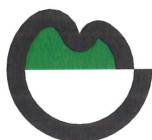


NEK

Krško Nuclear Power Plant
Vrbina 12
8270 Krško



TECHNICAL SPECIFICATION

LOW VOLTAGE MOTOR CONTROL CENTER BUCKETS FOR VA101 UNITS

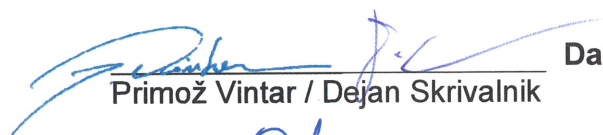
KRŠKO NUCLEAR POWER PLANT

SP-E5031

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24/September/2026

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Originator:


Primož Vintar / Dejan Skrivalnik

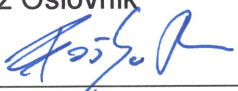
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Reviewer / Verifier:


Matjaž Ošlovnik

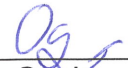
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Reviewer / Verifier:


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ESD Superintendent:


Peter Jan

Date: 24 / 09 / 2026

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Revision Number	Date (dd/mm/yy)	Reason for Revision and Revision Summary	Affected pages
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1	09/24/2026	Minor changes in bucket design. FU7 fuse type change. Thermal OL relay type correction.	Att 2: All pages 10 Att 3: 3 Att 3: 2

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1.0 SCOPE

1.1. General

This Specification covers the technical requirements for the final design, furnishing, manufacturing, shop testing, inspection, packaging, shipment, and delivery of fully assembled low-voltage Motor Control Center buckets and accessory equipment for the 400 V Motor Control Centers (MCCs) serving the ventilation units (VA101) at the Krško Nuclear Power Plant (NEK):

- EE103MCCD114 - VA101AHU01A MOTOR CONTROL CENTER
- EE103MCCD125 - VA101AHU02A MOTOR CONTROL CENTER
- EE103MCCD214 - VA101AHU01B MOTOR CONTROL CENTER
- EE103MCCD224 - VA101AHU02B MOTOR CONTROL CENTER

A total of eight (8) new fully assembled Motor Control Center buckets and accessory equipment for 400 Volts Motor Control Centers serving the VA101 units are required. Each Motor Control Center consists of the 2 buckets (front/rear). Front bucket is serving main circuit (power) and rear bucket is control circuit.

The existing Motor Control Centers are Westinghouse, Type W, with cabinet dimensions of 20 inches in depth, 19 inches in width, and 90 inches in height. Each MCC is equipped with an adapted vertical bucket designed for mounting motor starter components, including two (2) NEMA Size 5 (Westinghouse GCA-530) contactors and one (1) NEMA Size 4 (Cutler-Hammer A201K4CA) contactor, together with the associated protection and control equipment required for operation of the VA101 air-handling unit (AHU) two-speed consequent-pole motor.

The VA101 system (Reactor Building Containment Recirculation Ventilation System) is a safety-related system (Safety Class 2) and a Seismic Category I system. During normal operation, the system maintains the ambient temperature, pressure, and humidity inside the containment building within the prescribed limits, while during and following an accident, it contributes to reducing and controlling these parameters to support the maintenance of acceptable conditions.

The VA101 system consists of four identical two-stage air-handling units (AHUs), each providing normal and slow-speed operation. Each AHU is driven by a two-speed consequent pole motor (Dahlander motor) rated at 100/50 HP. Each MCC covered by this Technical Specification provides the necessary motor control and protection equipment, including contactors, overload protection, auxiliary relays and other associated components, required to operate the corresponding AHU motor in either normal (high-speed) or slow-speed mode.

Each AHU can be operated manually from the Main Control Room (MCR) or the Emergency Control Room (ECR). From the MCR, the operator can also select the required operating mode: normal or slow-speed, via a dedicated selector switch.

In addition to the manual control functions, an automatic start of all four AHUs in slow-speed mode is initiated independently upon receipt of either a Safety Injection (SI) signal or a Blackout (BO) signal.

The primary reason for replacement of the VA101 MCC buckets is the ageing of the existing equipment, including the approaching end of its expected service life and the limited availability of original replacement components. The existing NEMA Size 5 contactors have also experienced recurring operational issues, while the existing bucket design does not provide physical separation between the main power circuit and control circuit components.

Considering the age and obsolescence of the existing equipment, together with the increasing difficulty in obtaining original components and maintaining the existing design, replacement with a new bucket design incorporating next-generation contactors and proper separation of power and control circuits is required as a long-term solution.

As part of the proposed modification, a new MCC bucket design, described in the following sections of this Technical Specification, has been developed. The new bucket design is based on electrical equipment models already implemented in Westinghouse type W MCCs at NEK, while incorporating the necessary modifications to accommodate new-generation contactors and ensure proper separation between the main power circuits and control circuits.

The new main-circuit bucket shall incorporate Siemens SIRIUS NEMA-rated contactors, which, based on the performed evaluation of available contactor solutions, have been identified as the most suitable commercially available solution capable of meeting the required electrical characteristics while complying with the dimensional constraints imposed by the existing MCC design.

The equipment to be supplied is seismic class 1 and electrical class 1E.

The Supplier shall be responsible for compliance with all the detailed requirements presented in this Specification. The Supplier shall be responsible for performing, in addition to the requirements of this Specification, such analyses, tests, inspections, and other activities, which the Supplier considers necessary to ensure that the design, material, and workmanship are satisfactory for the service intended, or as may be required by common usage or good practice.

1.2. Scope of Equipment, Material, and Services to be furnished by the Supplier

The equipment, material, and devices to be furnished shall include, but not necessarily be limited to the following:

- A total of four (4) new, fully assembled Motor Control Center buckets for the main circuits and four (4) new, fully assembled Motor Control Center buckets for the control circuits, including the associated accessory equipment, for installation in the 20-inch-deep, 19-inch-wide, and 90-inch-high cabinets of the 400 V Motor Control Center, Type W, originally manufactured by Westinghouse. All eight (8) buckets shall be Nuclear Safety Related seismic class 1 and electrical class 1E.

Each set of buckets shall be equipped with three (3) NEMA Size 5 contactors, two (2) overload relays, and all other necessary components, including terminal blocks, fuses, control transformers, current transformers, mechanical interlocks, internal wiring, lugs, identification markers, and other required accessories.

The design of the new buckets shall follow the design and Bill of Materials (BOM) attached to this Technical Specification (see Attachments 3 (Section 35.0)). The BOM shall be strictly followed for all components for which the use of equivalent equipment is not explicitly permitted.

All the equipment shall be supplied for indoor installation and shall satisfy the characteristics specified later in the document.

2.0 DEFINITIONS AND ABBREVIATIONS

2.1. Definitions

MCC: Low voltage 400 Volts Motor Control Center

MCC main-circuit bucket: Bucket assemblies are completely self-contained packages, each consisting of a steel enclosure, mounting hardware, and the main-circuit electrical components required for two-speed consequent pole motor control.

MCC control-circuit bucket: Bucket assemblies are completely self-contained packages, each consisting of a steel enclosure, mounting hardware, and electrical components of control-circuit.

Safety-Related item: Any structure, system, component, or part used in a nuclear power plant that is relied upon during or following a design basis events to assure:

- the integrity of the reactor coolant pressure boundary,
- the capability to shut down the reactor and maintain it in a safe shutdown condition,
- the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposures.

Dedication: When applied to nuclear power plants, dedication is an acceptance process undertaken to provide reasonable assurance that a commercial grade item to be used as a basic component will perform its intended safety function and, in this respect, is deemed equivalent to an item designed and manufactured under a 10 CFR Part 50, appendix B, quality assurance program.

Supplier: The organization to which a purchase order from the Purchaser has been issued.

2.2. Abbreviations

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
AWG	American Wire Gauge
BOM	Bill of Material
BRKR, MCCB	Breaker, Molded-Case Circuit Breakers
CFR	Code of Federal Regulations
CoC	Certificate of Compliance
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EPRI	Electric Power Research Institute
FVNR	Full Voltage Non-Reversing motor controller
FVR	Full Voltage Reversing motor controller
MCC	Motor Control Center
MCCD	Motor Control Center (with backup by Emergency Power Supply)
NEK	Krsko Nuclear Power Plant

MECL	Master Equipment Component List
NCR	Non-conformance Report
NEMA	National Electrical Manufacturers Association
NON-SR	Non-Safety Related
NRC	The U.S. Nuclear Regulatory Commission
OBE	Operational Basis Earthquake
PO	Purchase Order
QA	Quality Assurance
QC	Quality Control
RFI	Radio-Frequency Interference
RFQ	Request for Quotation
SR	Safety Related
SSE	Safe Shutdown Earthquake
SWC	Surge Withstand Capability
UL	Underwriters Laboratories

3.0 CODES AND STANDARDS

The equipment to be supplied under this specification shall be designed, manufactured, inspected, and tested in accordance with the applicable requirements of the codes, standards, and specifications listed below. The applicability of individual requirements shall be determined based on the equipment function, safety classification, intended service conditions, and specific requirements identified in this Technical Specification.

