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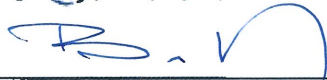




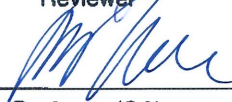
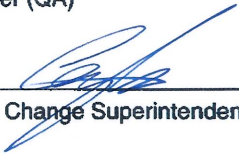
Technical Specification OSC, FILTER AND FILTER PLENUM

KRŠKO NUCLEAR POWER PLANT

SP-B3006 September 2017

Revision 0

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Aleksandar Jovanović		22.2.2018
	Originator (Savaprojekt)	Date
Vladimir Butković		24.02.2018
	Reviewer	Date
Boštjan Pevec		26.2.2018
	Reviewer	Date
Roman Krajnc		1.3.2018
	Reviewer	Date
Ivan Učanjšek		05.03.2018
	Reviewer	Date
Jože Kerin		05.03.2018
	Reviewer	Date
Romeo Bišćan		05.03.2018
	Reviewer (QA)	Date
Janko Cerjak		06/03/2018
	Engineering and Design Change Superintendent	Date



NUCLEAR POWER PLANT KRŠKO

Project Modification 1056-NA-L

*NEK SAFETY UPGRADE PROJECT – Design and Engineering
for modification 1056-NA-L “Reconstruction of Operational
Support Center (OSC)”*

TECHNICAL SPECIFICATION OSC, FILTER AND FILTER PLENUM (Rev. 5)

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	Name	Signature	Date
Prepared by:	<u>Aleksandar Jovanović</u>	<u>[Signature]</u>	<u>22.2.2018</u>
Reviewed by (Mechanical):	<u>Urban Žigante</u>	<u>[Signature]</u>	<u>22.2.2018</u>
Reviewed by (Electrical, I&C):	<u>Damjan Mežič</u>	<u>[Signature]</u>	<u>22.2.2018</u>
Reviewed by (QA):	<u>Tatjana Vresk</u>	<u>[Signature]</u>	<u>22.02.2018</u>
Approved by:	<u>Goran Šalamon</u>	<u>[Signature]</u>	<u>22.02.2018</u>

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1	15.2.2017	Revision correction previously given by the investor	---
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2	9.3.2017	Revision correction previously given by the investor	---
3	5.5.2017	Revision correction previously given by the investor	Page 60
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5	08.02.2018	Consideration of corrections suggested during technical dialog performed by investor.	---

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Attachment 1: Filter Plenum Performance Data List form (1 page)

Attachment 2: Applicable Floor Response Spectra Figures from the Appendices A and B of the OSC Seismic Analysis 1056-NA-L-PZI-3/1-A1 (4 pages)

Attachment 3: Reference drawing SS-906-781-1 Rev.0 (2 pages)

Attachment 4: Equipment Specification Exceptions form (1 page)

Attachment 5: Filter Plenum Data List form (1 page)

Attachment 6: Filter Plenum Electric Heating Coil Data List form (1 page)

Attachment 7: Vendor Technical Manual Guideline (1 page)

Attachment 8: MECL Data Tables (2 pages)

1 SCOPE

1.1 *Scope of Work*

This Specification includes the information required for the procurement of filter plenum for the Operational Support Center (OSC) air cleaning / air conditioning ventilation system in the Krško Nuclear Power Plant (NEK). Specification is classified as Non Safety Related (NSR), however Augmented Quality (AQ), Seismic Category I.

1.2 *Equipment, Material, and Services to be Furnished by the SUPPLIER*

The equipment, material, accessories, and services to be furnished by the SUPPLIER shall include, but are not necessarily limited to, the following:

1. Filter plenum consisting of the plenum housing and the following components:
 - a. Roughing filters;
 - b. High efficiency particulate air (HEPA) filters;
 - c. Charcoal adsorbers;
 - d. Heating coils;
 - e. Water deluge system spray piping and nozzles;
 - f. Test manifolds;
 - g. Instrumentation;
 - h. Internal wiring;
 - i. Lighting;
 - j. Compartments drain;
 - k. Access doors or panels.
 - l. Control system panel
2. One set of all special tools required for the operation and maintenance of equipment to be furnished.
3. Performance of all necessary factory acceptance tests.
4. Packaging and preparation for shipment.

1.3 *Equipment, Material, and Services to be Furnished by OTHERS*

The following equipment, material, and services will be furnished by OTHERS:

1. Receiving, unloading and erection of supplied equipment at the JOBSITE.
2. Foundations, structural support and anchor bolts.
3. Instrumentation and controls not furnished with the filter plenum.
4. External piping and duct connections to the filter plenum.
5. External wiring and connection to the filter plenum.

2 DEFINITIONS

AQ	Augmented Quality
BIDDER	An entity, which offers supply of products and/or services and submitted a bid within a public tendering procedure
DEC	Design Extension Conditions
EMI	Electromagnetic Interference
EQ	Environmental Qualification
JOBSITE	Installation location of equipment at the Nuclear Power Plant Krško site
NCN	Nonconformance Notice
NCR	Nonconformance Report
NEK	Nuclear Power Plant Krško
NRC	United States Nuclear Regulatory Commission
NSR	Non Safety Related
OBE	Operating Basis Earthquake
OSC	Operational Support Center
OTHERS	NEK or other company(ies) subcontracted by NEK
PURCHASER	Nuclear Power Plant Krško
QA	Quality Assurance
RFI	Radiofrequency Interference
SSE	Safety Shutdown Earthquake
SUPPLIER	An entity, which supplies equipment and/or services to NEK per this Specification

3 CODES, STANDARDS AND REGULATORY REQUIREMENTS

The filter plenum covered by this Specification is classified as Non Safety Related (NSR), however Augmented Quality (AQ) Seismic Category I. Electrical components are classified as Non Class 1E (NSR). They shall be designed, manufactured, tested, and certified in accordance with the applicable portions of the following codes and standards:

1. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE):
 - a. ASHRAE 52.2, Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size;
2. American Society of Mechanical Engineers (ASME)
 - a. AG-1-2015, Code on Nuclear Air and Gas Treatment;
 - b. N509-1989, Nuclear Power Plant Air Cleaning Units and Components;
 - c. N510-1989, Testing of Nuclear Air Treatment Systems;
 - d. ASME B&PVC, Section IX, Welding and Brazing Qualification;
 - e. NQA-1, 2008 with 2009/2011 Addenda, Quality Assurance Program Requirements for Nuclear Facility Applications;
3. American Society for Testing and Materials (ASTM):
 - a. ASTM A36, Specification for Structural Steel;
 - b. ASTM A53, Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
 - c. ASTM A240, Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Fusion-Weld Unfired Pressure Vessels;
 - d. ASTM A479, Specification for Stainless and Heat-Resisting Steel Wires, Bars, and Shapes for Use in Boilers and Other Pressure Vessels;
 - e. ASTM D1056, Specification for Flexible Cellular Materials Sponge or Expanded Rubber;
4. American Welding Society (AWS):
 - a. AWS D1.1, Structural Welding Code for Steel;
5. National Fire Protection Association (NFPA):
 - a. NFPA 15, Water Spray Fixed Systems;
 - b. NFPA 70 National Electric Code;
 - c. NFPA 90A, Standard for the Installation of Air Conditioning and Ventilation Systems;
 - d. NFPA 803, Standard for Fire Protection for Nuclear Power Plants;
6. NRC Regulatory Guides:
 - a. RG 1.29, Seismic Design Classification, Rev. 1, August 1973;

- b. RG 1.52, Design, Testing, and Maintenance Criteria for Post-Accident Engineered Safety Feature Atmosphere Clean-up System Air Filtration and Adsorption Units of Light Water Cooled Nuclear Power Plants, Rev. 4, September 2012;
 - c. RG 1.100, Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants, Rev. 3, September 2009;
 - d. RG 1.180, Guidelines for evaluating electromagnetic and radio-frequency interference in SR instrumentation and control systems, Rev. 1, October 2003;
7. Underwriters' Laboratories (UL):
- a. UL 586, Standard for High Efficiency, Particulate Air Filter Units;
 - b. UL 900, Standard for Air Filters Units;
8. US Department of Energy Technical Standards:

Unless stated otherwise by the PURCHASER, the SUPPLIER shall use the appropriate codes and a standard listed in this section in effect at the time of Purchase Order issued by the PURCHASER.

The SUPPLIER shall submit criteria for the design and fabrication of equipment not covered by codes given above to the PURCHASER for review and approval.

4 SUPPLEMENTAL DATA

4.1 *Supplemental Information*

Items listed below are hereby made a part of this Specification. Where a conflict exists between supplemental data and this Specification, this Specification shall take precedence.

Supplemental data items:

1. QS-610, Rev. 1, Generic Quality Assurance Program Requirements;
2. SP-A5001, Rev. 0, Technical Specification Service Level III Coatings;
3. SP-A5002, Rev. 0, Coatings for Internal Surfaces of ECR HVAC System;
4. SP-S702, Rev. 10, Seismic Analysis, Testing and Documentation;

NOTE: The specification SP-S702 is provided without Appendices with floor response spectra figures. Applicable flow response spectra figures are provided in the Attachment 2.

5. Document No. OSC Seismic Analysis 1056-NA-L-PZI-3/1-A1,

NOTE: The OSC Applicable OBE and SSE Floor Response Spectra Figures are taken from the Appendices A and B of the OSC Seismic Analysis 1056-NA-L-PZI-3/1-A1, and provided in the Attachment 2.

4.2 *Reference Drawings*

A reference drawing SS-906-781-1 Rev.0 in the Attachment 3 shows outside dimensions and general arrangement of components within the unit. The dimensions have been estimated by the design engineer.

