

NUCLEAR POWER PLANT KRŠKO

Mechanical Maintenance Department

TECHNICAL SPECIFICATION

FOR SUPPLY OF REACTOR VESSEL FLANGE SEALING SURFACES CLEANING MACHINE

(IN 8261220)

Revision 0

Classification: » AUGMENTED QUALITY «

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1. DESCRIPTION OF ACTIVITIES

This Specification defines scope, plan, schedule, technical, administrative, quality and other requirements for supply of the Cleaning machine for the Nuclear Power Plant Krško (NEK) Reactor Vessel (RV) flange sealing surfaces cleaning to NEK.

Abbreviations:

NEK	Nuclear Power Plant Krško,
RV	Reactor Vessel,
RVCH	Reactor Vessel Closure Head,
RB	Reactor Building,
FME	Foreign Material Exclusion (preventing foreign material to enter into systems and components),
ALARA	As Low As Reasonable Achievable,
QA	Quality Assurance
QC	Quality Control
QPR	Qualification Personal Record
FAT	Factory acceptance test
SAT	Site acceptance test

2. SCOPE

Scope of supply by supplier:

2.1 The Cleaning machine for the Nuclear Power Plant Krško (NEK) Reactor Vessel (RV) flange sealing surfaces cleaning

It contains but is not necessarily limited to following:

- a. Supply of new underwater cleaning machine for the NEK RV flange sealing surfaces cleaning (hereafter referred to as Cleaning machine). It remains NEK property. Technical requirements of the cleaning machine are specified in item 7 below,
- b. Cleaning machine FAT and SAT,
- c. Training of the NEK personnel for the NEK RV flange sealing surfaces cleaning by above supplied cleaning machine. It includes also preparation of the cleaning machine with its subcomponents for service, troubleshooting, performance of its maintenance, handling, decontamination and cleaning, storage, sealing surface cleanliness evaluation with cleaning machine cameras & monitor, sealing surface inspected area video recording and equipment preparation, etc.,
- d. Assistance/support of the supplier specialist at NEK site during first underwater cleaning of NEK RV flange sealing surfaces with above supplied cleaning machine. It consists also of cleaning machine preparation, sealing surfaces cleanliness evaluation, machine cleaning, decontamination, etc. (in the outage 2027),
- e. Recommended spare parts and consumable materials for the machine 10 years operation,

- f. Supply of Tools needed for cleaning machine use, maintenance and preparation for service,
- g. Supply of Cleaning machine software backup with instruction for program uploading/downloading and software to do it.

2.2 Proposal - Information required with the Proposal

Information to be submitted with the Proposal shall include, but is not necessarily limited to the following:

- a. Title of service, proposal designation and Table of content;
- b. Description of Scope of supply (Cleaning machine, tools, documentation, services, prerequisites, etc.);
It shall include detailed description of RV flange cleaning machine; machine with its main parts technical characteristics, advantages, principle of RV flange sealing surfaces cleaning and cleanliness evaluation (with acceptance criteria); number of qualified personnel needed during cleaning performance with machine; type of cleaning brushes, material and technical properties of cleaning brushes; machine traveling speed, brush rpm.; documentation, respected regulation; machine advantages; needed RV flange cleaning time and number of required cleaning passes, needed time for machine preparation for service; needed maintenance (prior to each use and periodic); needed power supply, voltage and frequency, voltage of subcomponents, needed water pressure; references; supplied documents; description/scope of machine FAT and SAT; list of recommended spare parts; machine cleaning, decontamination, etc.;
- c. List of references;
 - Machine,
 - Supplier and personnel references of the same successfully performed services with the proposed cleaning machine;
- d. Supplier evidence of capabilities (facilities, equipment, trained and qualified personnel etc.);
- e. QA Program Manual. QA Program shall satisfy ISO 9001. QA Program review and acceptance by the NEK shall be a prerequisite for selection of a Supplier as a Contractor;
- f. List of applicable documents (Codes, Standards (with specified Edition), Specifications (with specified Edition), Drawings, Procedures of inspection);
- g. Alara plan;
- h. Description of FME assurance;
- i. Organizational chart;
- j. Time and schedule shall include following:
 - pre-outage scope, cleaning machine delivery to NEK, documentation etc.,
 - outage scope, machine preparation for service, cleaning/inspection, time needed for machine decontamination and storage after cleaning (on hourly basis);
- k. Price break down per scope;
- l. List of Tools, equipment, measurement tools with tool dimensions and weights;
- m. Written Acceptance or all deviations or exceptions to these Specification requirements.