3.1. American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE):

- IEEE 323-1974: "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations"
- IEEE 344-1975: "IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations"
- IEEE 384-1987: "IEEE Standard Criteria for Independence of Class 1E Equipment and Circuits"
- IEEE 649-1991: IEEE Standard for Qualifying Class 1E Motor Control Centers for Nuclear Power Generating Stations
- IEEE 1050-1996: "Instrumentation and Control Equipment Grounding in Generating Stations"
- ANSI IEEE C62.41-1991 Recommended Practice for Surge Voltages in Low-Voltage AC Power Circuits
- ANSI IEEE C62.45-1992 Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits
- ANSI N45.2.2-1978: "Packaging Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants"

3.2. National Electrical Manufacturers Association (NEMA):

- NEMA ICS 2-2000 (R2005): "Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts"

3.3. Underwriters Laboratories, Inc. (UL):

- UL 845: Motor Control Centers (latest applicable edition)
- UL 60947-4-1 "Low-Voltage Switchgear and Controlgear - Part 4-1: Contactors and Motor-Starters - Electromechanical Contactors and Motor-Starter"

3.4. United States Codes of Federal Regulation (CFR):

- 10 CFR 50, Appendix B: "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants"
- 10CFR21 "Reporting of Defect and Noncompliance"

3.5. U.S. Nuclear Regulatory Commission:

- RG 1.180 (2003) Guidelines for evaluating electromagnetic and radio-frequency interference in safety-related instrumentation and control systems

3.6. International Electrotechnical Commission (IEC):

- IEC 61000-3-2013 Electromagnetic compatibility (EMC) - Part 3: Limits
- IEC 61000-4-2006 Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques
- IEC 61000-6-2005 Electromagnetic compatibility (EMC) - Part 6: Generic Standards – Emission/Immunity

3.7. Military Specifications USA (MIL)

- MIL-STD-461E Requirements for the Control of Electromagnetic Interference characteristics of Subsystems and Equipment

3.8. Electric Power Research Institute (EPRI)

- EPRI TR-3002002982 "Guideline for the Acceptance of CGI in Nuclear Safety-Related Applications, revision 1"
- EPRI TR-102323 "Guidelines for Electromagnetic Interference Testing of Power Plant Equipment, revision 5"

The Supplier shall provide the Purchaser (NEK) with the list of codes, standards, and specifications (identifying the effective issue by date) which govern the work performed within the scope of this document.

In the event of any conflict between codes, or this Technical Specification and the codes, the more stringent requirements shall apply. Any conflicts shall be reported to NEK.

4.0 SUPPLEMENTAL DATA

Additional documents, drawings, or detailed engineering data for specific MCC replacement buckets are listed in the Attachments (Section 35.0) and shall also be considered as a part of this Specification.

Seismic analysis testing and documentation shall be performed and prepared in accordance with the seismic response curves specified in SP-S702-044687-000 rev. 11 and provided in Attachment 4 (Section 35.0).

5.0 DOCUMENT SUBMITTAL

All documentation shall be submitted to the NEK procurement department to the following address:

Nuklearna Elektrarna Krško
Vrbina 12
8270 Krško, Slovenia, EU

All documentation submitted to NEK shall be in the form of hard copies and electronic media and shall include Purchase Order Number, Equipment Tag Number and Supplier Shop Order Number. The drawings shall contain the following information: drawing number, revision number, issuance date and the initials of the Supplier's employee.

The format of electronic media shall be fully compatible with the following software:

Text Documents:	Microsoft Word
Image Documents:	Adobe Acrobat (pdf)
Spreadsheets:	Microsoft Excel
Drawings:	AutoCAD
Planning & Scheduling:	Primavera / MS Project
Electronic mail:	Microsoft Outlook

NEK shall approve the use of any other electronic format. A2 or smaller paper size shall be preferred for drawings and A3 or A4 should be used whenever is possible.

All drawings (including drawings, graphs, specifications, etc.) submitted shall be in the form of electronic media.

6.0 DESIGN REQUIREMENTS

6.1. General

The design of replacement buckets shall be in accordance with the applicable standards for MCC and Industrial Control suitable to install in the NEK existing vintage Type W model MCC manufactured by Westinghouse. The design shall be tested to prove adequate mechanical and electrical capabilities. All major components shall be individually designed, tested and guaranteed by the manufacturer of the buckets.

The Supplier shall demonstrate the following by means of calculations or tests:

- Contactors shall start/stop the load (motors). Main and auxiliary contacts in close position shall have resistance of less than 1 ohm.
- Overload heaters: shall not trip on 100 % of rated current, will trip on overload. To measure contacts resistance.
- Auxiliary fuse: shall not blow on 100 % of rated current; will blow on fault current (short circuit or overload). To measure fuse resistance.

- Mechanical interlocks: To check interlock function.

MCC replacement buckets shall comply with the applicable ANSI, IEEE and NEMA standards as specified in paragraph 3.0.

All electrical equipment shall be listed and labelled.

In case the prototype bucket, especially for NEK qualification, is used, it shall be sent to NEK after the completion of the testing.

6.2. Components

Individual components with preferred Part Numbers for MCC replacement buckets are shown in the BOM in Attachment 3 (see Section 35.0).

6.3. Main-circuit buckets

Main-circuit buckets for motor loads shall consist of a steel enclosure, mounting hardware, and the main-circuit electrical components required for two-speed consequent pole motor control. The starter units shall include the following components:

- three (3) NEMA Size 5 contactors, Siemens SIRIUS 3RT1 product type
- two (2) thermal overload relays, Eaton A200 series
- three (3) current transformers 300:5 A, Class 0.3 B0.5
- one (1) mechanical interlock between two Siemens SIRIUS 3RT1 product type NEMA Size 5 contactors
- internal wiring and power terminal blocks (see Attachment 2 (Section 35.0)).

All components and wiring shall be readily accessible for ease of maintenance.

The bucket frame shall be fabricated from steel sheet metal with a minimum thickness of 2 mm and shall provide adequate mechanical strength and rigidity for the intended service conditions.

6.4. Control-circuit buckets

Control-circuit buckets for motor loads shall consist of a steel enclosure, mounting hardware, and electrical components of control-circuit. Each control unit shall include the following components:

- one (1) control transformer
- five (5) eight-pole control relays with convertible contacts, Eaton AR series
- one (1) four-pole control relays with convertible contacts, Eaton AR series
- seven (7) fuses
- internal wiring and control terminal blocks (see Attachments 2 (Section 35.0)).

The control-circuit bucket shall provide physical separation between the Safety-Related and Non-Safety-Related sections.

All components and wiring shall be readily accessible for ease of maintenance.

The bucket frame shall be fabricated from steel sheet metal with a minimum thickness of 2 mm and shall provide adequate mechanical strength and rigidity for the intended service conditions.

6.5. Magnetic Contactors

For two-speed non-reversing consequent pole motor controller three (3) NEMA Size 5 contactors shall be used:

- 42F: Main circuit contactor for fast-speed operation
- 42F1: Star point contactor for fast-speed operation
- 42S: Main circuit contactor for slow-speed operation

Contactors 42F1 and 42S shall be electrically and mechanically interlocked to prevent both contactors from being closed at the same time.

Contactors 42F and 42S shall be equipped with 3-pole overload relays.

The contactor coils shall be rated for 380–420 V AC, 50 Hz. The permissible coil operating voltage range shall be $0.8 \times U_{smin}$ to $1.1 \times U_{smax}$, corresponding to 304–462 V AC for a nominal coil voltage range of 380–420 V AC.

The contactor shall reliably pick up and close within the specified coil operating voltage range. Contactors shall operate without excessive or abnormal humming noise under normal operating conditions.

All contactors shall be equipped with replaceable auxiliary contacts.

Contactors shall be Siemens SIRIUS 3RT1 product type, NEMA Size 5.

6.6. Overload Protection

Overload motor protection shall be provided with a 3-pole, bimetallic, Trip Class 20, Type A thermal overload relays, adjustable relays which shall have auto/manual reset button adjusted to manual. Relays should have built-in interchangeable thermal heater elements. Preferred overload Relays shall be EATON A200 series NEMA Sizes 1-4 with thermal heater elements type FH.

The proposed overload relays shall provide motor protection equivalent to the existing overload protection, as follows:

- 49A: Overload protection of fast-speed operating circuit: Eaton A200 series thermal overload relay with FH thermal heater element.
- 49B: Overload protection of slow-speed operating circuit: Eaton A200 series thermal overload relay with FH thermal heater element.

Overload relay 49A shall be ambient compensated, while the 49B shall be ambient non-compensated type.

Fast-speed operating circuit overload protection shall be implemented using current transformers. The current transformers shall have characteristics equivalent to:

- Transformation ratio: 300:5 A
- Accuracy Class: 0.3
- Burden: B0.5

6.7. Control Power Transformers

Each Control-circuit bucket shall be equipped with a control transformer.

Input primary voltage of control transformer shall be 400 Volts, output secondary voltage shall be 110 Volts. Nominal power of control transformers shall be 100 Volts-Amps.

Control power transformer primary and secondary voltage shall be for operating frequency of 50 Hz, the option of 50/60 Hz is not allowed. Control power transformers shall operate without excessive or abnormal humming noise under normal operating conditions.

Control power transformer shall be fused on both primary and secondary side. On primary side both terminals shall be fused, while on secondary side one terminal shall be fused; the other secondary terminal shall be grounded.

6.8. Terminal Blocks

- a. Control wiring connection: Control-circuit buckets shall be equipped with double row screw terminal blocks. Terminal blocks shall be rated 600 volts and shall have a minimum rating of 20 amperes, with marker strips identifying all internal and external wiring. Wires shall be connected to terminal block with ring tongue cable lugs and tightened with a screw. No more than two wires shall be connected to the same side of a single terminal block.

The control terminal blocks shall have the following termination capacity:

- Two (2) eighteen-pole control terminal blocks in bucket's safety-related section
- One (1) eighteen-pole control terminal block in bucket's non-safety related section

- b. Power cable connection: Main-circuit buckets shall be equipped with power terminal blocks suitable for power cable termination. The terminal blocks shall be designed to accommodate ring tongue cable lugs, which shall be supplied under this Specification. The incoming power cable conductor size is 4/0 AWG.

The power terminals shall have the following termination capacity:

- Two (2) power terminals shall be suitable for connection of one 4/0 AWG field cable, and two 4/0 AWG internal wiring conductors.
- One (1) power terminal shall be suitable for connection of one 4/0 AWG cable or internal wire on each side.

The mounting locations of the power and control terminal blocks are indicated in Attachment 2 (see Section 35.0). The terminal block locations are determined based on the existing field power and control cable entry points for each bucket.