The BIDDER shall review the proposed dimensions and propose adjustments/corrections, if necessary. In case of any adjustments/corrections, such information shall be included in the Proposal.

5 DOCUMENT SUBMITTAL

5.1 General

All documents (including drawings, graphs, specifications, etc.) submitted shall be in the form of hard copies and electronic media. Acceptable document format sizes shall be A2 or smaller, A3 and A4 should be used whenever possible.

Preferred format for electronic correspondence is Adobe Acrobat Reader (pdf). Other acceptable formats shall be:

- Word Processing: Microsoft WORD (doc, docx);
- Spreadsheet: Microsoft EXCEL (xls,xlsx); and
- Computer Aided Drafting: AutoCAD (dwg).

All SUPPLIER's documents shall bear at least the following information:

- SUPPLIER's Name;
- Date of issue;
- Document status;
- Document number;
- Revision number;
- Construction Code or Standard;
- Other organizations participating in the manufacturing;
- NEK Purchase Order number; and
- NEK Specification number.

5.2 Information Required with the Proposal

The BIDDER shall submit complete operating data and description of the equipment offered with the Proposal. This data shall include the following:

1. Description of the filter plenum including instrumentation and control with operating characteristics of components.
2. Preliminary outline drawings showing general arrangement, all principal dimensions, weights of the unit and major items, operational and maintenance clearance dimensions, material specifications and typical cross section views. In case of any adjustments/corrections of dimensions on the reference drawing, such information shall be indicated on the outline drawing. The BIDDER may provide standard submittal drawings for this purpose.
3. Complete list of material indicating the ASME or ASTM number and grade of material to be used.
4. List of names and paragraph number of each code to which the equipment conforms.
5. A description of the method of clamping and sealing the HEPA and charcoal filters to the mounting frames and the method of sealing and testing seals between mounting frames and housing.

6. Description of charcoal adsorber fire protection system.
7. Description of factory acceptance tests to be performed.
8. Description of an alternate leak test method for HEPA filter charcoal adsorber filter banks, if applicable (see section 10.3).
9. Description of proposed procedure for seismic qualification of the equipment.
10. If the unit cannot be shipped completely assembled, the number, dimensions, weight of each shipping unit and amount of welding required to be performed at JOBSITE to completely assemble the unit.
11. Completion and return of the Equipment Specification Exceptions form with a description of any deviations or exceptions to this Specification (see Attachment 4).
12. Completion and return of the Filter Plenum Equipment Data List and Filter Plenum Electric Heating Coil Data List forms (see Attachments 5 and 6).

The BIDDER shall indicate additional documentation he proposes to supply.

5.3 Documentation Required after Contract Award

The documentation of the filter plenum shall include the following information as a minimum:

1. Certified outline drawings showing general arrangement, all principal dimensions, section views, location and size of piping connections, weight and center of gravity, clearance space required for maintenance or disassembly and other necessary interfaces. These drawings shall be specifically for the supplied equipment involved. Standard submittal drawings are not acceptable unless clearly marked or modified to indicate the concerned equipment.
2. Detailed drawings of components, sub-components or accessories. If these items are shown on separate drawings appropriate cross references shall be used.
3. Wiring diagrams and electrical bill of material of each electrical equipment item furnished.
4. Structural design information including forces and moments at every external equipment support interface, support hardware and bracket details, required anchor bolt sizes, anchor bolt locations, required anchor bolt materials, and specific anchor bolt torque requirements. The SUPPLIER shall make provisions for transmitting any tension or shear loads to the anchor bolts.
5. List of used materials with ASME or ASTM number and grade.
6. Any limitations regarding installation of the unit or its components.
7. Description of required site acceptance tests to be performed including a list of necessary test equipment.
8. Equipment start-up procedure.

The manufacturing documentation shall comprise the following as a minimum:

1. Documentation index;

2. Submittal schedule
3. Manufacturing and inspection plan;
4. Design and manufacturing documentation;
5. All certificates required with material;
6. Deviation, nonconformance and repair reports;
7. Seismic analysis reports
8. Test procedures;
9. Test reports showing conformance to all testing procedures;
10. Cleaning procedures;
11. Packaging, handling and storage procedures;
12. Vendor technical manual;
13. List of recommended spare parts with MECL data tables filled in (see Attachment 8);
14. Statement of shelf life and operational life of the units;
15. Certificate of conformance with the requirements of this Specification;

5.4 Final Documentation

The SUPPLIER shall submit the original and one (1) electronic copy (CD, DVD, flash memory media) of the final technical documentation.

6 DESIGN REQUIREMENTS AND DESIGN INPUTS

6.1 General

The filter plenum shall be designed in accordance with codes and standards listed in the section 3 of this Specification. The main design code shall be ASME AG-1.

The filter plenum unit shall be designed for safe continuous operation under the operating conditions noted in the Filter Plenum Performance Data List. The design life of the permanent components of unit shall be 40 years.

Seismic qualification shall be performed in accordance with the requirements of specification SP-S702 and the OSC Applicable OBE and SSE Floor Response Spectra Figures taken from the Appendices A and B of the OSC Seismic Analysis 1056-NA-L-PZI-3/1-A1, see Attachment 2.

The SUPPLIER shall certify that the equipment covered by this Specification will operate under all design loading combinations based on the design parameters specified herein.

Ventilation system contains one filter unit PLM001 for 100 % of the total air flow capacity.

6.2 Environmental Conditions

The filter plenum will be installed in the OSC Building. The following data shall be used for design of equipment:

- Minimum temperature: 5 °C;
- Maximum temperature 40 °C;
- Relative humidity: 95 % (without condensate).

6.3 Housing

The housing shall be designed and constructed as a walk-in type (bag-in bag-out filter types are not acceptable) in accordance with ASME AG-1, Section HA including Nonmandatory Appendix HA-B and shall be suitable for installation of all required components. General dimensions and arrangement of components are shown on the reference drawing.

The housing shall be constructed in sections as large as can be handled, shipped, and installed. Joints required for field assembly shall be flanged, suitable for field welding. Each section shall be provided with lifting lugs or eyes as required for installation and shall be clearly match-marked.

Material shall be stainless steel with a sufficient thickness and reinforcements to withstand all applicable loads.

Moreover, the housing shall be designed and manufactured to withstand pressures

from 0.6 psig (4150 Pa) negative to 3.0 psig (20700 Pa) positive applied to the inside of the housing, with no permanent deformation or damage. The housing shall also be designed to withstand the seismic loads specified in the OSC Seismic Analysis 1056-NA-L-PZI-3/1-A1. For additional requirements for seismic qualification refer to the section 11.2.

All pressure boundary welds, as well as welds between mounting frames and the housing shall be continuously welded. These welds shall be inspected by liquid penetrant test method.

Access doors shall be provided to compartments indicated on the reference drawing for maintenance, testing and inspection purposes. Doors shall be designed in accordance with the requirements of ASME AG-1, Paragraph HA-4433 and Nonmandatory Appendix HA-B. Doors shall be of the general marine bulkhead type, rated 2 psi (13.8 kPa) fume tight and shall be approximately 20 inch wide by 50 inch high, minimum (51 cm wide x 127 cm high, minimum). Gaskets shall be neoprene or silicone rubber that conforms to the requirements of ASTM D1056, Grade SCE-45 to 30/40 durometer. Doors shall open from both sides and shall be provided with latches and appropriate means to prevent unauthorized entry. Each access door shall be provided with a round window for compartment visual check and control (fire control safety purposes).

Lighting shall be provided to compartments indicated on the reference drawing for maintenance, testing and inspection purposes. Lighting shall be designed in accordance with ASME AG-1, Paragraph HA-4434.

Housing compartments shall be provided with a drain connection with an isolation ball valve. Drain connections shall be located on the opposite side of the access side (doors) of the housing base as indicated on the reference drawing SS-906-781-1 Rev.0 in Attachment 3.

Housing sections shall be built on channel, wide-flange sections or fabricated sections with a height of 8 inch (200 mm) capable of being secured firmly to the floor. Drain connections shall be extended to the edge of the assembly for convenient connection.

Flanged connections conforming to SMACNA HVAC Duct Construction Standards - Metal and Flexible shall be provided for connection to adjacent ductwork. Flange dimension shall be 2 in (50 mm).

6.4 Roughing Filters

Roughing filters bank shall consist of multiple filter cartridges designed and manufactured in accordance with ASME AG-1, Section FB. Roughing filters shall be factory-assembled, rigid-filter cartridges of glass fiber based filter media, containing a binder to retain the fibers.

Filter frames shall consist of corrosion-resistant material.

Filters shall have aluminum separators.

Sealants and adhesives shall qualify as self-extinguishing in accordance with UL 900, Class I requirements.

Gasket material shall be oil-resistant, expanded cellular elastomer, that conforms with requirements of ASTM D1056, Grade 2C3 or 2C4.

All materials shall be suitable for the environment as specified in accordance with ASME AG-1, Section FB.

Filters shall carry a UL label indicating full compliance with requirements of UL 900.

Filters shall have a MERV 13 rating in accordance with ASHRAE 52.2 or 80 – 90 % average atmospheric dust spot efficiency in accordance with ASHRAE 52.1.

The pressure drop of the clean filter shall not exceed 0.28 inch water gage (70 Pa) with an air flow rate of 1000 scfm (1699 m³/hr) per nominal 24" x 24" x 12" (610 mm x 610 mm x 305 mm) filter cell.

Each filter shall be equipped with a permanent label. The marking on the label shall be in accordance with ASME AG-1, Article FB-9000.

