

Technical Specification

RCS and CNT alternative cooling equipment installation

Mod. 1029-RH-L, phase 2

KRŠKO NUCLEAR POWER PLANT

SP-ES5124

Revision 1

Safety Related

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1	3. 12. 2018	<ul style="list-style-type: none"> • Section 1.2, OL31 for installation and outage 2021 for completion of work (operable ARHR system) are add • Section 2.1, Abbreviations – add RE – Outage • Section 3.1, General, Added OL31 and RE21 for implementation and completion of ARHR project. • Section 3.3, Procurement, Supply and Manufacturing – new paragraph will request for procurement and supply of material required by Civil Scope of work • Section 3.4, Installation and Commissioning – changed explanation for execution and completion of all works per modification 1029 • Section 3.4, Installation and Commissioning – additional explanation for work leaders • Section, 11.2 Project Execution Phase – changed from three hardcopies to one hard copy • Section 12, Performance Requirements – Chapter 4 change in correct Chapter 3.4 • Section 34, Schedule requirements are change. OL31 and RE21 are add in installation schedule • Section 43.5 and 43.6, notification for hold points has been harmonize on seven working day in both sections 	<p>5</p> <p>7</p> <p>10</p> <p>14</p> <p>14</p> <p>15</p> <p>28</p> <p>31</p> <p>38</p> <p>45</p>

Table of Content

1	<i>BACKGROUND & DESCRIPTION OF PROBLEM.....</i>	<i>6</i>
1.1	Background.....	6
1.2	Description of Problem	6
2	<i>ABBREVIATIONS & DEFINITIONS.....</i>	<i>7</i>
2.1	Abbreviations.....	7
2.2	Definitions	8
3	<i>SCOPE OF SERVICES</i>	<i>10</i>
3.1	General	10
3.2	Project Management.....	11
3.3	Procurement, Supply and Manufacturing	14
3.4	Installation and Commissioning.....	14
3.5	Project closure.....	17
3.6	Health and Safety.....	18
4	<i>SAFETY CLASSIFICATION OF CONTRACTED WORK</i>	<i>18</i>
5	<i>DESIGN INPUTS.....</i>	<i>18</i>
5.1	Installation package, installation and start-up.....	18
5.2	ARHR pump and heat exchanger	19
6	<i>APPLICABLE NEK- CONTRACTOR DESIGN CONTROL PROGRAM.....</i>	<i>22</i>
7	<i>APPLICABLE CODES, STANDARDS, DESIGN CRITERIA and REFERENCES</i>	<i>22</i>
7.1	Slovenian Codes.....	23
7.2	General US codes	23
7.3	USNRC Regulatory Guides	24
7.4	Codes and Standards	24
7.5	Other Supplemental Criteria and Information.....	24
7.6	Other NEK Supplemental Criteria and Information	24
7.7	NEK Programs, Procedures and Licensing documents.....	25
8	<i>IDENTIFICATION OF AFFECTED SYSTEM(S).....</i>	<i>26</i>
9	<i>IDENTIFICATION OF AFFECTED EQUIPMENT</i>	<i>26</i>
10	<i>SUPPLEMENTAL DATA</i>	<i>27</i>
11	<i>DOCUMENT SUBMITTAL</i>	<i>27</i>
11.1	BID Phase.....	27
11.2	Project Execution Phase	28
11.3	Additional Requirements.....	29
12	<i>PERFORMANCE REQUIREMENTS.....</i>	<i>31</i>

13	<i>MATERIAL REQUIREMENTS</i>	31
13.1	Approved Materials.....	31
13.2	Unapproved Materials	31
14	<i>FABRICATION AND ASSEMBLY</i>	31
14.1	General	31
14.2	Welding.....	31
15	<i>INSPECTIONS & TEST</i>	32
16	<i>QUALIFICATION, PARTS CLASSIFICATION & DOCUMENT TRACEABILITY</i>	32
17	<i>OTHER REQUIREMENT</i>	32
17.1	Contractors Responsibility	32
17.2	Health and Safety.....	33
18	<i>CLEANING</i>	34
19	<i>CORROSION PROTECTION/COATING</i>	34
20	<i>MARKING AND IDENTIFICATION</i>	34
21	<i>PACKAGING, HANDLING & STORAGE</i>	35
21.1	Packing and handling.....	35
21.2	Storage	35
22	<i>SOURCE INSPECTION/SURVEILLANCE NOTIFICATION</i>	35
23	<i>NONCONFORMING MATERIALS</i>	35
24	<i>SPECIAL HANDLING</i>	36
25	<i>SHELF LIFE</i>	36
26	<i>10CFR21 REPORTING</i>	36
27	<i>COMMERCIAL GRADE ITEM DEDICATION</i>	36
28	<i>SUPPLIER DOCUMENTATION REQUIREMENTS</i>	37
29	<i>REPAIR RECORDS</i>	37
30	<i>SHIPPING REQUIREMENTS</i>	37
31	<i>VENDOR TECHNICAL MANUAL AND REGISTERED UPDATES</i>	38
32	<i>TRAINING PROGRAM</i>	38
33	<i>REVIEW & VERIFICATION OF WORK</i>	38
34	<i>SCHEDULE REQUIREMENTS</i>	38
35	<i>STATUS REPORTING REQUIREMENTS</i>	39
36	<i>WORK OR INFORMATION TO BE PROVIDED BY NEK</i>	39
37	<i>CHANGES of WORK SCOPE</i>	40
38	<i>RECORDS</i>	40
39	<i>ORGANIZATIONAL CONTACT</i>	41
40	<i>CONTRACTOR’S TECHNICAL APPROACH to the WORK</i>	41

41	ACCESS TO CONTRACTOR FACILITY AND DOCUMENTS.....	42
42	SUBCONTRACTED WORK.....	42
43	QUALITY ASSURANCE REQUIREMENTS.....	43
43.1	General	43
43.2	Quality Manual	43
43.3	Contractor's Responsibilities for Sub-contractors.....	44
43.4	Inspections.....	44
43.5	Notification Points	45
43.6	STOP/Hold Points	45
43.7	Documentation.....	45
44	NEK PROPRIETARY DATA	47
45	APPENDIX	47
45.1	ARHR flow diagram 1W04600	48
45.2	DMP Sections - 1029-RH-L (phase 2).....	49
45.3	PMM Template.....	50
45.4	Project schedule	51

1 BACKGROUND & DESCRIPTION OF PROBLEM

1.1 Background

Nuclear Power Plant Krško (NEK) has decided to take steps for the upgrade of safety measures to prevent severe accidents, and to improve the means to successfully mitigate their consequences. NEK has prepared the Safety Upgrade Program for that modernization. Per NEK specification, the content of the program for NEK Safety Upgrade Program is consistent with the nuclear industry response to the Fukushima accident and the resulting update of the Safety Reference Levels proposed by WENRA in November 2013. This includes plant upgrades/design changes to address Design Extension Conditions (DEC A and DEC B).

Safety Upgrade Program (SUP) is divided in different projects and in three phases. One of the SUP projects in Phase 2 is the RCS and CNT Alternative Cooling Design project (Mod.1029-RH-L). Implementation of this project shall be finished in year 2019. Additional systems, structures and components (SSC), which will be implemented within this SUP modification, will be designed and structured in accordance with DEC requirement specific for the Krško NPP design and site location.

1.2 Description of Problem

The RCS/RB sump alternate cooling system is designed for design extended conditions (DEC) and beyond design bases accidents (DEC B). All design and installation requirements are in document DMP 1029-RH-L (phase 2), RCS and CNT alternative cooling design.

The alternate residual heat removal (ARHR) pump and heat exchanger, together with the associated suction pipes and discharge pipes will be used for alternative cooling of the RCS and the RB sump water, with the purpose of removing the decay heat and transfer it to an ultimate heat sink (UHS). Discharge pipes will be connected to CI - containment spray system, to SI safety injection, to reactor vessel and to containment atmosphere via penetration RH-1043-0460 and to existing RHRS trains A and B). The existing RHRs trains will be upgraded with check valves downstream the RHRs pumps.

The new ARHR piping and components are Safety Class 2, except for the ARHR HX cooling lines and pump motor cooling lines (if required) which are Safety Class 3. Corresponding isolation valves are also Class 3.

The scope of services on OL30, OL31 and outages 2019 and 2021 shall include all specification requirements for installation (mechanical, electrical/I&C and civil), as required to allow NE Krško to have operable ARHR system with all associated equipment in the outage 2021.

2 ABBREVIATIONS & DEFINITIONS

2.1 Abbreviations

AB	Auxiliary Building
ANSI	American National Standards Institute
ARHR	Alternative Residual Heat Removal System
AUHS	Alternative Ultimate Heat Sink
BOM	Bill of Material
CC	Component Cooling Water System
CI	Containment Spray System
CDP	Conceptual Design Package
CFR	Code of Federal Regulations
CMTR	Certified Material Test Reports
CX	Containment Testing & Pressurization System
DBA	Design Basis Accident
DCM	Document Control Module
DEC	Design Extended Conditions
DECTS	Design Extension Conditions Technical Specification
DMP	Design Modification Package
DP	Documentation Package
ESD	Engineering Service Division
ESF	Engineered Safety Feature
FAT	Factory Acceptance Test
FD	Flour Drain System
FDCR	Field Design Change Request
FSAR	Final Safety Analyze Report
HE	Handling Equipment System
ID	Identification Number
LCO	Limiting Conditions for Operation
MECL	Master Equipment Component List
MHX	Mobile Heat Exchanger
NEK	Nuklearna Elektrarna Krško (NPP Krsko)
NSR	Non Safety Related
NPP	Nuclear Power Plant
NSSS	Nuclear Steam Supply System
OBE	Operating Basis Earthquake
OSP	Operating Surveillance Procedures
QA	Quality Assurance
OL	On Line
QSD	Quality System Division
RE	Outage
RG	Regulatory Guide
RB	Reactor Building
RH	Residual Heat Removal System
SNSA	Slovenian Nuclear Safety Administration
SAT	Site Acceptance Test
SI	Safety Injection
SR	Safety Related
SSC	System, Structures and Components

SUP	Start-Up Procedure
SSE	Safe Shutdown Earthquake
TOP	Turn-Over Package
TR	NEK Technical Reports
TS	NEK Technical Specification
QA	Quality Assurance
QSD	Quality System Division SQ Seismic and Dynamic Equipment Qualification
URSJV	Uprava Republike Slovenije za Jedrsko Varnost (Slovenian Nuclear Safety Administration)
USAR	Currently valid NEK Updated Safety Analysis Report
USNRC	United States Nuclear Regulatory Commission
WOI	Waiver of Inspection
ZVISJV	Zakon o varstvu pred ionizirajočimi sevanji in jedrski varnosti (Radiation Protection and Nuclear Safety Act)

2.2 Definitions

- **Commissioning** - The process by means of which SSC of facilities and activities, having been constructed, are made operational and verified to be in accordance with the design and meeting the required performance criteria.
- **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.
- **Design Basis** - is a set of information, regulatory requirements and postulated accident scenarios (gathered in USAR) for which nuclear power plant SCC were originally designed. Information identifies the specific functions to be performed by a structure, system or component of a facility, and the specific values or ranges of values chosen for controlling parameters as reference bounds for design. These values may be (1) restraints derived from generally accepted state-of-the art practices for achieving functional goals or (2) requirements derived from the analysis (based on calculation and/or experiments) of the effects of the postulated accident for which a structure, system, or component must meet its functional goals. They may also result from the regulatory requirements or applicable codes and standards.
- **Design Extended Conditions (DEC)** – are severe accident conditions and higher requirements that were not considered for design basis, but are considered in the design process of a new facility or for an upgrade of existent SSC in accordance with best estimate methodology for which release of radioactive material is kept within acceptable limits.