6.9. Fuses

Fuses for control circuits shall be installed in fuse holders. Two-pole (2P) and single-pole (1P) fuse holders with built in fuses shall be used as follows:

Control transformer circuits fuses (safety-related circuit)

- FU1 and FU2 on a primary transformer side shall be 600 Vac rated, 3 Amp, Class CC current-limiting time-delay fuses, installed in a two-pole fuse holder.
- FU7 on a secondary transformer side shall be 600 Vac rated, 1 Amp Class CC current-limiting time-delay fuse, installed in a single-pole fuse holder.

NEMA Size 5 contactor coil circuit fuses (safety-related circuit)

- FU3 and FU4 shall be 600 Vac rated, 3 Amp, Class CC current-limiting time-delay fuses, installed in a two-pole fuse holder.

Motor space heaters circuit fuses (non-safety-related circuit)

- FU5 and FU6 shall be 600 Vac rated, 3 Amp, Class CC current-limiting time-delay fuses, installed in a two-pole fuse holder.

6.10. Internal Wiring

Buckets shall be wired in accordance with this Specification, and tables and drawings shown in Attachment 2 (see Section 35.0).

Wire size shall be corresponded to the intended electrical duty and mechanical requirements. Preferred wire is Firewall SIS Switchboard Wire.

All internal wiring shall be marked. Permanent markings shall identify each terminal (at device and terminal block) in accordance with the wiring and schematic diagrams. Each conductor shall be similarly identified at each terminating point using a sleeve type smear-proof, nonconductive, embossed wire marker. Marking shall be able to withstand the same environment as the wire insulation.

Internal wiring shall have no splices in any circumstance, nor shall more than two wires be terminated on one terminal point.

Power wiring

Power wiring shall be rated 600 Volts, flame-retardant, and of 19-strand construction. The internal power wiring for the fast-speed circuit shall be sized to provide a minimum continuous ampacity of 200 A, while the slow-speed circuit shall have a minimum continuous ampacity of 139 A, both at an ambient temperature of 40°C. The sizing shall ensure adequate thermal capacity, reliable operation and compliance with the actual operating conditions.

Regardless of the above, the minimum internal power wiring shall be as follows:

- 4/0 AWG – fast-speed power circuit
- 1/0 AWG – slow-speed power circuit

All power wiring shall be wired out to terminal blocks. Connections made on terminal blocks and on internal devices shall be made using ring tongue cable lugs. Burndy cable lugs are the preferred manufacturer for power wiring.

Control wiring

Control wiring shall be performed with 600 Volts, flame retardant, type 7-strand wire.

A minimum wire size of 14 AWG shall be used for 110 VAC control circuits, and a minimum wire size of 12 AWG shall be used for 400 VAC control circuits.

Current transformer secondary circuits shall be wired using a minimum 10 AWG wire size.

All control wiring shall be wired out to terminal blocks. Connections made on terminal blocks and on internal devices shall be made using ring tongue cable lugs with pre-insulated sleeves. Preferred cable lugs for control wiring are Burndy, type YAES.

6.11. Fixing the components

All electrical and mechanical components shall be securely mounted to the bucket structure to withstand the mechanical stresses associated with handling, installation, operation, maintenance activities, and service-induced vibration.

Components mounted on sheet metal panels, support plates, or structural members fabricated from minimum of 2 mm thick steel shall be fastened using machine screws and permanently installed self-clinching threaded fasteners (pressed-in nuts) or equivalent captive threaded inserts. The use of sheet metal screws, self-tapping screws, or thread-forming screws for mounting major components is not permitted.

All mounting hardware shall be corrosion-resistant zinc-plated steel or stainless steel and shall be selected to provide adequate mechanical strength for the intended application.

To prevent loosening due to vibration and repeated operational cycling, all bolted connections shall incorporate locking provisions (lock washers, serrated lock washers, or wedge-lock washers).

The selected locking method shall permit normal maintenance and replacement of components while ensuring long-term mechanical integrity of the assembly.

Components shall be mounted in a manner that prevents distortion of the component frame, enclosure, or mounting surface. Adequate clearance shall be provided for wiring, inspection, adjustment, testing, removal, and replacement of components.

The Supplier shall ensure that all mounting arrangements are suitable for the mass and operational characteristics of the installed equipment, including NEMA Size 5 contactors, control transformers, relays, terminal blocks, current transformers, and other associated devices.

All fasteners shall be tightened in accordance with the fastener manufacturer's recommended torque values. Thread engagement shall be sufficient to achieve the required mechanical strength and vibration resistance.

The completed assembly shall show no evidence of loose hardware, component movement, or degradation of mounting integrity during inspection, testing, or normal service conditions.

6.12. Spare parts

The Supplier should supply Nuclear Safety Related spare parts as listed in BOM in Attachment 3 (see Section 35).

7.0 PERFORMANCE REQUIREMENTS

7.1. General requirements shall be as follows:

The new MCC main-circuit and control-circuit buckets shall be suitable for controlling 400 Volts, 3-phase, 50 Hertz two-speed consequent pole motor (Dahlander motor) of rated power 100/50 HP motors.

The incoming supply to the MCC will be a nominal 400/230 Volts, 3-phase, 50 Hertz AC with 3-wire conductor, from solidly grounded neutral source. MCC buckets shall be installed in vintage MCC type W manufactured by Westinghouse.

The MCC buckets shall be designed for fixed installation inside the existing MCC, type W manufactured by Westinghouse, with cabinet dimensions of 20 inches in depth, 19 inches in width, and 90 inches in height.

8.0 MATERIAL REQUIREMENTS

The Supplier shall be responsible for all materials and their procurement specification. The traceability of all purchased materials and material certificates is required.

All materials shall be new and shall be selected by the Supplier to perform as specified herein.

The wiring insulation shall be flame-retardant, self-extinguishing, and shall not support combustion.

Terminal blocks shall be of a material, which will neither support combustion nor propagate flame.

Polyvinylchloride shall not be used in any equipment, components, or insulations.

9.0 FABRICATION AND ASSEMBLY

MCC replacement buckets shall be assembled so they sustain environmental and seismic requirements specified under item 11.0.

Internal wiring shall follow accepted industry practice and shall be neatly bounded and marked on both ends. Only two wires shall be connected to the same point on the terminal block. All bolted electrical connection and structural bonds shall be torqued to require value.

Only new (not used) components/materials traceable and certified to meet the design requirements shall be used in production.

MCC replacement buckets shall be delivered to NEK fully assembled, tested and ready for installation.

Fabrication shall not begin until all deviations from this specification are resolved, the design is approved by NEK, and the Supplier receives a written approval from NEK.

10.0 INSPECTIONS AND TEST

10.1. General Requirements

The Supplier shall be responsible for conducting all inspections and tests, as well as for recording the results and records maintenance.

All testing, inspection, and acceptance criteria shall conform to the applicable codes and standards as specified under section 3.0. When no code or standard applies, the acceptance criteria shall be the Supplier's standard and have proven suitability for the service. The Supplier shall submit a list and brief description of all tests, codes, and acceptance criteria as part of the proposal.

All testing and inspection procedures, dedication plans for contactors, control transformer, overload relay and the whole bucket shall be submitted to NEK for review, fulfill and approval. NEK shall also be informed about time schedule of all tests and the beginning of assembly. The Supplier shall supply an overall Quality plan for all activities (design, dedication, seismic, EMI/RFI evaluation and environmental qualification, fabrication, assembly, factory testing and delivery).

The Supplier shall perform all production tests in accordance with the applicable section of IEEE standards. Qualification/dedication test shall be performed in accordance with section 11.0 of this Specification.

The Supplier shall certify all test reports indicating their accuracy and conformance with the applicable codes and contract requirements. Certified test reports covering all tests performed shall be submitted in accordance with the Suppliers Data and Inspection Requirements.

Tests shall verify the ability of all equipment to perform its intended functions within the applicable tolerances and performance guarantees, such that when the equipment is shipped and correctly connected to external devices, the complete system is operable as intended.

The MCC replacement buckets shall be tested to prove adequate mechanical and electrical capabilities. Control wiring correctness, continuity checks, and polarity check shall be performed. Electrical tests shall be performed at nominal voltage and frequency. For seismic qualification testing contactor and overload relay shall be nominally loaded; overload relay shall be adjusted to manual.

The Supplier shall conduct all tests in the field of ambient conditions, using test equipment design especially for the product tested to be able to obtain consistent results.

Contactor coil pickup and dropout voltage measurements resistance shall be performed, as well as contacts and coil resistance.

Voltage drop test shall be performed on power circuits in completely assembled buckets.

Complete torque checking shall be performed for all bucket components.

NEK reserve the right to visit the Supplier plant at any time to witness routine factory tests and such other test of control as may be required to provide the correctness of wiring and operation. The Supplier shall give the NEK at least twenty (20) working days prior notice of all tests, and other checkpoints in the manufacturing program specifically requested by the NEK.

The Supplier shall prepare factory acceptance test plan and send it to NEK for approval (see paragraph 25.2). Qualified NEK personnel will be present during the final FAT at supplier site.

10.2. Manufacturer's Certification

An authorized and qualified factory-trained manufacturer's representative shall certify in writing that the equipment has been designed, fabricated, tested, and delivered in accordance with the requirements of this specification. Equipment shall be inspected prior to the generation of any reports.

10.3. Acceptance Criteria

Acceptance shall be based on the testing and inspection of the complete assembly/bucket and the approval of the documented construction, testing and inspection procedures. Assembly, which fails to meet the acceptance criteria for any test or inspection, shall be reported to NEK as non-conformance as specified in section 16.0, be reworked, or replaced and retested.

NEK will only accept material and equipment that meet the requirements of this Specification and the codes, and standards listed.

The equipment shall operate to the full intent of this specification. Any material or equipment, which fails within the warranty period, shall be replaced immediately by the Supplier at no additional cost to NEK for material, equipment, services, labor, and transportation.

All the testing, and verification of compliance with the requirements of the specifications and valid standards shall be carried out and documented. The documentation shall be traceable to the tested equipment by serial numbers, purchase order number or any other unique identification.