6.5 HEPA Filters

HEPA filters bank shall consist of multiple filter cartridges designed and manufactured in accordance with ASME AG-1, Section FC. Filter cartridges mounted in the filter bank shall satisfy testing requirements, specified in the section 10.3 of this Specification.

Each filter shall be constructed by pleating a continuous sheet of filter media into closely spaced pleats separated by inserts. Edges of separators shall extend at least 1/8 inch (3.175 mm) beyond the pleats of the media. Pleats and separators shall not be kinked more than 1/4 inch (6.35 mm) from a straight line drawn from end to end, and shall be perpendicular with the frame within $\pm 1/4$ inch (6.35 mm) as measured from a perpendicular drawn from the opposite end of the pleat or separator. Filters shall have aluminum separators.

The filter media shall be glass fiber and shall conform to the requirements of ASME AG-1, Mandatory Appendix FC-I.

The pleated media and separators shall be enclosed in a stainless steel case conforming to ASTM A240, Type 304 and securely fastened at all sides and ends of the filter case with a self-extinguishing adhesive to avoid media bypassing.

Gasket material shall be oil-resistant, closed cell expanded cellular elastomer, that conforms to the requirements of ASTM D1056, Grade 2C3 or 2C4.

Filters shall carry a UL label indicating full compliance with requirements of UL 586.

The pressure drop of the clean filter shall not exceed 1 inch water gage (250 Pa) with an air flow rate of 1000 cfm (1699 m³/hr) per nominal 24" x 24" x 12" (610 mm x 610 mm x 305 mm) filter cell.

Marking or labeling of each filter cell shall be in accordance with ASME AG-1, Article FC-9000.

Each filter unit shall be clamped to the mounting frame with enough pressure (at a minimum of four pressure points) to enable the gaskets to maintain a reliable seal under operating conditions. Clamps shall be easily operable from an accessible position as shown on the reference drawing. Clamping mechanism shall meet the requirements of ASME AG-1, Section FG. No one clamp shall apply sealing pressure to more than one filter cell. Clamps shall be of stainless steel, conforming to ASTM A240, Type 304.

Filters shall be assembled in accordance with the highest standards of workmanship to provide uniformity of materials and construction, finish, and cleanliness. Filter cells shall be shipped separately for installation at the JOBSITE.

6.6 Charcoal Adsorber

Charcoal adsorber filter bank shall consist of multiple Type II filter trays in accordance with ASME AG-1, Section FD. The mounting frames shall be arranged to house the number of adsorber trays indicated in the Filter Plenum Performance Data List. The plenum housing and bank arrangement shall permit removal of adsorber trays in "slide drawer" fashion.

The adsorber tray shall consist of 2 inch thick (50.8 mm) minimum adsorbent beds in a modular unit as shown in ASME AG-1, Figure FD-4100. The beds shall be enclosed by a nonperforated case on three sides and a faceplate on the fourth side. The adsorber trays shall be installed horizontally in a cabinet like mounting frame to which the faceplate is clamped and sealed. Handles are provided on the front of the tray to facilitate handling and installation.

The filter media shall be new, granular, activated and impregnated carbon and shall conform to the requirements of ASME AG-1, Article FF-5000.

Adsorber trays shall be filled with adsorbent using a filling method qualified in accordance ASME AG-1, Subsubarticle FD-5320. After filling, adsorbent fines shall be removed from the beds by blowing with clean, dry, oil-free compressed air or by vacuuming. After filling, each tray shall be tested in accordance with ASME AG-1, Subsubarticle FD-5330. Adsorber trays mounted in the filter bank shall satisfy testing requirements, specified in the Section 10.3 of this Specification.

Each charcoal filter bank shall include four carbon test canisters, 2 inches (51 mm) in

diameter by 2 inches (51 mm) thick, for each lot of carbon. The carbon in the canisters shall be from the same lot as the carbon in the bank. The test canisters shall receive the same exposure as the media in the filter trays and they shall have documented, proven performance data.

Adsorber tray flanged facing, sides, end, perforated bed screens, and components touching charcoal shall be fabricated completely of stainless steel conforming to ASTM A240, Type 304.

When filled with sorbent, an adsorber tray shall have a minimum residence time of 0.25 s at rated capacity of 333 cfm (566 m³/h). The residence time shall be determined by the procedure in ASME AG-1, Mandatory Appendix FD-I.

The pressure drop of a filled adsorber tray shall not exceed 1.25 inch water gage (310 Pa) at rated flow of 999 cfm (1698 m³/h).

Each adsorber tray shall be legibly and permanently marked in accordance with ASME AG-1, Article FD-9000.

The flanged facing or clamping flange whereby the adsorber tray will be mounted and sealed shall be formed of one plate with four external flanges. The plate shall be fastened and gasketed using a fire-retarding gasket material so that no air leakage occurs either between the plate and the adsorber beds or between the plate and the filter-mounting frames. The gaskets shall be a closed cell neoprene or silicone rubber sponge, which conform to ASTM D 1056, Grade SCE-43E1 or SCE-44E1.

Each adsorber tray shall be individually wrapped and enclosed in a sealed plastic bag that is moisture and water-vapor resistant in accordance with ASME AG-1, Subarticle FD-7100 and shall be shipped separately for installation at the JOBSITE.

6.7 Mounting Frames

The filter bank mounting frames shall be in accordance with the requirements of ASME AG-1, Section FG. The filter bank mounting frames and bracing shall be welded steel, arranged to house the number of filter cells indicated in the Filter Plenum Performance Data List. Surfaces contacting the filter cartridge or the filter cartridge mounting sealing gasket shall be of stainless steel conforming to ASTM A479, Type 304.

6.8 Electric Heating Coil

The electric heating coil shall be designed in accordance with the requirements of ASME AG-1, Section CA.

The electric heating coils shall be designed following the guidelines of ANSI/NFPA 70 and UL 1096, but need not bear UL label. The electric heating coils shall be capable of meeting the design requirements of Paragraphs CA-4422 through CA-4429 and the structural requirements of Subsubarticle CA-4430.

Heaters shall be constructed of steel-sheathed elements with steel flanges and fins permanently furnace brazed to the sheath. Each sheath and fin shall be continuously coated with a heavy layer of ceramic fixed at not less than 815°C and capable of continuously resisting corrosion from high air humidity without cracking or spalling.

Factory wiring shall be insulated with high temperature, nonflammable insulation, (PVC insulation shall not be used) with nickel-plated conductors rated for 250°C. Wiring from each element on the bank shall be brought to clearly marked terminals.

Heating elements shall be enclosed in a stainless steel frame. The frame shall be constructed for slip-in installation.

Resistance coil terminals and nuts shall be stainless steel. Terminal insulators and bracket bushings shall be high grade ceramic. Insulators shall be securely positioned.

Heaters having a total rating greater than 48 amperes shall be divided into equal subcircuits. Current rating of any subcircuit shall not exceed 48 amperes.

Heaters shall be provided with one overcurrent device for each subcircuit. The primary protection device shall be disc-type, automatic reset thermal cutout. Secondary protection shall be fusible, link-type, limiting devices to deenergize the elements if primary cutout fails. The primary and secondary devices shall be serviceable through the terminal box without removing the heater from the system. Prewired fuses and fuse blocks shall be provided for each circuit of each heating coil.

Heaters shall be provided with contactors. These shall be 380V, 3-phase, 50-Hz, magnetic heaters with a 110V control circuit. A 380/120V control transformer with fused overcurrent protection, rated to energize all contactors simultaneously, shall be provided in each contactor panel. The SUPPLIER shall obtain from the coil manufacturer linear thermal cutout for all heating coils 72 inches (183 cm) wide or wider.

Each heating coil shall be provided with a differential pressure type air flow switch by the coil manufacturer. The switches shall deenergize heating coils through the magnetic contactors on loss of air flow.

Each heater shall be provided with a terminal box as a part of the coil-mounting frame. The terminal box shall house the primary automatic reset thermal cutouts, the secondary fusible link cutouts, the differential pressure air flow switch, and the linear thermal cut out where applicable. Controls within the terminal box shall be factory wired to an identified terminal strip. Terminal box construction, wiring, and appurtenances shall conform to the requirements of Specification SP-S702, OSC Seismic Analysis 1056-NA-L-PZI-3/1-A1 and Specifications SP-A5001 and/or SP-A5002.

A remote-mounting type contactor panel shall be provided for each heater. The contactor panel shall house the magnetic contactors, fuses and fuse blocks, and the fused-control transformer. Each contactor panel shall have a nonfused disconnect switch. Controls within the contactor panel shall be factory wired to an identified

terminal strip. Contactor panel construction, wiring, and appurtenances shall conform to the requirements of Specification SP-S702, OSC Seismic Analysis 1056-NA-L-PZI-3/1-A1 and Specifications SP-A5001 and/or SP-A5002.

Electric heating coil shall be legibly and permanently marked in accordance with ASME AG-1, Article CA-9000.

6.9 Fire Protection

The complete charcoal adsorber section shall be provided with a water-spray cooling and fire-extinguishing protection system. Upon initiation, the spray system shall be capable of completely flooding the entire volume of charcoal in the plenum. The water spray system shall conform to the requirements of NFPA 15.

Water piping shall be of galvanized steel, conforming to ASTM A53. Fittings shall be galvanized, malleable iron or steel threaded.

Provisions shall be made to completely drain the water spray system.

Water spray nozzles shall have orifices and all internal waterways of not less than 5/32 inch (3.96 mm) diameter. The nozzles shall be constructed of brass or stainless steel.

The water spray piping system shall be hydraulically calculated, with nozzle flowing pressure of not less than 30 psig (2.1 kp/sq cm) in accordance with NFPA 15.