2.3 Pre-outage Activities

Pre-outage activities of supplier consists of all needed activities for successful NEK RV flange sealing surfaces cleaning and cleanliness evaluation performance during outage 2027 with supplied cleaning machine. The pre-outage activities shall include but is not necessarily limited to the following:

1. Cleaning machine manufacturing, supply, preparation, testing and qualification for services,
2. Pre-Service documentation package (defined in item 2.4),
3. Machine, tools and material transportation to NEK site,
4. Personnel trainings and qualification.

2.4 Pre-service documentation package

Pre-Service documentation package shall be delivered by Supplier to NEK for review and approval not later than by January 15th, 2027. NEK will review the documentation package and provide comments to the Supplier. The supplier shall provide the Pre-Service documentation package with resolved NEK comments not later than 15th of February 2027. It shall be provided in hard copy and in electronic version (pdf). All documents including Software shall be delivered to NEK on the memory sticks or portable disks.

It shall include, but not be necessarily limited to the following:

1. Cleaning machine documentation

It shall include but not be limited to following:

- a. Title, Document designation, Machine manufacturer, Table of contents, Technical data of the machine, Reference documents,
- b. Cleaning machine certificate of conformity including with CE certificate of conformity,
- c. Operation and maintenance manual of the cleaning machine and subcomponents,
- d. Detailed description of supplied equipment,
- e. Procedures/instructions for cleaning machine (including with cameras, control unit, monitor, remote control unit, spray nozzles, etc.) preparation for service; testing with acceptance criteria; the RV flange sealing surfaces cleaning, cleanliness evaluation (with acceptance criteria) and recording of the RV sealing surface; operating and control; handling; maintenance; assembling/disassembling; machine inspecting; decontamination; cleaning after use; storage; etc. It shall contain instruction of machine recommended settings for NEK RV flange sealing surfaces cleaning and cleanliness evaluation,
- f. Drawings of the cleaning machine and its subcomponents,
- g. Bill of materials with Indicated number of part from the drawing, Part name, Part number designation, Number of installed parts, Material of part, Part dimensions, Manufacturer, Weight, Notes, etc.,
- h. Drawing of the cleaning machine components in connection with connection cables, hoses, etc.,
- i. Electric and hydraulic schematics,
- j. Wiring diagrams,
- k. Recommended maintenance scope and frequency,
- l. Troubleshooting,
- m. Recommended spare parts list,

- n. Software with instructions for uploading/down loading, etc.,
- o. Safety instructions,
- p. FAT and SAT instruction with inspection plan, acceptance criteria and defined supplier control points and place for NEK (H,W, R,) points,
- q. Training Material for training of NEK personnel for cleaning machine preparation for service, operation, inspection, maintenance, decontamination cleaning ,
- r. Standard camera resolution test chart for underwater inspections - A2 format,
- s. Supplier Organization chart with responsibilities and NEK interfaces,
- t. Etc.

2. NEK site activities performance documentation

It shall include, but not be necessarily limited to the following:

- a. Title of service, Designation, Revision, Contents and Introduction;
- b. List of applicable documents (Codes, Standards, Specifications, Drawings, Service, handling, packaging, transportation procedures, Inspection and QA/QC Procedures);
- c. General description of planed work;
- d. Service schedule – detailed;
- e. Integrated work sequence and quality control plan with reference documents and its steps, acceptance criteria, defined supplier control points and place for NEK H(old), W(itnes), R(ecord) points;
- f. Service applicable working and inspection/ control procedures, qualification records, personnel qualification records, and other documentation;
- g. Alara plan;
- h. Supplier Organization chart with responsibilities and NEK interfaces;
- i. Personal Qualification Records, referenced, HP Record and Medical Exam Certificate, etc.;
- j. List of Tools, equipment, measurement tools and gauges with calibration Exam Certificates and other certificates where applicable,

2.5 Service preliminary report

The Preliminary Report shall be submitted by the Supplier not later than during the exit meeting after RV flange sealing surface cleaning successfully completed with the supplied cleaning machine at NEK site. It shall be delivered in hard copy and in electronic version (pdf). Preliminary Report shall include, but is not necessarily limited to the following:

- a. Document Title, Designation, Revision, Table of Contents and Introduction;
- b. Description of performed work;
- c. Conclusions and recommendations;
- d. Completed work sequence and control plan, testing, FAT, SAT documentation, check lists, Records/Reports, etc.;
- e. List of Nonconformance reports (NCR) and reports as well as methods of their resolving and NCR issued with corrective action verification;

- f. Revised cleaning machine technical documents, if needed.
- g. Etc.