Copies of all test documents shall be submitted to NEK prior to the shipment of the equipment.

11.0 ITEM QUALIFICATION

11.1. General

The function of MCC replacement buckets is to provide 400 Volts, 50 Hz power distribution and control to NEK existing essential VA101 AC loads. Buckets shall be supplied in accordance with this Specification, they are classified Nuclear Safety related Class 1E, and shall be qualified per IEEE standards specified in section 3.0.

The Supplier shall send detailed environmental and seismic test documentation, including Qualification plan package, to NEK for review and comments prior to the start of the manufacturing of equipment. The qualification shall include documentation which certifies that the test/analysis parameters envelope the specified conditions.

11.2. Environmental Qualification

The environmental service condition of MCC replacement buckets is considered MILD.

The MCC and buckets shall be designed for continuous operation under the following ambient conditions:

- a. Maximum temperature: 40 °C
- b. Maximum relative humidity: 95 % (without condensate)
- c. Radiation: Negligible

MCC replacement buckets shall have a design life of 40 years at normal ambient temperature with routine parts replacement as identified by the Supplier. For components which do not meet the 40-year criteria, a list shall be furnished detailing the replacement parts, shelf life of parts, and frequency of change out to maintain Qualification.

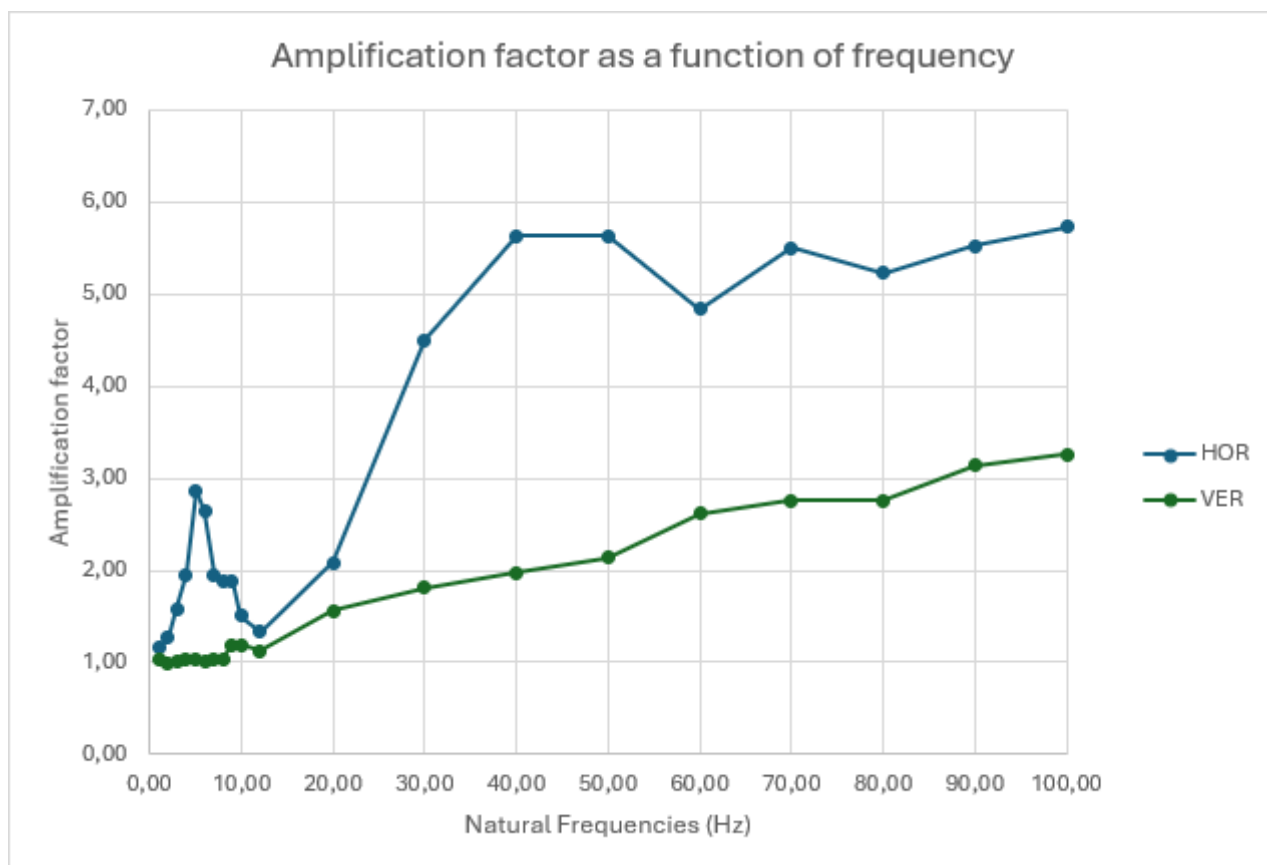
11.3. Seismic Qualification

Equipment to be supplied in accordance with this Specification and classified Nuclear Safety related Class 1E, shall be seismically qualified per IEEE 344. It shall sustain no damage and will perform its function in all positions (open, close) when subjected to operational basis seismic accelerations, acting both horizontally and vertically and occurring simultaneously. In addition, no component accessory or control shall dislodge, nor sustain damage, that can cause any loss of function or accuracy when the equipment is subjected to design basis seismic accelerations. Equipment shall sustain 5 OBE and 1 SSE earthquakes. Consider OBE and SSE spectra A73- A76 presented in Attachment 4 in Section 35, and amplify them using amplification factors depending on natural frequency as shown below. Amplification factors are calculated as average values based on NEK's previous similar MCCD qualification. Amplified OBE and SSE spectra can be used for seismic qualification test in accordance with IEEE 344.

Between seismic qualification testing of contactors and associated overload relays shall be nominally loaded; note that the MCC bucket components shall be nominally loaded also at least one hour before seismic testing.

Seismic Qualification plan shall be described in the Quality Plan and shall be submitted to NEK for review and approval prior to the start of qualification.

Amplification factor vs Frequency		
Frequency	Horizontal	Vertical
1,00	1,16	1,04
2,00	1,26	0,99
3,00	1,58	1,00
4,00	1,96	1,03
5,00	2,87	1,03
6,00	2,63	1,02
7,00	1,95	1,03
8,00	1,88	1,03
9,00	1,89	1,19
10,00	1,50	1,20
12,00	1,33	1,13
20,00	2,09	1,57
30,00	4,50	1,81
40,00	5,63	1,98
50,00	5,63	2,14
60,00	4,84	2,62
70,00	5,51	2,76
80,00	5,23	2,76
90,00	5,52	3,14
100,00	5,73	3,26



11.4. Electromagnetic and Radio Frequency Interference Evaluation

The equipment to be supplied shall be qualified per Regulatory Guide 1.180 (rev. 2) or EPRI TR-102323 (rev. 5), if applicable. The NEK program ED-19 and ESP-2.631 procedure shall also be considered.

Compliance with the following is required, as endorsed by RG 1.180 (2003) if applicable:

- a. EMI/RFI emission and susceptibility testing (radiated, conducted power line and conducted signal line): MIL-STD-461E, IEC 61000-3, IEC 61000-4 and IEC 61000-6
Selected MIL-STD-461E test methods and operating envelopes endorsed.
Selected IEC 61000 test methods and operating envelopes endorsed.
- b. SWC testing: IEEE C62.41-1991, IEEE C62.45-1992 and IEC 61000-4.
Selected IEEE C62.41-1991 surge test waveforms endorsed with associated IEEE C62.45-1992 test methods.
Selected IEC 61000-4 surge test waveforms and test methods endorsed.
General withstand levels are included in RG 1.180 (2003), position 5. Surge withstand levels shall comply with Category B, Medium Exposure (according to IEEE C62.41-1991) and Level 4 (according to IEC 61000-4).

12.0 CLEANING

All parts shall be free from dirt, scale, and unwanted grease. The handling of equipment throughout production and packaging shall be carried out so that no foreign materials are introduced into or onto the equipment and that its mechanical or electrical operation is not hindered.

13.0 CORROSION PROTECTION / COATING

All surfaces shall be protected from corrosion and oxidation in accordance with the manufacturer's standard methods. Paint shall be WHITE color and suitable for the operating temperatures of the equipment, in white tone for bucket, as normally supplied for Nuclear Power Plants. Paint coatings shall be free of sags, runs and incomplete coverage.

14.0 MARKING AND IDENTIFICATION

The Supplier shall propose their own identification system and it shall be approved by NEK. These measures shall ensure that the lot number, serial number, or other appropriate means, either on the item or on records maintains the identification of items traceable to the item throughout its fabrication, shipment, and use.

Internal wiring marking shall be placed on both sides of the wire.

All installed components in the buckets shall have MECL marks, which will be provided by NEK.

15.0 PACKAGING, HANDLING AND STORAGE

Packaging or crating shall be such as to ensure satisfactory transportation, handling, and arrival of the equipment to its destination in condition as judged by NEK to be readily handled

and placed immediately in permanent position ready for operation with a minimum of field work and it shall comply with ANSI N45.2.2 requirements. Shipping containers for the equipment shall indicate the identification numbers of the units contained.

ShockWatch and TipNTell indicators (ULINE or equivalent) shall be installed on the equipment housing and each shipping crate in all three axes prior to shipment. Clear acceptance criteria for receiving inspection shall be identified by the Contractor before shipment.

The Supplier shall inform NEK of any special storage requirements sufficiently in advance of the shipping to allow for the necessary preparation.

16.0 NONCONFORMING MATERIALS

Any deviation 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 are considered non-conformance and must be approved by NEK. Any such deviation request must be made in writing prior to disposition by means of a Deviation/Change Request Form submitted to NEK for approval prior to continuing work.

Non-conformance with specification requirements and applicable codes and standards invoked by this specification will not be accepted until approved by NEK.

Non-conformances, that cannot be brought within specification requirements by rework or replacement, shall be reported to NEK and approved by NEK. When such conditions exist, the Supplier shall initiate a Non-conformance Report (NCR) using the Supplier's standard Non-conformance document, which identifies the Non-conformance and the Supplier's disposition.