The water spray system shall be supported in such a manner that it will not fail when subjected to the loads specified herein and in the OSC Seismic Analysis 1056-NA-L-PZI-3/1-A1.

The water spray system piping shall terminate at a threaded connection outside the plenum.

The SUPPLIER shall submit complete design and installation drawings to the PURCHASER for review and approval, before installation of the system into the plenum.

The complete system of piping shall successfully pass a 2-hour hydrostatic test at 200 psig (14 kp/sq cm) without leakage. The test shall be conducted at the factory.

6.10 Test Manifolds

Test manifolds shall be provided for test agent injection, or sampling, to perform in-place aerosol tests in accordance with ASME AG-1 Subsubarticles TA-4600 and TA-4700. Preferred configuration should be Plan B as shown on the Figure HA-C-1130-2.

Permanently installed manifolds, qualified in accordance with ASME AG-1, Nonmandatory Appendix HA-D are preferred. If such manifolds interfere with installation and removal of filters, they shall be designed for temporary removal to

allow access to the filters.

6.11 Electrical Power Supply

The Contractor shall be responsible for all materials and their procurement specification. All current carrying parts shall be copper made. Control, instrumentation and alarm wiring shall be a minimum of 14 AWG 7-strand copper conductors, 600V 90°C flame retarding insulation. Where wire is subjected to flexing on hinged panels 14AWG 41-strand extra flexible, copper conductors with 600V, 90°C flame-retardant insulation shall be used. Any insulation used shall be free from halogens (chloride, etc) and made from non-combustible materials. All electrical power interfaces shall be of minimum 4x 1 AWG size, screw type terminals. Control interfaces size shall be 14 AW and 16 AWG for instrumentation – both types also screw terminals.

6.12 Instrumentation

Design, fabrication, and selection of instrumentation and control systems shall be in accordance with this Specification and ASME AG-1, Section IA. Additionally, as a guidance in determining instrumentation and controls for nuclear air and gas treatment systems refer to Nonmandatory Appendix IA-C.

Local differential pressure gauges and differential pressure transmitters shall be provided for roughing and HEPA filter banks, as well as for total differential pressure across the whole filter plenum. Differential pressure gauges shall have a display scale in mm water column.

Differential pressure gauges shall be completely piped and mounted on the gauge panel on the plenum housing, approximately 1.5 m above the floor.

Transmitters shall be 2 wire type, powered by 24VDC with an output signal of 4 – 20 mA. All transmitters shall be wired and terminated to a marked instrumentation terminal box on the side of the plenum housing.

Local differential pressure gauges and differential pressure transmitters may be combined into a single component.

Alarm actuating device shall be provided with contacts for local and remote alarm annunciation. Local indication LED lamps shall be provided for high (HI) and high-high (HI-HI) alarm, wired and powered in the instrumentation terminal box on the side of the plenum housing. Remote contacts for HI and HI-HI alarm annunciation shall be dry type, normally open, 3A terminated in the instrumentation terminal box on the side of the plenum housing. The first alarm set point shall be approximately 160 °F (71.1 °C). The second alarm set point shall be approximately 350 °F (176 °C).

Three (3) temperature elements shall be provided across the top of charcoal filter bank for remote temperature monitoring. The elements shall be of Pt100 type, partially sheathed with holes for sensing air temperature, stainless steel body and head assembly. The elements shall be factory wired to a marked terminal box on the side of the plenum housing.

6.13 Airflow Measuring Station

To assure high measurement accuracy (2-3% of actual flow or better) under extreme conditions caused by turbulent, rotating, and multi-directional airflows normally present near fan inlets or discharge ducts and directly downstream from duct elbows, transitions, etc. a thermal airflow measuring station shall be provided with the sensor pattern as equal area with honeycomb flow straighteners and dual analog outputs (4 to 20 mA) for airflow and temperature. The airflow measuring station shall be of the rugged construction, fully field serviceable, with sensors for self-diagnostics, and selectable display of individual sensor velocity and temperature.

7 PERFORMANCE REQUIREMENTS

The performance requirements of the filter plenum unit required under this Specification are given in the Filter Plenum Performance Data List form in the Attachment 1.

8 MATERIALS AND DETAILS OF CONSTRUCTION

Materials used in the construction of filter plenum housing shall conform to requirements of ASME AG-1, Article HA-3000.

The SUPPLIER shall state the identification of all material used in the construction of the unit. Identification shall include ASME or ASTM number and grade.

Certified mill test reports shall be provided for materials used in the construction of the unit.

All materials shall be capable of withstanding a cumulative radiation level of up to 10 Gy.

9 FABRICATION AND ASSEMBLY

Welds on the filter plenum housing, filter support frames, and structural framing shall be made and inspected in accordance with AWS D1.1 or ASME Section IX. Welders shall be so qualified.

Installation of electric components shall be in accordance with NFPA 70 National Electric Code.

If filter plenum is shipped in separate sections, each shipping section shall be match marked and dismantled after fabrication. Shipping sections shall be as large as possible and so designed that final assembly at the JOBSITE can be made without special tools or measurements.

10 INSPECTIONS AND TESTS

10.1 Test Responsibility

The SUPPLIER shall perform all necessary factory acceptance tests to verify that supplied equipment meets requirements of applicable codes and standards and this Specification.

The supplier shall prepare test procedures for all factory acceptance tests and submit them to the PURCHASER for review and approval.

The SUPPLIER shall notify the PURCHASER at ten (10) working days in advance with exact date of testing. The tests shall be witnessed by the PURCHASER's representative.

Any deficiencies or malfunctions which occur during the tests shall be corrected and the test repeated.

Test reports shall be prepared for each test and submitted to the PURCHASER for review and approval.

Prior to shipment, the unit shall meet the performance requirements specified in the Filter Plenum Performance Data List.

10.2 Housing

The following factory tests in accordance with ASME AG-1, Article HA-5000 shall be performed by the SUPPLIER after completion of construction of the filter plenum:

1. Visual inspection in accordance with ASME AG-1, Subsubarticle TA-3510, to verify that the unit is designed and constructed in accordance with applicable design codes and standards and this Specification.
2. Housing pressure test at the structural capability pressure in accordance with ASME AG-1, Paragraph TA-3522. Upon completion of the test, there shall be no permanent distortion or breach of integrity.
3. Housing leak test in accordance with ASME AG-1, Paragraph TA-3523. Total leakage shall not exceed 0.5 cfm per 1000 cfm of air flow rate at the final test pressure of 10 inch w.g. (2500 Pa).
4. Air-aerosol mixing uniformity test in accordance ASME AG-1, Subarticle TA-4600, to verify that injection manifolds provide uniform mixing of the challenge agent upstream of the HEPA and adsorber filter banks.
5. Sampling manifold test in accordance with ASME AG-1, Nonmandatory Appendix HA-D, to verify that the sampling manifolds collect representative sample of the challenge agent downstream of the HEPA or adsorber filter banks.

NOTE: If the unit is shipped in sections for assembly at the JOBSITE the above mentioned tests shall be performed by the SUPPLIER after assembly and installation at the JOBSITE.

10.3 *Filters and Charcoal Adsorbers*

The SUPPLIER shall submit documentation to certify that roughing filters, HEPA filters and charcoal adsorber meet the requirements of applicable section of ASME AG-1.

The following factory tests shall be performed after final assembly of the unit in accordance with ASME N510-1989:

1. HEPA and charcoal adsorber filter bank differential pressure test. Differential pressure across clean HEPA filter bank shall not exceed 1 inch w.g. (250 Pa) at rated flow of 1000 cfm (1699 m³/h). Differential pressure across charcoal adsorber filter bank shall not exceed 1.25 inch w.g. (310 Pa) at rated flow of 1000 cfm (1699 m³/h).
2. HEPA filter bank in-place leak test. Combined penetration and leakage of filter bank shall not exceed 0.05% of challenge aerosol (DOP aerosol). If greater penetration is obtained, leaks shall be located and repaired. The repaired filter bank shall be tested again.
3. Charcoal adsorber refrigerant leak test. Combined penetration and leakage of adsorber bank shall not exceed 0.05% of challenge refrigerant gas. If greater penetration is obtained, leaks shall be located and repaired. The repaired filter bank shall be retested again.

NOTE: The SUPPLIER may use alternative methods to perform in-place leak tests of the HEPA and charcoal adsorber filter banks. Alternative methods shall be described in the Proposal.

10.4 *Electric Heating Coil*

The electric heating coil shall be factory tested after fabrication in accordance with ASME AG-1, Subarticle CA-5400. Test results shall be recorded on the Filter Plenum Electric Heating Coil Data List form and shall be submitted to the PURCHASER for review and approval.

11 ITEM QUALIFICATION

11.1 Equipment Environmental Qualification (EQ)

The equipment covered by this Specification will operate in Mild environment during Design Basis and Severe Accidents. This means that environmental parameters during severe accidents will not be more severe than the environmental parameters during normal plant operation, specified in section 6.2. Also the 40 years normal operation total integrated dose, including the severe accident dose at equipment location is expected to be lower than 10 Gy (a formal limit for Harsh environment dose for equipment containing electronic components).

The SUPPLIER shall design the equipment to perform the safety function under specified environmental conditions (mild), supported by a maintenance schedule of the availability of equipment to perform its intended function at any time during the designed lifetime (aging addressed by surveillance, maintenance, etc.).

The SUPPLIER shall provide EQ documentation to the PURCHASER for review and approval. The provided documentation shall justify that equipment meets or exceeds the requirements of this Specification.

11.2 Seismic Qualification

Seismic qualification shall be performed in accordance with the requirements of the specification SP-S702 and the OSC Seismic Analysis 1056-NA-L-PZI-3/1-A1.