2.6 Final report

Final Report shall be prepared, reviewed and approved by Supplier and submitted to NEK in two hard copies and in electronic version (pdf) on the portable disc thirty (30) days upon submittal of Preliminary Report. Final report shall have resolved all NEK comments. All documents including Software shall be delivered to NEK on the memory sticks or portable disks.

The Final Documentation Package shall include, but is not necessarily limited to the following:

- a. Document Title, Designation, Revision, Table of Contents and Introduction;
- b. Description of performed work;
- c. Conclusions and recommendations;
- d. Completed work sequence and control plan, testing, FAT, SAT documentation, check lists, Records/Reports, work and control procedures, etc.;
- e. List of Nonconformance reports (NCR) and reports as well as methods of their resolving and NCR issued with corrective action verification;
- f. Organization chart, List of Personnel involved in service with qualification Records;
- g. Updated cleaning machine documents (specified in item 2.4 1), inspection and control plan and software.
- h. etc.

3. SAFETY CLASSIFICATION

AQ -“Augmented Quality”

The Cleaning machine is classified **Augmented Quality**. Its function is cleaning of the Safety Related Component sealing surfaces. That is why all needed measures of quality shall be assured during design, manufacturing, testing, operation, transportation, storage, cleaning, handling, etc.

4. TYPE OF SERVICE

The Price for scope of supply (machine, tools, spare parts, services, etc.) specified in this specification shall be fixed.

5. REGULATIONS, STANDARDS AND PROCEDURES

The Contractor shall perform activities in accordance with his own Quality program and appropriate procedures. He shall perform the scope in accordance with following documents;

- a. C.E. Book No.19273 Instruction Manual Reactor Vessel (revised), Krsko Nuclear Power Plant,
- b. 19273-121-002 Upper vessel machining (dwg),
- c. 19273-126-002 Vessel flange machining and cladding (dwg),
- d. E-19273-171-004 rev. 02 General Arrangement – Elevation (dwg.),
- e. ISO 9001: 2015 Quality management system,
- f. 2006/42/EC DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 17 May 2006 on machinery, and amending Directive 95/16/EC,
- g. 2014/30/EU DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast),
- h. 2014/35/EU DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits (recast),
- i. EN ISO 12100: 2011-03 Safety of machinery — General principles for design — Risk assessment and risk reduction,
- j. EN 60204-1: 2019-06 Safety of machinery - Electrical equipment of machines - Part 1: General requirements,
- k. EN IEC 61000-6-2: 2019-11 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environment,
- l. EN IEC 61000-6-4: 2020-09 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments,
- m. EN 61000-6-5: 2016-07 Electromagnetic compatibility (EMC) - Part 6-5: Generic standards - Immunity for equipment used in power station and substation environment,
- n. EN ISO 4413: 2011-04 Hydraulic fluid power - General rules and safety requirements for systems and their components,

- o. ISO 10304-1 Water quality — Determination of dissolved fluoride, chloride, nitrite, orthophosphate, bromide, nitrate and sulfate ions, using liquid chromatography of ions - Part 1: Method for water with low contamination,
- p. ISO 17294-2 Water quality — Application of inductively coupled plasma mass spectrometry (ICP-MS)
- q. ISO 17025 Testing and calibration laboratories,
- r. ADP-1.1.101 Preprečitev vnosa tujkov (FME),
- s. ADP-1.1.128 Upoštevanje in dokumentiranje preventivnih ukrepov preprečitve vnosa tujkov (PVT) ob odprih sistemih ali komponentah,
- t. ADP-1.1.033 Varnost in zdravje pri delu v Nuklearni elektrarni Krško,
- u. ADP-1.1.051 Vstop, izstop in gibanje v tehnološkem delu NEK,
- v. ADP-1.1.105 Priročna skladišča in kontrolirano odložena oprema v tehnološkem delu NEK,
- w. ADP-1.7.004 ALARA planiranje dela (ALARA planing of works),
- x. ADP-1.7.007 Vnos opreme, rezervnih delov orodja in drugih materialov v radiološko nadzorovano območje,
- y. ADP-1.6.703 Ravnanje z nevarnimi odpadki,
- z. ADP-1.6.701 Kontrolirani vstop nevarnih kemikalij v NEK,
- aa. ADP-1.8.005 Vstop delavcev zunanjih izvajalcev v NEK,