- **Engineering** shall mean the profession of applying scientific principles to the design, construction, maintenance, and of operation of buildings, equipment and systems
- **Exclusion Area** is the area within a circle with the center in the center of the nuclear power plant reactor and a radius of 500 m;
- **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 1029–RH-L, RCS and CNT Alternative Cooling Design
- **Purchaser** or **NEK** or **NPP Krško** shall mean Krško Nuclear Power Plant.
- **Specification** shall mean SP- ES5124, Rev. 0 RCS and CNT alternative cooling equipment installation Technical Specificatuion
- **Start-up** shall mean testing to validate system functionality and performance while operating new equipment
- **Handover package** (HOP) 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 SERVICES

3.1 General

Modification 1029-RH-L is part of the Safety Upgrade Program (SUP) Phase 2. Main contractor for design of this project is Westinghouse Belgium (WEB).

The implementation of the complete ARHR project is split into several Phases of implementation (RE18, OL30, RE19, OL31 and RE21) and consequently the whole scope will be covered with two (2) separate DMP's. The scope of DMP for Phase 1 covers limited works for mechanical erection in outage RE18 and is partially perform in outage RE18. In outage R18 only half (RHR train A) of planned scope for mechanical erection was accomplished. Second half of planned scope for phase 1 (RHR train B) is included in scope of DMP 1029-RH-L, part 2 implementation. The DMP Part 2 will cover installation in OL30, OL31 and RE19, RE21.

New RCS and CNT Alternative Cooling system is classified as Nuclear Safety Related (SR), Safety Class (SC) 2 and 3, Seismic Category I, and it is accordance with original classification criteria as described in the USAR Section 3.

Generally, the major scope of complete modification is:

1. ARHR pump RHAPRH03.
2. ARHR heat exchanger RHAHRS03.
3. The suction piping from the RHR system train A/B upstream of existing RHR system pumps A/B. There are three (3) water sources: RWST, RB sump or RCS Loop 1/2.
4. The double MOV suction isolation valves 108700 A/B.
5. The ARHR pump discharge will be directed to four (4) possible routes:
 - a. Under DEC A conditions: Two discharge lines connected to the existing RHR system between RHR pump A/B and the exiting RHR HEX's. RCS cooling will be performed trough the existing RHR HEX cooled down by the CC system. The ARHR pump cooler will be cooled by CC system.
 - b. Under DEC B conditions: RCS cooling will be performed trough new ARHR heat exchanger RHAHRS03 to the three possible routes:
 - Route 1: Connection to SI/RHR for RCS cooling (RCS HL's or CL's).
 - Route 2: Connection to CI for containment spray.
 - Route 3: connection to the Containment atmosphere for RB sump flooding.The primary coolant and ARHR pump cooler will be cooled by Sava River water pumped to the ARHR HEX and ARHR PMP cooler with a mobile pump installed in the yard.
6. The double MOV discharge isolation valves 108713 A/B.
7. The flow throttling valves 108719 and 108720.

8. The connections to CI, SIS and containment penetration RH-1043-046.0 with MOV isolation valves 108723 and 108731 and HOV 108728.
9. The pipes for Component Cooling Water System (CCWS) supply for the ARHR pump cooler.
10. The Sava River cooling water piping from the ARHR HEX to connections points in IB and AB, for mobile equipment alignment.
11. The boric acid injection line to a suitable connection point in AB.
12. Installation of two check valves 8726A/B into existing RH system.

All details and equipment's are present on new ARHR flow diagram 1W04600 (Attachment 45.1).

The Contractor shall be responsible for compliance with all of the detailed requirements presented in this Specification and DMP 1029-RH-L (phase 2). There shall be no deviation from this Specification or its references without prior written authorization by Purchaser. The Contractor Scope of Service shall generally be:

- Preparation of all installation packages for mechanical, electrical/I&C and civil scope of works,
- installation of all components and equipment according to DMP 1029-RH-L,
- system start-up support,
- overall project management, planning, scheduling and reporting,
- site walk-downs,
- preparation of QA documentation package,
- preparation of installation and start-up Hand – over packages.

The Contractor shall ensure that the installation and start-up is implemented on schedule while meeting quality, safety and radiation exposure targets. 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.

All purchasing, manufacturing, installation and start-up work and planning shall be scheduled in accordance with the overall Project Schedule (see Paragraph 34 SCHEDULE REQUIREMENTS), as adjusted and agreed by both parties before contract award.

3.2 Project Management

3.2.1 General

Project management should include all personnel and other resources necessary to plan, organize, direct, and control the RCS and CNT Alternative Cooling Equipment Installation Project. They shall be responsible for:

- a) Developing the Project plan & schedule
- b) Working with NEK to approve the plan & schedule
- c) Coordination of all mechanical, electrical/I&C and civil installation activities in field.

- d) Preparation of Field Design Change Requests for the necessary changes identified during installation and testing requiring additions to existing design or corrections of DMP and execution of all necessary fieldwork related to these changes.

The Contractor shall provide the necessary personnel and equipment to successfully accomplish the RCS and CNT Alternative Cooling Equipment Installation Project as identified and described elsewhere in this Specification. The Contractor shall be responsible for the selection and supervision of all personnel within the project organization under the Contractor's control. Various elements to be included in the Contractor's Project management are describe herein.

As a part of the proposal the Contractor shall identify and describe the organization under which the work will be perform, 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 supply. The Contractor shall also identify the executive who will have the responsibility and authority for completion of the work scope.

The Contractor shall provide technical staff with specifically defined duties, responsibilities, and authorities to support timely resolution all design and other deficiencies in design documentation identified during installation phase of the project. The personnel shall be defined as key personnel. The key personnel shall be assigned full-time to the work, and their names and titles shall be clearly depicted on any and all organization charts when applicable. The Contractor will not change personnel assigned to key positions without the prior approval of the Purchaser.

The Contractor shall designate an Authorized Representative to act on behalf of the Contractor for all matters related to the Contract, including:

- a) Receiving all communications from the Purchaser
- b) Providing all approvals, consents, authorizations, and proposals
- c) Transmitting all communications to the Purchaser
- d) Acting for and committing for Contractor

During the course of the RCS and CNT Alternative Cooling Equipment Installation Project, regularly scheduled and special meetings will be required between the Purchaser and the Contractor to review progress, establish and review schedule requirements, and discuss other items (modifications) concerning the status of the RCS and CNT Alternative Cooling Equipment Installation Project work. These meetings will be scheduled at the Purchaser's facilities and will be attended by the appropriate Purchaser and Contractor personnel.

3.2.2 Planning, scheduling and reporting – Project Management Manual

After the Contract award, the Contractor shall finalize Project Management Manual with integrated detailed schedule with milestones and reports for Purchaser's approval of overall schedule (fabrication and delivery of equipment on site).

The Contractor shall be responsible to prepare and submit to the Purchaser for approval the Project Management Manual (PMM) defined in attachment 45.4. The purpose of this document is to establish guidelines for conducting business and to provide reference to specific administrative procedures that affect work activities between the Contractor and the Purchaser. The PMM will define Project level interfaces, as well as the overall Project operation. The PMM is intend to establish the basis for effective communication and responsive actions between the contracting parties. The PMM shall also include existing NEK communication infrastructure using Microsoft SharePoint 2010 application on NEK Portal "Projektne mape).

The PMM will address the issues such as Project organization and interfaces between the Purchaser, Contractor, Subcontractors and Major Equipment Suppliers. Correspondence and communication control and their record keeping will also be addressed within the PMM. The PMM will further describe the process required that will permit the Contractor to utilize the existing Purchaser procedures during the performance of work.

Due to the nature of the PMM, it is intended to be a "living document", and the Contractor will be required to maintain and revise it as the project progresses. All PMM revisions will require approval of the Purchaser.

The PMM shall be the plant lifetime document and shall be properly treated through NEK's document control program.

Within the PMM the simple process for the classification of certain set of the documentation as safeguard information shall be defined. Such sets of documentation shall be recognized based on the content of the included information and shall be recognized as soon as possible but definitely before the issue of such set of documentation. Required process shall recognize the classification of the information and define the way and persons who will take care about such kind of documents.

Project Control includes provision of personnel, supplies, software, and equipment necessary to perform all planning and schedule functions for the project. The objectives of the Project Control functions are:

- a) Overall Project control from the Contract award to the HOP handover to NEK.
- b) All project scheduling shall be performed on Project management software PRIMAVERA P-6 or similar.

3.3 Procurement, Supply and Manufacturing

- Contractor shall procure all material (steel profiles, hoists, anchors, ...) and manufacture all needed platforms and supports for transportation of all major equipment - ARHR pump RHAPRH03, ARHR heat exchanger RHAHRS03 and major valves on final location in AB el. 89. BOM of needed material is in *"Report on Internal transport of ARHR HEX and ARHR pump due to Modification 1029-RH-L"* made by Faculty of Mechanical Engineering and is part of DMP 1029.
- NEK is supplier of all mechanical and electro/I&C material (DMP Section C – Bill of Material). Complete DMP Section C 2.1 (Bill of Material for Civil Scope) Contractor will procure and supply. Exceptions are items 1.1 on page C2.1-1 (pump base plate) and items 23, 24 (delivery and installation of shield wall and doors for AB el. 89). Item 1.1 will be delivered by pump manufacturer (SPX) and items 23, 24 will be procured by NEK.