The supplied equipment shall withstand Design Extension Conditions (DEC) seismic loads. Operating basis earthquake (OBE) floor response spectra and applicable safety shutdown earthquake (SSE) floor response spectra that are given in the Attachment 2 of this specification.

The SUPPLIER shall provide seismic qualification documentation to the PURCHASER for review and approval.

11.3 Electromagnetic (EMI) and Radiofrequency Interference (RFI) Evaluation

Instrumentation and control equipment covered by this Specification shall be evaluated in accordance with RG 1.180.

The SUPPLIER shall provide EMI/RFI evaluation documentation to the PURCHASER for review and approval.

12 CLEANING

Equipment internals shall be shop cleaned in accordance with ASME AG-1, Subsubarticle AA-6540 and ANSI/ASME NQA-1, Part II, Subpart 2.1.

The SUPPLIER shall submit cleaning procedures to the PURCHASER for review and approval.

13 CORROSION PROTECTION AND COATING

Corrosion protection and coating of exterior carbon steel and other surfaces susceptible to corrosion shall be in accordance with the requirements of Specifications SP-A5001 and SP-A5002.

Galvanized steel, stainless steel and non-ferrous surfaces shall not be painted.

The SUPPLIER shall submit corrosion protection and coating procedures to the PURCHASER for review and approval.

14 MARKING AND IDENTIFICATION

Equipment supplied within the scope of this Specification shall be provided with a stainless steel nameplate, affixed in an accessible area with at least the following information:

- Manufacturer's name;
- Manufacturer's serial number;
- Equipment type;
- Year of manufacture;
- Tag number as indicated on the Filter Plenum Performance Data List form;
- NEK Purchase Order number;
- Design air flow rate;
- Total electrical consumption.

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

These identification and control measures shall be designed to prevent the use of incorrect or defective material, parts, and components as well as to provide a permanent record to assist in future evaluations of in service degradation of parts.

15 PACKAGING, HANDLING AND STORAGE

Packaging, handling and storage of the filter plenum housing and installed components shall be in accordance with ASME AG-1, Article AA-7000 and ANSI/ASME NQA-1, Part II, Subpart 2.2. Protection level shall be level B.

Packaging, handling and storage of components, which are shipped separately shall be in accordance with appropriate section of ASME AG-1, i.e. FB, FC and FD.

Equipment shall be stored, inspected, handled, and cleaned by methods which ensure that harmful contaminants do not remain on any component surface in contact with process fluids.

Desiccant shall be employed for all components. Tags shall be provided on all components containing desiccant defining the type and amount used.

Protection of internal cleanliness shall be achieved by sealing all openings with plugs, caps, or covers. Coated equipment shall be handled at all times with equipment such as stout, wide belt slings and wide padded skids designed to prevent damage to the coating. Bar cables, chains, hooks, meal bars, or narrow skids shall not be permitted to come in contact with the coating.

The SUPPLIER shall prepare procedures for packaging, handling, storage and cleaning after installation. The packaging procedure shall take into account the method of transportation to be used, as well as the possible storage duration and storage environment. The procedures shall be submitted to the PURCHASER for review and approval.

If any special storage requirements are required, the SUPPLIER shall inform the PURCHASER sufficiently in advance of shipping to allow for necessary preparation.

16 NONCONFORMING MATERIALS

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 SUPPLIER desires to accept, must be approved by the PURCHASER. Any such deviation request must be made in writing prior to disposition by means of a Deviation/Change Request Form submitted to the PURCHASER for approval prior to continuing work.

Nonconformance with specification requirements, and applicable codes and standards invoked by this Specification will not be accepted until approved by the PURCHASER. When such a condition exists, SUPPLIER shall initiate a Nonconformance Report (NCR) using the SUPPLIER's standard nonconformance document, which identifies the nonconformance and the SUPPLIER's proposed disposition.

The SUPPLIER shall:

1. Segregate the nonconformance item to prevent any further processing which may result in a change of the nonconformance as identified.
2. Make the NCR available to the responsible PURCHASER inspector for review to ensure the nonconformance is completely identified and accurately stated.
3. Transmit NCR with recommended disposition to the PURCHASER in an expeditious manner. The SUPPLIER shall provide technical justification for the recommended dispositions.

The requirements of the specification are binding; no departures are acceptable without the prior consent of the PURCHASER.

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

Once the item is identified with a NCR, such NCR shall remain assigned to that item permanently and PURCHASER shall be advised of the originating NCR.

17 RECORDS

A record system shall be established and maintained by the SUPPLIER 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 and material analyses. Records shall, as a minimum, identify inspector or data recorder, data inspection that was performed, type of observation, procedures used, results, acceptability, and action taken with any deficiency noted. Collection, storage and maintenance of records shall be in accordance with the requirements of the SUPPLIER's procedure.

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.

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

1. Records are technically correct in accordance with applicable procedures.
2. Records are complete including all attachments. Records shall be reviewed to assure all required data, i.e., signatures, dates, etc., have been completed or marked not applicable (N/A) as required.
3. Corrections to data have properly been made. Corrections to data shall include the data and the identification of person authorized to make the corrections.
4. Records are legible – can be clearly read and suitable for microfilming. The original of all records should be transmitted to the PURCHASER as a record.

18 OTHER REQUIREMENTS

18.1 SUPPLIER's Responsibilities

The SUPPLIER shall be responsible for compliance with all of the detailed requirements presented in this Specification. Review and approval of any drawings, specifications and/or tests by the PURCHASER shall in no way relieve the SUPPLIER from these responsibilities.

Specific requirements which the SUPPLIER shall follow during design and fabrication process are given in the sections 6, 7, 8, 9, 10, 11, 12, 13, 14 and 15 of this Specification.

In addition to the requirements of this Specification, the SUPPLIER shall be responsible for performing analyses, tests, inspections and other activities which the SUPPLIER considers necessary to make sure that the design, material and workmanship are satisfactory for the service intended, or as may be required by common usage or practice.

The SUPPLIER shall obtain resolution of any conflict from the PURCHASER prior to proceeding with any work involving that conflict.

18.2 PURCHASER's Responsibilities

The PURCHASER shall have the following responsibilities:

1. Provide the SUPPLIER with all available documentation upon request.
2. Provide any special requirements applicable to the installation of equipment.
3. Designate a contract Responsible Engineer who will serve as the principal interface with the SUPPLIER.

Whenever the PURCHASER's approval is required in this Specification for submittals, procedures, methodologies, approaches or options, such approval shall be provided in writing or if provided orally shall be confirmed in writing. The PURCHASER will provide all required approvals in a timely fashion consistent with the project schedule.

The PURCHASER shall review proposed additions to the approved products listing and determine if they meet the requirements of the NEK Chemical Control Program. Approved products will be allowed on site with proper labeling.

19 RIGHT OF ACCESS

PURCHASER's representative shall be allowed to the all areas where the design, fabrication, and assembly of the components, subcomponents and accessories will take place such as shops, working areas, and engineering offices of the SUPPLIER and its suppliers at any time for the purpose of quality assurance audits, inspection and witnessing. Witness and hold points with advance notice requirements should be stipulated.

Such audits will include examination of documentary evidence of activities affecting quality and will be carried out on a planned, periodic basis during the course of the work to verify compliance with all aspects of the program and to determine the effectiveness thereof.

20 QA PROGRAM REQUIREMENTS

20.1 SUPPLIER's QA Program

This specification and NEK QA specification QS-610 Rev.1 establish the SUPPLIER's QA program requirements that shall apply to all activities affecting the quality of supplied equipment, materials, or services.

The SUPPLIER shall have its own Quality Assurance program that complies ISO 9001 or equivalent, and relevant requirements of QS 610 Rev.1 which shall assure that all services ordered by this specification conform to the requirements of this specification and the Code. Reporting of defects and noncompliance in accordance with SUPPLIER's QA Program and relevant requirements of NEK QS 610 Rev.1, shall be implemented by the SUPPLIER.

The SUPPLIER shall submit with Proposal one controlled copy of its Quality Manual proposed for the scope of work to be performed for the PURCHASER's review and acceptance.

The SUPPLIER shall retain full responsibility to perform QA function in all activities and his responsibility for QA implementation cannot be transferred to others or reduced in any way.

20.2 SUPPLIER's Responsibility for Subcontractors

The SUPPLIER shall ensure that its subcontractors meet applicable requirements of this Specification.

The Specification requirements shall apply to subsuppliers for works and services not performed by the SUPPLIER.

The SUPPLIER shall be fully responsible for all actions of his subcontractors in relation to the PURCHASER.

20.3 Certificate of Conformance/Compliance

The SUPPLIER and its subcontractors shall provide a Certificate of Compliance stating that all provided equipment and services meet requirements of codes, standards and this Specification.

20.4 Manufacturing and Inspection Plans

The SUPPLIER shall provide the Manufacturing and Inspection Plans with record (R), witness (W) and hold (H) points to the PURCHASER for review and approval prior to start of manufacturing.

The Manufacturing and Inspection Plans shall cover at least all relevant inspection requirements and shall outline the manufacturing and production sequence and specific inspections that are required to be performed.

The SUPPLIER shall update the Manufacturing and Inspection Plan and submit copies thereof to the PURCHASER when changes are approved by the PURCHASER.

21 SPECIAL HANDLING

The SUPPLIER shall specify any special handling requirements and provide the PURCHASER with appropriate procedure, which shall explain and emphasize them in detail.

The SUPPLIER shall provide any special requirements and advice for maintaining cleanliness of the components during extended site storage, indoors or outdoors, and installation.

The SUPPLIER shall also specify additional requirements necessary to maintain equipment warranties.

Special handling requirements shall be provided in the vendor technical manual.

