSC meetings	Management review of project				
PM meetings	Regular meetings with <b>Contractor</b> and NEK PMs, held as telephone conferences or personal meetings according to needs. Project Management for Project-controlling and status updating				
Site Readiness Review Meeting	Preparation of outage. Verification that all requirements for successful outage are fulfilled.				
Safety meeting (site)	Safety controlling at site				
Job Mobilization meeting	Preparation of Outage work				
Bi-monthly quality telcon	Vendor quality and production schedule follow up. Coordination of WPs, PDRs and quality proceedings				
Technical Meetings	Discuss and solve technical problems				

#### Enclosure 8: Project-meetings and characteristics

## 6.4. SUB-CONTRACTING

Sub-contractors will be managed by team-members who are responsible for respective scope. A list of current subcontractors with contact and scope information can be found as Attachment 1: List of subcontractors and potential subcontractors, on page I.

Subcontractors are chosen in accordance with respective, applicable quality requirements (please compare PQP). NEK receives copies of technical specifications for subcontractors without commercial information. The **Contractor** intellectual property rights have to be protected and respected.

As per main contract, The **Contractor** shall notify to NEK the names of the subcontractors proposed to perform a part of the Scope of Supply and shall not award any principal part of the Scope of Supply to any subcontractor without prior written approval of NEK. The refusal should be justified by NEK. Full overall responsibility always remains on The **Contractor's** side concerning participation of Slovenian and non-Slovenian companies as The **Subcontractors** subcontractors. Approval for hardware subcontractors which are listed in this revision of the PMM are deemed as "approved by NEK".

## 6.5. CORRESPONDENCE AND DOCUMENT TRANSMISSION

### 6.5.1. COMMUNICATION CHANNELS

Item/ topic	Formal transmittal	Medium/ format	Direct Addressee	Copy to
All commercial contractual matters (e.g. Invoices)	yes	Optional: Postal Letter Email with scanned letter		
All requests related to contractual obligations (Change-requests, Change-orders etc.)	yes			
Technical information with direct contractual relevance	yes	optional		
Technical information without direct contractual relevance	normally no	Email		
Results of technical information exchanges (e.g. design input)	yes	Email		
Project specific issues, deficiencies, non-conformances of any type (NCR, PDR, SPWAR) please see chapter 7.4	yes	Email, to be confirmed by receiver		

**Enclosure 9: Correspondence requirements related to topic**



Technical information with direct contractual relevance refers to input-data of high significance e.g. design data as input for calculations which determine design of components. All exchanged design input data or information must display its respective source.

Technical information without direct contractual relevance is related to e.g. explanations for understanding, comments if easily and quickly to implement and without high significance. Quickly to implement provides, that misunderstandings will be discovered quickly without causing damage. Providing the possibility of exchanging technical information without the obligation of formal record has the purpose to facilitating information flow.

All mentioned people might be temporarily replaced. Respective names have to be communicated to the other party according to the correspondence requirements.

Internal project correspondence box

The **Contractor** Share-point portal for the project, which hosts project related documents and information, provides a library for filing all email communication. Outgoing mails from the **Contractor** are copied to the box (cc). Incoming mails to the **Contractor** are forwarded from the account of the PM by using a MS-Outlook forwarding rule. Internal alerts will be implemented. The library and respective procedures ensure a high level of information-availability and security of communication within the project team.

#### 6.5.2. PROJECT CORRESPONDENCE

**Contractor** and NEK use a specific tracking system for the correspondence within this project (i.e. Numbering system). The following basic rules will be followed when assigning letters, email, or file numbers:

**Y**-BBB-CCC-XXX, where:

- a. **Y** stands for project subject
- b. BBB three letters abbreviation for the sender (i.e. NEK)
- c. CCC three letters abbreviation for the receiver, (i.e. for the **Contractor**)
- d. XXX current number of the letter or email.

Formal coding of correspondence is used if content could need to be referenced, because of contractual relevance. To be transmitted formally: Invoicing, Non-conformance reports, PDRs, SPWARs, change-requests, change-orders, minutes of meetings except for informally handled minutes of PM-teleconfs.

Document which have to be provided by the **Contractor** to NEK in hardcopy or (vice versa) e.g. Drawings, Reports, Calculations, Lists etc. will be sent by post accompanied with a formal letter number. The accompanying letter for a transmittal will include the following data: Addresses of sender and receiver, name of sender PM with signature, date, purpose of transmittal (for approval <FA>, for commenting <FC>, for information <FI>). For attached documents: Document no, Document Rev., Document Title, Document Issuer, Document format, Document Type, Transmittal no.

A template can be found as Attachment 7: Transmittal Sheet, page VII.



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In the further course of the project the **Contractor** may be granted access to certain parts of NEK Share-point portal through which documents could be provided during the commenting and review processing.

#### 6.5.3. AUTHORIZED PERSONS

Transmittals are normally sent by the Project managers. Other **Contractor** persons entitled are: Technical Project manager, Quality Manager, Documentation Control and others, who are entitled by the PM. Transmittals which contain final contractual deliverables from the **Contractor** to NEK as per contract, are sent by the Local PM or entitled persons from the **Contractor** who is the contract partner of NEK.

#### 6.5.4. EXTERNAL SHAREPOINT PAGE

NEK established an external data storage page which the **Contractor** can access. If **Contractor** personnel need access to that page, respective instructions will be provided by NEK engineer. Respective persons will then be enrolled as users and can access the page via user login and Tokencode provided via RSA SECURID.

The page is used to provide files which exceed normal file sizes which can be transmitted via email. The party which provides documents to the other party uses an official transmittal mail (numbered) to inform the other party about the upload and the location where the file is stored (most convenient is sending a link with the transmittal mail).

The URL for the page is:

**to be filled by the Contractor**

### 6.6. IT-TOOLS AND SOFTWARE

Software shown in, Enclosure 10: List of software for project management, will (some optional) be used within the project implementation with regard to project management and communication on technical matters.

**to be filled by the Contractor**

**Enclosure 10: List of software for project management**

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## 7. PROJECT CONTROLLING

### 7.1. PROJECT PLANNING AND SCHEDULING

#### 7.1.1. TYPES OF SCHEDULES

An **overall integrated project schedule** for the complete project from contract signing until end of warranty was developed. The planning unit for this overall schedule is "day". This schedule refers to the project phases described in section 5.2 Phases of project, p.2.

#### 7.1.2. UPDATING AND FOLLOW-UP

The **overall integrated project schedule** is updated regularly and is provided to NEK each month for project reporting. The contract dates in the original contract schedule are valid throughout the project as per contract. However a **Contractor** baseline is to be communicated to NEK for official approval, showing the current status of the baseline dates. Explanations on deviations shall be included (e.g. reason, background, consequences). An approved schedule gets a formal major revision number. Schedules for each monthly update only get minor revision numbers (separated by a dot behind the major revision number). Details of schedule documentation are determined (within contract range) by the assigned project scheduler, however. Changes in the schedule dates between two monthly reports are outlined. Input-information is retrieved from various partners (internal and external) by adequate tools / programs as digital information or via direct communication, e.g. phone supported by online-conferencing.

#### 7.1.3. PROJECT SCHEDULE FEATURES

The **Contractor** schedule has the following features:

- Critical path logic diagram for all work activities prior to the outage
- Identify the duration of these activities
- Indicate changes in the critical path during the job
- Allocate major resources where they are most needed
- Provide updated progress and activity reports during the project
- Accept, change and update as frequently as monthly (project schedule), to evaluate scope and/or schedule changes as they occur



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## **7.2. PROJECT REPORTING**

The **Contractor** provides written status reports on a monthly basis for the work being performed. These reports will contain brief information but will convey all necessary information to the NEK Project Manager for evaluation the overall status and progress of the project.

The overall status of the work reports include:

1. Overall status of the project
2. Accomplishments from the previous report issued.
3. Technical, quality, management or other concerns, or emerging issues that could impact schedule, costs, or quality of work.
4. Work-arounds, or planned remedial actions and "path-forward" to ensure milestone dates are met.
5. Four (4) week look-ahead, including the dates of measuring, testing and inspections of the equipment per the QST.
6. Overall project management assessment.
7. Project Schedule (overall view of the IPS)

Please see Attachment 2: Content of Project Reports, page I. Monthly Project Reports (MPR) will be provided approximately each 1<sup>st</sup> to 5<sup>th</sup> day of the month and report on the past months issues.

## **7.3. ACTION ITEM HANDLING AND ISSUE TRACKING**

An Action Item list is administrated as a living document by the **Contractor** (assigned person). This document is attached to the monthly progress report with its current status. The document will be update for action item tracking in PM-telcons.

Updates can be made available more often to NEK if necessary and if feasible with reasonable effort. Each time an Action item comes up it will be included into the AIL (Action item list). It can be communicated on an informal way (phone, email, direct verbal communication etc.) or formally, if necessary. To ensure proper recording and traceability it will come up in the monthly report next following the first occurrence and be discussed/ tracked in regular progress meetings until being closed which will be declared in mutual agreement.

## **7.4. CONTROLLING OF PROJECT SPECIFIC ISSUES, DEFICIENCIES AND NON-CONFORMANCES**

The project specific issue and deficiency controlling is specified for two periods: (a) from project beginning until SAT completion period and (b) after the SAT completion until end of warranty period.



---

#### 7.4.1. PROBLEM/ DEFICIENCY REPORT (PDR)

Applicability: The PDR is used for problems/deficiencies or technical issues in the project period from project beginning until SAT completion. Furthermore all deviations from the contractual documents are handled by PDRs, including Technical Specification SP-E rev.0, if not requiring contract amendments (to be mutually agreed). Both sides, i.e. NEK and Contractor can initiate a PDR for addressing problems/deficiencies, technical issues or deviations to the other party. In the PDR it is shown by whom it was initiated.

If a technical issue and/or problem/deficiency are discovered by Contractor or its subcontractors, Contractor internally uses its standard issue reporting and issue resolution/disposition tools. These are described in the PQP. In case a PDR needs to be issued to NEK, the internal form will not be attached to the PDR but its content will be entered in respective PDR fields and send to NEK officially. Contractor is permitted to hide proprietary/confidential information.

In case that NEK detects a technical issue or problem/deficiency, it is reported to Contractor using the same PDR form with the only difference that it will be identified in the document head that it is initiated by NEK. Respectively NEK is author of included comments. For tracking purposes, the PDR form will have its unique PDR number and priority assignment. Numbering will be consecutively regardless by whom it was initiated. The basic workflow outlined as shown below applies.

Basic workflow for PDR, e.g. initiated by NEK:

- Detection of problem/deficiency or technical issue or other deviation
- Rating (priority, A,B,C or D)
- Communicating to Contractor responsible
- Confirmation of reception to be sent to NEK
- Assigning capable personnel for resolving Contractor
- Including issue in the "Action item list" with category PDR, due date according to priority Contractor
- Workflow for PDR to be followed (share-point workflow: message, confirmation, status reporting). Contacting NEK personnel if necessary for resolution.
- Starting related Contractor internal quality workflows (such as PCM depending on issue, please see PQP)
- Follow up until resolution. Quality –controlled documentation
- Communication in Project reports.



PDR Priority	Required response time	Sender	Receiver at Contractor	Communication (all to be applied)	AIL priority
A	< 2 days	NEK PM	XXXX	Email with high priority Phone-call (reaching one of the receivers personally) Formal letter (sent or handed over)	High
B	< 5 working days			Email with high priority Phone-call (reaching one of the receivers personally) Formal letter (sent or handed over)	High
C	< 2 wks			Email with normal priority Formal letter (sent or handed over)	Normal
D	< 4 wks			Email with normal priority Formal letter (sent or handed over)	Normal

#### Enclosure 11: PDR priorities and handling

The following are the available priority assignments:

**PDR Priority A:** The issue needs urgent (within two days as maximum) response from Contractor/NEK technical personnel. System performance is degraded and ongoing (test) activity cannot be completed or the tasks that were planned to follow cannot be executed.

**PDR Priority B:** The issue needs prompt response (within five working days as maximum). Considering some plan adjustments and rescheduling, part of the planned and scheduled work can be continued but not with the full system performance and not with the full system functionality as designed. If the issue is not resolved within the available time, (FAT & SAT) activities will have to be rescheduled for some another time.

**PDR Priority C:** The identified issue has no influence on ongoing activities and no influence on scope of work that is in progress. However, the system demonstrates obvious technical issue or deficiency that has to be resolved. The major part of problems, deviations and/or deficiencies that would belong to this priority group that are issues related to the manufacture and or assembly of the generator and related components. The appropriate time window for resolution of problems / deficiencies from the Priority 3 group is up to two weeks.

**PDR Priority D:** Minor issues that do not affect system functionality and system performance (equipment, cable, materials, inconsistencies in non-essential documentation). Those problems, deviations and/or deficiencies cannot be seen by the NEK operators. The problem resolution should be achieved within 4 weeks.

All PDR's of priority 1 and 2 shall be closed while small number of the lower priority (3 & 4) PDRs (less than twenty) may still be open before taking-over the unit by NEK and starting the warranty period.



#### 7.4.2. SYSTEM PERFORMANCE / WARRANTY ACTION REQUEST (SPWAR)

The SPWAR is used for all respective issues coming up between SAT completion and end of Warranty period, i.e. project phase-groups E (please see paragraph 7.4.1 Problem/ Deficiency Report (PDR)).

For any technical issues and/or deficiencies in the works subject to warranty service discovered by NEK during the warranty period, NEK uses the form SPWAR provided in Attachment 5: System performance / Warranty Action Request (SPWAR), page I, to capture such findings. For tracking purposes, the SPWAR form will have its unique SPWAR number and priority assignment. The available priority assignments are shown in 7.4.1, (please compare PDR).