The Supplier shall:

- Segregate the non-conformance item to prevent any further processing which may result in a change of the non-conformance as identified.
- Make the NCR available to the responsible NEK inspector for review to ensure the non-conformance is completely identified and accurately stated.
- Promptly transmit the NCR with the recommended disposition to NEK. The Supplier shall provide technical justification for the recommended dispositions.

The requirements of this Specification are binding; no departures are acceptable without NEK's prior consent.

The NCR shall provide the method for the Supplier to obtain a documented response and approval from NEK when non-conformance is identified. The use of NCR will pertain to the work at the Supplier and/or Sub-supplier's shops. Once the item is identified with the NCR, its NCR shall remain assigned to that item permanently and NEK shall advise of the originating NCR.

17.0 RECORDS

17.1. Record System

A record system shall be established and maintained by the Supplier to provide documentary evidence of the quality of items and activities affecting quality. Quality assurance records shall include results of reviews, inspections, test, audits, monitoring of work performance and material analysis. The records shall identify at least the Supplier's name, order number, inspection and data records, data inspection that was performed, type of observation, procedures used, results, acceptability and actions taken in case of deficiencies. Records of inspection shall also include identity of drawings and procedures utilized along with the revision level.

All quality verification records, procedures and qualifications shall be identifiable to the item or activity involved. All these records shall be sent to NEK as they originated and shall also be included in the final documentation package delivery.

18.0 OTHER REQUIREMENTS

Any additional requirements and/or exceptions imposed beyond this specification requirements during the bidding, negotiating, and contracting process shall be identified as change to this specification and brought to the attention of the NEK ESD – Design and Modification Superintendent for resolution concurrence and/or approval.

19.0 RIGHT OF ACCESS TO SUPPLIER AND SUPPLIER FACILITIES

NEK shall be allowed access to the areas where the design, fabrication and assembly of the equipment specified in this Specification will take place, such as shops, working areas and engineering offices of the Supplier and their subcontractors at any time for the purpose of auditing:

- a. The Supplier's accepted Quality Assurance Program
- b. Equipment qualification
- c. Factory acceptance testing

Such audits shall include examination of documentary, evidence of activities affecting quality and shall be carried on a planned periodic basis, during the course of work.

The Supplier shall assure proper space and communication capacities (phone, internet) for NEK during audit activities.

20.0 QA PROGRAM REQUIREMENTS

The Supplier shall have a Quality Program that complies with 10CFR50 Appendix B and which shall assure that all materials, manufacturing practices, examinations and testing conform to the requirements of this specification and the Code. The Supplier shall submit their Quality Assurance Program to NEK for review with the proposal and prior to the commencement of any work on the design and manufacture.

The Supplier shall also send Quality Plan with R (record), W (Witness) and H (Hold) points, which will be approved and fulfilled by NEK.

A Certificate of Compliance (COC) shall be supplied to NEK by the Supplier to certify that the provided equipment and services meet the requirements of this Specification and the associated purchase order. Any deviation from the Specification or repair to the equipment, which has been accepted in writing by NEK, shall not relieve the Supplier from their responsibility for satisfactory equipment performance in accordance with this Specification.

21.0 SPECIAL HANDLING

The Supplier shall specify special handling requirements, if required, and provide NEK with appropriate procedure, explaining and emphasizing them in detail. The Supplier shall also specify additional requirements necessary to maintain equipment warranties.

22.0 SHELF LIFE

The Supplier shall not ship any item with less than 75 % of its remaining shelf life at time of shipment. The Supplier shall provide shelf-life data by one of the following methods:

- Expiration date
- Cure date and material composition

If above requirements are not met, the material shall be shipped back to the Supplier at their expenses. The Supplier will also provide shelf-life data for the recommended spare parts by cure date and material composition.

23.0 10CFR21 REPORTING

The deliverables per this specification or related order are subjected to the provisions of Title 10 of the U.S. Code of Federal Regulations Part 21: Reporting of Defect and Noncompliance. All the reporting pursuant to 10CFR21 shall be made to NEK Procurement Support (ING.PDO) Superintendent Stanko Manojlovic, Engineering support for long term operation (phone: +386 748 02 527, mail: stanko.manojlovic@nek.si) simultaneously with the reporting to the authority US NRC. For safety related equipment supplied outside the USA, the Supplier shall be subject to reporting pursuant to 10CFR21 to the NEK ING.PDO Superintendent, only.

24.0 COMMERCIAL GRADE DEDICATION

Commercial grade dedication shall be in accordance with the nuclear industry standard (EPRI NP-6406, EPRI TR-3002002982 and NP-5652) and documented as acceptable to the NRC requirements. The Supplier shall notify NEK in writing if planning to use Commercial Grade Items.

Commercial Grade dedication plan shall be described in the Quality Plan and shall be submitted to NEK for review and approval prior to the start of dedication.

Dedication test record (for critical characteristics from dedication plan approved by NEK) shall include acceptance criteria. Dedication test record shall be supplied with items or shall be supplied as part of the final documentation package.

25.0 SUPPLIER DOCUMENTATION REQUIREMENTS

The Supplier shall supply NEK with copies of documents, such as listed below, but not limited to this list:

25.1. Documents listed below shall be delivered to NEK with the Bid:

- a. Standard catalogue information for components installed in new replacement buckets.
- b. Manufacturer specification sheet which covers technical data for offered components models with all options and accessories that are standard option.
- c. List and a brief description of all tests, codes, and acceptance criteria as defined in paragraph 10.1.
- d. All testing, inspection, and acceptance criteria
- e. Types of tests, material manufacturing procedure or sequence, or construction listed in this specification, which are not the Supplier's standards.
- f. Spare parts list mentioned in paragraph 6.12.

Any deviation or exceptions to this Specification shall be listed on the Equipment specification Exceptions form. The Supplier shall send all exceptions to this Specification together with the proposal to NEK for review, comment, and acceptance. After that, any further deviations regarding equipment or documentation shall not be accepted by NEK.

Any supplement information included with the proposal which is not directly associated with the subject specification shall be designated as a "sample".

25.2. Documents listed below shall be delivered to NEK with the equipment ordered (for MCC buckets and all installed components):

- a. Detailed Manufacturing and Quality Plan for controlling the manufacture of this equipment, which collectively indicates sequences and dates for material requisition, fabrication, testing, qualification, and shipment, with Record, witness and Hold points which will be commented filled out and approved by NEK. The submitted timeline shall be in weeks from the date of the receipt of purchase order.
- b. Installation, Operation and Maintenance Instructions. These shall include, among others preparation and testing for all components for replacement purposes, and torque requirements for all bolted connections.
- c. Copies of all test reports performed by the Supplier and required under section 10.0.
- d. A copy of the production test program and acceptance criteria along with a listing of the standard to which they conform, which shall be commented and approved by NEK.
- e. Copies of the fabrication QC records.
- f. Protective devices time/current curves for all current ratings; delivered as drawings and spreadsheets.
- g. Factory acceptance test (FAT) procedure (shall be supplied to NEK at least 4 weeks before FAT date).

- h. Certificate of Conformance (CoC) certifying all the requirements of this specification and purchase order have been met and qualification is in accordance with IEEE 323-1974 and IEEE 344-1975.

All the Supplier's documentation shall include revision number, date of issuance, the initials of the Supplier's employee who is responsible for the preparation of the drawings, NEK Purchase Order Number, and Suppliers Shop order Number.

Shipment must be accompanied by certification that contains the signature of a person responsible for the quality function of the Supplier, and that states that the material or articles meet the applicable drawing and/or specifications cited in the purchase order. Applicable specifications, part numbers and serial numbers shall be referenced in the certification and the applicable revision number shall be indicated. Certification shall contain NEK purchase order number.

26.0 NEK PROPRIETARY DATA

NEK has a proprietary interest in all the drawings, designs, specifications, documents information or know-how which may be furnished pursuant to the execution of the contract and in any know-how improvement, discovery or invention which may be made, developed or conceived in the performance of works under this Specification or which may arise or result therefrom (hereinafter collectively referred to as "information"). All such information shall be considered proprietary to NEK. The right to use such information shall be transmitted to the Supplier only for their personal use and shall be entirely restricted to the performance of the contract and shall be subject to the confidentiality provision.

27.0 NON-CONFORMANCE REPORTS

The Supplier shall provide a copy for approval of all non-conformance reports disposed as repair or use-as-is disposition of material during the manufacturing process only in cases that affect interchangeability, design or operating parameters generated during manufacture or processing of this order. This report shall include technical justification for non-conformance dispositions.

All dispositions which do not return an item to the conditions stated in an approved drawing or specification shall be approved by NEK prior to the shipment of the affected item.

28.0 REPAIR RECORDS

Together with the documentation package shipment, the Supplier shall provide to the NEK with all generated record of repairs, and they shall include as a minimum, following information:

- a. Summary of repair/refurbishment work that has been performed on the equipment.
- b. Brief analysis of the reason for failure of the equipment.
- c. Details of any "special process" used during repairs that were not used in manufacture.
- d. A list of replacement parts installed in the repaired equipment.

29.0 SOURCE INSPECTION / SURVEILLANCE NOTIFICATION

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

The Purchaser shall have the right to establish notification points for which the Supplier shall give prior notification to the Purchaser. In addition, the Purchaser may establish temporary notification points as needed to ensure resolution of temporary quality problems. Notifications for Witness or Hold points require the receipt of notification at least twenty (20) working days in advance of the scheduled time of performance.

The Supplier shall contact NEK when a witness or hold point has been reached and the Supplier will not proceed past that point until the inspection has been established or waived by NEK.

Inspection or examinations performed by NEK, or the designated representatives, do not relieve the Supplier of his responsibility to meet the requirements of this purchase order.

30.0 SHIPPING REQUIREMENTS

The Supplier shall provide packaging and shipping methods for protection from effect of temperature extremes, humidity, transit shocks and jarring during transport and storage.