3.4 Installation and Commissioning

During OL30 should be completed all new piping which will be connecting to the existing RHR train A and train B piping, existing SI piping in front of valve 8841 and piping to CI system. That means at RHR train A during outage 2019 at least the piping after the valve 108713A on ARHR pump discharge side has to be completed and that piping will be temporarily closed with cap or blind flange. In OL31 the work on this side of piping can continue and final connection with the rest of ARHR system will be completed during this OL period. The same strategy shall be applied for RHR train B, where during the outage at least the piping after the valve 108713B on ARHR pump discharge shall be completed and temporarily closed to allow the continuation of work in OL31. On RHR suction sides (train A and B) in outage 2019 at least the piping after the valves 108700A and 108700B shall be completed and temporarily closed to allow work later on OL31. On TIP1 (connection on existing SI system in front of the valve 8841) the piping has to be completed and temporarily closed at least after the valve 108731. The same is valid for the CI system where the piping after the valve 108723 has to be completed and temporarily closed during outage 2019. The piping to the containment penetration has to be completed after isolation valve 108725 and then temporarily closed. The strategy for the complete ARHR installation shall be such as to complete during outage 2019 all connections to the existing systems as explained above and then in OL31 to continue with installation of all other not yet installed piping and components. On OL31 there shall be made final connections to the piping that was temporarily closed during the outage 2019 and then in the outage 2021 just final SAT testing will be performed.

Major tasks in this phase shall include:

- Management and responsibility of installation, ensuring compliance with technical scope, procedures, quality, and schedule per DMP 1029-RH-L (phase 2).

- Preparation of all Installation Packages per NEK procedure ESP–2.619 (Preparation of Installation Packages). Work Sequence Plan shall include work sequences during OL30, OL31 and during outages RE19 and RE21. In outage RE19 works will be performed in system windows for RHR train A and B. System window RH01 in outage 2019 according to the actual version of outage schedule will be 125 hours for RHR train A, starting October 6th at 16.00 and finish on October 11th, 2019 at 21.00. For RHR train B system window RH20 is 120 hours, starting on October 11th at 14.00 and finish on October 16th, 2019 at 14.00. For installation of piping connection in front valve 8841 is prepared system window RHRR with duration 55 hours, starting on October 9th at 9.00 and finish at October 11th, 2019 at 16.00.
- Contractor shall provide all equipment, tools, materials, lighting, manpower, gasses for welding and purging, welding filler material, testing, inspection and other services necessary for the completion of the all installation and construction works on mechanical, electrical/I&C and civil side.
- Contractor shall provide all equipment, tools, materials, manpower for the completion of the all required electrical/I&C installation works in NEK Simulator concerning mod. 1029-RH-L.
- All internal surfaces in existing RHR piping where new piping will connect (welded) have to be decontaminate before welding start. Decontamination shall be provided with IBELL Ex Dekont and Dekopur FS 500.
- Testing and Qualification of welders and welding techniques shall be done on mockups with similar system conditions that are expected during work execution on field to avoid any problems with maintaining suitable weld gas atmosphere (purge gas Ar).
- Providing work leader for any planned activity familiar with NEK processes and qualified as a work leader covering all three disciplines (mechanical, electrical/I&C and civil). To be able to interface with plant processes and personal he/she should speak Slovenian/Croatian.
- Contractor shall assign fire watch persons for fire risk activities.
- Contractor shall take appropriate FME actions to prevent the introduction of foreign material into affected plant systems (RH, CC, SI, CI) and its components. Contractor shall prepare FME program for installation and implementation of complete mod. 1029-RH-L (phase 2). All workers should be aware of the possible consequences of a failure to properly implement effective FME controls and practices during their work activities. Any workers should stop work if FME becomes or is in danger of becoming compromised. Workers' understanding and implementation of the FME program is critical to the overall success of the FME program.
- Perform all mechanical, electrical/I&C and civil installation activities which are necessary to make systems, components and structures fully operable and in accordance with design documents.

- Perform transportation of all major and other equipment from NEK warehouse to final location (AB el. 89). For transportation of new major equipment on final location inside Auxiliary Building, contractor can use solutions provided in *“Report on Internal transport of ARHR HEX and ARHR pump due to Modification 1029-RH-L”* made by Faculty of Mechanical Engineering, LASOC Laboratory from Ljubljana. This Report is attached to DMP 1029-RH-L (phase 2). Contractor can also use his own solutions and approaches for transportation of all new major equipment on AB el. 89. All different solutions have to be prove by calculations and approved by Purchaser.
- The Contractor shall support NEK at testing of crane HE103CRN-005. Test will prove capacity of this crane to lift load of 10 t. Support shall include a transportation of concrete test block from NEK Yard to AB100 on steel platform below crane HE103CRN-005.
- Provide interface, integration and coordination for installation, commissioning, start-up and safety.
- The Contractor shall satisfy all test and inspection requirements of the ASME Code and other applicable documents. Pressure testing (piping hydro tests) of Class 2 and 3 components during and after installation shall be implemented in accordance with ASME standards.
- The Contractor shall prepare all testing and inspection procedures required to fulfill the design and code requirements.
- Tests and inspections shall be performed in accordance with written procedures which have been reviewed and approved by the Purchaser.
- Only personnel qualified and certified in accordance with the latest edition of SNT-TC-1A and with the requirements of ASME Section XI, IWA-2300 and Section III, NC-5000 shall perform NDE. Only personnel certified as Level II or III shall interpret the results of examinations. The Contractor shall submit, for Purchaser’s approval, the NDE program it plans to implement to satisfy the requirements of ASME III, ASME XI, and this Specification.
- The Contractor shall submit all applicable NDE testing procedures, including examination report forms, for review and approval by the Purchaser prior to implementation. In addition, when the Contractor subcontracts work including nondestructive examinations required by this Specification, the subcontractor’s procedures will be reviewed and approved by the Purchaser. These procedures shall be submitted to the Purchaser after review and approval by the Contractor.
- The Contractor shall submit procedures and techniques for performing surface and volumetric examination for the Purchaser’s approval prior to use.
For Class 2 Piping:
 - Per NC-5222, welded piping joints shall be radiographed (all large bore piping between TIP, ARHR Pump and ARHR HX). Per NC-5242, welded branch connection shall be examined by liquid penetrant method (sockolet for instrumentations, vent and drains connections). Per NC-5261, socket and

attachment welds shall be examined by liquid penetrant method (instrumentations, vents and drains connections up to the valves and the integrally welded attachment support (lugs)).

For Class 3 Piping:

- Per ND-5222, welded piping joints shall be radiographed (this concerns all large bore piping between ARHR HX and Connection to Sava River).

Ultrasonic examinations as required by NEK Preservice Inspection program shall be performed on all Class 2 welds recognized as consequence high in Risk Assessment analysis. These are welds on ARHR pump suction piping from TIP 2 and TIP 3 (Tie In Point) to pump suction nozzle and welds on pump discharge side from TIP 1 to valves 108733 and 108732.

- ASME Code Editions that were used at design of ARHR system:

	ASME Edition
Existing System & Interface with Existing Systems	ASME BPVC Section III, Nuclear Components, 1971 Edition through Winter 1972 Addenda
Piping & Fittings	ASME BPVC Section III, Nuclear Components, 1971 Edition through Winter 1972 Addenda
Mechanical Equipment & Supports	ASME BPVC Section III, Nuclear Components, 1998 Edition, Addenda 1999 & 2000

Note: For the piping, the design edition was selected to be 1971 through Winter 1972. During the course of the project, Westinghouse accepted to change the piping material properties to 1998 Edition with Addenda 1999 and 2000, so it will be easier to procure. Only the equations used in the piping qualification remain the ones from 1971 with winter 1972, the material properties used in the piping analyses are from Edition 1998 with addenda.

- Support at SAT (Site Acceptance Test) at NEK Site.
- The contractor shall have temporary offices at NEK location.

Nothing in this Specification shall relieve the Contractor from performing, such analyses, tests, inspections and other activities that the Contractor considers necessary to ensure that the design, material and workmanship are satisfactory for the service intended, or as may be required by common usage or good practice.

3.5 Project closure

Contractor shall provide all needed activities to close project according to the requirements of NEK procedures. Project closure shall include the following activities:

- Preparation of mark-up drawings
- Preliminary and Final Installation Report

3.6 Health and Safety

The safety scope includes the provision of all personnel, materials, equipment, tools, facilities, and supplies necessary to implement the health and safety program required to accomplish the project. All work associated with the project shall be performed in accordance with and in full compliance with all applicable regulations and laws and the Purchaser's safety rules. All work shall be performed in a systematic manner under the documented safety program which provides the necessary direction to comply with the rules and regulations and provides for the health and safety of the personnel and protection of the plant.

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.

The Contractor shall designate a qualified Safety Representative. The Safety Representative shall attend all project safety meetings and participate fully in all activities outlined in Contractor's safety program. The Contractor's Safety Representative shall have stop-work authority for unsafe acts or conditions, shall be considered key person, and shall be on site when work is performed. The Contractor's health and safety staff shall be adequately trained to respond to any emergency or medical situation resulting from the project work.

4 SAFETY CLASSIFICATION OF CONTRACTED WORK

The contracted work is classified as Nuclear Safety Related.

Contractor shall have experience/references on same or similar scope of work performed on PWR Nuclear Power Plant(s) in EU and/or in US. Contractor shall have at least two approved references in last ten years for similar scope of work performed. Scope of works shall include installation of major SR equipment (pumps, heat exchangers, valves ...), SR piping/supports and electrical and I&C installation inside PWR Nuclear Power Plant Main Control Rooms.

5 DESIGN INPUTS

5.1 Installation package, installation and start-up

Installation packages shall be performed according to the DMP 1029-RH-L. See appendix where are DMP sections relevant for installation procurement phase. All technical details, procedures and needed drawings are defined within this document.

5.2 ARHR pump and heat exchanger

In accordance with the connected RHRS and the requirements for operation after a DEC event, the ARHR pump is a Nuclear Safety Class 2 component with an ASME N Stamp and is located in AB el. 89, room 014. Pump cooler has active cooling from an available cooling source, CC system or Sava river water.

ARHR heat exchanger is also located in AB el. 89, room 014 and is classified as Nuclear Safety Class 2 (RHR side) and Safety Class 3 on Cooling side (CC system).