6. EQUIPMENT IDENTIFICATION

Reactor Pressure Vessel:

System:	RC
Funct. Desc:	REACTOR VESSEL
Equipment No.:	RCPCR01
Building:	RB
Bldg Elev:	107.62
Equip Elev:	107.62
Room:	02B
ASME:	1
ANSI:	1
SR:	Y
Maintenance rule:	Y
RV Manufacturer.:	COMBUSTION ENG. INC.
RV Manuf. Part No.:	E-19273-171-004
Manufacturing code:	ASME Boiler & Pressure Vessel Code, Section III Rules for Construction of Nuclear Vessels, 1971 Edition including Winter 1972 Addenda,

RV flange sealing surfaces sealed with silver coated O-rings,

7. TECHNICAL REQUIREMENTS

The scope of supply shall be conducted in accordance with suppliers' Quality Manual, Procedures and document & requirements specified in this technical specification.

The RV flange sealing surfaces cleaning machine requirements are as follows:

1. It shall ensure long-term successful and efficient cleaning and cleanliness evaluation of the NEK site RV flange sealing surfaces in underwater and in dry conditions with no negative impact or damage to the RV sealing surfaces and other equipment NEK during cleaning performance or handling,
2. The cleaning machine with the control device, monitor and remote control unit shall consist of two angle gear drives adjustable and adjusted according to the NEK RV flange radius; a brush drive with brush; guide components; camera holders with machine front end and back end cameras for the sealing surfaces cleanliness evaluation; encoder; two spray heads for spraying the RV flange sealing surfaces with water, hoses for machine water supply 30 m long; a distribution box; machine components interface cables; cables between machine distribution unit and control unit 20 m long; hoses for machine air supply; a bracket, ropes, shackles, lifting equipment and means for operating/handling of the machine with crane, etc. Connecting cables and hoses shall be quick connecting type. Cables and hoses shall be equipped with reels.
3. It shall be designed and manufactured in accordance with referenced documentation (item 5 above), requirements of this technical specification and other applicable standards for such machines,
4. The supplier shall provide a declaration of conformity that supplied item conforms to the applicable standards, directives with requirements of this technical specification. The item shall be marked with CE marking,
5. The RV flange sealing surface cleaning by machine shall be remote controlled and operated by operator with control unit from the NEK refueling operating floor (elevation RB115) with support of the technician from the refueling machine for guidance of the cleaning machine cables during RV flange cleaning and with no need of personnel support in RX cavity (elevation RB107). Installation of the machine to the RV flange shall be performed by polar crane with no need of technician to enter to the RV flange elevation,
6. It shall ensure the RV sealing surfaces are cleaned with or without the Upper Internals (UI) installed in the RV,
7. It shall ensure a simple and efficient cleanliness evaluation of the RV flange sealing surface using the cleaning machine cameras and the machine monitor during cleaning. The video of the inspected area shall be recorded and stored with the machine control unit. Later, it shall be possible to copy the video (data) to a portable disc for further evaluation of the sealing surface area by NEK personal computers. Video recordings must be in a format compatible with free computer video players (Windows 10 or newer),
8. It shall be resistant to corrosion or other degradation process due to operation in borated water condition and designed for the RV sealing surfaces cleaning in the following environment condition:
Water chemistry: boron 2500 to 3500 ppm,
chlorides, fluorides ≤ 150 ppb,
Radiation level: 20 mSv/h and radiation level of possible hot spots,
Temperature: ≤ 60 °C,