Material certifications and all certifications or accompanying documentation supplied under this order shall be directly shipped from the Supplier to NEK. The Distributor shall not take possession of any material or documentation.

NEK authorized source inspectors have the right to hold shipment if purchase order requirements are not met.

31.0 DELIVERY SCHEDULE

The Supplier shall deliver the items required to be received at NEK by the date specified in the public procurement documentation.

32.0 HOLD POINTS

NEK shall have the right to establish hold points and notification points for which the Supplier shall give prior notification. NEK shall identify inspection, witness, or hold points which it intends to participate in based on the received Detail Manufacturing and Quality Plan. The Plan shall be delivered to NEK according to a mutually agreed schedule, as defined in the paragraphs below.

In addition, NEK may establish hold points and temporary notification points as needed to ensure the resolution of quality problems or temporary quality problems.

Predetermined hold or notification points require receipt of notifications at least twenty (20) working days prior to the scheduled time of performance. The following hold points for which prior notification is required are mandatory:

- a. Start of production
- b. Assembly
- c. Equipment seismic qualification tests
- d. Factory Acceptance Tests (all tests)
- e. Readiness of the final documentation package
- f. Shipping release.

The Supplier shall submit documentation for the item manufacturing and quality plan. Based on this information, NEK shall have the right to specify hold points in the processing of the items and when the Supplier shall submit the required documentation to NEK for review and approval.

The documentation shall be submitted to the NEK Purchasing Department Superintendent. The Supplier shall not proceed beyond the hold point without a written approval from NEK.

33.0 VENDOR TECHNICAL MANUAL AND REGISTERED UPDATES

All manuals shall be provided to NEK for review, comment and acceptance prior to the final issue and delivery. Preliminary versions shall be clearly marked and in proper PDF format. Drawings shall be also in acad and pdf format.

The final version shall be furnished in electronic version.

The Supplier shall furnish manuals with all the necessary information for operation and maintenance and updated specific data and drawings for the items supplied. The Supplier shall be responsible for sending applicable manual updates to NEK.

34.0 TRAINING

Not applicable to this specification.

35.0 ATTACHMENTS

Attachment 1: Type W Motor Control Center General Information and Existing Design Description

Attachment 2: Motor Control Center New Buckets Conceptual Design Drawings

Attachment 3: Motor Control Center New Buckets Preliminary BoM

Attachment 4: Seismic Response Curves

Attachment 5: QS 610, Rev.2: "QA Specification: Generic Quality Assurance Program Requirements"

Attachment 1: Type W Motor Control Center General Information and Existing Design Description**Att. 1.1-1: General Information and description**

MCC was manufactured and supplied by Westinghouse Electric Corporation, General Control Division, Chicago during 1978.

Model: Type W

Purchase No: 13-KRA-060

General Order No: ZEU1106-015

List of MCC:

MCC Tag	Building / Elevation	Safety Related
EE103MCCD114	CB / 107	Yes
EE103MCCD125	CB / 107	Yes
EE103MCCD214	CB / 107	Yes
EE103MCCD224	CB / 107	Yes

Note: CB - CONTROL BUILDING

MCCs are Nuclear Safety Related equipment.

Cabinets information:

Dimensions: 20 inches deep x 19 inches wide x 90 inches high.

The cabinet dimensions are in accordance with the Outline and Floor Plan shown in Figure 13c of the Westinghouse Instruction Book I.B. 12-129d, "Instructions for Type W Control Centers".

The cabinet itself provide bottom entry for power cables and top entry for control cables.

The cabinet design is without vertical and horizontal bus.

All four cabinets are of the same design.

Cabinets EE103MCCD114 and EE103MCCD125 are located next to each other, EE103MCCD114 on the left, and EE103MCCD125 on the right when viewed from the front.

Cabinets EE103MCCD214 and EE103MCCD224 are located next to each other, EE103MCCD214 on the left, and EE103MCCD224 on the right when viewed from the front.

Attachment 1: Type W Motor Control Center General Information and Existing Design Description

Att. 1.2-1: Type W MCC: Outline & Floor Plan for 20 Inch Deep One Compartment – One wireway (I.B. 12-129d, Figure 13c)