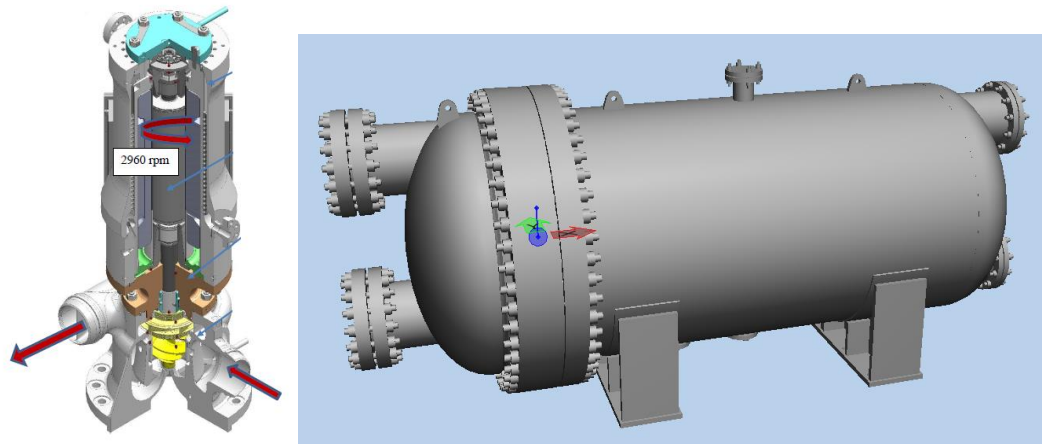


Figure 1: 3D model of the ARHR pump and heat exchanger

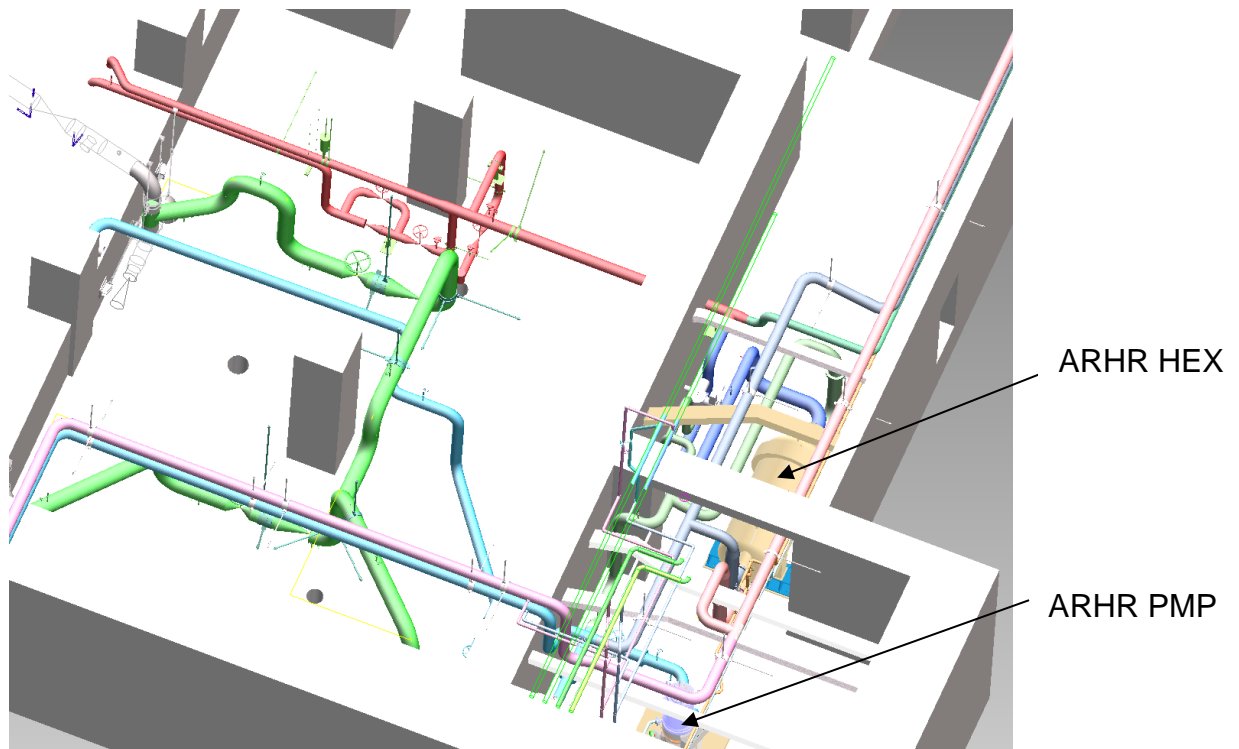


Figure 2: Ground plan of the AB el. 89, showing new piping (colour) and major equipment (PMP, HEX) – look from plant west side

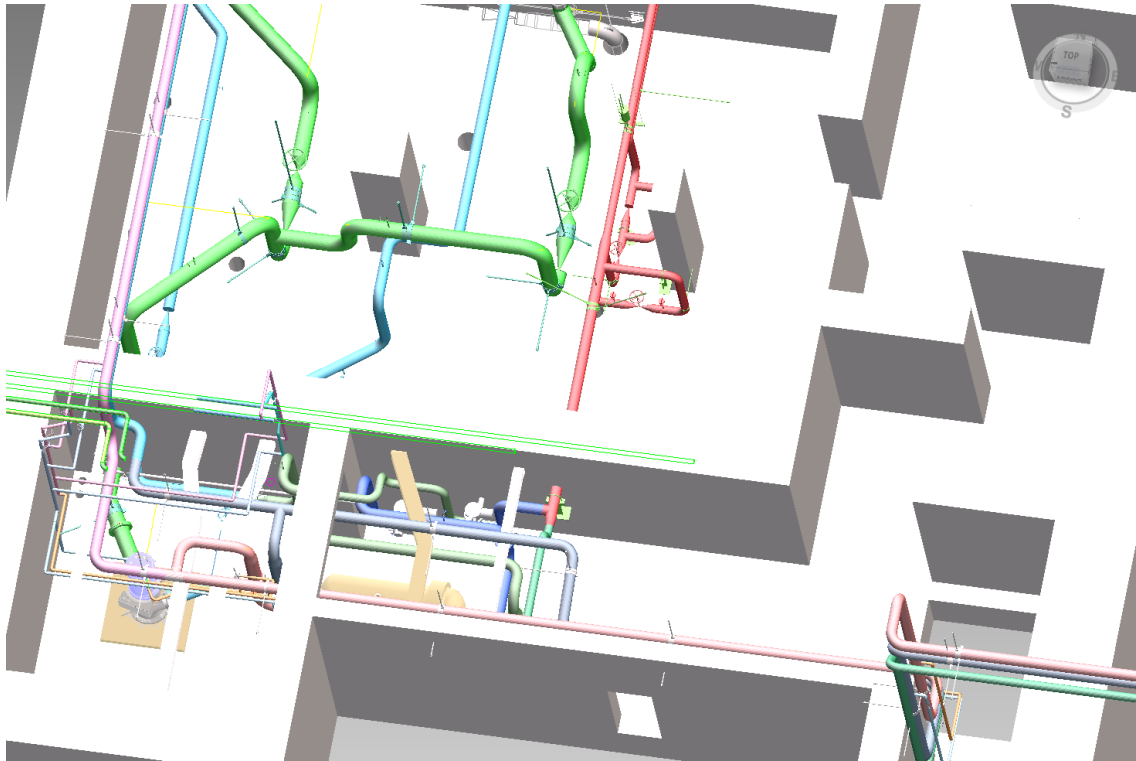


Figure 3: Ground plan of the AB el. 89, showing new piping and major equipment (PMP, HEX) – look from plant south side

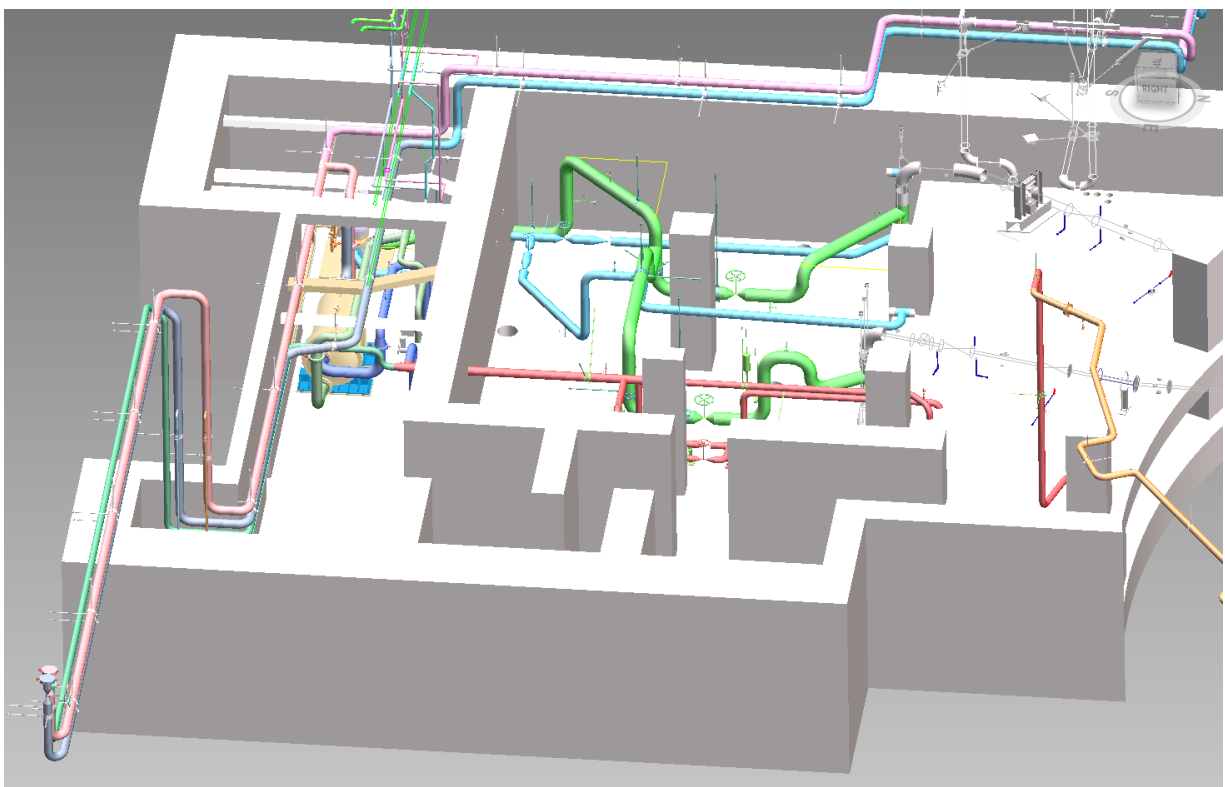


Figure 4: Ground plan of the AB el. 89, showing new piping and major equipment (PMP, HEX) – look from plant east side