SPWAR Priority	Required response time	Sender	Responsible Persons at <i>Contractor</i>	Modalities	AIL priority
A	< 2 days	NEK PM	XXXXXX	Unit performance seriously degraded or system inoperable	High
B	< 5 working days			Unit performance below design requirements and/ or part of the unit unavailable	High
C	no later than next maintenance outage			System performance/ functionality not significantly affected. Minor adjustments required.	Normal
D	< 4 wks			All minor issues that do not affect system functionality/ performance. Not visible for NEK operators / maintenance personnel	Normal

Enclosure 12: SPWAR Priorities and modalities

#### 7.4.3. NONCONFORMING PRODUCT

Handling of nonconforming products and related procedures are included or respectively referenced in the PQP.

## 8. PROJECT CHANGE MANAGEMENT

### 8.1. CONTROL OF DESIGN AND DEVELOPMENT CHANGES

All changes of the contractual requirements triggered by NEK are performed according to the Contract Section XXX. For those triggered by Contractor section XXX applies.

No.	Action	Responsibility
SCOPE IDENTIFIED IN ADVANCE OF OUTAGE		
1	Identify scope change which is outside of the existing contract.	NEK + Contractor
2	Agree on scope to be quoted by Contractor and DOR	NEK + Contractor
3	Submit offer for additional scope to be provided	Contractor
4	Review offer and provide feedback to Contractor	NEK
5	Finalize scope, schedule, DOR and final price of additional scope	NEK + Contractor
6	Issue contract modification to Contractor for additional scope	NEK
7	Contractor to provide scope as defined in the contract change modification	Contractor
SCOPE IDENTIFIED DURING OUTAGE		
1	Identify scope change which is outside of the contract scope of supply	NEK + Contractor
2	Agree on scope to be quoted by Contractor and DOR	NEK + Contractor
3	Provide budget estimate for the work to be performed	Contractor
4	NEK to sign authorization for extra work to be performed	NEK
5	Perform work as needed to prevent adverse effects to the outage schedule.	Contractor
6	Provide finalized offer to NEK for work performed	Contractor
7	Issue contract modification to Contractor for additional work performed	NEK

#### Enclosure 13: Division of responsibility on scope changes



No.	Action	Responsibility
SCOPE IDENTIFIED IN ADVANCE OF OUTAGE		
1	Identify scope change which is outside of the existing contract.	NEK + Contractor
2	Agree on scope to be quoted by Contractor and DOR	NEK + Contractor
3	Submit offer for additional scope to be provided	Contractor
4	Review offer and provide feedback to Contractor	NEK
5	Finalize scope, schedule, DOR and final price of additional scope	NEK + Contractor
6	Issue contract modification to Contractor for additional scope	NEK
7	Contractor to provide scope as defined in the contract change modification	Contractor
SCOPE IDENTIFIED DURING OUTAGE		
1	Identify scope change which is outside of the contract scope of supply	NEK + Contractor
2	Agree on scope to be quoted by Contractor and DOR	NEK + Contractor
3	Provide budget estimate for the work to be performed	Contractor
4	NEK to sign authorization for extra work to be performed	NEK
5	Perform work as needed to prevent adverse effects to the outage schedule.	Contractor
6	Provide finalized offer to NEK for work performed	Contractor
7	Issue contract modification to Contractor for additional work performed	NEK

Enclosure 13: Division of responsibility on scope changes shows the workflows for changes on design and development. Workflow starts with the identification of the matter and respective necessity. Different activities have to be performed by NEK or/and Contractor to reach the final contractual fixed change as outlined in above show table.

## 9. QUALITY ASSURANCE

The QA and QC approach is described according to applicable sections in SP-E and applicable sections in QS 610 from NEK in the separate PQP (Project Quality Plan) for the project. The Project Quality Plan is briefly described in 4.2, p. 6. In some areas property rights from Contractor have to be regarded, especially for some detailed technical procedures which will be addressed in the PQP. Contractor standard procedures will not be changed. To ensure project specific implementation, work packages which are basis for processing activities related to procedures may be changed.

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There are three major QSTs for the project which are applicable on: (a) Phases 1,2,3,4, i.e. from design and manufacturing until end of transport (b) for Assembly at site (Krsko NPP) and lifting, which are Phase 5 and 6 and (c) for Installation and commissioning.

The part of the PQP for installation and commissioning requires detailed work-packages and work-plans which are to be developed according to document delivery schedule (please see section 11, page 21). Therefore this part of the PQP is only crucially covered at the project start. A list of testing procedures from **Contractor** is being administrated and updated during the project. To each procedure, its number, title, revision and owner are displayed.

## **10. SITE WORK**

### **10.1. PLANNING**

For planning of site work work-packages, work-plans and a respective outage are issued according to the document delivery schedule.

### **10.2. LOGISTICS**

The amount of new equipment, materials and personnel, as well as old equipment handling during the project, requires close cooperation between **Contractor's** site management/logistics personnel with NEK security and receiving personnel.

Logistics coordination entails:

- receipt of equipment (forms, data, security issues etc.)
- development of the laydown plan
- pre-job set-up
- inspection and staging of material (tagging, protocols etc.)

Detailed workflows and interfaces will be identified in respective procedures. Since content of procedures is mostly confidential and intellectual property, contractual agreements on this matter apply. Confidential procedures could be looked at. Copies cannot be provided.

## **11. DOCUMENT DELIVERABLES AND TRANSMITTAL SCHEDULE**

### **11.1. DRAWING AND DOCUMENT NUMBERING SYSTEM**

Drawings and documents which are included in the DMP use the NEK DCM numbering system. Documents will also show **Contractor** document numbers in respective fields for document control and designation.



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## 11.2. DOCUMENT STATUS (CONTRACTOR)

- Preliminary release

Documents which are provided to NEK for review will have the status "preliminary release". This means that responsible **Contractor** personnel have approved the preliminary release to NEK.

- Final release

As soon as comments by NEK have been regarded and all issues are clarified/ solved, the documents will be sent to NEK for approval in the status of "final release". The highest status for documents which were commented and the very comments replied by **Contractor**, is final release.

- Approved for construction

After having received written approval, all applicable documents will get the status approved for construction. This applies for NEK and **Contractor** documents. Approval of documents is to be made visible by stamping the hardcopy of the document.

## 11.3. DOCUMENT REVIEW BY NEK

### 11.3.1. PROCESS

**Contractor** will provide documents for review in electronic form to NEK. With the goal to make review effective and efficient NEK accepts marked up drafts, which should however be self-explaining and adequate.

Documents which are provided to NEK by **Contractor** for review in the status of preliminary release should be returned to **Contractor** redlined, red-circled or anyhow highlighted with accompanying comments explaining the matter of concern and change request. NEK returns the transmittal sheet (please see) with respective remarks and assigns the NEK approval status to the document. NEK provides comments to **Contractor** documents in pdf files with the "commenting" function ("note" or "text box").

**Contractor** replies to comments using the "reply to" function directly assigned to the comment of NEK.

After a document was rejected, **Contractor** provides the next higher revision with NEK comments applied as well as the commented file with replies to the comments. The respective file shall be added a "\_c" after NEK incorporated comments and an additional "-r\_" when being replied by **Contractor**. Respective letters are added each time when commenting / replying is performed.

### 11.3.2. NEK APPROVAL STATUS

- Approval status "rejected"

This status constitutes that the provided document does not meet the contractual requirements as per NEK perspective.

- 
- Approval status "approved with comments"

If NEK has comments on provided documents, they can be "approved" with comments if the significance of the comments is low, i.e. not affecting **Contractor** procurement specifications negatively with regard to fulfillment of final contract requirements or in general not affecting schedule, costs and technical solution.

Respective comments shall be corrected by **Contractor** as soon as feasible and reasonable, but for sure well before issuing of the final DMP so that any aspects of the comments will be regarded. This document status constitutes that the content of the document is in compliance with the contractual requirement and justifies invoicing if an installment is associated with.

- Approval status "approved"

The final status constitutes that the document is in full compliance with contractual requirements. No further changes are needed on the document itself (however the document might have to be adopted during further processing within the DMP/ instruction book incorporation).

#### **11.4. DOCUMENT TRANSMITTAL SCHEDULE**

The applicable document transmittal schedule for the **Name of the project** is shown in SP-E **3.2. Attachment v page xx**.

#### **12. PROVISIONAL ACCEPTANCE PARAMETERS**

Respective parameters are provided in SAT procedure.



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## **13. ATTACHMENTS**

### **Attachment 1: List of subcontractors and potential subcontractors**

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## Attachment 2: Content of Project Reports

### Table of Contents

1	Overall status of the project.....	3
2	Outlook .....	3
3	Accomplishments since last Report.....	3
4	Potential negative impacts (technical, quality, management).....	3
5	Outlook and mitigation measures if required .....	3
6	Attachments.....	4
6.1	Action Item List.....	4
6.2	PDR status .....	6

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**Attachment 3: Project Schedule**



# Attachment 4: Problem/ Deficiency Report (PDR)

NUCLEAR POWER PLANT KRŠKO PROJECT



## PDR – Problem/Deficiency Report

PDR Number (nnn):	Priority (A-D):	Date of PDR Issue (dd/mm/yy):

Initiated by NEK ☐ / ☐

NEK/ <input type="checkbox"/> : PDR Issue
PROBLEM TITLE:
Affected Components:
Reference documents:

NEK/ <input type="checkbox"/> : Scenario Identification
Environment description and order of events that were predecessors to the problem appearance:
Identified by:

NEK/ <input type="checkbox"/> : Description of the Problem or Deficiency					
Problem/deficiency existence verified and approved by:	Date (dd/mm/yy):	Problem is repeatable:	YES <input type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>

<input type="checkbox"/> : Troubleshooting and Problem/Deficiency Root Cause Explanation	
Troubleshooting and Explanation Provided by:	Date (dd/mm/yy):

<input type="checkbox"/> : Corrective Action Proposal and Corrective Action Tracking Log and Tracking References	
Corrective Action Description:	
Corrective Action Performed by:	Date (dd/mm/yy):
<input type="checkbox"/> Track Changes	
References:	
Other Applicable Documentation References and Attachments:	

NEK: Resolution and/or Answer Acceptance	
NEK Comments:	
Accepted by:	Date (dd/mm/yy):

## Attachment 5: System performance / Warranty Action Request (SPWAR)

NUCLEAR POWER PLANT KRŠKO PROJECT



### SPWAR – System Performance/Warranty Action Request

SPWAR No. (nnn):	Priority (1-4):	SPWR Issue date (dd/mm/yy):

Form to be issued by NEK as problem reporting and problem resolution tracking tool during the generator warranty period

<b>NEK: SPWAR Issue</b>	
<b>PROBLEM TITLE:</b>	
Affected Components:	
Reference documents:	

#### NEK: Scenario Identification

Environment description and order of events that were predecessors to the problem appearance:

Identified by:

#### NEK: Description of the Problem or Deficiency

Problem/deficiency existence verified and approved by:	Date (dd/mm/yy):	Problem is repeatable:	YES <input type="checkbox"/>	NO <input type="checkbox"/>	N/A <input type="checkbox"/>
--	------------------	------------------------	---------------------------------	--------------------------------	---------------------------------

#### Contractor: Troubleshooting and Problem/Deficiency Root Cause Explanation

Troubleshooting and Explanation Provided by:	Date (dd/mm/yy):
--	------------------

#### Contractor: Corrective Action Description, Corrective Action Tracking Log and Tracking References

Corrective Action Description:

Corrective Action Performed by:	Date (dd/mm/yy):
---------------------------------	------------------

Contractor Track Changes References:

Other Applicable Documentation References and Attachments:

#### NEK: Resolution and/or Answer Acceptance

NEK Comments:

Accepted by:

Date (dd/mm/yy):

Template file: SPWAR.docx

Page 1 of 2

Contractor

PMM Attachments  
Page A-V



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**Attachment 6: Work-package content**

**WORK PACKAGE CONTENTS**

- Activity Identification Number(s)
- Technical Information
  - Drawings
  - Process specifications
  - Field procedures
  - Availability Information Bulletins (AIB's)
  - Operation and Maintenance Memos (OMM's)
  - Action Items List (AIL) = List of open points (LOP)
- Contingency Plans
- Special Tool Requirements
- Safety Requirements
- QA/QC Checklists - hold/verification points for work in progress
- Data Sheets - recording work performed and inspection findings
- Attachments - including special materials

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**Attachment 7: Transmittal Sheet**

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**Attachment 8: Document-Cover-Sheet**





**QC POROČILO :**

Številka poročila : QD4-RE16-044

Številka DN : 75786, 75825, 75824, 75821  
Sistem : MS  
Oznaka naprave : CROSSUNDER CEVOVODI  
Lokacija : TB-107  
Tip opreme : Cevovodi med H.P. turbino in MSR  
Oznaka linije : CROSSUNDER A, B, C D  
Varnostna oprema: NE

Datum : 09.10.2016

**INŠPEKCIJA CEVOVODA :**

Vzrok za inšpekcijo : - Trend obrabe zadnjih remontov / zadolžitev po ZKP 2016/65  
Stanje pred inšpekcijo : - Cevovod je obrabljen. Obrabe so lokalne.  
Obseg : - Crossunder cevovod – linije A, B, C, D (glej priloženo skico na strani 2)  
Aktivnosti : - Postavitev odrov, odstranitev izolacije (TO.VZST)  
- VT kontrola notranjosti  
- Merjenje debeline z ultrazvočnim merilcem (SKV-QC, Qtechna)

Oprema : - UT merilec PANAMETRICS 37 DL+ ; UT sonda D791( S/N : 682043)  
- Kontaktno sredstvo ZG-F (LOT: G 0830 F)  
Umerjanje opreme: - UT merilec PANAMETRICS 37 DL+ na :  
- STOPNIČASTI KALIBRIRNI BLOK (S/N: 362.6296.0)  
Verifikacija umerjanja: - KALIBRACIJA USTREZA : DA ☒ NE ☐

Izvedba kalibracije : - Vili Knez PODPIS :  DATUM: 09.10.2016 7h

Reference : - QD-4 ; QCP-9.445

Opis / ugotovitve : Izvedena je bila UT inšpekcija crossunder cevovodov. Nominalna debelina cevovoda je 20mm. Dogovorjena meja sprejemljivosti znaša 14mm. Ugotovljenih je bilo 12 lokacij, ki so pod mejo sprejemljivosti. Minimalne debeline po posameznih linijah : CUP-A: 12,77 mm, 9,75mm, 13,90mm. CUP-B: 13,90, 13,60mm. CUP-C: 13,85 mm, 9,13mm. CUP-D: 10,95mm, 13,55mm, 13,27mm, 13,94mm, 6,90mm. Za natančne rezultate glej skice in tabele.