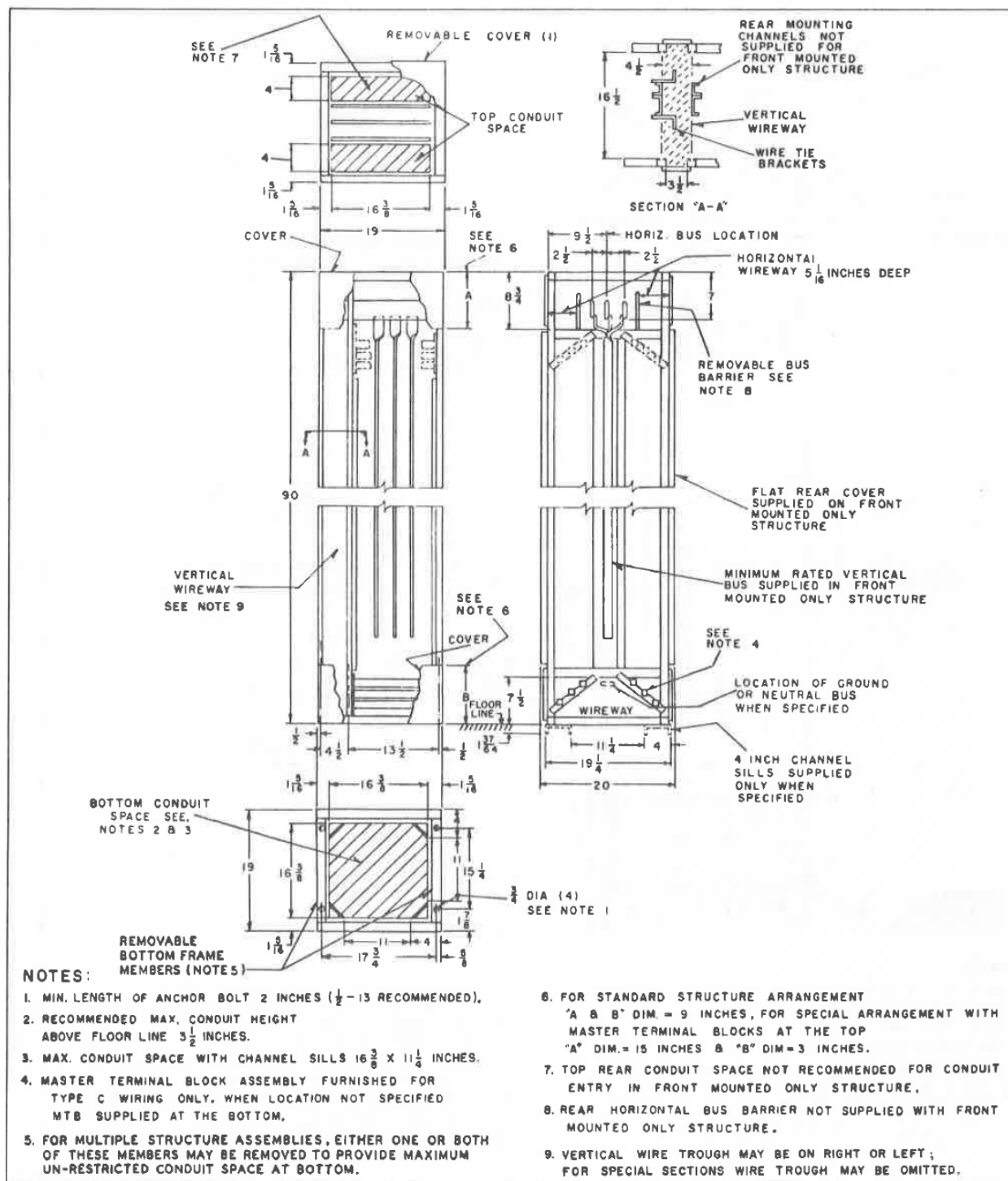


Fig. 13c Outline & Floor Plan - 20 Inch Deep One Compartment - One Wireway

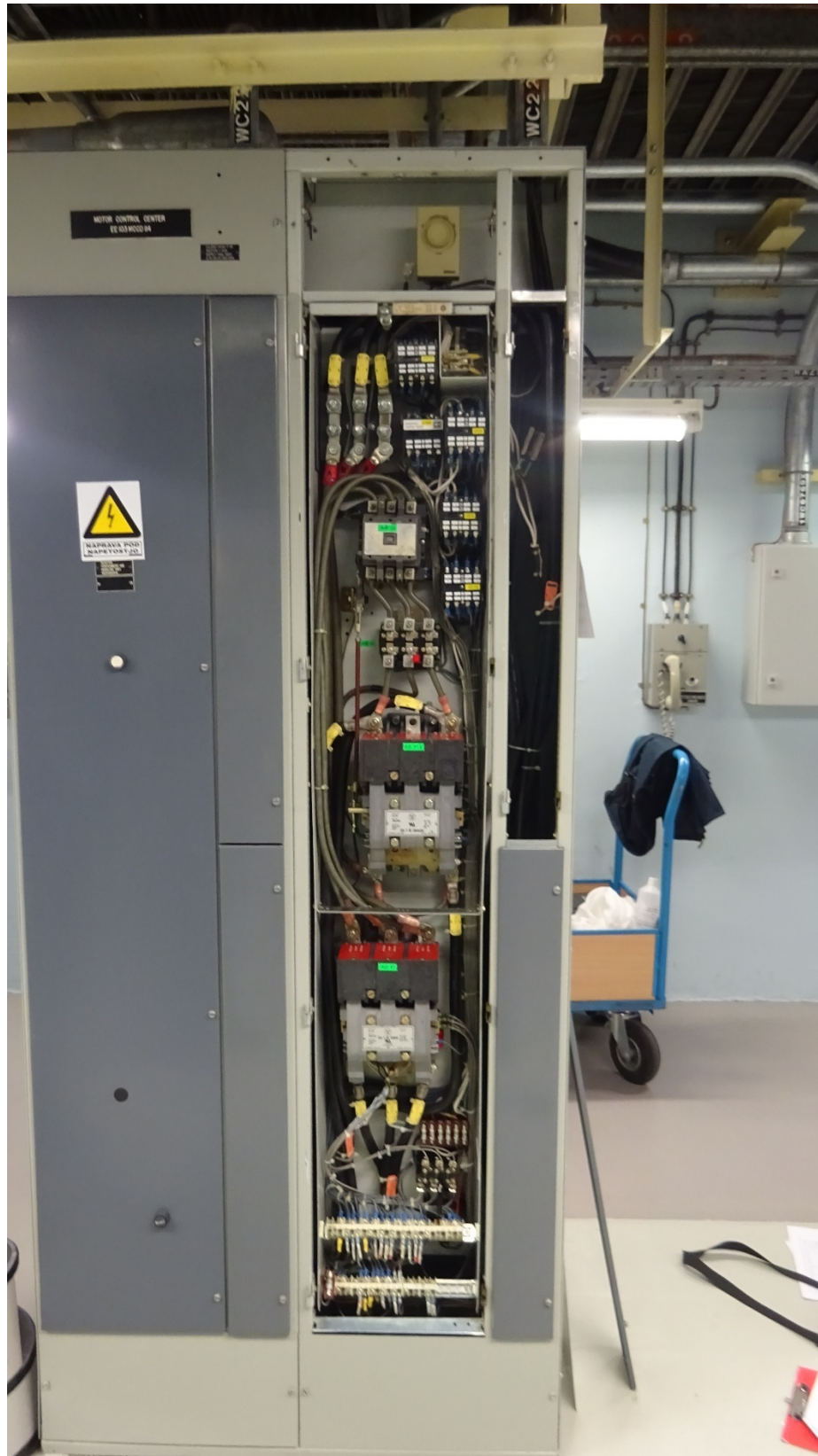
Attachment 1: Type W Motor Control Center General Information and Existing Design Description

Att. 1.3-1: Photo of EE103MCCD114 Cabinet with Front Door Open



Attachment 1: Type W Motor Control Center General Information and Existing Design Description

Att. 1.4-1: Photo of EE103MCCD125 Cabinet with Front Door Open



Attachment 1: Type W Motor Control Center General Information and Existing Design Description

Att. 1.5-1: Photo of EE103MCCD214 Cabinet with Front Door Open



Attachment 1: Type W Motor Control Center General Information and Existing Design Description

Att. 1.6-1: Photo of EE103MCCD224 Cabinet with Front Door Open



Attachment 1: Type W Motor Control Center General Information and Existing Design Description

Att. 1.7-1: Photo of EE103MCCD224 Cabinet with Rear Door Open

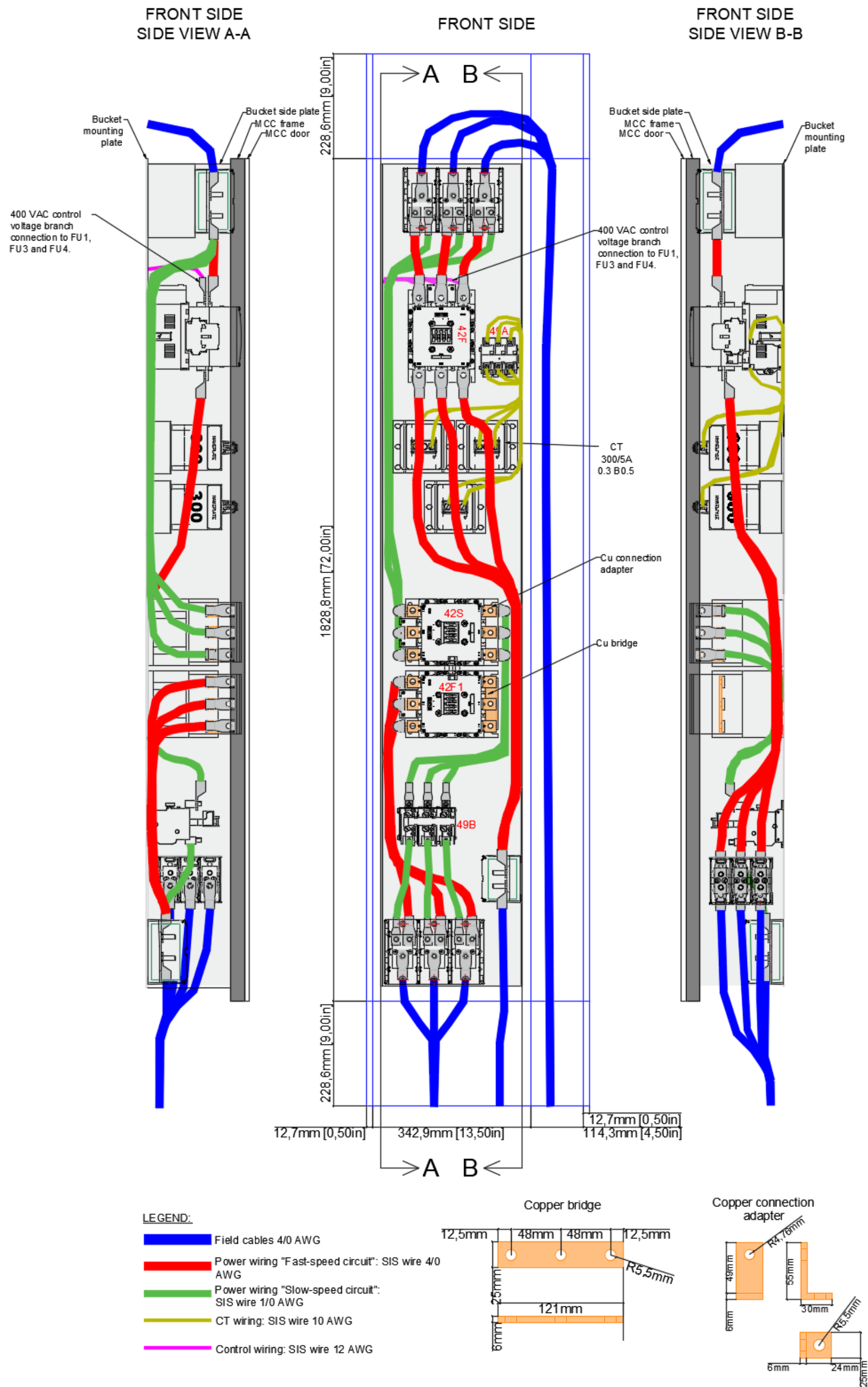


Attachment 1: Type W Motor Control Center General Information and Existing Design Description

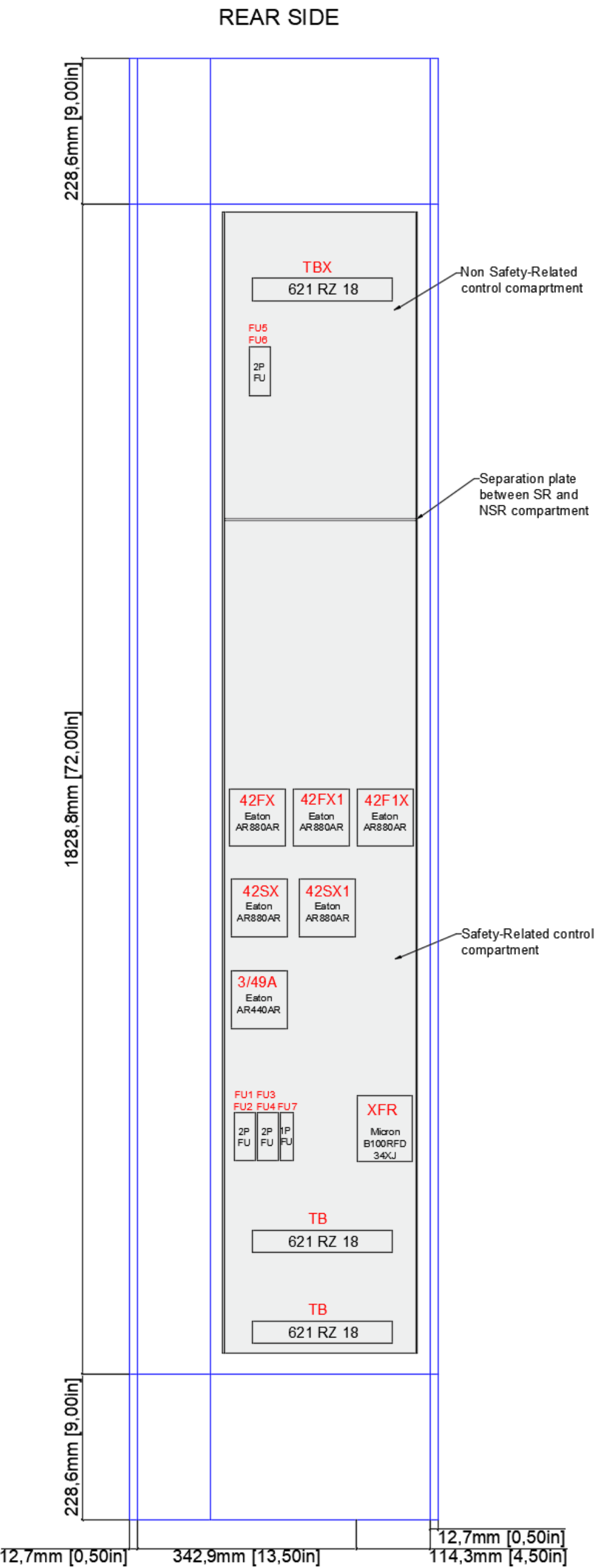
Att. 1.7-1: Rear Top-Side Bolt Connection Between Adjacent Cabinets