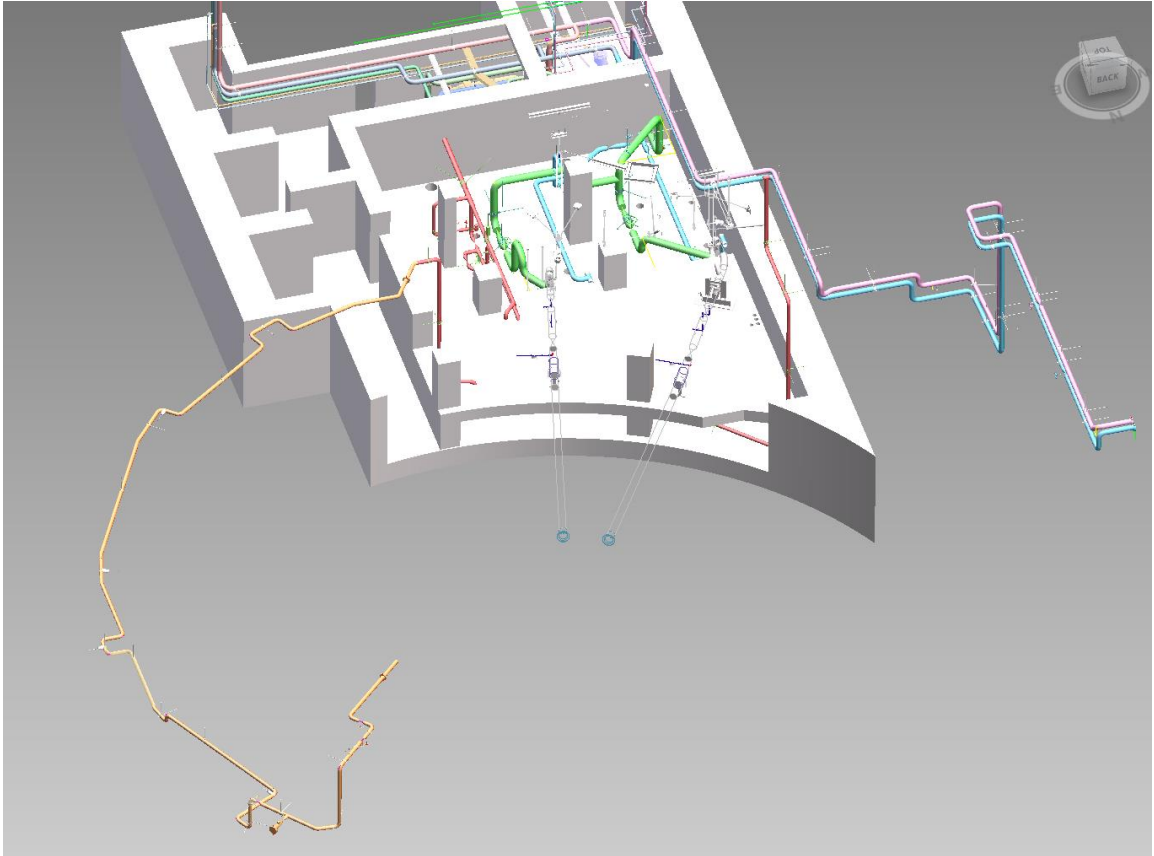


Figure 5: Ground plan of the AB el. 89, showing new piping and major equipment (PMP, HEX) – look from plant north side

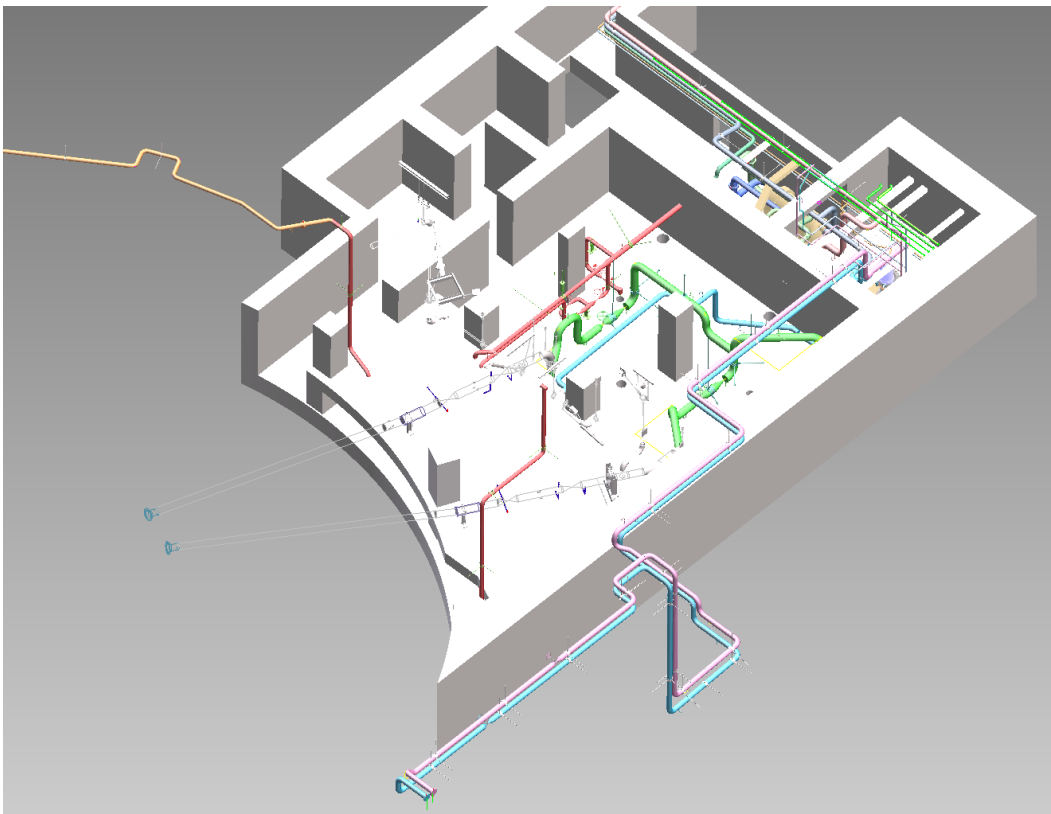


Figure 6: Ground plan of the AB el. 89, showing new piping and major equipment (PMP, HEX) – look from plant north-west side

6 APPLICABLE NEK- CONTRACTOR DESIGN CONTROL PROGRAM

- ED-1 Design Modification Control Program
- ED-2 Document Control Program
- ED-14 Reactivity Management 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)
- ESP-2.301 TS Changes and Licensing Amendments
- ESP-2.607 Design Verification
- QD-1 Quality Assurance Plan
- QS 610 Generic Quality Assurance Program Requirements

7 APPLICABLE CODES, STANDARDS, DESIGN CRITERIA and REFERENCES

The design criteria, regulations, codes and standards listed below are applicable to the RCS and CNT Alternative Cooling Equipment Installation and are to be considered in the detailed design.

To the extent specified herein, the version and full identity of all codes, standards, and other documents applicable to this Specification are shown in Section 7. A later version of some of the dated documents may become mandatory under regulations that have jurisdiction. If this develops, the newer version of each document shall be identified by means of a revision to the Specification. If there is a conflict between this Specification and a referenced document, the Contractor shall refer the matter in writing to the Purchaser to inform him of the conflict and to provide a proposal to resolve the conflict for Purchaser's approval. This process will also apply in the case of a conflict between codes and standards.

The code and standard dates are provided as a reference. The Contractor, unless otherwise stated by the Purchaser, shall use the appropriate codes and standards listed in this section in effect at the time Purchase Order is issued by Purchaser.

Contractor will provide a detailed review of listed references in Sections 7.1 through 7.7 during the project initiation phase. Any conflicts or contradictions between references will be addressed with proposed resolution by the Contractor to NEK.

7.1 Slovenian Codes

- Rules on the use of radiation sources and on activities involving radiation (JV2/SV2), Ur.l. RS, No. 27/2006
- “Pravilnik o dejavniki sevalne in jedrske varnosti” (JV5), (Rules on radiation and nuclear safety factors (JV5), Ur.l. RS, No. 92/2009 and 9/2010)
- “Pravilnik o zagotavljanju varnosti po začetku obratovanja sevalnih ali jedrskih objektov” (JV9), Ur.l. RS 85/09, 9/10, 87/11 (Rules on the safety of radiation and nuclear facilities)
- Odločba 3570-11/2011/7 “Odločba o izvedbi modernizacije varnostnih rešitev za preprečevanje težkih nesreč in blažitev njihovih posledic”
- Zakon o varstvu pred ionizirajočimi sevanji in jedrski varnosti (ZVISJV), (Ionising Radiation Protection And Nuclear Safety Act, Official Gazette of the Republic of Slovenia (ZVISJV), Ur.l. RS, No. 102/2004-UPB2, 70/2008-ZVO-1B, 60/2011 and ZVISJV-D,74/15)
- Ur.l. RS110/2002-ZGO-1, 24/2003, 50/2003-UPB1, 46/2004, 102/2004-UPB2, 70/2008-ZVO-1B, 60/2011
- Pravilnik o fizičnem varovanju jedrskih snovi, jedrskih objektov in sevalnih objektov, Ur.l. RS 31/05 (Rules on physical protection of nuclear materials, nuclear facilities and radiation facilities)
- Uredba o zagotavljanju varnosti in zdravja pri delu na začasnih in premičnih gradbiščih, Ur- l. RS 83/05 (Decree on safety and health at work at temporary or mobile construction sites)
- 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)
- Konvencija o jedrski varnosti, UL RS-MP, št. 16/1996
- Pravilnik o splošnih ukrepih in normativih za varstvo pri delu z dvigali (žerjavi), Ur. l. SFRJ št. 30/69. (Regulations on general measures and standards for protection at work with cranes)

7.2 General US codes

- 10 CFR 50, Appendix A, “General Design Criteria”
- 10 CFR 50 Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants”
- 10 CFR 21, “Recommendations for Enhancing Reactor Safety in the 21st Century”; U.S.NRC; July 2011
- ASME BPVC Section III, Nuclear Components, Class 1, 1971 Edition through Winter 1972 Addenda for the interfaces to the existing systems
- ASME Code Section II, III, V, VIII, IX that has been adopted and referenced in 10 CFR 50.55a
- ASME Code Section XI, 2007 Edition with the 2008 Addenda for fourth interval inservice inspection examination
- ASME/ANSI B36.10-1985, Welded and Seamless Wrought Steel Pipe

- ASME/ANSI B18.2.2-1987, Square and Hex Nuts
- ASME/ANSI B36.19-1985, Stainless Steel Pipe
- ANSI N45.2.1–1980, Cleaning of Fluid Systems
- ANSI/ASNT CP-189, ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel, 1995
- ASME Y14.5M, Geometric Dimensioning & Tolerance
- ASTM A 36-70a - Standard Specification for Structural Steel

7.3 USNRC Regulatory Guides

- RG 1.29, Revision 1, “Seismic Design Classification”, August 1973
- RG 1.32, “Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants”;
- RG 1.38, “Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage and Handling of Items for Water Cooled Nuclear Power Plants”.
- RG 1.116, Quality Assurance Requirements for Installation, Inspection and Testing of Mechanical Equipment and Systems (endorses N45.2.8).