9. The cleaning machine shall be designed to clean:
 - a. RV flange sealing surface stainless steel of clad material P-8 (E309+E308),
 - b. Leakage Tube Monitor locations of clad material P-43 (ENiCrFe-3),
10. It shall be designed for the following dimensions:
 - a. RV flange sealing surface outside diameter 3498,9 mm (137,75'')
 - b. RV flange sealing surface inside diameter 3259,1 mm (128,31'')
 - c. outside diameter of RVCH inner O-ring groove 3336.11 mm (131,34'')
 - d. outside diameter of RVCH outer O-ring groove 418.66 mm (134,593'')
 - e. width of RVCH O-ring grooves 15.82 mm (0,623'')
 - f. diameter of silver coated O-rings 13,33 or 12,7 mm (0.525'' or 0,5''),
11. The cleaning machine shall ensure its easy decontamination and cleaning after cleaning of the RV flange sealing surfaces. To facilitate decontamination of the machine surfaces they shall be clean, iron-free and metal parts machined up to 25 RMS finish (Ra 0,8 μ m) or better. All welds between the beams, plates, covers, lifting attachments etc. shall be cleaned and grinded to improve quality of the surfaces up to a 63 RMS finish (Ra 1,6 μ m). The base metal shall be clean, free of weld spatter, slag, etc.,
12. It shall ensure ALARA principles of operation and handling with machine,
13. It shall be designed for underwater condition work including with cables, connectors and other associated equipment which is submerged in RX cavity water during RV flange cleaning,
14. It shall ensure multiple use of brushes and easy replacement in case of need,
15. The cleaning machine brushes shall ensure cleaning in longitudinal direction of the RV flange sealing surface. They shall be adaptable to the sealing surfaces,
16. Traveling of the cleaning machine shall start earlier than rotation of the brush during the sealing surfaces cleaning. The Brush rotation shall stop prior to travel of machine stops. The machine shall have automatic mode of operation and manual mode of operation. It must have option of machine travel along the sealing flange with stopped cleaning brush rotation and with no negative impacts to the sealing surfaces during the travel.
17. The cleaning machine and its brush shall not degrade or cause damage to the RV sealing surface or cause any negative effects during and after RV sealing surface cleaning performance. The supplier shall provide brush technical data sheet with specified material in the proposal,
18. The cleaning machine shall be efficient to ensure clean RV flange sealing surfaces from all visible grease, dirt, dust, oxide buildups, scale, silver, rust etc. in maximal 3 cleaning passes,
19. The cleaning machine shall be designed for plant electric supply 100 - 240 V; 50-60 Hz; 1 phase.
20. The Cleaning machine control unit shall ensure low voltage (48 V or less) to the machine cables and cleaning machine for work in RX cavity and underwater condition.
21. The cleaning machine sealing surfaces water spraying system shall be designed for operating water pressure of 5,2 bar available at NEK site;

22. The cleaning machine shall be equipped with colour monitor and 2 colour cameras with resolution of at least 300 lines horizontally. Cameras shall have their own light source,
23. The cleaning machine weight shall be not more than 45 kg;
24. Cleaning machine main components shall have name plate with following information: Part name; Part number designation; Year of manufacturing, Weight of machine or device; Voltage, Power , manufacturer, etc.,
25. The Cleaning machine shall be designed to ensure all FME standards (no lost parts during operation and handling, easy/reliable machine FME monitoring, etc.),
26. The cleaning machine steering, operation and control shall be independent from cameras. Nonoperation of cameras shall not affect operation of the machine cleaning,
27. The cleaning machine equipment shall be supplied in Aluminum metal boxes for safe transportation and storage, water and dust proof per IP65. They shall be equipped with means for transportation with overhead crane and ropes (as lifting lugs, eye bolts or similar), fork lift and with handles for manual handling. Cables shall be supplied with cable reel and connection plugs,
28. The cleaning machine shall ensure safe operation, handling and work. It shall be equipped with emergency STOP switch/button,
29. During all stages of the fabrication process, cleaning of items shall be performed in accordance with ANSI 45.2.1 class B or equivalent ISO standard,
30. Handling and transportation shall be in accordance with QS 610 rev.2, paragraph 4.13.
31. The proposed design of cleaning machine of the supplier shall have at least 5 references of the successful RV flange sealing surfaces underwater cleanings at NEK (PWR) type nuclear power plants in last 5 years and at least 2 such machines in service which were manufactured in last 10 years;
32. The machine & tools, procedures and labor supplied by the supplier shall be qualified for performance of the scope of supply,
33. The condition for RV flange cleaning in outage 2027:
The upper internals (UI) is placed on the UI stand in the refueling cavity and lower internals is placed in the RV during the RV flange cleaning. The RVCH is placed on the RVCH stand during service performance. The RV flange cleaning by underwater cleaning machine is performed while RX cavity water is approximately 2 m above RV flange
34. The cleaning machine shall successfully pass performance test at all its operation modes in underwater and in dry condition. SAT includes successful test and qualification of the machine on the mockup and successful completion of first underwater cleaning and cleanliness evaluation of the NEK RV flange sealing surfaces.