Stanje po inšpekciji : SPREJEMLJIVO ☐ SPREJEMLJIVO S KOMENTARJEM ☐ NI SPREJEMLJIVO ☒

Zaključek : Za vse obrabe, ki so pod mejo sprejemljivosti, se predlaga sanacija z navarjanjem, kot se je to izvajalo že v prejšnjih remontih. Glej grafične priloge.

UT meritve izvedel : Vili Knez

Podpis: 

Datum : 09.10.2016

Poročilo pripravil : Damjan Četrtrič

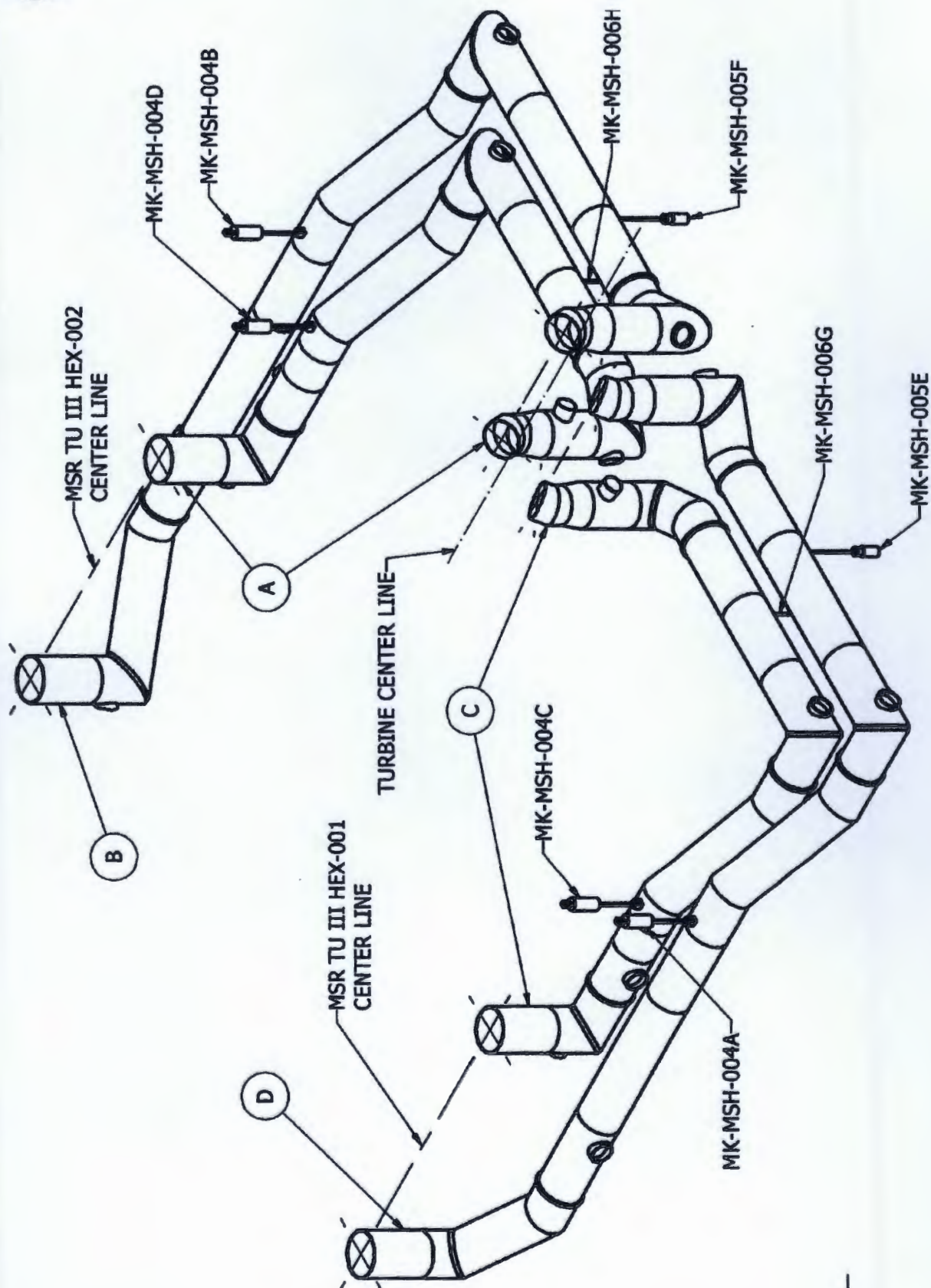
Podpis: 

Datum : 09.10.2016



## QC POROČILO :

Lokacije / oznake posameznih linij (A, B, C, D):



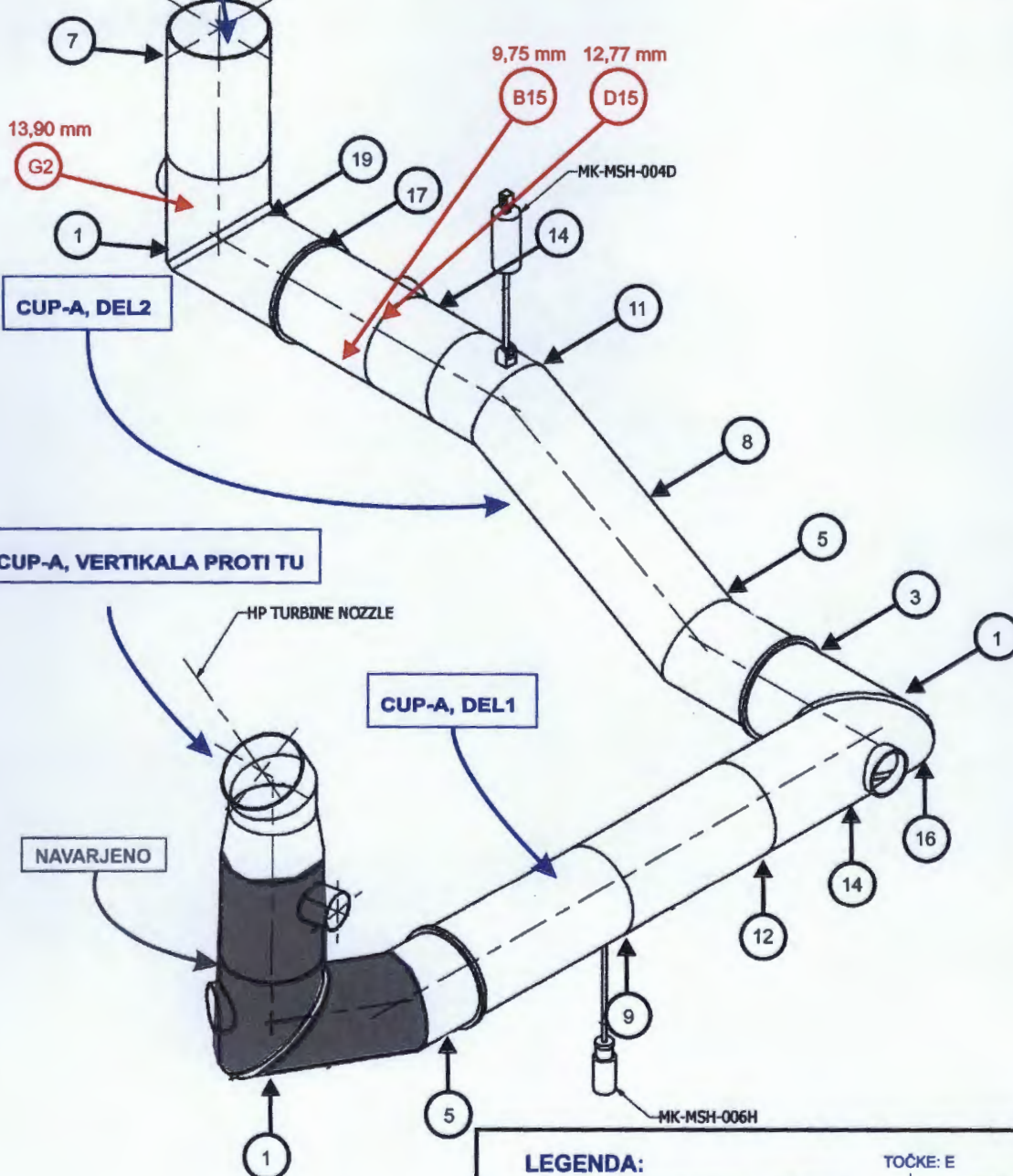




CUP-A, VERTIKALA PROTI MSR

MSR TU III HEX-002 NOZZLE

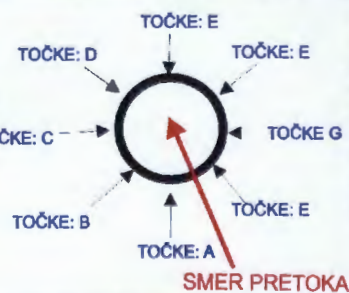
## CROSS UNDER A Remont 2016



### LEGENDA:

Meritve so se izvajale v smeri pretoka, z razmakom 0,5m in osmimi točkami po obodu (A-H). Na skici so le nekatere točke za lažjo orientacijo in kritične meritve (označene z rdečo).

1 lokacija vzdolžne koordinate







**Meritve na CUP-A ; Del 1 :**

	A	B	C	D	E	F	G	H	Min	Max	Delta	Avg	Dev
U/S MAIN	1	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
	2	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
	3	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
	4	17.56	17.56	19.45	19.02	18.47	23.00	17.76	16.57	23.00	6.43	18.67	1.97
	5	15.77	18.91	19.34	20.00	20.00	20.00	19.63	15.77	20.00	4.23	19.15	1.42
	6	20.00	20.00	20.00	20.00	20.00	20.00	16.82	16.82	20.00	3.18	19.60	1.12
	7	15.88	18.21	20.00	18.02	18.95	20.00	18.44	16.22	20.00	4.12	18.22	1.53
	8	18.08	16.84	18.25	16.90	18.90	20.00	18.91	16.72	20.00	3.28	18.08	1.19
	9	20.00	17.43	20.00	16.90	17.94	16.84	17.90	16.45	20.00	3.55	17.93	1.38
	10	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
	11	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
	12	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
	13	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
	14	20.00	16.31	16.91	17.43	16.41	15.81	15.84	15.85	20.00	4.19	16.82	1.41
	15	18.08	20.00	20.00	20.00	20.00	17.61	17.26	16.58	20.00	3.42	18.93	1.50
	16	20.00	20.00	20.00	18.68	16.62	15.56	17.83	17.83	20.00	4.44	18.32	1.67

**Meritve na CUP-A ; Del 2 :**

	A	B	C	D	E	F	G	H	Min	Max	Delta	Avg	Dev
U/S MAIN	1	15.04	16.81	16.68	16.77	20.00	20.00	14.73	14.73	20.00	5.27	17.90	2.35
	2	17.88	16.81	18.72	17.80	18.20	18.80	20.00	16.81	20.00	3.19	19.11	1.05
	3	20.00	20.00	18.36	20.00	20.00	20.00	14.45	14.45	20.00	5.55	18.90	1.94
	4	20.00	20.00	20.00	15.40	20.00	16.40	20.00	15.40	20.00	4.60	18.98	1.81
	5	15.56	20.00	20.00	20.00	20.00	20.00	17.68	15.56	20.00	4.44	19.15	1.66
	6	20.00	20.00	20.00	20.00	20.00	20.00	16.00	15.22	20.00	4.78	18.90	2.04
	7	15.23	20.00	20.00	20.00	20.00	20.00	18.17	15.23	20.00	4.77	18.86	1.77
	8	20.00	20.00	20.00	20.00	20.00	20.00	17.81	17.48	20.00	2.52	19.41	1.09
	9	20.00	20.00	20.00	20.00	20.00	20.00	18.91	16.21	20.00	3.79	19.39	1.34
	10	20.00	20.00	20.00	20.00	20.00	20.00	18.35	16.20	20.00	3.80	19.32	1.39
	11	20.00	20.00	20.00	20.00	20.00	20.00	17.91	16.39	20.00	3.61	19.29	1.38
	12	20.00	15.49	16.66	17.45	18.88	15.85	18.04	15.49	20.00	4.51	18.05	1.84
	13	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
	14	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
	15	14.43	9.75	16.62	12.77	17.43	17.36	16.11	9.75	17.43	7.68	15.05	2.65
	16	20.00	16.12	17.86	20.00	20.00	17.52	17.24	16.12	20.00	3.88	18.60	1.49
	17	20.00	17.29	16.70	20.00	20.00	16.96	16.20	16.20	20.00	3.80	17.96	1.72
	18	20.00	20.00	20.00	20.00	18.10	19.63	20.00	18.10	20.00	1.90	19.72	0.67
	19	20.00	20.00	18.25	18.25	20.00	20.00	20.00	18.25	20.00	1.75	19.51	0.79
	20	20.00	18.44	18.13	20.00	20.00	17.31	20.00	17.31	20.00	2.69	19.51	0.94