7.4 Codes and Standards

- ANSI N18.2 - “Nuclear Safety Criteria for Water Reactor Plants”; ANS; 1973;
- ANSI N45.2-1977, “Quality Assurance Program Requirements for Nuclear Power Plants”;
- ANSI N45.2.15, “Requirements for the Control of Hoisting, Rigging and Transporting of Items at Nuclear Power Plant Sites”;

7.5 Other Supplemental Criteria and Information

- NUREG-0612, “Control of Heavy Loads at Nuclear Power Plants”, January 1980

7.6 Other NEK Supplemental Criteria and Information

- 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
- Pravilnik o študiji požarne varnosti, Ur.l. RS 28/05, 66/06, 132/06
- Pravilnik o protieksplzijski zaščiti, Ur.l. RS 102/00, 91/02, 16/08, 1/11, 17/11, 103/11
- Tehnična smernica TSG-1-001:2010; Požarna varnost v stavbah
- SIST DIN 14090 - Površine za gasilce na zemljišču
- SP-A3000 - SERVICE LEVEL II COATINGS INSIDE NEK TECHNOLOGICAL AREA
- SP-A500A - PAINTING INTERIOR SURFACES OF CONTAINMENT
- SP-A501A - PAINTING OF EQUIPMENT IN CONTAINMENT

7.7 NEK Programs, Procedures and Licensing documents

7.7.1 NEK Programs

- ED-1 Design Modification Control Program
- ED-2 Document Control Program
- ED-14 Reactivity Management Program
- ED-15 Configuration Control Program
- EDC-4 Cable Tray, Cable & Conduit Separation Criteria
- EDC-5 Grounding System Criteria
- MD-23 Risk Assessment

7.7.2 ADP - Administrative Procedures

- ADP 1.0.131 Organizacija izvedbe modifikacije (Development of modifications)
- ADP 1.0.500 Program protipožarne zaščite – Požarni red (Fire protection program)
- 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 Prezem, 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

7.7.3 ESP – Engineering Procedures

- ESP-2.113 EAM MECL equipment numbering system
- ESP-2.301, Technical Specification Changes and Lic. Amend.
- ESP-2.302, Administration of Changes to the USAR
- ESP-2.303, Authorization of Changes, Tests and Experiments (10CFR50.59)
- ESP-2.306, Administration of Changes to the Radiological Technical Specification (RETS)
- ESP-2.307 Administration of Changes to the Design Extended Conditions Technical Specifications (DECTS)
- 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

7.7.4 FPP - 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 tekocinami
- EIP 17.044 Nudenje prve pomoči in prve medicinske pomoči v primeru nezgode v nek

7.7.5 Other Procedures

- GMC 4.004 Gradbeni odri
- QD-1 Quality Assurance Plan
- QS610 Generic Quality Assurance Program Requirements

8 IDENTIFICATION OF AFFECTED SYSTEM(S)

RH, CC, CI, SI, SX

9 IDENTIFICATION OF AFFECTED EQUIPMENT

Existing RH, CI, CC and SI system piping.

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 100.30 m and installation of major equipment is on el. 89 inside Auxiliary Building (see Figures 2 to 6).

11 DOCUMENT SUBMITTAL

All document (including drawing, graphs, specifications ...) submitted shall be in the form of hard copies and electronic media. Electronic media shall be in a format fully compatible with following software:

- Word Processing: Word
- Computer-aided Drafting: AutoCAD

All the submitted documents shall bear at least following identification:

- Contractor's Name
- Date of issue
- Document number
- Revision number
- Construction Code
- NEK's Order Number
- NEK'S Spec Number

The Customer shall furnish the following documentation for the project:

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 installation
2. Project Schedule
3. Project Management Manual (See. Appendix 0) and PQP.
4. List of used standards.
5. Contractor's QA Manual in acc. with the Sect. 43 of this spec.

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 description 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 DMP 1029-RH-L.

11.2 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. 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 one hard copy and one soft copy (DVD 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.

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.

11.2.1 Documentation according to NEK ESD procedures:

- a. Installation package according to the procedure ESP 2.619
- b. FME plan according to ADP 1.1.101 Preprečitev vnosa tujkov (FME program)
- c. Final Documentation – Mark-up for Essential drawings shall be furnished by Contractor to NEK as soon as possible but not later than when the systems are ready for Operability declaration.
- d. Mark-up As Built drawings - They include all affected and new drawings reflecting as built configuration. Essential drawings shall be delivered before the declaration of operability.
- e. Hand Over Package (HOP) - Maximum 3 months after the installation completion, the Contractor shall prepare Hand Over Package

Table 1: Number of required documents per NEK procedures

Installation Package (IP); (to be submitted for NEK review 2 months prior to installation start)	1 hard and 1 soft copy
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11.2.2 Engineering Documents for NEK review and approval:

- a) Project Management Manual
- b) Project Quality Plan
- c) Monthly Progress Report (for information)
- d) Walk-down reports
- e) Purchasing specification for equipment
- f) Installation & Inspection Plans
- g) Installed Equipment Documentation Packages
- h) FME Plan
- i) HOP package

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.

11.3 Additional Requirements

11.3.1 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 qualities 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 2010 version©
- Spreadsheet: EXCEL©
- Computer-aided Drafting: AutoCAD©
- Planning & Scheduling: PRIMAVERA© or MS Project

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 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 3.4 Installation and Commissioning.

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.
2. All materials used shall be new and in accordance with the applicable fabrication code.

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 General

1. Fabrication materials, methods, and quality assurance shall be in accordance with the Contractor's Safety Analysis Report, Certificate of Compliance, Contractor's approved quality assurance program, and the applicable codes and standards in Section 7.0, Codes and Standards.
2. All material used in fabrication shall be new and shall conform to the appropriate material specifications. Prefabrication shall be performed to minimize field welding.

14.2 Welding

1. Welding during installation of Class 2 and 3 components shall be done in accordance with requirements of an Article NCA-3131 (ASME III Edition 1998, Division 1 – NCA).
2. All aspects of welding and NDE shall be in accordance with the Contractor's approved Safety Analysis Report, 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.

3. All welding, welding procedures and qualifications, and welder qualifications shall be in accordance with the applicable ASME or AWS code, respectively.
4. Documentation for all weld filler material used in the fabrication of components that are classified as Safety Related shall be furnished to the Purchaser as part of the final certification package with a CMTR.
5. Weld surfaces shall be suitable for the NDE to be performed.
6. UT and radiographic examination results, where required, shall be submitted to the Purchaser in the fabrication document package.

15 INSPECTIONS & TEST

Inspections and tests is described in DMP where specific Installation and Test Procedures shall be developed and hold points defined.

Testing, Inspection and related acceptance criteria shall conform to the applicable codes and standards as specified in section 7. In the absence of the specific code, the Contractor shall use these standards, which shall be submitted with the proposal.

Contractor has to have implementation program for Detection of Counterfeit and Fraudulent Products. All code material reconciliations shall be supplied to Purchaser.

16 QUALIFICATION, PARTS CLASSIFICATION & DOCUMENT TRACEABILITY

ARHR system is classified as Nuclear Safety Related system.

17 OTHER REQUIREMENT

17.1 Contractors Responsibility

Should the Contractor propose to purchase from other Contractors any equipment, material, or service specified herein, the Contractor shall identify to the Purchaser the SubContractor and the specific components they need to provide. If the proposed SubContractor will manufacture any of the items covered by the specification completely or perform sufficient fabrication of the items which require presence of the Purchaser's Shop Inspector in the SubContractor's shop, the Contractor shall identify the SubContractor to the Purchaser.

The Contractor or his agent shall perform inspections and/or witness tests at the SubContractor facilities. The presence of PSI does not relieve the Contractor of his responsibilities to meet the requirements of this specification.

The Contractor shall be completely responsible for the installation of the all ARHR system components as required in DMP 1029-RH-L. The Contractor shall be fully responsible to ensure that his work, and the work of any sub-Contractor, is of high quality in every respect of workmanship throughout and fully complies with this specification. If any requirement of this specification is determined by the Contractor to be technically incorrect or technically unsuitable, or that conformance would diminish the Contractors responsibility or the product performance after installation; then the Contractor shall transmit such objections in writing to PURCHASER within forty-eight hours of discovery or with the proposal.

In all respects, equipment supplied in response to this specification shall incorporate normally accepted industry practice of engineering, design, and workmanship. It is not the intent of this specification to specify all details of design and construction. The equipment shall be constructed and equipped with accessories in accordance with this specification and with Contractor's standard practices when such practices do not conflict with this specification.

17.2 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 RCS and CNT alternative cooling equipment installation project.

The Contractor shall designate a qualified Safety Representative. The Safety Representative shall attend all project safety meetings and participate fully in all activities outlined in Contractor's safety program. The Contractor's Safety

Representative shall have stop-work authority for unsafe acts or conditions, shall be considered key person, and shall be on site when work is performed. The Contractor's occupational health and safety staff shall be adequate to respond to the administrative aspects any emergency or medical situation resulting from the RCS and CNT alternative cooling equipment installation work. The Contractor shall maintain reports of all accidents and injuries. The Contractor, once mobilized, shall hold regularly scheduled meetings to instruct its personnel on safety practices and the requirements of the safety program. The Contractor shall furnish safety equipment and enforce the use of this equipment by its personnel.

Before the installation, the Contractor shall submit the Safety Plan to the Purchaser for approval. Program shall have statement which industrial health standards and safety standards were used in preparation of RCS and CNT alternative cooling equipment installation activities. Approval of Contractor's Program by the Purchaser does not relieve the Contractor of any Contractor health and safety responsibilities. Safety Plan is part of the Installation Package.

18 CLEANING

The Contractor shall establish and maintain standard industrial cleanliness throughout fabrication, assembly, removing, installing, testing, and inspection of equipment. The Contractor shall be responsible for ensuring that these same requirements for cleanliness are met by its sub-suppliers.

Presence of foreign material that includes grit, metal, particulate matter, oil slag, scale, rust, fiber, and designated detrimental material, which can obstruct operation of hardware or cause wear or erosion, shall be avoided. Necessary precautions shall be provided to maintain the cleanliness as high as possible during piping modification activities.

19 CORROSION PROTECTION/COATING

Corrosion protection/painting shall be performed respecting compatibility of applied products to NEK approach for plant equipment (see Paragraph 7.6).

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

Project 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.