22 SHELF LIFE

The SUPPLIER shall not ship any item that has less than one-year remaining shelf life at time of shipment.

The SUPPLIER shall provide shelf life data as follows:

1. Expiration date,
2. Cure date or manufacturing date, and
3. Material composition.

If the above requirements are not met the item will be shipped back to the SUPPLIER at the SUPPLIER's expenses.

23 10CFR21 REPORTING

Not applicable.

24 COMMERCIAL GRADE ITEM DEDICATION

Not applicable.

25 SUPPLIER DOCUMENTATION REQUIREMENTS

The SUPPLIER documentation requirements are given in the sections 5, 10, 11, 12, 13, 15, 16, 20, 27, 28, 30, 31, 33 and 34 of this Specification.

Prior to start of fabrication, the SUPPLIER shall prepare a preliminary Documentation Index detailing the quality assurance documents which will be required to comply with this specification and referenced codes and standards. The index shall identify both by document type and the specific component or part, each individual document that will be submitted to the PURCHASER for information and approval. It shall also identify records, which will document the results of operations, inspections and tests. Upon completion of equipment fabrication, testing, and inspection, but prior to release for shipment, the Index shall be finalized to show the drawings and procedures actually used and the records which document the results of all inspections and tests performed. The final Documentation Index shall be verified for accuracy and completeness and submitted to the PURCHASER.

Each shipment must be accompanied by certification containing the signature of a person responsible for the quality control of the SUPPLIER, stating the material or items conform to all purchase order requirements. Applicable part numbers and other item identification, qualification reports and the NEK Purchase Order number shall be referenced by the certification. The SUPPLIER shall be responsible for inspecting the items and checking the applicable records, prior to shipment, to verify compliance with all specific requirements. Acceptance of the completed sets of records by the PURCHASER doesn't relieve the SUPPLIER of responsibility for compliance with specification requirements.

The SUPPLIER shall provide to the PURCHASER a list of recommended spare and replacement parts or assemblies for the ordered / supplied item. The appropriate delineation of the technical and quality assurance related data required for ordering these parts or assemblies shall also be identified. Each part of supplied component must be notified on replacement parts list or Bill of Material. This data shall be supplied as portion of the final documentation package for information.

26 PURCHASER PROPRIETARY DATA

The PURCHASER has a proprietary interest in all of the drawings, designs, specifications, documents, information or know-how which may be furnished pursuant contract execution and in any know-how, improvement, discovery or invention which may be made, developed, or conceived in the performance of work hereunder or which may arise or result there from (hereinafter collectively referred to as the "Information"). All such information shall be considered to be proprietary to the SUPPLIER. The right to use of all such Information shall be transmitted to the PURCHASER only for its personnel use and shall be entirely restricted to the performance of the contract and subject to the confidentiality provision.

27 NON-CONFORMANCE REPORTS

Nonconformances with specification requirements, approved drawings, and applicable codes and standards invoked by this Specification will not be accepted until approved by the PURCHASER.

Nonconformances to be reported for approval by the PURCHASER are those ones, which cannot be brought within specification requirements by rework or replacement. When such condition exists, the SUPPLIER shall initiate a Nonconformance Notice (NCN) using the SUPPLIER's standard proposed disposition. In addition, the SUPPLIER shall:

1. Segregate the nonconforming item to prevent any further processing which may result in a change of the nonconformance as identified.
2. Properly disposition and send the NCN to the PURCHASER.
3. Provide technical justification if recommended disposition is "Use-As-Is" or "Repair".

The resolution NCN shall be approved by the PURCHASER. Further engineering and/or manufacturing after detection of non-conformances, prior to the PURCHASER's approval shall be at the SUPPLIER's risk.

The non-conformance report shall provide a method by which the SUPPLIER shall obtain a documented response and approval from PURCHASER when non-conformances are identified. The use of the non-conformance reports will pertain to work at the SUPPLIER's and/or subcontractors' shops.

28 REPAIR RECORDS

With the documentation package shipment, the SUPPLIER shall provide the PURCHASER with all generated repair records and they shall include as a minimum the following information:

1. Summary of repair/refurbishment work that has been performed on the item(s).
2. Brief analysis of the reason for failure of the item(s).
3. Details of any special processes used during repairs that were not used during fabrication.
4. A list of replacement parts installed in the repaired items(s).

29 SOURCE INSPECTION/SURVEILLANCE NOTIFICATION

SUPPLIER shall provide access to the SUPPLIER 's plant facilities and records pertaining to this Specification for the purpose of planning and performing source inspection / surveillance activities.

The PURCHASER requires ten (10) working days advance notice for the purpose of establishing hold points and ten (10) working days advance notice that witness or hold points have been reached.

The SUPPLIER shall contact the PURCHASER's designated representative when a witness or hold points have been reached. The SUPPLIER will not proceed past that point until inspection has been established or waived by the PURCHASER.

Inspection or examinations performed by the PURCHASER, or designated representatives do not relieve the SUPPLIER of its responsibility to meet the requirements of this Specification.

30 SHIPPING REQUIREMENTS

Shipping shall be in accordance with the requirements of ASME AG-1, Article AA-7000 and ANSI/ASME NQA-1, Part II, Subpart 2.2. Protection level shall be Level B.

The SUPPLIER shall provide packaging and shipping methods for protection from the effects of temperature extremes, humidity, transit shocks and jarring.

The shipping container shall be clearly tagged with the NEK identification number and NEK Purchase Order number.

Material and all certifications or accompanying documentation supplied within the scope of this specification shall be directly shipped from the SUPPLIER to PURCHASER.

The PURCHASER's authorized source inspectors have the right to hold shipment if purchase order requirements are not met.

HEPA filter cells and charcoal adsorber trays shall be packaged and shipped separately for installation at the JOBSITE.

31 DELIVERY SCHEDULE

After contract award, the SUPPLIER shall, on the basis of delivery milestones defined in the contract, provide an integrated detailed delivery schedule with milestones for delivery of documentation, fabrication and delivery of components which will be provided within the scope of this Specification.

32 WITNESS AND HOLD POINTS

The SUPPLIER shall provide the Manufacturing and Inspection Plan of overall activities in accordance with the scope of contractual activities to the PURCHASER for review and approval.

The PURCHASER shall have the right to determine his own witness and hold points in the SUPPLIER's Manufacturing and Inspection Plan. For these witness and hold points the PURCHASER may establish notification points for which the SUPPLIER shall give prior notification to the PURCHASER. In addition, the PURCHASER may establish hold points and temporary notification points if necessary to ensure resolution of quality problems or temporary quality problems.

Predetermined hold points and notification points require receipt of notification at least ten (10) working days in advance of the scheduled time of performance.

Predetermined witness and hold points require receipt of notification at least ten (10) working days in advance of the scheduled time of performance.

The following hold points for which a prior notification is required are:

1. Factory tests
2. Shipping release

The SUPPLIER shall not proceed beyond the predetermined hold points without written approval from the PURCHASER.

33 VENDOR TECHNICAL MANUAL AND REGISTERED UPDATES

The SUPPLIER shall furnish a vendor technical manual with all necessary information for operation and maintenance, updated specific data and equipment(s) drawings. Standard manuals are not acceptable unless clearly marked or modified to indicate the concerned equipment.

A special attention shall be paid to technical documentation and instructions for the following topics:

1. Installation;
2. Operating instructions;
3. Maintenance;
4. Troubleshooting in case of detected bypass leakage;
5. Storage instructions for filter cells;
6. Replacement parts;
7. Special tools and instrumentation;
8. Drawings of components and related equipment.

Table of contents of the vendor technical manual is given as a guideline in the Attachment 7.

34 TRAINING

Not applicable.

35 ATTACHMENTS

Attachment 1: Filter Plenum Performance Data List form (1 page)

Attachment 2: Applicable Floor Response Spectra Figures from the Appendices A and B of the OSC Seismic Analysis 1056-NA-L-PZI-3/1-A1 (4 pages)

Attachment 3: Reference drawing SS-906-781-1 Rev.0 (2 pages)

Attachment 4: Equipment Specification Exceptions form (1 page)

Attachment 5: Filter Plenum Data List form (1 page)

Attachment 6: Filter Plenum Electric Heating Coil Data List form (1 page)

Attachment 7: Vendor Technical Manual Guideline (1 page)

Attachment 8: MECL Data Tables (2 pages)

ATTACHMENT 1
FILTER PLENUM PERFORMANCE DATA LIST
KRŠKO NUCLEAR POWER PLANT

1.	Tag number	<u>VA781PLM-001</u>
2.	Quantity required	<u>1</u>
3.	Safety class	<u>NSR/AQ</u>
4.	Seismic category	<u>I</u>
5.	Unit location	<u>OSC, P35; El. 101.80</u>
6.	Applicable floor response spectra from 1056-NA-L-3/1-A1	<u>OBE Level 1 SSE Level 1</u>
7.	Ambient conditions at equipment location	
a.	Temperature °F (°C)	<u>41 (5) - 104 (40)</u>
b.	Relative humidity, %	<u>95 max</u>
c.	Barometric pressure, inch Hg (kPa)	<u>29.37 (99.44)</u>
8.	Design air flow at actual operating conditions, a cfm (m ³ /h)	<u>12000 (20400)</u>
9.	Electric heating coil	
a.	Capacity, kW	<u>24</u>
b.	Entering air temperature, °F (°C)	<u>104 (40) max</u>
c.	Heating coil electrical characteristics (V/phase/Hz)	<u>380/3/50</u>
10.	Roughing filters	
a.	Number of banks per plenum	<u>1</u>
b.	Filter cells arrangement, cells width x cells height	<u>4 x 3</u>
c.	Filter efficiency per ASHRAE 52.2	<u>MERV 13</u>
11.	HEPA filters	
a.	Number of banks per plenum	<u>2</u>
b.	Filter cells arrangement, cells width x cells height	<u>4 x 3</u>
c.	Minimum efficiency (0.3 µm diameter test aerosol particles), %	<u>99.97</u>
12.	Charcoal adsorbers	
a.	Number of banks per plenum	<u>1</u>
b.	Filter trays arrangement, cells width x cells height	<u>4 x 9</u>
c.	Minimum efficiency (refrigerant challenge gas), %	<u>99.95</u>
d.	Adsorber type	<u>Type II</u>
13.	Reference drawing	<u>SS-906-781-1</u>

ATTACHMENT 2

**Applicable OBE and SSE Floor Response Spectra Figures
from the Appendices A and B of the OSC Seismic Analysis 1056-NA-L-PZI-3/1-A1**

NOTES:

Names of Floor response spectra on each figure include considered direction (X, Y, Z), state (OBE, SSE), for Level (nivo 1) and value of damping (%).