**Meritve na CUP-A vertikalna proti MSR :**

	A	B	C	D	E	F	G	H	Min	Max	Delta	Avg	Dev
U/S MAIN	1	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
	2	20.00	20.00	20.00	20.00	20.00	20.00	13.90	13.90	20.00	6.10	19.07	2.14
	3	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.23	20.92	0.69	20.73	0.30
	4	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.14	20.38	0.24	20.19	0.08
	5	20.00	20.00	20.00	20.00	20.00	20.00	20.00	19.87	20.00	0.13	19.90	0.04
	6	20.00	20.00	20.00	20.00	20.00	20.00	20.00	19.86	19.90	0.04	19.88	0.02
	7	20.00	20.00	20.00	20.00	20.00	20.00	20.00	19.89	20.12	0.23	19.95	0.08



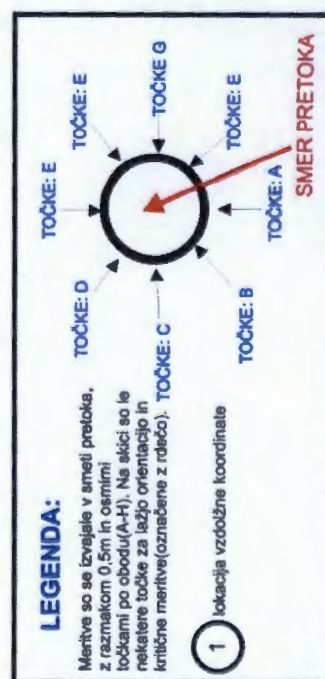
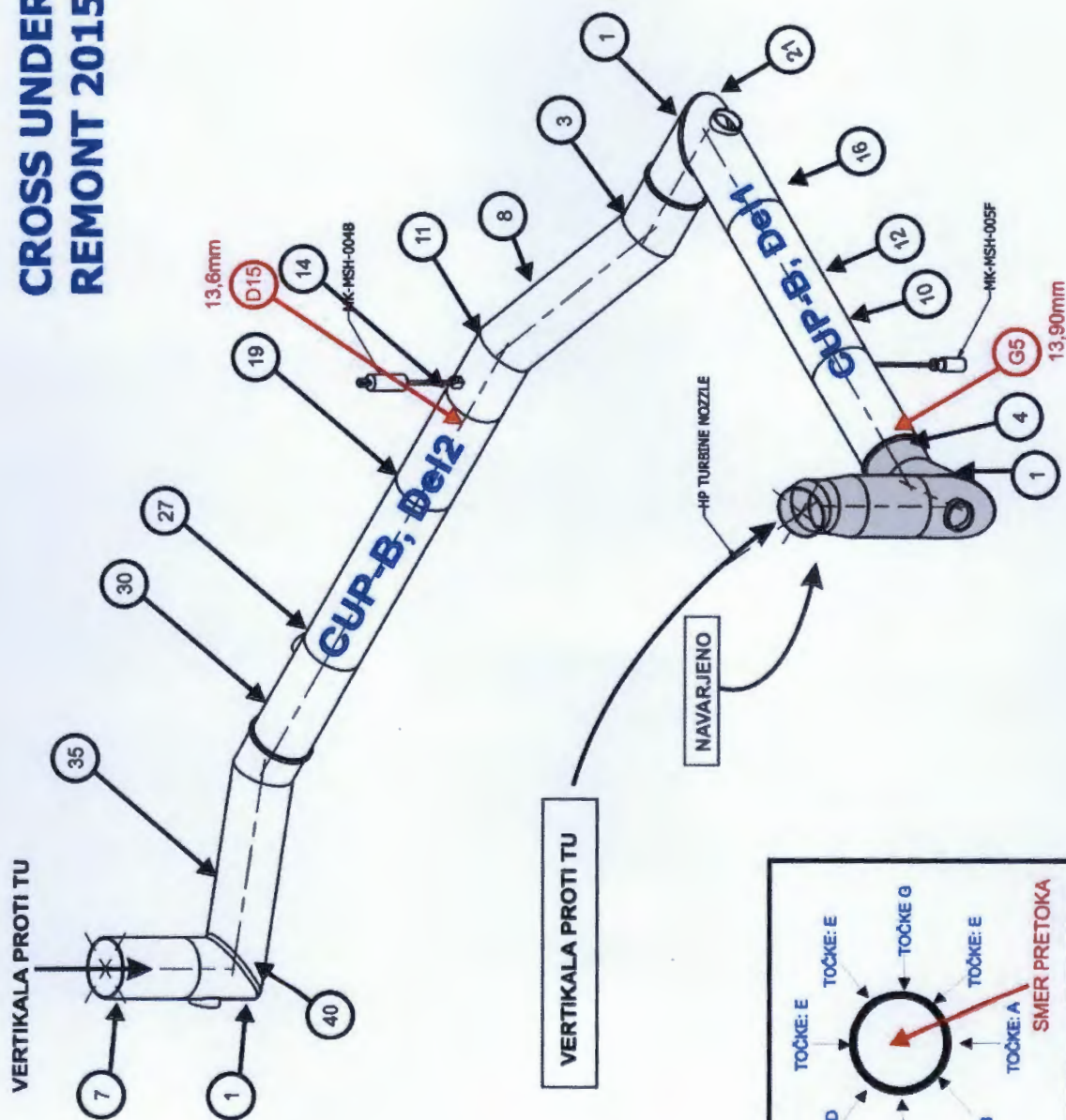
## Obrabe crossunder linije CUP-A :







## CROSS UNDER B REMONT 2015







## Meritve na CUP-B ; Del 1 :

	A	B	C	D	E	F	G	H	Min	Max	Delta	Avg	Dev
1	24.34	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	24.34	1.34	23.17	0.47
2	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
3	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
4	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
5	17.40	18.80	17.82	17.77	13.99	15.05	18.87	17.83	13.99	18.87	4.88	17.20	1.75
6	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
7	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
8	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
9	20.41	20.73	20.37	20.73	20.73	20.73	20.73	20.73	20.41	20.73	0.10	20.73	0.03
10	18.83	20.00	20.00	20.00	17.80	18.16	20.00	20.00	17.80	20.00	2.20	19.47	0.93
11	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
12	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
13	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
14	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
15	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
16	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
17	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
18	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
19	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
20	16.52	17.31	20.00	20.00	20.00	20.00	16.25	16.52	16.25	20.00	3.75	18.25	1.75
21	17.79	18.99	20.00	20.00	18.73	20.00	20.00	20.00	17.79	21.05	3.26	19.56	1.08

## Meritve na CUP-B ; Del 2 :

	A	B	C	D	E	F	G	H	Min	Max	Delta	Avg	Dev
1	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
2	17.65	20.00	20.00	20.00	20.00	20.00	20.00	20.00	17.65	20.00	2.35	19.71	0.83
3	20.00	18.00	15.70	17.87	18.67	16.34	17.62	17.52	15.70	20.32	4.62	17.86	1.46
4	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
5	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
6	17.41	20.00	20.00	20.00	20.00	20.00	20.00	20.00	17.41	20.35	2.94	19.54	0.95
7	17.81	20.00	20.00	20.00	20.00	20.00	20.00	20.00	17.81	20.00	2.09	19.15	0.88
8	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
9	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
10	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
11	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
12	18.55	18.17	14.92	20.00	18.78	16.09	15.36	18.64	14.92	20.00	5.08	17.56	1.85
13	20.00	20.00	20.00	20.00	18.73	16.86	17.67	20.00	16.86	20.00	3.14	19.16	1.27
14	20.00	20.00	20.00	20.00	20.00	16.41	16.54	20.00	16.41	20.00	3.59	19.12	1.63
15	17.08	16.60	16.46	13.63	18.46	20.00	18.89	18.93	13.63	20.00	6.37	17.60	2.00
16	18.39	16.79	20.00	20.00	20.00	20.00	20.00	20.00	16.79	20.00	3.21	19.19	1.22
17	18.18	20.00	20.00	20.00	20.00	20.00	20.00	20.00	18.07	20.00	1.93	19.53	0.87
18	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
19	20.00	16.60	16.49	18.27	18.41	18.84	18.84	20.00	16.49	20.00	3.51	18.52	1.38
20	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
21	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
22	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
23	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
24	20.00	18.41	16.95	15.44	16.94	16.37	16.94	15.76	15.76	20.00	4.24	17.59	1.49
25	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
26	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
27	15.95	16.83	16.56	16.05	16.63	15.93	15.99	18.43	15.99	18.43	2.84	16.50	0.89
28	20.00	20.00	20.00	20.00	20.00	14.86	14.80	17.08	14.80	20.00	5.20	18.34	2.39
29	17.12	20.00	20.00	20.00	20.00	20.00	20.00	20.00	17.12	20.00	2.88	19.46	1.07
30	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
31	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
32	16.40	18.97	18.38	16.46	18.94	18.38	18.76	18.86	16.40	19.65	3.25	18.43	1.27
33	18.35	18.88	17.77	20.00	20.00	18.36	20.00	20.00	18.35	20.00	1.65	19.37	0.75
34	20.00	20.00	20.00	20.00	20.00	18.33	15.38	20.00	15.38	20.00	4.62	19.21	1.66
35	20.00	20.00	20.00	20.00	20.00	18.45	20.00	20.00	18.45	20.00	1.55	19.61	0.55
36	20.00	20.00	18.05	20.00	20.00	20.00	20.00	20.00	18.05	20.00	1.95	19.67	0.70
37	18.30	20.00	18.24	18.76	18.40	16.39	16.95	20.00	16.39	20.00	3.61	18.38	1.28
38	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
39	20.00	20.00	17.81	20.00	18.06	17.89	20.00	20.00	17.81	20.00	2.19	19.22	1.08
40	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00



### Meritve na CUP-B vertikalni proti MSR :

	A	B	C	D	E	F	G	H	Min	Max	Delta	Avg	Dev
1									18.80	20.00	1.20	19.85	0.42
2									20.00	20.00	0.00	20.00	0.00
3	16.76		16.03	15.40					15.40	20.00	4.60	18.31	1.98
4									20.00	20.00	0.00	20.00	0.00
5									20.00	20.00	0.00	20.00	0.00
6									20.00	20.00	0.00	20.00	0.00
7	32.23	32.23	32.23	32.23	32.23	32.23	32.23	32.23	32.23	32.23	0.00	32.23	0.00

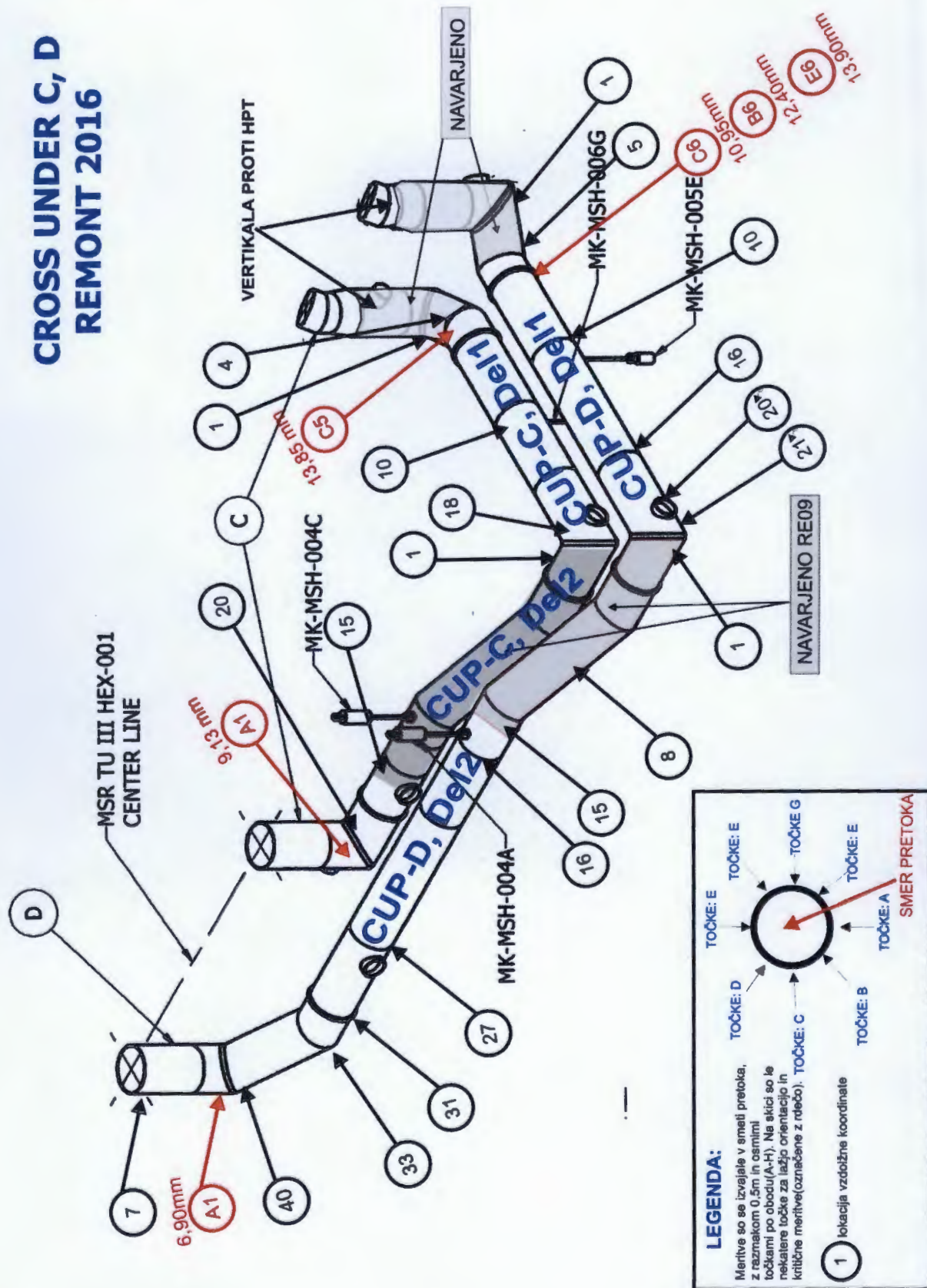
### Obrabe crossunder linije CUP-B :