The Contractor shall provide, for Purchaser's review and approval, procedures for packaging, shipping, site receiving, site storage, handling, and cleaning after installation of delicate equipment. The packaging procedure shall take into account the method of transportation to be used, as well as the possible storage duration and storage environment.

21.2 Storage

The Contractor shall verify the site storage and/or specify additional requirements necessary to maintain equipment warranties. The Contractor shall provide any special requirements and advice for maintaining of equipment in proper shape during extended site storage, indoors or outdoors.

22 SOURCE INSPECTION/SURVEILLANCE NOTIFICATION

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

23 NONCONFORMING MATERIALS

Nonconformance with specification requirements, approved drawings, and applicable federal, state, and local codes and standards invoked by this specification will not be accepted until approved by the Purchaser.

Non-conformances to be reported for approval by the Purchaser are those non-conformances which cannot be brought within specification requirements by rework or replacement. When such a condition exists, the Contractor shall initiate a Nonconformance Report (NCR) using the Contractor's standard proposed disposition.

Additionally, the Contractor shall:

- a) segregate the nonconforming item to prevent any further processing which may result in a change of the nonconformance as identified,

- b) make the NCR available to the Purchaser's Inspector for review to assure the nonconformance is completely identified and accurately stated, and
- c) properly disposition and transmit the NCR to the Responsible Engineer by the most expeditious means. The NCR may be telecopied, followed by direct transmittal of the original. The Contractor shall provide technical justification if recommended disposition is "Accept-As-Is" or "Repair".

NOTE: For better understanding a sketch shall be made or picture taken in order to show Nonconformance.

The requirements of the Specification are binding; no departures are acceptable without the prior consent of the Purchaser. The resolution/approval of Deficiency Notices, Nonconformance reports, Field Change Notices, etc. must be approved in advance by the Purchaser. Further engineering and/or manufacturing after the detection of non-conformances, prior to Purchaser's approval, shall be at Contractor's risk.

The NCR shall provide the method by which the Contractor shall obtain a documented response and approval from the Purchaser when non-conformances are identified. The use of the NCR will pertain to work at the Contractor's and/or subsupplier's shops.

24 SPECIAL HANDLING

Contractor shall prepare instruction/procedures for handling the equipment which will be used within RCS and CNT alternative cooling equipment installation 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 apply to this order.

27 COMMERCIAL GRADE ITEM DEDICATION

NEK do not expect Commercial Grade Dedication process during RCS and CNT alternative cooling equipment installation project. If the Bidder expects some material, parts, components, processes or activities from commercial market, this shall be specified in the quotation. The bidder shall provide dedication program in quotation.

28 SUPPLIER DOCUMENTATION REQUIREMENTS

The Contractor will provide all the documentation specified in this Specification.

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 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. 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
RCS and CNT alternative cooling equipment installation project
Attn: Mrs. Nataša Sagernik

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 PROGRAM

N/A

33 REVIEW & VERIFICATION OF WORK

The Contractor* is required to perform a detailed checking operation, review and/or verification of all documents in the Installation Package. 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.

*Main Contractor cannot delegate this task to the subcontractor involved in preparation of the Installation Package or HOP.

34 SCHEDULE REQUIREMENTS

In order to comply with the objective of full implementation of the modification the following Schedule completion activities/milestones are considered (Detailed schedule is provided in Attachment 45.4 Project schedule):

Table 2: Schedule requirements

No.	Description	Duration (months)
1	Contract awarded	T ₀
2	PMM and PQP send to NEK on approval	T ₀ +1
3	IPs for OL30 and RE19 approved by NEK	T ₀ +3
4	Start of Installation on OL30	T ₀ +3
5	Installation in outage 2019 – October 2018	T ₀ +7
6	IPs for OL31 and RE 21 approved by NEK	T ₀ +8
7	Start of Installation on OL31	T ₀ +8
8	Completion of installation on OL31	T ₀ +15
9	Completion of installation on RE21 and SAT testing	T ₀ +26
6	Commissioning Completed	T ₀ +26
7	HOP Signed	T ₀ +27

35 STATUS REPORTING REQUIREMENTS

Contractor is responsible for the status reporting and can NOT delegate this responsibility to the subcontractor. Status shall be given based on the common task project:

- a) Reports of Design Activities Progression
- b) The Contractor shall provide to NEK a monthly written status report for design work being completed, started, open problems, planned activities in next month and delayed.

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:

- a) Select the Contractor who best conforms to the Purchaser's requirements. The Purchaser will revise the specification following the completion of the technical part of the bid process and issue specification ES 5124 Rev. 1 if necessary.
- b) Designate a Project Manager who will serve as the principal interface with the Contractor on the individual modification
- c) Perform revision of all procedures based on the inputs provided by Contractor. These inputs are markup of affected procedures.
- d) Provide all interface information with any plant activities related to this project
- e) Provide access for onsite inspection to all the areas where new systems, major equipment and accessories will be located.
- f) Provide all available as-built documentation
- g) Provide an on-site training to all SELLER's and his subcontractor's employees as needed to meet requirements for an "unescorted access" to perform the on-site activities.
- h) Provide HP technicians and Decontaminators
- i) Provide Electrical power connections (220/400 V 3 phase, 50 Hz)
- j) Purchaser shall prepare Start-up Procedures (SUP's).
- k) Integrate all mutually agreed SELLER's interface activities into an overall Purchaser operation on-line plan. NEK shall be responsible for conducting the plan in a timely manner.

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.

37 CHANGES of WORK SCOPE

The Contractor shall notify the Purchaser in each case when the change of work or plan will affect the quality of work, schedule or cost of contracted activities. Any such deviation must be made in writing by means of a form submitted to the Purchaser for approval prior to continuing work.

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 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, Installation Lead Project Manager and responsible for mechanical scope of work

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

Janez Kastelic, Responsible engineer for I&C and electrical scope of work

- Phone: + 386 4802 225
- E-mail: janez.kastelic@nek.si

Igor Horvat, Responsible engineer for civil scope of work

- Phone: + 386 4802 153
- E-mail: igor.horvat@nek.si

Nataša Sagernik, Purchasing department

- Phone: + 386 4802 446
- E-mail: natasa.sagernik@nek.si

40 CONTRACTOR'S TECHNICAL APPROACH to the WORK

As a part of the NEK "Request for Proposal/ Quotation", the Contractor shall prepare a brief preliminary Project Management Manual and Project Quality Plan (PQP) which outlines how and where the work will be performed and indicates how the Contractor understands his scope of work. The quotation should also indicate if similar project applications have been performed by the Contractor.

The Contractor's proposal shall include his reasons for every and all sections either as a general statement or specific comments or both.

The Contractor is not hindered to submit any additional documents to ensure completeness of the quotation.

The Contractor's responsibilities (scope of work description and scope of supply) are specified in Chapter 3 of this Specification. Additionally, this Specification also provides requirements which Contractor must follow in the work mainly specified in Chapter 0.

The Contractor shall be responsible for the following resources:

- All labor required to physically perform the work. This labor force shall possess skills to perform the work on the Project.
- Field Engineering. Contractor's field personnel shall be capable, qualified, and able to perform the duties required to the satisfactory resolution of field problems.

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

NOTE: Based on law of ZVISJV and based on "Pravilnik o dejavnih sevalne in jedrske varnosti (JV 5)" Article 60, (nadzor podizvajalcev in dobaviteljev) Purchaser is responsible for establishing surveillance on Contractor and its subcontractors to ensure high quality and nuclear safety for the public.

- (<http://www.ursjv.gov.si/fileadmin/ujv.gov.si/pageuploads/si/Zakonodaja/SlovenskiPredpisi/NPB/JV5.pdf>)
- ([http://www.ursjv.gov.si/fileadmin/ujv.gov.si/pageuploads/si/Zakonodaja/SlovenskiPredpisi/NPB/NPB_ZVISJV - 27.7.2011.pdf](http://www.ursjv.gov.si/fileadmin/ujv.gov.si/pageuploads/si/Zakonodaja/SlovenskiPredpisi/NPB/NPB_ZVISJV_-_27.7.2011.pdf))

NOTE: Contractor personnel working under Contractor's direct responsibility are not considered as sub-contractors in this context.

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.

All subcontractors need to be qualified by Contractor and have to be included on its Approved Supplier List (ASL). 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 General

General Requirements:

- a) The Contractor has to be qualified for the scope of the Contract.
- b) The contractor shall have quality system program which meet requirements of 10CFR50 App. B, NCA-4000 and NEK Quality Specification QS-610 (Attached to Bidding Documentation).
- c) The reporting requirements of 10CFR21, "Reporting of Defects and Noncompliance", shall apply throughout the entire Project.
- d) The Contractor's Quality Control Manual and referenced company standards shall apply to all design practices employed on the work performed pending review and concurrence by the Purchaser.

QA requirements specified in the following QA sections apply to the Contractor subcontractors. One (1) controlled copy of the Contractor's Level I QA Program Manual shall be submitted to NEK with the Proposal if not already submitted to NEK. Contractor shall notify Purchaser of any Level I QA Program changes that are issued during the conduct of the contract.

43.2 Quality Manual

Contractor's Quality Manual review and acceptance by the Purchaser shall be a prerequisite for selection of 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 and approved by the Purchaser prior to the implementation.

- a) The Contractor has the responsibility for QA activities for all work pursuant to this Specification. All technical and quality requirements shall be met.
- b) All work performed by Subcontractor(s) shall be subject to the technical and quality requirements of this Specification as well. The Contractor shall be responsible for all subcontracted activities.

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 seven (7) 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 concern 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. The reporting requirements of Title 10, Code of Federal Regulations, Part 21(10CFR21), "Reporting of Defects and Noncompliance", shall apply.

Mandatory hold points are considered to be those tests, inspections, or operations which require witnessing by the NEK Representative and beyond which operations shall not proceed without written consent of the Purchaser.

The Contractor's failure to stop at a hold point will be a cause for rejection of those activities for which notification was not provided or which were not held. Hold points require receipt of notification at least seven (7) working days in advance of the scheduled time of performance.

43.7 Documentation

43.7.1 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.

43.7.2 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 or 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.