8. SUPPLIER AND LABOR QUALIFICATION REQUIREMENTS

The Supplier shall provide evidence of his references, qualification and capability to perform the scope defined in this technical specification including the design and manufacturing of the cleaning machines for NEK type RV sealing flanges in accordance with the requirement of his own QA program and applicable standards as defined in this technical specification.

The supplier shall provide qualified labor and equipment for performance of the scope required in this specification on NEK's type RV sealing flanges. Appropriate knowledge, skills and qualification shall be proved with qualification certificates and with references of specified works performed on the said equipment.

The Supplier specialists shall have at least three references in last six years of successfully performed services of machine site preparation and cleaning of NEK type RV sealing flanges with the machine specified in this technical specification.

Prior to the start of services at NEK site the Supplier labor shall pass NEK trainings including general employee training for job performance at NEK site. They shall get familiar with the house rules concerning NEK's basic regulations on the movement on site, treatment of equipment, the requirements of safety at work, as well as with the requirements of radiological and fire protection, etc.

The Supplier shall respect relevant procedures, prescriptions and regulations as stated in this technical specification. He shall be familiar with NEK's method of work and shall follow NEK's procedures.

The Supplier and his personnel who will work at NEK site shall be qualified for work in Radiological controlled area. They shall be fit for duty and to perform the services in accordance with NEK's Radiological Protection Requirements.

The Supplier personnel shall be qualified for work in Foreign Material Exclusion (FME) area.

The Supplier shall submit to NEK all necessary documents for the Contractor personnel which enables them to work in NEK radiation controlled area at least 30 days prior to start of outage 2027.

9. DETAILED SCHEDULE

The cleaning machine shall be supplied to NEK prior to 1st March, 2027. Performance of the supplied cleaning machine FAT and theoretical and practical training of NEK personnel shall be conducted by 15th February 2027.

The beginning of NEK 2027 year outage is scheduled for 1st April. The RV sealing surfaces first cleaning with supplied machine is preliminary scheduled for 23rd April, 2027 (night shift). It is going to be performed on the critical path of NEK outage, which means that supplier shall have to adapt to possible actual 2027 outage schedule change. The machine site preparations and testing shall be performed earlier.

The Bidder has to submit his detailed schedule of the machine manufacturing, testing, preparation for service at NEK site, cleaning, inspection and all activities with their prerequisites in the Bid. The Schedule has to be harmonized with NEK integral 2027 outage schedule. The detailed harmonized time schedule will be submitted to the Bidder at a later date, when clearly determined.

Coordination of the services performance shall be made between Contractor site team leader and NEK's coordinator responsible for the said scope of services.

For employee to be mobilized during NEK 2027 Outage the Contractor shall submit the documentation to NEK one month before the start of the outage.

10. CONTRACTOR'S OBLIGATIONS

The Supplier shall fully meet the said scope but he shall first of all:

- a. Follow NEK's rules and procedures including with documents specified in this technical specification,
- b. During the work at NEK site the supplier personnel shall do their best to produce as little radioactive waste as possible,
- c. The Supplier shall provide his own procedures and documentation for the performance of the whole scope supply activities,
- d. Provide to NEK cleaning machine software that works on Windows 10 or later on memory stick/disk.
- e. Provide all tools and goods needed for successful completion of the scope of supply. Tools, materials, goods and hazardous materials used during site service performance shall be specified in the bid. Their quantities shall be specified too,
- f. Provide transportation of machine, tools and materials to NEK site.
- g. All hazardous material provided to NEK by Supplier shall be on list of NEK approved materials. Approval for use of hazardous material at NEK site per ADP 1.6.701 shall be acquired by Supplier 30 days prior to outage 2027 start,
- h. All preconditions (as water level in RX cavity, condition of the sealing surface prior to cleaning, electric power, compressed air, crane etc.) to be met for successful performance of the subject services shall be specified in quotation and in Pre-service documentation package,
- i. The Supplier Time Schedule is to be part of the quotation. The Supplier Time Schedule (outage activities) will be suited to NEK integral outage activities schedule. NEK outage schedule is not fully fixed. The Contractor has to adapt his activity to current NEK 2027 outage schedule during service performance,
- j. All measures needed to prevent Foreign material entry to the systems (FME) during service performance shall be assured. RV flange cleaning at NEK site will be performed in FME zone 1. FME inspection points shall be specified in quality plan. Works in FME zones shall be notified with written documents.
- k. All tools needed for work at NEK site and supplied by Supplier shall be faultless and inspected by qualified tool verifier. Certificate of supplier tool qualified verifier inspection shall be provided to NEK during tool entrance to NEK,
- l. Tools which will enter to NEK shall be specified on the list. Tool list shall be provided to NEK prior to tool entrance to NEK, Instruction for handling and rigging of tools, tool boxes /containers with lifting plans shall be part of the Pre-service documentation package. It shall contain list of tool / box content, their weight and location of center of gravity, dimension etc. All boxes/containers or heavier tools shall be equipped with transportation eye bolts, lugs and hand handles to ensure safe work performance.
- m. The activities or use of tools or machines or materials shall not cause any negative impact or damage to the RV sealing flange or other NEK equipment,
- n. The Supplier shall provide personal protective equipment for work in NEK non radiological controlled area including safety protection goggles,
- o. The Supplier shall ensure all measures to prevent fire hazard,