# CROSS UNDER C, D REMONT 2016







## Meritve na CUP-C ; Del 1 :

	A	B	C	D	E	F	G	H	Min	Max	Delta	Avg	Dev
1	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
2	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
3	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
4	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
5	16.33	16.53	13.87	20.00	15.61	18.78	19.30	17.83	13.87	20.00	6.13	17.41	1.98
6	15.27	20.00	20.00	20.00	18.09	18.93	17.88	14.78	14.78	20.00	5.22	18.12	2.09
7	17.47	16.38	16.15	16.75	15.25	17.86	17.26	17.97	15.25	17.97	2.72	16.89	0.93
8	18.56	16.60	16.91	17.53	17.67	18.25	18.67	17.67	16.60	18.67	2.07	17.77	0.74
9	17.26	17.07	16.87	17.70	17.65	18.00	18.00	17.75	16.87	20.00	3.13	17.92	1.07
10	18.39	17.51	20.00	20.00	20.00	20.00	20.00	20.00	17.51	20.00	2.49	19.49	0.98
11	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
12	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
13	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
14	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
15	17.24	16.60	16.78	16.78	20.00	16.82	17.01	17.81	16.60	20.00	3.40	17.38	1.12
16	20.00	16.12	18.06	18.74	20.00	20.00	20.00	19.38	16.12	20.00	3.88	18.92	1.33
17	20.00	20.00	15.91	20.00	20.00	16.94	20.00	20.00	15.91	20.00	4.09	19.11	1.68
18	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00

## Meritve na CUP-C ; Del 2 :

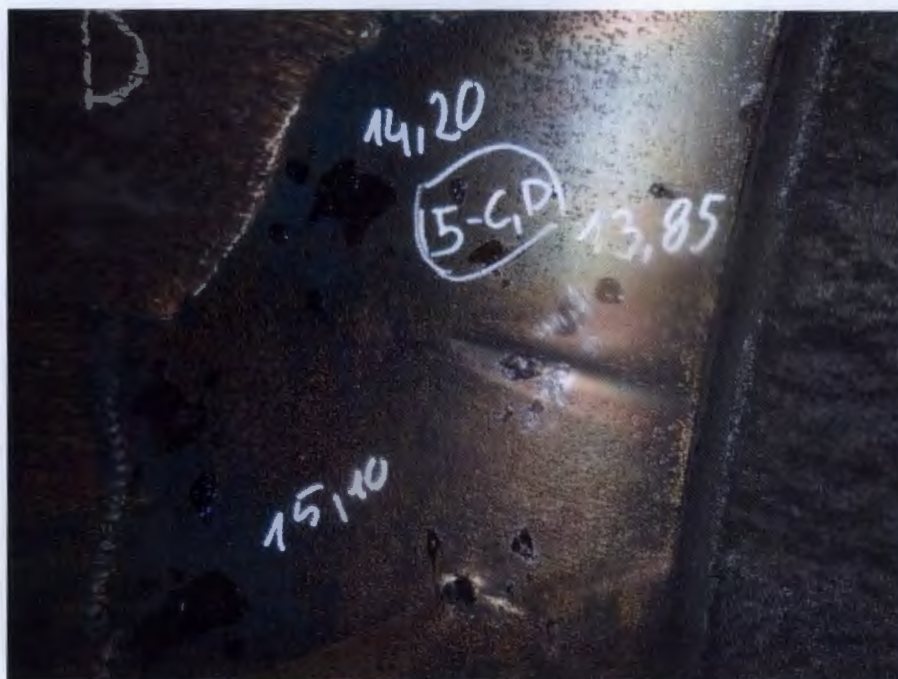
	A	B	C	D	E	F	G	H	Min	Max	Delta	Avg	Dev
1	22.21	22.21	22.21	22.21	22.21	22.21	22.21	22.21	22.21	22.26	0.05	22.22	0.02
2	22.21	22.21	22.21	22.21	22.21	22.21	22.21	22.21	22.21	22.23	0.02	22.21	0.01
3	24.32	24.32	24.32	24.32	24.32	23.00	24.32	24.32	23.00	24.32	1.32	24.16	0.47
4	23.00	24.32	24.32	23.00	24.32	23.00	24.32	24.32	23.00	24.32	1.32	23.83	0.68
5	24.32	24.32	24.32	23.00	24.33	24.33	23.00	24.32	23.00	24.33	1.33	23.99	0.61
6	24.32	24.33	23.00	24.32	24.32	24.33	23.00	24.33	23.00	24.33	1.33	23.99	0.61
7	24.32	24.33	24.32	23.00	24.32	23.00	22.04	22.01	22.04	24.33	2.29	23.51	0.92
8	22.03	22.04	22.03	22.03	22.03	22.03	22.03	22.03	22.03	22.06	0.03	22.05	0.01
9	22.03	22.06	22.06	22.06	22.06	22.06	22.06	22.07	22.03	22.07	0.04	22.06	0.01
10	22.07	22.06	22.06	22.06	22.11	22.07	22.06	22.07	22.05	22.12	0.07	22.07	0.02
11	22.07	22.06	22.07	22.06	22.06	22.06	22.07	22.07	22.06	22.07	0.01	22.06	0.01
12	22.07	22.06	22.06	22.07	22.06	22.07	22.07	22.07	22.05	22.08	0.03	22.07	0.01
13	22.07	22.07	22.07	22.07	22.06	22.10	22.09	22.08	22.06	22.10	0.04	22.08	0.01
14	22.08	22.08	22.08	22.07	22.08	22.09	22.07	22.08	22.07	22.09	0.02	22.08	0.01
15	22.08	22.11	22.17	22.16	22.18	22.18	22.18	22.18	22.08	22.17	0.09	22.15	0.03
16	18.63	18.93	18.93	18.99	18.41	18.83	18.44	18.13	18.13	19.49	1.36	18.91	0.40
17	16.46	18.62	16.24	16.25	18.54	17.62	18.99	16.39	16.24	18.99	2.75	17.39	1.19
18	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
19	23.00	23.00	18.08	18.80	17.19	17.82	18.05	18.07	15.80	23.00	7.20	18.88	2.66
20	19.02	20.00	20.00	20.00	20.00	20.00	20.00	20.00	19.02	20.00	0.98	19.88	0.35

## Meritve na CUP-C ; vertikalni cevovod proti MSR :

	A	B	C	D	E	F	G	H	Min	Max	Delta	Avg	Dev
1	9.13	20.00	20.00	20.00	20.00	20.00	20.00	20.00	9.13	20.00	10.87	18.64	3.84
2	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
3	17.51	16.44	16.42	16.86	18.76	18.83	17.80	20.00	16.42	20.00	3.58	17.83	1.28
4	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
5	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
6	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
7	31.84	31.94	31.95	31.95	31.95	31.95	31.95	31.95	31.84	31.95	0.11	31.93	0.04



Obrabe crossunder linije CUP-C :







## Meritve na CUP-D ; Del 1 :

	A	B	C	D	E	F	G	H	Min	Max	Delta	Avg	Dev
1	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
2	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
3	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
4	23.67	23.45	23.45	23.48	23.49	23.49	23.50	23.51	23.45	23.67	0.22	23.50	0.07
5	23.50	17.63	19.12	18.43	19.17	16.55	18.25	18.73	16.55	23.50	6.95	19.05	2.02
6	16.72	13.55	10.95	13.27	16.86	13.94	18.92	18.74	10.95	18.92	7.97	15.37	2.86
7	16.95	17.40	20.25	16.63	20.00	20.00	18.56	16.18	16.18	20.00	3.82	18.22	1.63
8	17.59	17.19	20.00	17.29	18.21	18.12	18.40	18.59	17.19	20.00	2.81	18.17	0.90
9	18.45	18.46	17.17	17.02	18.32	16.93	16.43	15.63	15.63	18.46	2.83	17.30	1.03
10	20.00	20.00	20.00	16.92	17.01	16.95	17.30	17.24	16.92	20.00	3.08	18.19	1.51
11	16.59	20.00	20.00	20.00	20.00	20.00	20.00	20.00	16.59	20.00	3.41	19.57	1.21
12	20.00	20.00	20.00	19.99	20.22	20.00	20.00	20.00	19.98	20.22	0.24	20.02	0.08
13	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
14	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
15	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
16	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
17	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
18	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
19	20.25	20.25	20.25	18.62	20.00	20.00	20.00	20.00	18.62	20.32	1.70	19.94	0.55
20	19.12	17.63	20.00	20.00	20.00	19.25	19.32	19.04	19.04	20.00	0.96	19.53	0.42
21	17.27	17.32	20.00	20.00	20.00	20.00	20.00	20.00	17.27	20.00	2.73	19.32	1.25

## Meritve na CUP-D ; Del 2 :

	A	B	C	D	E	F	G	H	Min	Max	Delta	Avg	Dev
1	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
2	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
3	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
4	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
5	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
6	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
7	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
8	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
9	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
10	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
11	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
12	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
13	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.00	0.00	23.00	0.00
14	23.00	23.00	23.00	23.00	23.00	23.00	23.00	23.82	23.00	23.82	0.82	23.10	0.29
15	17.00	15.60	17.79	18.62	18.49	14.71	13.86	14.28	13.86	18.49	4.63	16.08	1.78
16	16.21	23.00	23.00	20.00	20.00	20.00	18.90	14.12	14.12	23.00	8.88	19.40	3.05
17	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
18	15.19	15.20	20.00	20.00	20.00	20.00	20.00	15.64	15.19	20.00	4.81	18.75	2.08
19	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
20	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
21	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
22	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
23	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
24	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
25	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
26	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
27	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
28	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
29	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
30	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
31	14.71	18.75	20.00	20.00	20.00	18.54	18.49	17.28	14.71	19.91	5.20	18.23	2.04
32	20.00	20.00	20.00	20.00	16.43	18.37	17.78	17.75	17.75	20.00	2.25	19.04	1.05
33	20.00	18.40	16.46	20.00	20.00	20.00	20.00	20.00	16.46	20.00	3.54	19.29	1.27
34	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
35	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
36	20.00	20.00	17.12	18.25	20.00	18.56	18.32	20.00	17.12	20.24	3.12	19.52	1.02
37	20.00	20.00	20.00	16.66	18.73	16.17	18.74	20.00	16.17	20.24	4.07	18.82	1.60
38	20.00	20.00	20.00	17.83	17.63	20.00	20.00	20.00	17.63	20.00	2.37	19.43	1.05
39	20.00	20.00	20.00	16.56	17.04	20.00	20.00	20.00	16.56	20.00	3.44	19.20	1.49
40	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00





### Meritve na CUP-D ; vertikalni cevovod proti MSR :

	A	B	Off Center C	D	E	F	G	H	Min	Max	Delta	Avg	Dev
1	6.98	20.00	20.00	20.00	20.00	20.00	20.00	20.00	6.98	20.00	13.02	18.37	4.60
2	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
3	20.00	20.00	20.00	17.96	18.39	14.16	17.08	16.65	14.16	20.00	5.84	18.03	2.05
4	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
5	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
6	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00
7	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	20.00	0.00	20.00	0.00