Considered directions according to “true north” and “plant north”:

- Direction X = East – West response,
- Direction Y = North – South response,
- Direction Z = Vertical response.

Actual levels according to “local zero” (+/-0,00 = altitude +157,85m a.s.l. = NEK altitude 102,650m):

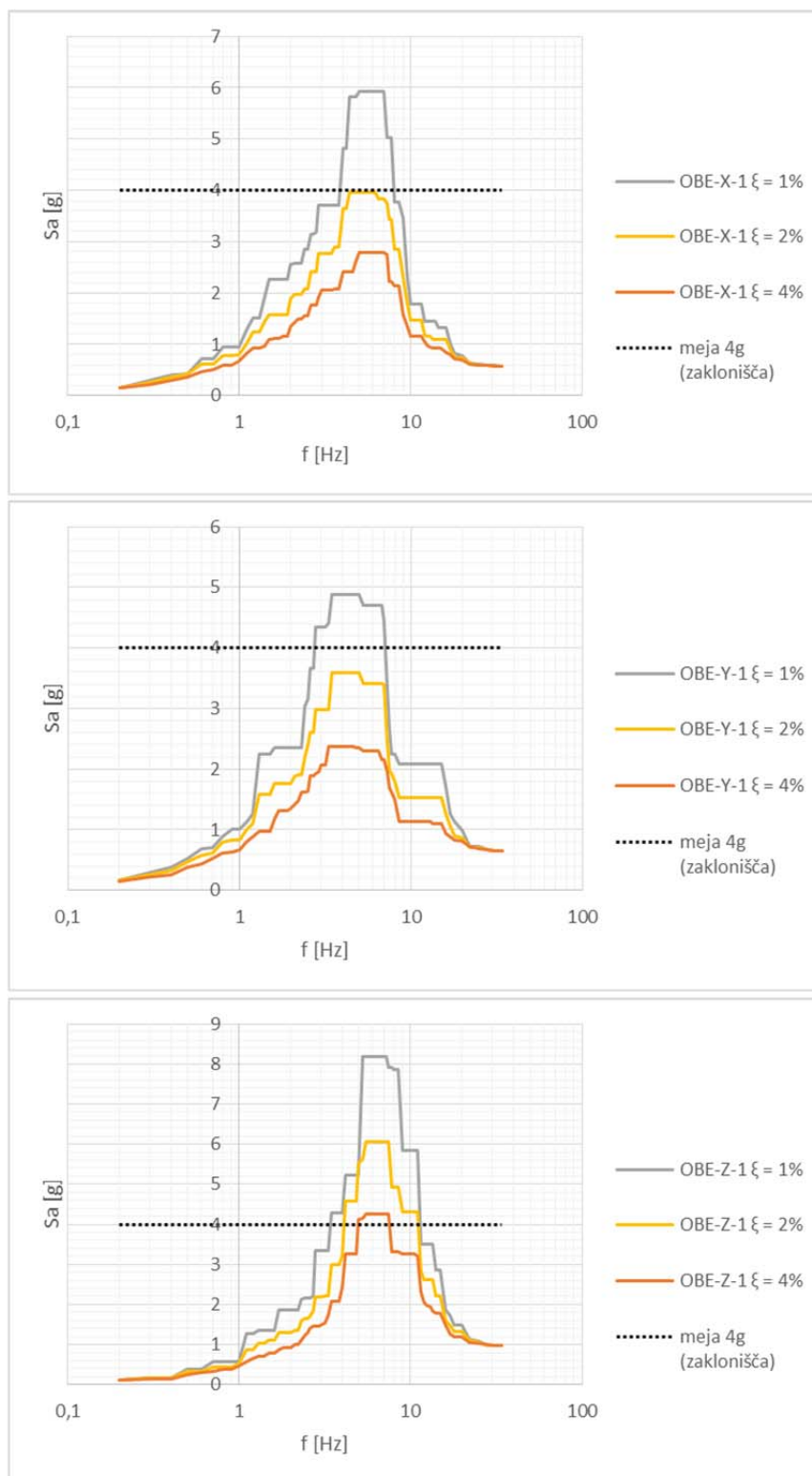
- Level 1 = Slab's axial elevation corresponds to NEK altitude 101,300m;

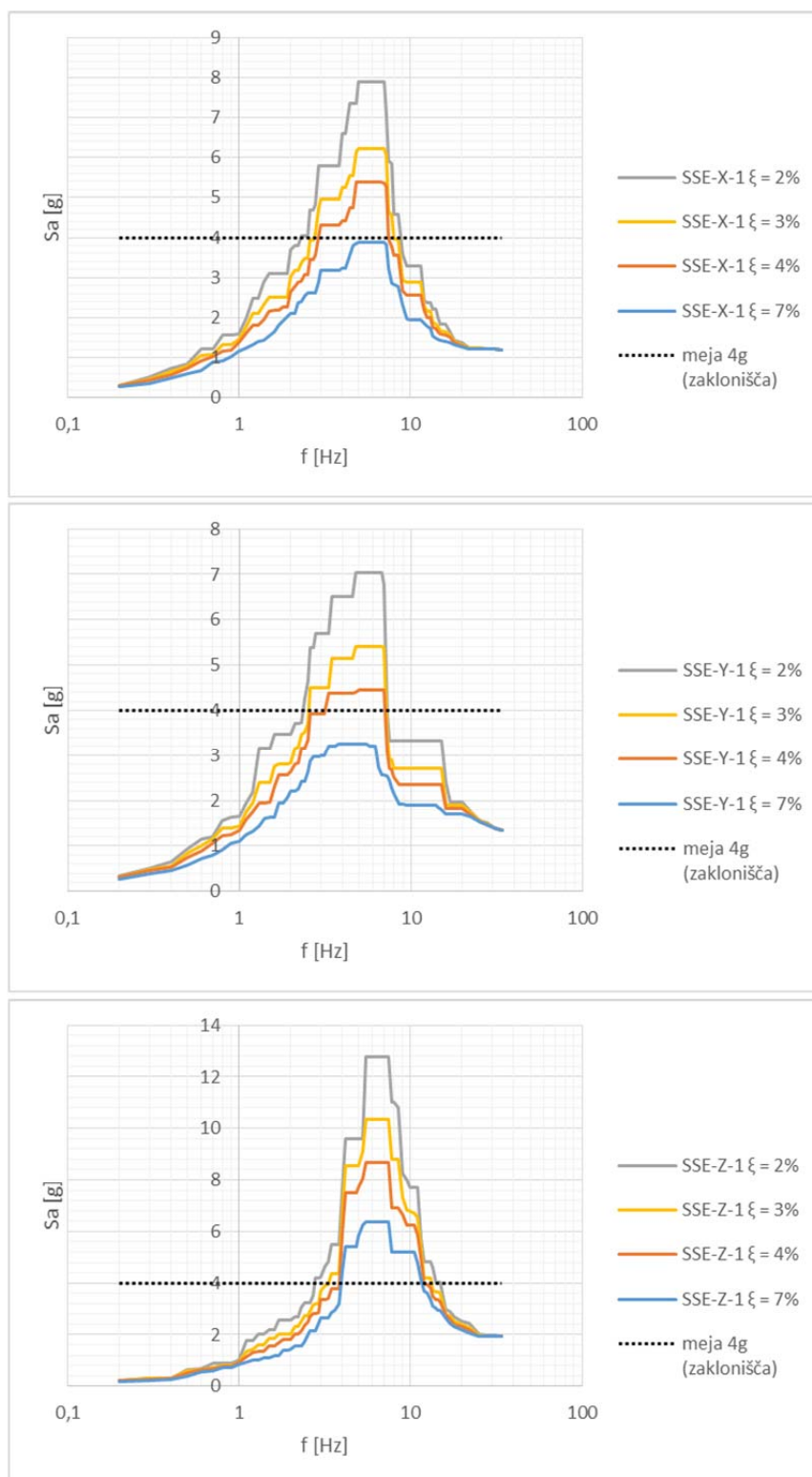
OPC building is considered as shelter, that is why there is a rule for minimum value of equipment accelerations (shown on each FRS chart as “meja 4g (zaklonišča)”):

- For higher levels (Level 1): $S_{a,min} = 4g$.

Included floor response spectra:

- OBE: Level 1 (Etažni spektri – OBE – nivo 1) for all directions and dampings (page 5 of Appendix A of Document OSC Seismic Analysis 1056-NA-L-PZI-3/1-A1);
- SSE: Level 1 (Etažni spektri – SSE – nivo 1) for all directions and dampings (page 5 of Appendix B of Document OSC Seismic Analysis 1056-NA-L-PZI-3/1-A1).