- p. The Supplier shall ensure safety at work, respect safety at work requirements and use required protective equipment,
- q. The Supplier shall ensure tidiness and cleanliness of workplaces,
- r. English or Slovene shall be used as official communication language. Bid and documentation shall be provided in English language,
- s. Supplied documents, drawings etc. shall be legible.
- t. The Supplier specialist/team at NEK site shall have support of their company engineering department during the service performance,
- u. The Supplier shall submit all IT equipment (computers tablets, data storage devices, etc.) that will be used at NEK technological area to NEK process information system department for malware check,
- v. The supplier shall provide access to the supplier's plant facilities and records pertaining to this purchase order for the purpose of performing test and inspection activities in accordance with the plan. NEK requires 14 days advance notice that witness or test points have been reached.
- w. If NEK tools are going to be used at NEK site, the Supplier shall use it in a proper way, get appropriate qualification for related work and successful performance of services.

11. NEK's OBLIGATIONS

The NEK shall be obligated to:

- a. Provide NEK responsible person to coordinate site jobs between contractor and NEK.
- b. Provide crew for cleaning with underwater cleaning machine with support and assistance of supplier,
- c. Provide polar crane and refueling machine support,
- d. Issue work order (work instructions is within Suppliers scope),
- e. Carry out radiation survey and NEK health physics support for activities at NEK,
- f. Provide NEK 2027 Outage Time Schedule,
- g. Harmonize the performance of particular activities with NEK 2027 Time Schedule and communicate with the control room,
- h. Provide personal protective equipment for work in radiological controlled area available at NEK site. Equipment which is not available at NEK site is Suppliers scope.

12. SPECIFIC REQUIREMENTS

Requirements for materials

If any special materials will be used and installed in machines, following shall be respected:

Lead, mercury, and other low melting point materials, their alloys and/or their compounds, sulphur, lead, low melting point metals, their alloys, and their compounds are prohibited from use.

Certified Product Report shall be obtained by the Contractor for each lot of consumable material and shall include as a minimum:

- a. Manufacturer's name and designated product,
- b. Actual results of the required tests reported in ppm (halogens, water leachable chlorides, sulphur, etc.),
- c. Identification of low melting point constituents.

For expendable materials, the following limits shall apply. Engineering approval is required for use of an expendable material whenever the chemical analyses exceed these limits.

- | | |
|------------------------------|----------|
| a. Water leachable chlorides | 100 ppm |
| b. Halogenated compounds | 1000 ppm |
| c. Sulphur and its compounds | 1000 ppm |

13. QA REQUIREMENTS

The contractor will ensure that contractual quality-related requirements are fulfilled using his own quality management system, which complies with ISO 9001 and with relevant requirements from QA specification NEK QS 610, rev 2, Generic Quality Assurance Program Requirements. If the contractor fails to fulfill the above-mentioned QA requirements, this will be deemed as violation of contractual obligations by the contractor. QA/QC activities will be performed in accordance with Quality Plan/Control Plan, contractor's internal technical and quality control procedures, which must be approved by purchaser beforehand; and under surveillance of NEK and contractor's qualified QA/QC personnel. Handover documentation must include all quality records, as defined in the contract, and must be provided to the purchaser in the form of a final report data package after completion of all works. Handover documentation / final report data package will be reviewed and approved by responsible representatives of the purchaser and the contractor.

14. ATTACHMENTS

Appendix 1: QS 610 Generic Quality Assurance Program Requirements rev.2,