### Obrabe crossunder linije CUP-D :



**NEK**

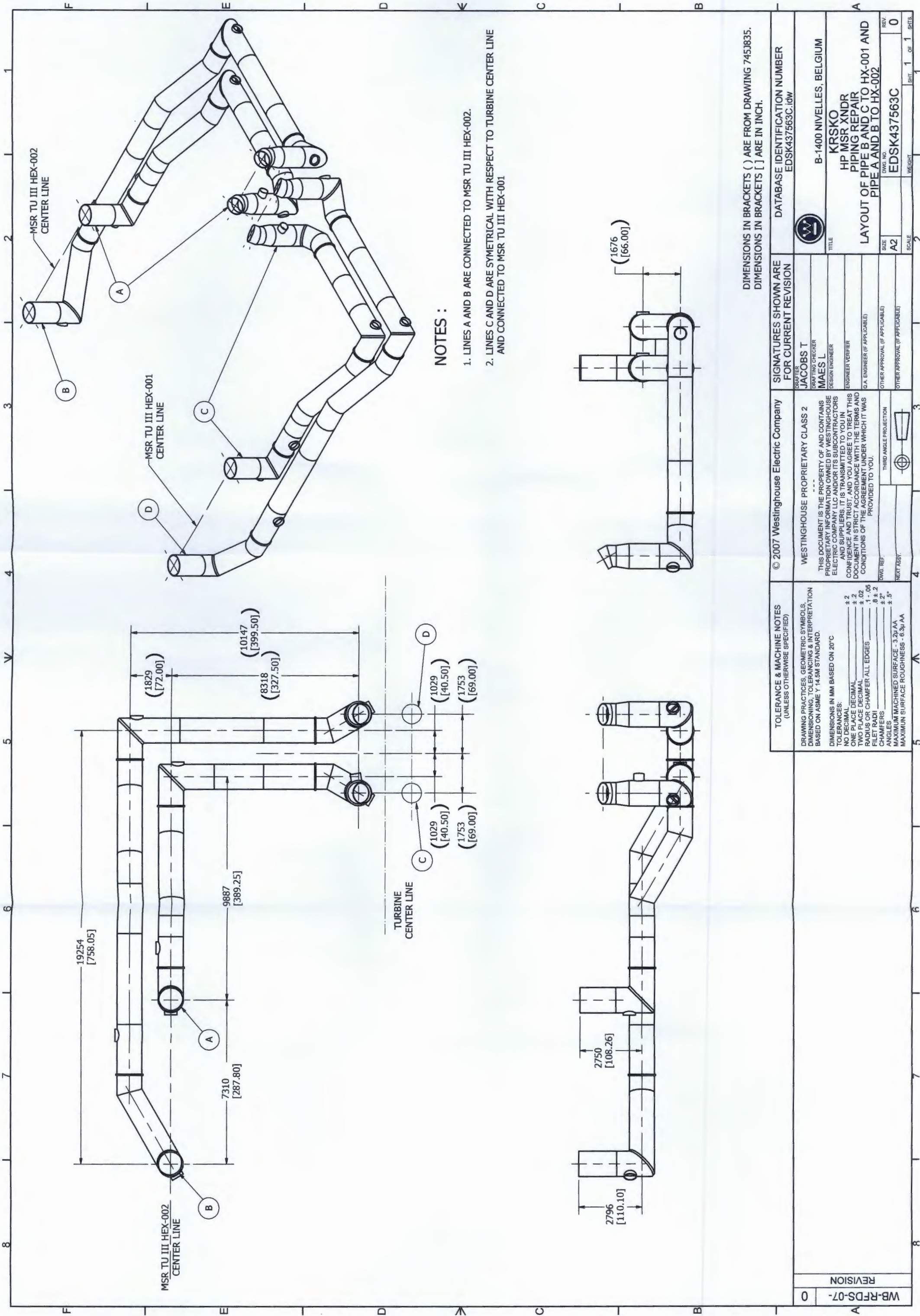
**SKV-QC**

**KSD / 06**

**QC POROČILO :**



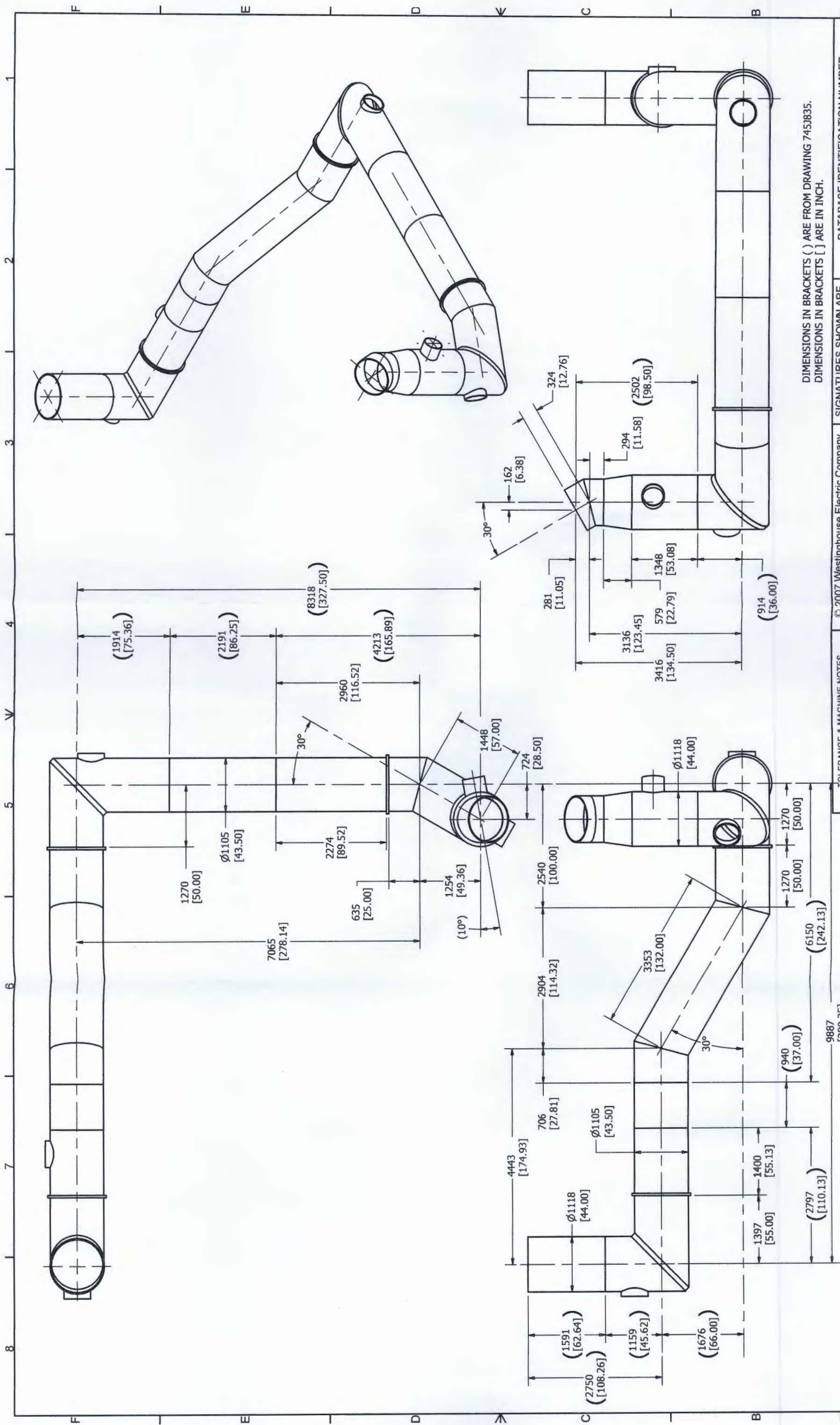





DIMENSIONS IN BRACKETS ( ) ARE FROM DRAWING 745J835.  
DIMENSIONS IN BRACKETS [ ] ARE IN INCH.

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© 2007 Westinghouse Electric Company		SIGNATURES SHOWN ARE FOR CURRENT REVISION	
DRAWING PRACTICES, GEOMETRIC SYMBOLS, DIMENSIONING, TOLERANCING & INTERPRETATION BASED ON ASME Y 14.5M STANDARD.		DRAWN BY: JACOBS T	
TOLERANCES:		CHECKED BY: MAES L	
NO DECIMAL		DESIGNED BY:	
ONE PLACE DECIMAL		ENGINEER VERIFIER:	
TWO PLACE DECIMAL		QA ENGINEER (IF APPLICABLE):	
RADIUS OR CHAMFER ALL EDGES		OTHER APPROVAL (IF APPLICABLE):	
FILET RADI		OTHER APPROVAL (IF APPLICABLE):	
CHAMFERS		SIZE	
ANGLES		A2	
MAXIMUM MACHINED SURFACE - 3.2μ AA		SCALE	
MAXIMUM SURFACE ROUGHNESS - 6.3μ AA		1 OF 1	
		SHT	
		1	
		WEIGHT	
		EDSK437563C	
		REV	
		0	
		TITLE	
		B-1400 NIVELLES, BELGIUM	
		KRSKO	
		HP MSR XNDR	
		PIPING REPAIR	
		LAYOUT OF PIPE B AND C TO HX-001 AND	
		PIPE A AND B TO HX-002	
		DATABASE IDENTIFICATION NUMBER	
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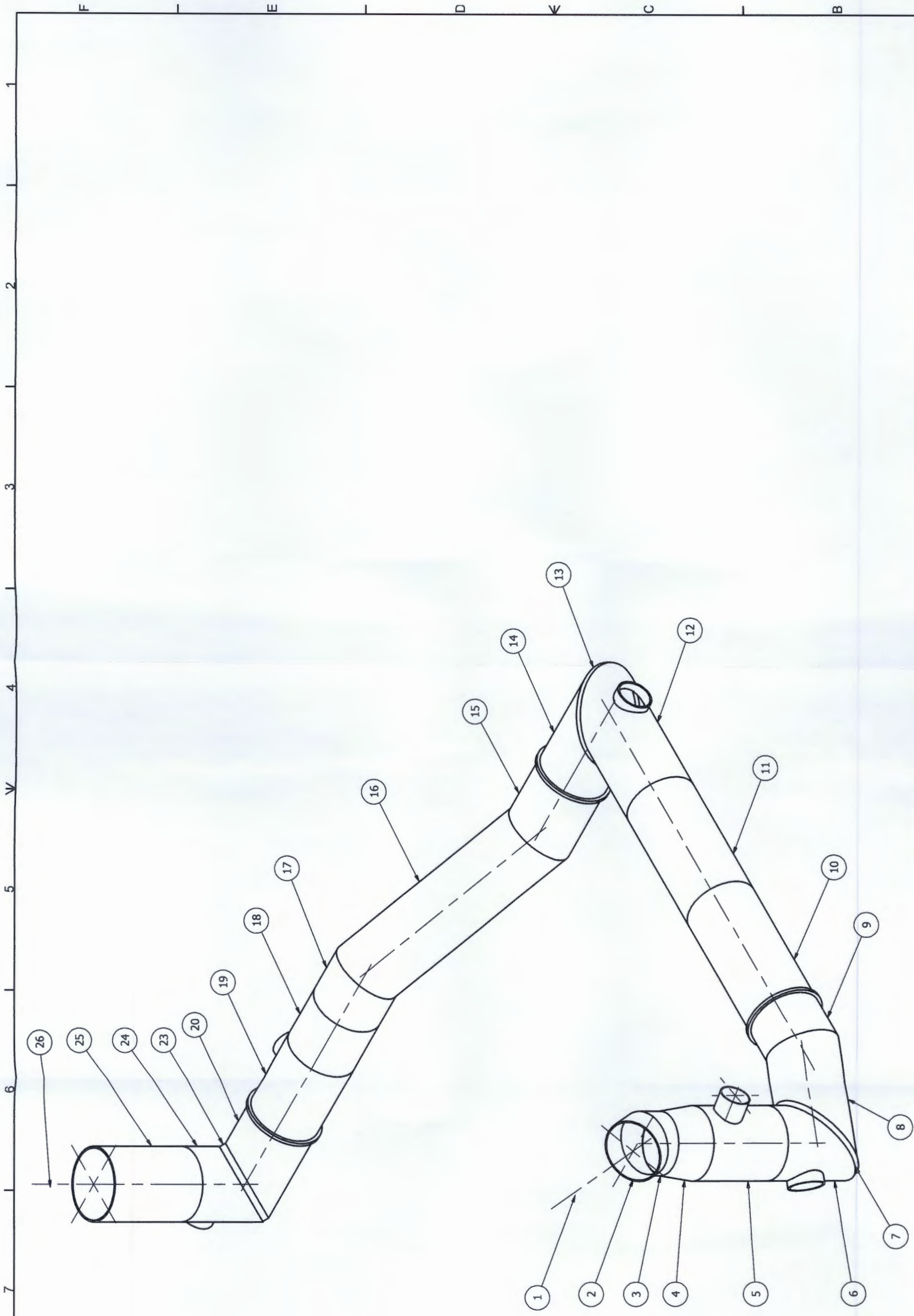