- OBE: Level 1 (Etažni spektri – OBE – nivo 1)

- SSE: Level 1 (Etažni spektri – SSE – nivo 1)

ATTACHMENT 3

Filter plenum unit reference drawing

Unit VA781PLM-001 dwg SS-906-781-1 Rev.0

				NUKLEARNA ELEKTRARNA KRŠKO NUCLEAR POWER PLANT KRŠKO		USER: A.J. CHG: U.2	
		BUILDING SERVICE HVAC EQUIPMENT LAYOUT CRITERIA OSC HVAC AND HABITABILITY SYSTEM OSC FILTER PLENUM (VA781PLM-001)		DATE: 22.2.2018 REV. 0	SS-906-781-1 DRAWING NUMBER 1/1		
		NOTES: 1. REF. TECH. SPEC. SP-B3006 2. ALL DIMENSIONS IN MM, EXCEPT AS NOTED 3. ELECTRICAL AND CONTROL CABINETS ARE SEPARATE PARTS, ATTACHED TO THE UNIT OR MOUNTED AT SEPARATE LOCATIONS		PRELIMINARY DATA SHUTDOWN SYSTEM <input checked="" type="checkbox"/> ENGINEERED SAFETY FEATURE <input type="checkbox"/> SC-1 <input type="checkbox"/> SAFETY CLASS SC-2 <input type="checkbox"/> SC-3 <input type="checkbox"/> NON-NUCLEAR SAFETY <input type="checkbox"/> AUGMENTED QUALITY <input checked="" type="checkbox"/> SHUTDSEIZMIC CATEGORY 1			
		EQUIPMENT TYPE: FILTER PLENUM WITH ROUGHING, HEPA, CHARCOAL FILTERS AND ELECTRIC HEATER		EQUIPMENT CAPACITY: 20400 CMH; 12000 CFM			
		DESIGN PRESSURE: SEE TECH. SPEC. SP-B3006		TEMPERATURE: 41° F (5° C) MIN AMBIENT 104° F (40° C) MAX AMBIENT			
		PRELIMINARY UNIT SELECTION: 1. N/A 2. N/A 3. N/A		OTHER: ONE UNIT REQUIRED 104° F (40° C) MAX AMBIENT			
		BY: ALEKSANDAR JOVANOVIĆ DATE: 22.2.2018 OTHER:		MOTOR DATA:			
		NET WEIGHT: N/A		INSULATED: NO			
		MAINTENANCE REQUIREMENT: FILTER REPLACEMENT, INSTRUMENT CHECKS, LEAK TESTING, FILTER TESTING, SCHEDULED MAINTENANCE		SUPPORT METHOD: SUPPLIED ON STEEL BASE FRAME INTEGRAL TO THE UNIT; MOUNTED ON CONCRETE PAD			
		CABLE/PIPING INTERFACE: ELECTRICAL CONNECTIONS, FIRE PROTECTION PIPING, DRAIN CONNECTIONS		CLEARANCE REQUIREMENT: INDICATED ON THE SKETCH			
		LOCATION: OSC BUILDING P35 - HVAC ENGINE ROOM, EL 101.80 F.S.D. NO.: D-906-781		REMARKS:			
		SUCCESSFUL BIDDER:		DATE:			
RELEASED FOR BIDDING PURPOSES		REVISIONS		REFERENCES			

ATTACHMENT 4
EQUIPMENT SPECIFICATION EXCEPTIONS
KRŠKO NUCLEAR POWER PLANT

The BIDDER certifies that the Proposal is in complete and absolute agreement with this Specification, except as specifically outlined below (use additional sheets if required).

BIDDER'S NAME

MANUFACTURER'S NAME

QUOTATION NUMBER

SIGNATURE

TITLE

Exceptions from this Specification:

ATTACHMENT 5
BIDDER'S FILTER PLENUM DATA LIST
KRŠKO NUCLEAR POWER PLANT

The BIDDER shall return one copy of this form with the Proposal with all the blanks filled in.

BIDDER'S NAME

MANUFACTURER'S NAME

QUOTATION NUMBER

	Overall dimensions				Largest shipping package			
Filter plenum Tag number	Length (m)	Width (m)	Height (m)	Total weight (kg)	Length (m)	Width (m)	Height (m)	Shipping weight (kg)
VA781PLM-001								

ATTACHMENT 6
FILTER PLENUM ELECTRIC HEATING COIL DATA LIST
KRŠKO NUCLEAR POWER PLANT

The BIDDER shall return one copy of this form with the Proposal with all the blanks filled in.

BIDDER'S NAME

MANUFACTURER'S NAME

QUOTATION NUMBER

- | | | |
|-----|--|-------|
| 1. | Coil tag number | _____ |
| 2. | Air flow, scfm (m ³ /h) | _____ |
| 3. | Entering air temperature, °F (°C) | _____ |
| 4. | Entering air temperature, °F (°C) | _____ |
| 5. | Capacity (kW) | _____ |
| 6. | Electrical characteristics (V/phase/Hz) | _____ |
| 7. | Current drawn, A | _____ |
| 8. | Primary protection device cut-out temperature, °F (°C) | _____ |
| 9. | Date of test | _____ |
| 10. | Test data certified by | _____ |

ATTACHMENT 7
VENDOR MANUAL GUIDELINE
KRŠKO NUCLEAR POWER PLANT

INTRODUCTION

Purpose and Scope of Manual

Definitions

1 EQUIPMENT DESCRIPTION

1.1 System description and purpose

1.2 Equipment Functional Description and Specifications

2 INSTALLATION

2.1 Receiving

2.2 Handling

2.3 Installing

2.4 Connections, grounding and shielding

2.5 Cleaning and inspection

2.6 On-site testing

2.7 Removal of equipment from service

2.8 Storage and maintenance instructions

3 OPERATING INSTRUCTIONS

3.1 General

3.2 Safety precautions

3.3 Start-up procedures

3.4 Operation

3.5 Operational checkout at plant shutdown

3.6 Testing at power

3.7 Equipment set points

4 MAINTENANCE

4.1 Preventive maintenance procedures and programs

4.2 Safety precautions and interlock checks

4.3 Test equipment and tools for maintenance and troubleshooting

4.4 Dismantling and reassembly of assemblies and subassemblies

4.5 Alignment and adjustment procedures (including torque sheet data)

4.6 Operational performance test

5 TROUBLESHOOTING

5.1 Troubleshooting procedures and/or troubleshooting chart

6 REPLACEMENT PARTS

6.1 Parts Lists

6.1.1 Introduction

6.1.2 Maintenance Parts List

6.1.3 List of Manufacturers and addresses with ordering instructions

6.2 Recommended parts List

7 SPECIAL TOOLS AND INSTRUMENTATION

7.1 List of Special Tools, P/N, Spec. Tools DWG's

8 DRAWINGS & FIGURES

ATTACHMENT 8 MECL DATA TABLES

Table 1: List of equipment data for new components

NO.	EQUIP NO.	DISCIPLINE		
1	EQUIP DISCIPLINE	E	I	M
2	EQUIP CATEGORY			
3	SYSTEM CODE			
4	PARENT EQUIP NO			
5	EQUIP STATUS CODE			
6	EQUIP TYPE			
7	FUNCTIONAL DESCRIPTION			
8	EQUIP NOTE TEXT			
9	TEXT VERIF			
10	LABEL TYPE			
11	POSITION			
12	LABEL TEXT			
13	EQUIP SUBCATEGORY			
14	ASME CODE CLASS			
15	ANSI SAFETY CLASS			
16	IEEE SAFETY CLASS			
17	SEISMIC CATEGORY			
18	EQUIP QUALIFICATION REQUIRED			
19	SAFETY RELATED			
20	INSTR LIST N/A			N/A
21	SCM SC			
22	SAF.FUNC.			
23	BUILDING ID			
24	ROOM NO			
25	EQUIP ELEVATION			
26	EX ZONE			
27	DESIGN PRESSURE	N/A		
28	PRESSURE UOM	N/A		
29	DESIGN TEMPERATURE	N/A		
30	TEMPERATURE UOM	N/A		
31	MODEL			
32	SPIN			
33	SERIAL NO			
34	VALVE ID	N/A	N/A	
35	MANUFACTURER ID			
36	MANUFACTURER BRANCH ID			
37	VENDOR ID			
38	VENDOR BRANCH ID			
39	MANUFACTURER PART NO			
40	PURCHASE ORDER NO			
41	INSTALLATION YEAR			
42	VOLTS N/A			
43	AMPS N/A			
44	HP KW N/A N/A			
45	RPM N			

Table 2: List of equipment data for spare parts

MECL EQUIP. NO.	
EQUIPMENT DESCRIPTION	
PART NUMBER	
MANUFACTURER	
REFERENCE DOCUMENT	INSTRUCTION MANUAL
	DRAWING NO.-REV. NO.
	BILL OF MATERIAL

Table 3: List of equipment spare parts

ITEM NO.				
MANUFACTURER PART NUMBER (MPN)				
MPN DESCRIPTION				
SAFETY CLASSIFICATION				
QUANTITY				
UNIT OF MEASURE (UOM)				
MANUFACTURER TITLE ADDRESS				
SERIAL NUMBER				
LOT/HEAT/REAL/BATCH NO.				
SHELF LIFE CONTROL				
SHELF LIFE MONTHS				
ASME CODE PN				
IEEE PN				
STORAGE LEVEL				
ISM REQ				
QUALIFIED LIFE - MONTHS				
SERVICE/OPERATION LIFE - MONTHS				
RECOMMENDED QUANTITY				
ITEM PRICE				
PURCHASE ORDER NO.				
REFERENCE RECORDS				