43.7.3 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

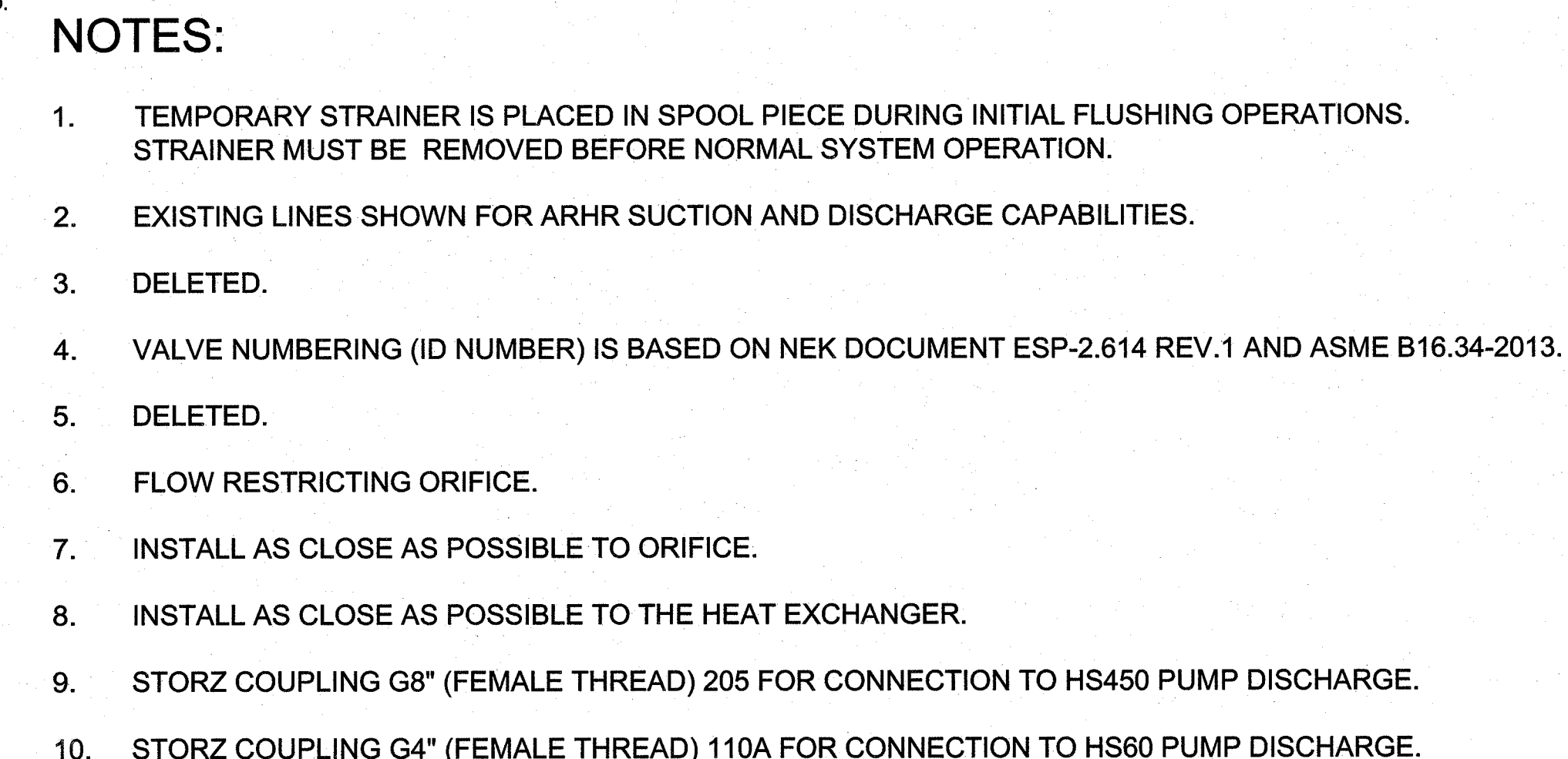
NEK proprietary data are defined in the Contract. Refer to General Terms and Conditions proprietary-related paragraph.



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 ARHR flow diagram – 1W04600
- 45.2 DMP Sections (C, E, F and H) - 1029-RH-L (phase 2)
- 45.33 PMM Template
- 45.4 Project schedule

45.1 ARHR flow diagram 1W04600



TOLERANCE & MACHINE NOTES (unless otherwise specified) DRAWING PRACTICES: CHAMFER SYMBOLS, DIMENSIONING, TOLERANCES & DIMENSIONS TO BE USED ARE BASED ON ASME Y 14.5 STANDARD. DIMENSIONS IN mm shall be ON 20°C NO DECIMAL ONE PLACE DECIMAL TWO PLACE DECIMAL RADIUS OR CHAMFER ALL EDGES FILED RADIUS ANGLES MAXIMUM MACHINED SURFACE - 3.2u MAXIMUM SURFACE ROUGHNESS - 8.3u STATUS: <input checked="" type="checkbox"/> PRE <input type="checkbox"/> CFC <input type="checkbox"/> CAE <input type="checkbox"/> DES <input type="checkbox"/> OPEN ITEMS		© 2018 Westinghouse Electric Company LLC All Rights Reserved WESTINGHOUSE PROPRIETARY CLASS 2 INFORMATION ON THE AUTHORITY OF AND CONFIDENTIALITY OF THIS INFORMATION OWNED BY WESTINGHOUSE ELECTRIC COMPANY LLC IS HEREBY DECLARED TO BE UNCLASSIFIED AND ITS DISCLOSURE IS IT TRANSMITTED TO YOU IN CONFIDENCE AND TRUST AND YOU ARE NOT TO DISCLOSE THIS DOCUMENT OR ITS CONTENTS WITH THE TERMS AND CONDITIONS OF THE AGREEMENT UNDER WHICH IT HAS PROVIDED TO YOU ANY UNAUTHORIZED USE OF THIS DOCUMENT IS PROHIBITED. REF DESG THREE NAIL PROJECTION  REF ASBY  REF NBR REF NO TOLERANCE: NA WEIGHT: NA SHT. 1 OF 1		DATE: July 31, 2018 DRAWN BY: J. H. H. H. CHECKED BY: J. H. H. H. APPROVED BY: J. H. H. H. Westinghouse KRSKO ALTERNATE RHR (AHRH) PIPING & INSTRUMENTATION DIAGRAM 1W04600 WESTINGHOUSE ELECTRIC BELGIUM B-1400 INVELOS, BELGIUM	
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45.2 DMP Sections - 1029-RH-L (phase 2)

1029-RH-L (phase 2) DMP Sections (C, E, F and H) are added on DVD as a separate document to this specification.

45.3 PMM Template

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

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 (<i>Contractor</i>):	_____	_____	_____	_____
Reviewed by:	_____	_____	_____	_____

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[illegible]

2. CROSS-REFERENCES

- Project Quality Plan for Project _____

3. TABLE OF CONTENTS

1.	Revision Control Log	2
2.	Cross-references	2
3.	Table of contents	3
3.1.	List of Tables.....	4
4.	Abbreviations, Purpose and applicability of the document	5
4.1.	Purpose and applicability.....	6
4.2.	Relation to other documents.....	6
5.	Project Description.....	6
5.1.	Project Scope.....	6
5.2.	Phases of project	7
6.	Project Organization	9
6.1.	Project Teams.....	9
6.1.1.	Site Team	9
6.2.	Project Steering Committee.....	9
6.2.1.	Purpose and goals.....	9
6.2.2.	PSC-meetings.....	9
6.3.	Project Meetings and conferences	10
6.4.	Sub-Contracting	11
6.5.	Correspondence and Document transmission	11
6.5.1.	Communication channels.....	11
6.5.2.	Project correspondence	12
6.5.3.	Authorized persons.....	13
6.5.4.	External Sharepoint page	13
6.6.	IT-Tools and Software	13
7.	Project Controlling.....	14
7.1.	Project Planning and Scheduling.....	14
7.1.1.	Types of schedules.....	14
7.1.2.	Updating and follow-up	14
7.1.3.	Project Schedule features.....	14
7.2.	Project reporting.....	15
7.3.	Action item handling and Issue tracking.....	15
7.4.	Controlling of project Specific Issues, deficiencies and non-conformances.....	15
7.4.1.	Problem/ Deficiency Report (PDR)	16
7.4.2.	System performance / warranty action request (SPWAR)	18
7.4.3.	Nonconforming product.....	18
8.	Project change management.....	19
8.1.	Control of design and development changes.....	19
9.	Quality Assurance.....	20
10.	Site Work.....	21
10.1.	Planning	21
10.2.	Logistics	21
11.	Document Deliverables and transmittal schedule.....	21

11.1.	Drawing and document numbering system.....	21
11.2.	Document status (<i>Contractor</i>)	22
11.3.	Document review by NEK.....	22
11.3.1.	Process.....	22
11.3.2.	NEK approval status	22
11.4.	Document transmittal schedule	23
12.	Provisional Acceptance Parameters	23
13.	Attachments	I

3.1. LIST OF TABLES

Enclosure 1:	List of abbreviations and definitions.....	6
Enclosure 2:	Project phases	8
Enclosure 3:	Project Team NEK.....	9
Enclosure 4:	Project Team Contractor	9
Enclosure 5:	Project Organizational - Chart Contractor	9
Enclosure 6:	Project Organization - Chart NEK	9
Enclosure 7:	Project Steering Committee	9
Enclosure 8:	Project-meetings and characteristics	10
Enclosure 9:	Correspondence requirements related to topic.....	11
Enclosure 10:	List of software for project management.....	13
Enclosure 11:	PDR priorities and handling	17
Enclosure 12:	SPWAR Priorities and modalities.....	18
Enclosure 13:	Division of responsibility on scope changes	19

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.

The Scope of the project is described in SP-EXXXXX 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

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 Contractor 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 **Contractor's** 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:

YY-BBB-CCC-XXX, where:

- a. **YY** 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.

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 send 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 later by NEK.

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

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

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 1st to 5th 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-Exxxx 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 Contractor	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-xxxx 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.

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.

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-Exxxx, as Attachment x, page xx.

12. PROVISIONAL ACCEPTANCE PARAMETERS

Respective parameters are provided in SAT procedure.

13. ATTACHMENTS

Attachment 1: List of subcontractors and potential subcontractors

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

Attachment 3: Project Schedule

Attachment 4: Problem/ Deficiency Report (PDR)

NUCLEAR POWER PLANT KRŠKO PROJECT **Project Number**
Form ID: Form 001



PDR – Problem/Deficiency Report

Contractor
Logo

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

Initiated by NEK ☐ / Contractor ☐

NEK/XXX: PDR Issue	
PROBLEM TITLE:	
Affected Components:	
Reference documents:	

NEK/Contractor: Scenario Identification
Environment description and order of events that were predecessors to the problem appearance:
Identified by:

NEK/Contractor: 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 Proposal and 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):

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

NUCLEAR POWER PLANT KRŠKO PROJECT **Project Number**
Project Name



SPWAR – System Performance/Warranty Action Request

CONTRACTOR'S LOGO

SPWAR No. (nmn):	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

NEK: SPWAR Issue				
PROBLEM TITLE:				
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

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

Attachment 7: Transmittal Sheet

Attachment 8: Document-Cover-Sheet

45.4 Project schedule