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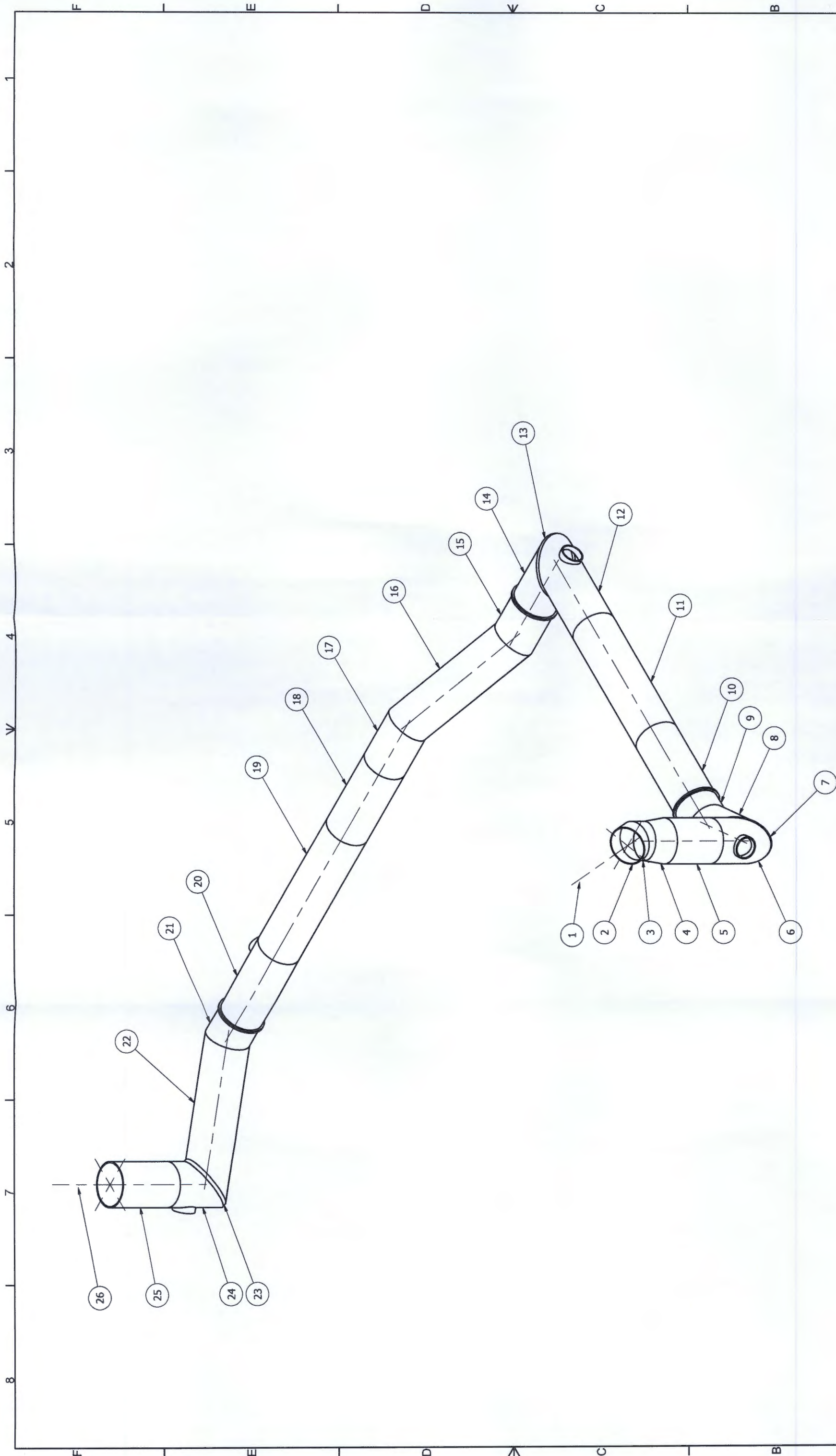
568/ [389.25]		TOLERANCE & MACHINE NOTES (UNLESS OTHERWISE SPECIFIED)		© 2007 Westinghouse Electric Company		SIGNATURES SHOWN ARE FOR CURRENT REVISION		DATABASE IDENTIFICATION NUMBER EDSK437565C.idw	
		DRAWING PRACTICES, GEOMETRIC SYMBOLS, DIMENSIONING, TOLERANCING & INTERPRETATION BASED ON ASME Y 14.5M STANDARD.		WESTINGHOUSE PROPRIETARY CLASS 2  *** THIS DOCUMENT IS THE PROPERTY OF AND CONTAINS PROPRIETARY INFORMATION OWNED BY WESTINGHOUSE ELECTRIC COMPANY LLC AND/OR ITS SUBCONTRACTORS AND SUPPLIERS. IT IS TRANSMITTED TO YOU IN CONFIDENCE AND TRUST, AND YOU AGREE TO TREAT THIS DOCUMENT IN STRICT ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE AGREEMENT UNDER WHICH IT WAS PROVIDED TO YOU.		DRAFTER JACOBS T		Westinghouse Electric Belgium	
		DIMENSIONS IN MM BASED ON 20°C				DRAWING CHECKER MAES L		B-1400 NIVELLES, BELGIUM	
		TOLERANCES:				DESIGN ENGINEER		TITLE	
		NO DECIMAL _____ ± 2				ENGINEER VERIFIER		KRSKO	
		ONE PLACE DECIMAL _____ ± 2				Q.A. ENGINEER (IF APPLICABLE)		HP MSR XNDR	
		TWO PLACE DECIMAL _____ ± 0.05				OTHER APPROVAL (IF APPLICABLE)		PIPING REPAIR	
		RADIUS OR CHAMFER ALL EDGES _____ ± 1.05						DIMENSIONING OF	
		FILET RADI _____ ± 2						PIPE A TO HEX-002	
		CHAMFERS _____ ± 2°				SIZE		DWG. NO.	
		ANGLES _____ ± 5°				A2		REV	
		MAXIMUM MACHINED SURFACE - 3.2µ AA						EDSK437565C	
		MAXIMUM SURFACE ROUGHNESS - 8.3µ AA				THIRD ANGLE PROJECTION		SCALE	
						NEXT ASSY		WEIGHT	
								EST : 12000 kg	
								1 OF 1	
								SHTS	





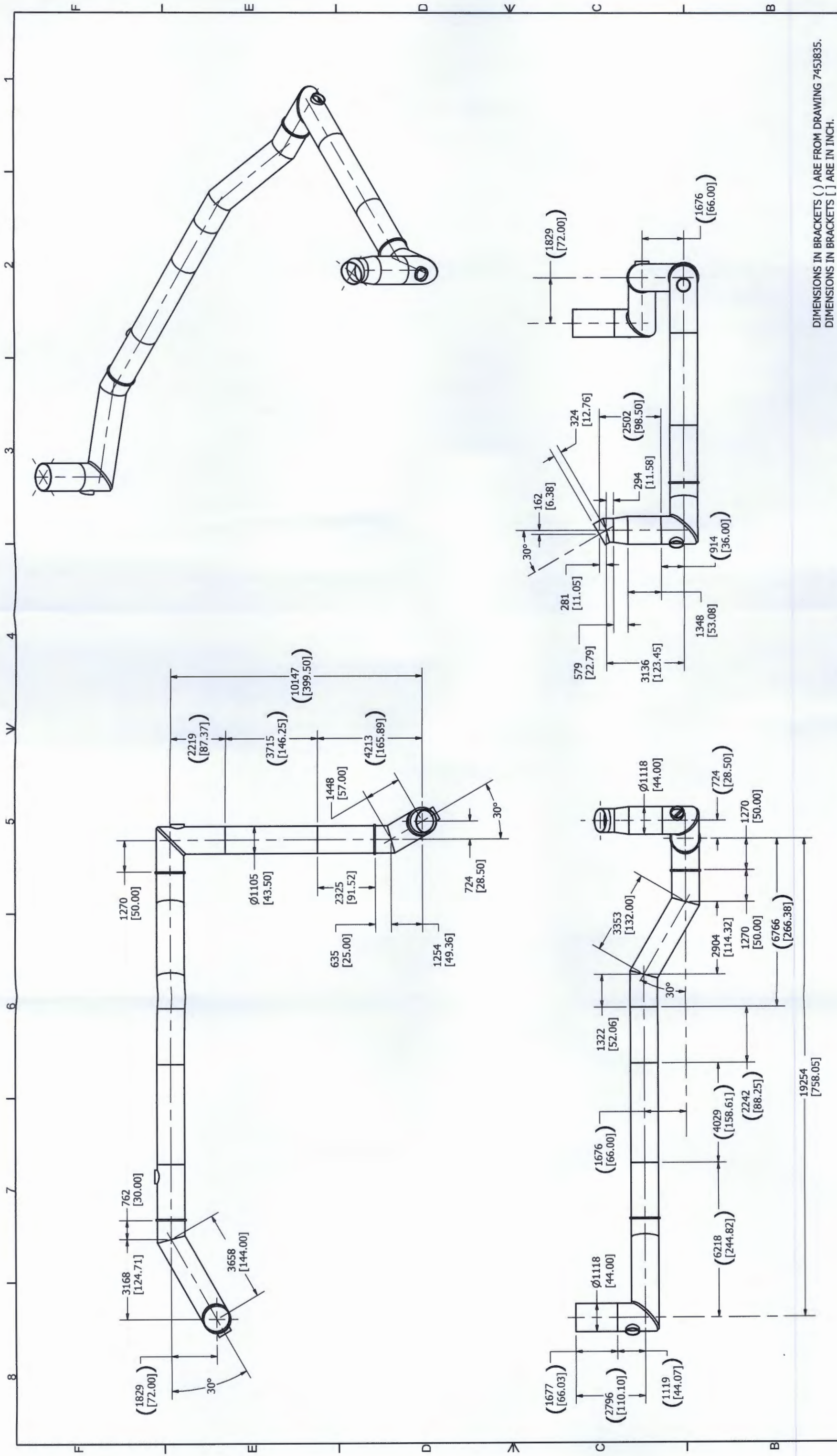
WB-RFDS-07-0		REVISION		0	
TOLERANCE & MACHINE NOTES (UNLESS OTHERWISE SPECIFIED)		© 2007 Westinghouse Electric Company		SIGNATURES SHOWN ARE FOR CURRENT REVISION	
DRAWING PRACTICES, GEOMETRIC SYMBOLS, DIMENSIONING, TOLERANCING & INTERPRETATION BASED ON ASME Y 14.5M STANDARD. DIMENSIONS IN MM BASED ON 20°C TOLERANCES: NO DECIMAL _____ ± 2 ONE PLACE DECIMAL _____ ± 2 TWO PLACE DECIMAL _____ ± .02 RADIUS OR CHAMFER ALL EDGES _____ .1 - .05 Fillet Radii _____ .3 ± .2 CHAMFERS _____ .3 ± .2 ANGLES _____ ± 5° MAXIMUM MACHINED SURFACE - 3.2μ AA MAXIMUM SURFACE ROUGHNESS - 6.3μ AA		WESTINGHOUSE PROPRIETARY CLASS 2 --- THIS DOCUMENT IS THE PROPERTY OF AND CONTAINS PROPRIETARY INFORMATION OWNED BY WESTINGHOUSE ELECTRIC COMPANY LLC AND/OR ITS SUBCONTRACTORS AND SUPPLIERS. IT IS TRANSMITTED TO YOU IN CONFIDENCE AND TRUST, AND YOU AGREE TO TREAT THIS DOCUMENT IN STRICT ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE AGREEMENT UNDER WHICH IT WAS PROVIDED TO YOU.		DRAWER JACOBS T DRAFTING CHECKER MAES L DESIGN ENGINEER ENGINEER VERIFIER Q.A. ENGINEER (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE)	
DATABASE IDENTIFICATION NUMBER EDSK437564C.idw		© 2007 Westinghouse Electric Company		DRAWER JACOBS T DRAFTING CHECKER MAES L DESIGN ENGINEER ENGINEER VERIFIER Q.A. ENGINEER (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE)	
Westinghouse Electric Belgium B-1400 NIVELLES, BELGIUM		© 2007 Westinghouse Electric Company		DRAWER JACOBS T DRAFTING CHECKER MAES L DESIGN ENGINEER ENGINEER VERIFIER Q.A. ENGINEER (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE)	
KRSKO HP MSR XNDR PIPING REPAIR NUMBERING OF PIPE A TO HEX-002		© 2007 Westinghouse Electric Company		DRAWER JACOBS T DRAFTING CHECKER MAES L DESIGN ENGINEER ENGINEER VERIFIER Q.A. ENGINEER (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE)	
DWS NO. EDSK437564C		© 2007 Westinghouse Electric Company		DRAWER JACOBS T DRAFTING CHECKER MAES L DESIGN ENGINEER ENGINEER VERIFIER Q.A. ENGINEER (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE)	
REV. 0		© 2007 Westinghouse Electric Company		DRAWER JACOBS T DRAFTING CHECKER MAES L DESIGN ENGINEER ENGINEER VERIFIER Q.A. ENGINEER (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE)	
SCALE A2		© 2007 Westinghouse Electric Company		DRAWER JACOBS T DRAFTING CHECKER MAES L DESIGN ENGINEER ENGINEER VERIFIER Q.A. ENGINEER (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE)	
WEIGHT EST : 12000 kg		© 2007 Westinghouse Electric Company		DRAWER JACOBS T DRAFTING CHECKER MAES L DESIGN ENGINEER ENGINEER VERIFIER Q.A. ENGINEER (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE)	
1 OF 1 SHEETS		© 2007 Westinghouse Electric Company		DRAWER JACOBS T DRAFTING CHECKER MAES L DESIGN ENGINEER ENGINEER VERIFIER Q.A. ENGINEER (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE)	





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0		A	
TOLERANCE & MACHINE NOTES (UNLESS OTHERWISE SPECIFIED)		© 2007 Westinghouse Electric Company	
DRAWING PRACTICES, GEOMETRIC SYMBOLS, DIMENSIONING, TOLERANCING & INTERPRETATION BASED ON ASME Y 14.5M STANDARD. DIMENSIONS IN MM BASED ON 20°C TOLERANCES: NO DECIMAL _____ ± 2 ONE PLACE DECIMAL _____ ± 2 TWO PLACE DECIMAL _____ ± .02 RADIUS OR CHAMFER ALL EDGES _____ .1 - .05 FILET RADIUS _____ .8 ± 2 CHAMFERS _____ ± 2 ANGLES _____ ± 5 MAXIMUM MACHINED SURFACE - 3.2μ AA MAXIMUM SURFACE ROUGHNESS - 6.3μ AA		WESTINGHOUSE PROPRIETARY CLASS 2 --- THIS DOCUMENT IS THE PROPERTY OF AND CONTAINS PROPRIETARY INFORMATION OWNED BY WESTINGHOUSE ELECTRIC COMPANY LLC AND/OR ITS SUBCONTRACTORS AND SUPPLIERS. IT IS TRANSMITTED TO YOU IN CONFIDENCE AND TRUST, AND YOU AGREE TO TREAT THIS DOCUMENT IN STRICT ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE AGREEMENT UNDER WHICH IT WAS PROVIDED TO YOU.	
SIGNATURES SHOWN ARE FOR CURRENT REVISION		DRAFTSMAN JACOBS T DRAFTING CHECKER MAES L DESIGN ENGINEER ENGINEER VERIFIER S.A. ENGINEER (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE) OTHER APPROVAL (IF APPLICABLE)	
DATABASE IDENTIFICATION NUMBER EDSK437566C:ldw		© 2007 Westinghouse Electric Company	
Westinghouse Electric Belgium B-1400 NIVELLES, BELGIUM		WESTINGHOUSE PROPRIETARY CLASS 2 --- THIS DOCUMENT IS THE PROPERTY OF AND CONTAINS PROPRIETARY INFORMATION OWNED BY WESTINGHOUSE ELECTRIC COMPANY LLC AND/OR ITS SUBCONTRACTORS AND SUPPLIERS. IT IS TRANSMITTED TO YOU IN CONFIDENCE AND TRUST, AND YOU AGREE TO TREAT THIS DOCUMENT IN STRICT ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE AGREEMENT UNDER WHICH IT WAS PROVIDED TO YOU.	
KRSKO HP MSR XNDR PIPING REPAIR NUMBERING OF PIPE B TO HEX-002		DWG. NO. EDSK437566C REV. 0	
SIZE A2		THIRD ANGLE PROJECTION	
SCALE 1 OF 1		NEXT ASSY.	
WEIGHT EST : 18000 kg		SHT. 1 OF 1	

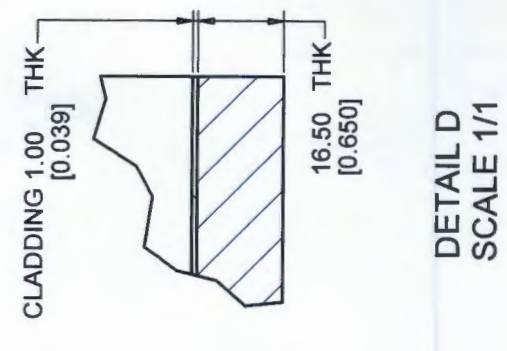
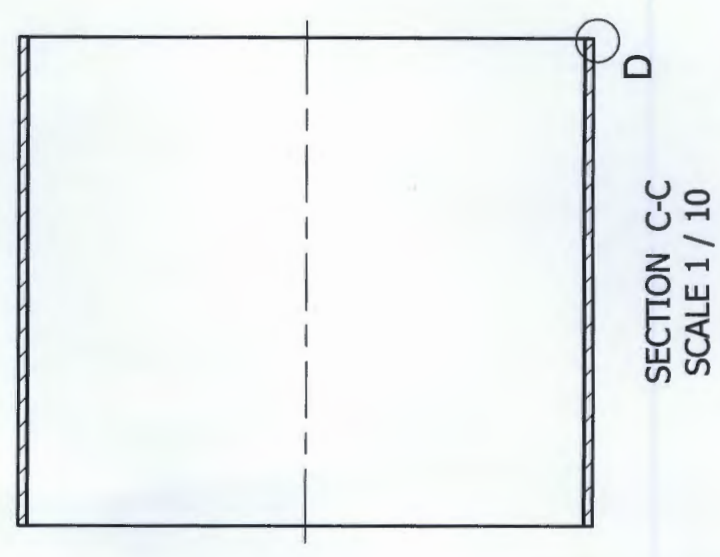
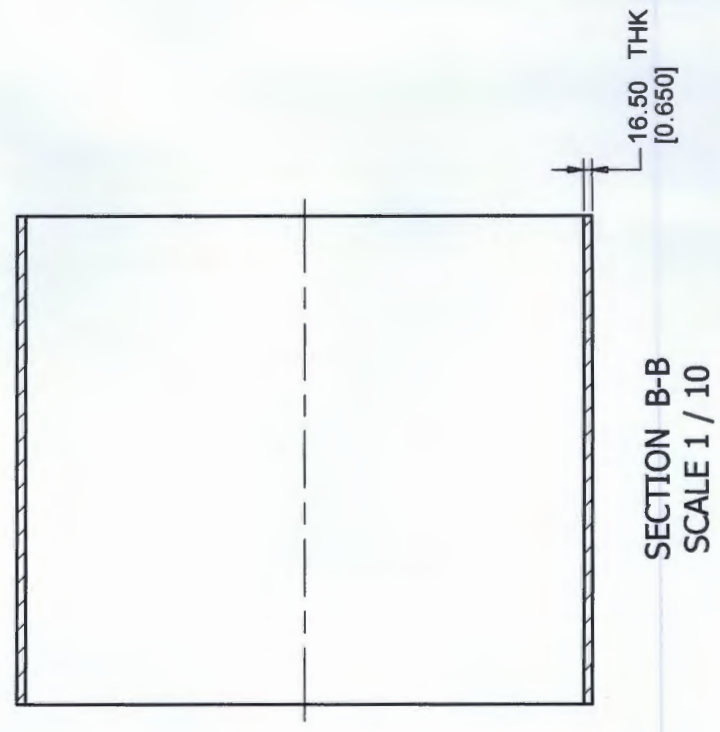
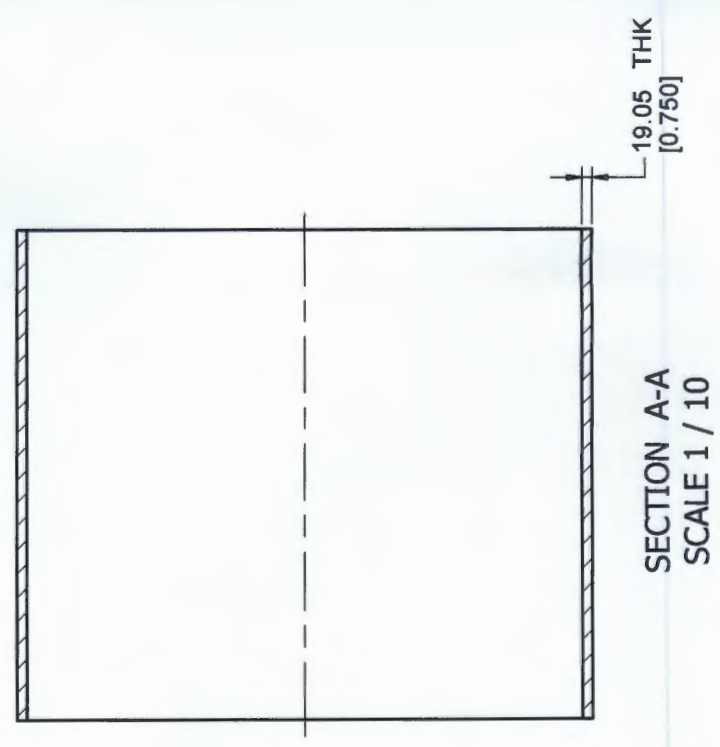
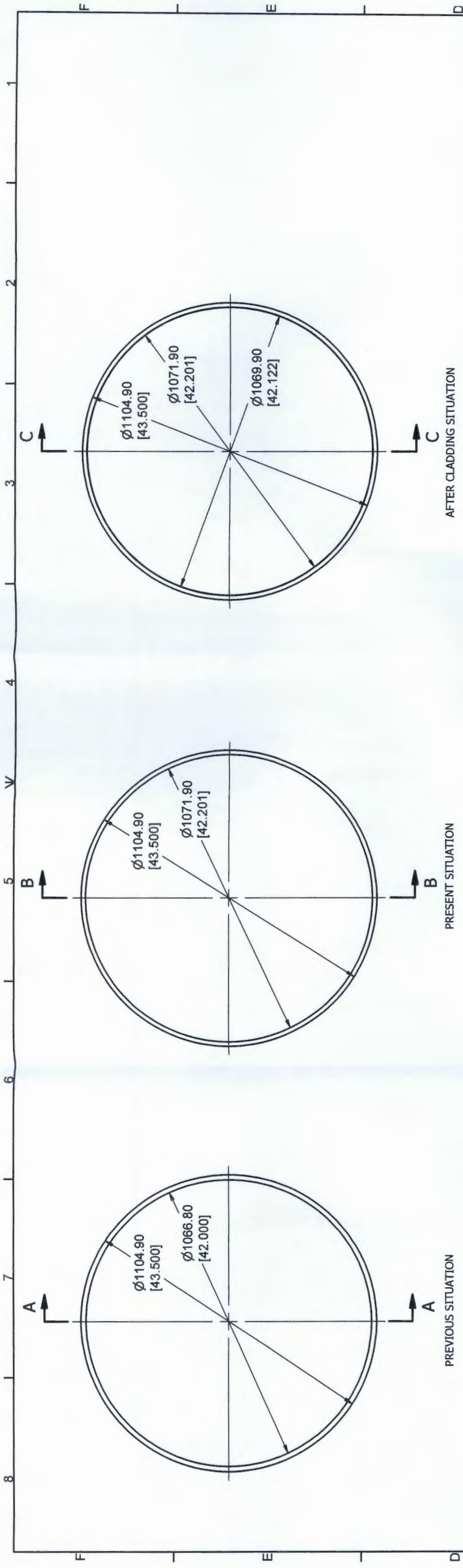




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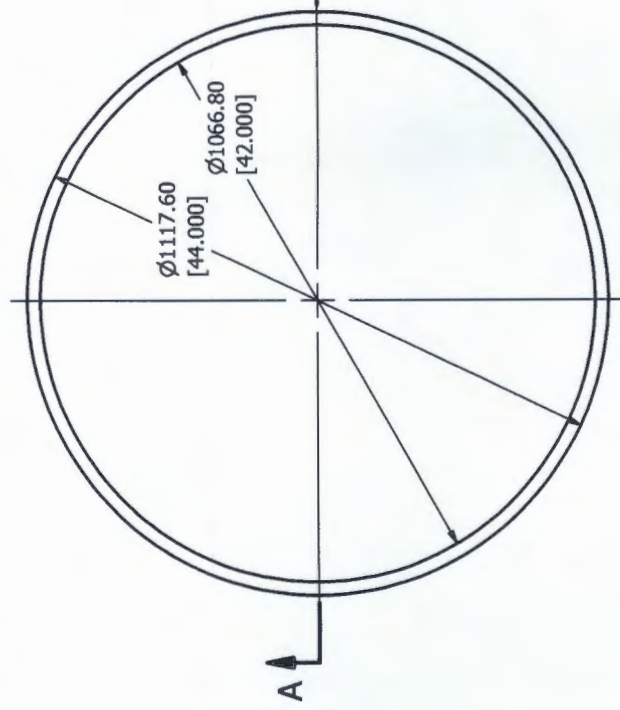
WB-RFDS-07-0		REVISION		0	
TOLERANCE & MACHINE NOTES (UNLESS OTHERWISE SPECIFIED)		© 2007 Westinghouse Electric Company		SIGNATURES SHOWN ARE FOR CURRENT REVISION	
DRAWING PRACTICES, GEOMETRIC SYMBOLS, DIMENSIONING, TOLERANCING & INTERPRETATION BASED ON ASME Y 14.5M STANDARD.		WESTINGHOUSE PROPRIETARY CLASS 2		DRAFTER JACOBS T	
DIMENSIONS IN MM BASED ON 20°C		THIS DOCUMENT IS THE PROPERTY OF AND CONTAINS PROPRIETARY INFORMATION OWNED BY WESTINGHOUSE ELECTRIC COMPANY LLC AND/OR ITS SUBCONTRACTORS AND SUPPLIERS. IT IS TRANSMITTED TO YOU IN CONFIDENCE AND TRUST, AND YOU AGREE TO TREAT THIS DOCUMENT IN STRICT ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE AGREEMENT UNDER WHICH IT WAS PROVIDED TO YOU.		DRAFTING CHECKER MAES L	
TOLERANCES:		DESIGN ENGINEER		ENGINEER VERIFIER	
NO DECIMAL		Q.A. ENGINEER (IF APPLICABLE)		OTHER APPROVAL (IF APPLICABLE)	
ONE PLACE DECIMAL		DWG. REF.		OTHER APPROVAL (IF APPLICABLE)	
TWO PLACE DECIMAL		NEXT ASSY		SIZE A2	
RADIUS OR CHAMFER ALL EDGES		THIRD ANGLE PROJECTION		SCALE 1 OF 1	
FILET RADI		WEIGHT EST : 18000 kg		REV 0	
CHAMFERS		EDSK437567C		SHT. 1	
ANGLES		KRSKO		1	
MAXIMUM MACHINED SURFACE - 3.2μ AA		HP MSR XNDR		1	
MAXIMUM SURFACE ROUGHNESS - 6.3μ AA		PIPING REPAIR		1	
		DIMENSIONING OF		1	
		PIPE B TO HEX-002		1	
		B-1400 NIVELLES, BELGIUM		1	
		WESTINGHOUSE Electric Belgium		1	
		EDSK437567C		1	
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WB-RFDS-07- 0 REVISION	TOLERANCE & MACHINE NOTES (UNLESS OTHERWISE SPECIFIED)  DRAWING PRACTICES, GEOMETRIC SYMBOLS, DIMENSIONING, TOLERANCING & INTERPRETATION BASED ON ASME Y 14.5M STANDARD.  DIMENSIONS IN MM BASED ON 20°C  TOLERANCES: NO DECIMAL _____ ± 2 ONE PLACE DECIMAL _____ ± 2 TWO PLACE DECIMAL _____ ± 0.2 RADIUS OR CHAMFER ALL EDGES _____ ± 0.05 FILED PARTS _____ ± 0.2 CHAMFERS _____ ± 0.2 ANGLES _____ ± 5° MAXIMUM MACHINED SURFACE - 3.2μ AA MAXIMUM SURFACE ROUGHNESS - 6.3μ AA	© 2007 Westinghouse Electric Company  WESTINGHOUSE PROPRIETARY CLASS 2  THIS DOCUMENT IS THE PROPERTY OF AND CONTAINS PROPRIETARY INFORMATION OWNED BY WESTINGHOUSE ELECTRIC COMPANY LLC AND/OR ITS SUBCONTRACTORS AND SUPPLIERS. IT IS TRANSMITTED TO YOU IN CONFIDENCE AND TRUST, AND YOU AGREE TO TREAT THIS DOCUMENT IN STRICT ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE AGREEMENT UNDER WHICH IT WAS PROVIDED TO YOU.  DWG. REF. _____ NEXT ASSY. _____ THIRD ANGLE PROJECTION	SIGNATURES SHOWN ARE FOR CURRENT REVISION  DRAFTER: JACOBS T DRAFTING CHECKER: MAES L DESIGN ENGINEER: _____ ENGINEER VERIFIER: _____ Q.A. ENGINEER (IF APPLICABLE): _____ OTHER APPROVAL (IF APPLICABLE): _____ OTHER APPROVAL (IF APPLICABLE): _____	DATABASE IDENTIFICATION NUMBER EDSK437569C.idw  <b>Westinghouse Electric Belgium</b> B-1400 NIVELLES, BELGIUM  TITLE: KRSKO HP MSR XNDR PIPING REPAIR HORIZONTAL PIPE REPAIR STEPS DWG. NO. EDSK437569C REV. 0 SIZE A2 SCALE 1 SHEET 1 OF 1
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[illegible]