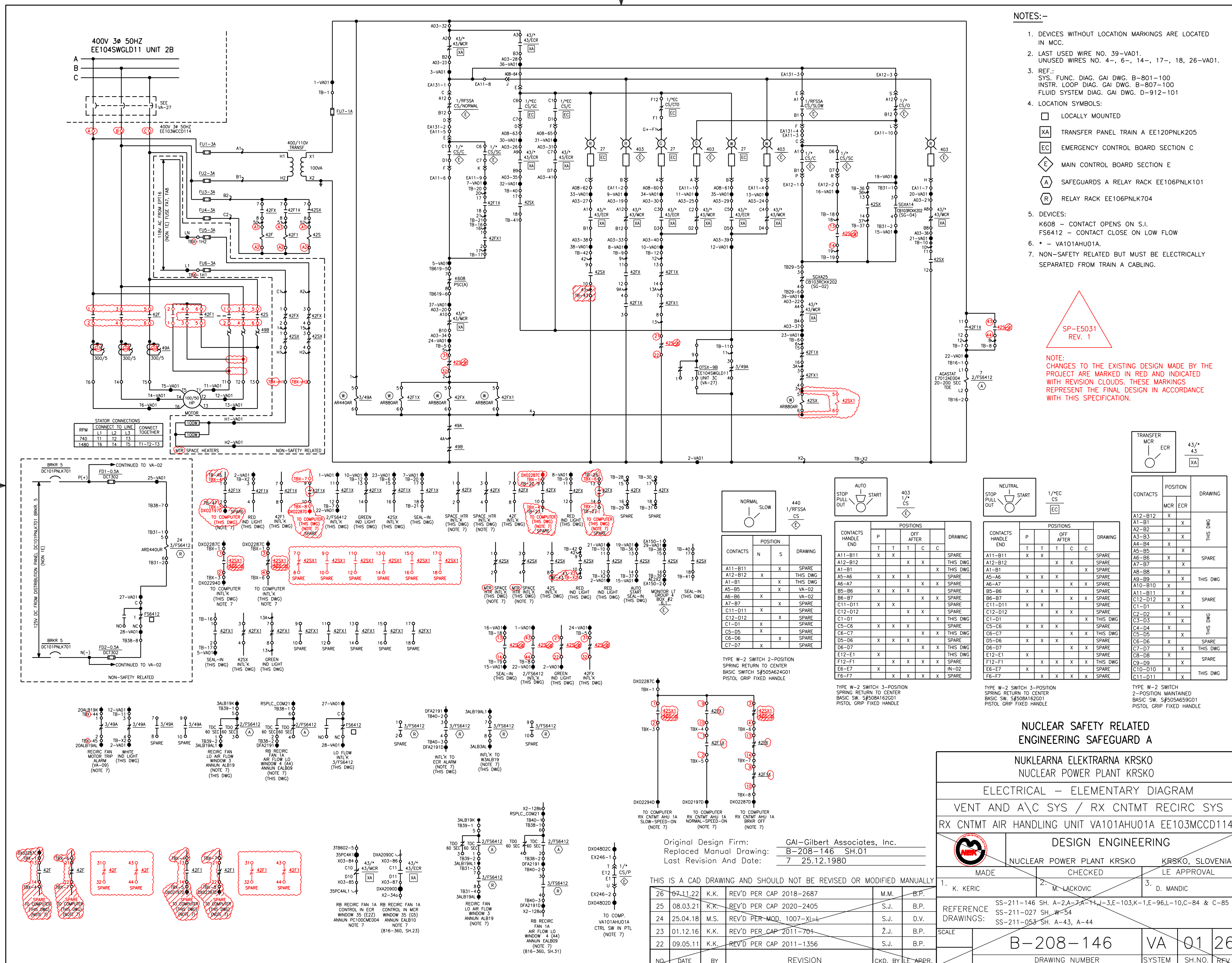
Attachment 2: Motor Control Center New Buckets Conceptual Design Drawings
Att. 2.1-1: New Front-Side Equipment Arrangement and Connection Design



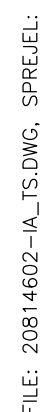
Attachment 2: Motor Control Center New Buckets Conceptual Design Drawings
Att. 2.2-1: New Rear-Side Equipment Arrangement Design



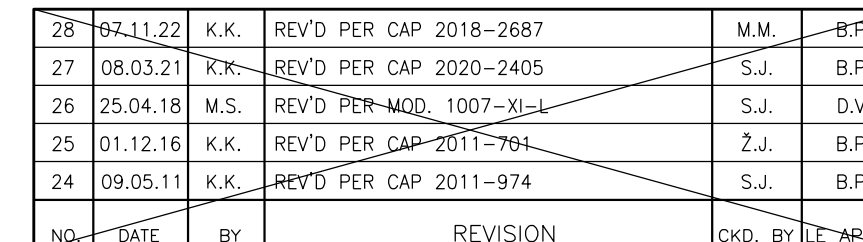
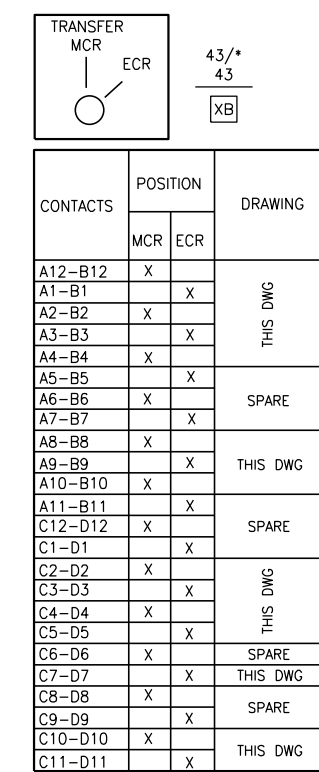
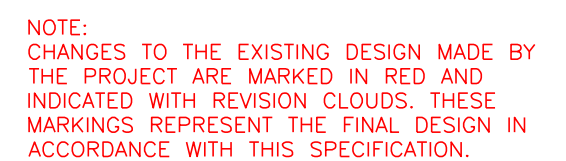
Att. 2.3-1 Electrical Elementary Diagram for EE103MCCD114



Att. 2.4-1 Electrical Elementary Diagram for EE103MCCD125

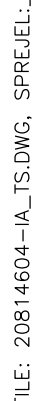


Att. 2.5-1 Electrical Elementary Diagram for EE103MCCD214



B-208-146	VA	03	28
DRAWING NUMBER	SYSTEM	SH.NO.	REV.

Att. 2.6-1 Electrical Elementary Diagram for EE103MCCD224



Attachment 2: Motor Control Center New Buckets Conceptual Design Drawings

Att. 2.8-1 Internal wiring connection table

CONN. NUMBER	INTERNAL WIREMARK	BUCKET	FROM DEVICE	TERMINAL	BUCKET	TO DEVICE	TERMINAL	WIRE SIZE	BRAID	NOTE
1	N/A	CONTROL	42F1X	1	CONTROL	42FX	10	14 AWG		
2	N/A	CONTROL	42F1X	2	CONTROL	TBX	5	14 AWG	BRAID	NON SAFETY-RELATED CONNECTIO
3	X2	CONTROL	42F1X	3	CONTROL	42SX	12	14 AWG		
4	9A	CONTROL	42F1X	4	CONTROL	42FX	12	14 AWG		
5	2	CONTROL	42F1X	5	CONTROL	42FX1	5	14 AWG		
6	4	CONTROL	42F1X	6	CONTROL	42FX1	6	14 AWG		
7	B2	CONTROL	42F1X	7	CONTROL	42FX	7	14 AWG		
9	N/A	CONTROL	42F1X	9	CONTROL	42FX	14	14 AWG		
10	N/A	CONTROL	42F1X	10	CONTROL	TBX	8	14 AWG	BRAID	NON SAFETY-RELATED CONNECTION
11	1	CONTROL	42F1X	11	CONTROL	3/49A	5	14 AWG		
12	7	CONTROL	42F1X	12	CONTROL	TB	7	14 AWG		
13	12	CONTROL	42F1X	13	CONTROL	TB	12	14 AWG		
14	13A	CONTROL	42F1X	14	CONTROL	42FX1	7	14 AWG		
15	6	CONTROL	42F1X	15	CONTROL	TB	6	14 AWG		
16	3A	CONTROL	42F1X	16	CONTROL	42FX1	3	14 AWG		
17	20	CONTROL	42F1X	17	CONTROL	TB	20	14 AWG		
18	21	CONTROL	42F1X	18	CONTROL	TB	21	14 AWG		
19	C1	CONTROL	42FX	1	CONTROL	FU6	*	12 AWG	BRAID	*FUSE LOAD-SIDE TERMINAL NON SAFETY-RELATED CONNECTION
20	14	CONTROL	42FX	2	CONTROL	42SX	1	14 AWG	BRAID	NON SAFETY-RELATED CONNECTION
21	A2	CONTROL	42FX	3	CONTROL	FU5	*	12 AWG	BRAID	*FUSE LOAD-SIDE TERMINAL NON SAFETY-RELATED CONNECTION
22	15	CONTROL	42FX	4	CONTROL	42SX	3	14 AWG	BRAID	NON SAFETY-RELATED CONNECTION
23	2	CONTROL	42FX	5	CONTROL	42FX1	5	14 AWG		
24	4	CONTROL	42FX	6	CONTROL	42SX	6	14 AWG		
25	B2	CONTROL	42FX	7	CONTROL	42SX	7	14 AWG		
27	N/A	CONTROL	42FX	9	CONTROL	TBX	1	14 AWG	BRAID	NON SAFETY-RELATED CONNECTION
28	N/A	CONTROL	42FX	10	CONTROL	TBX	4	14 AWG	BRAID	NON SAFETY-RELATED CONNECTION
29	9	CONTROL	42FX	11	CONTROL	TB	9	14 AWG		
30	N/A	CONTROL	42FX	13	CONTROL	TBX	6	14 AWG	BRAID	NON SAFETY-RELATED CONNECTION
31	N/A	CONTROL	42FX	14	CONTROL	TBX	7	14 AWG	BRAID	NON SAFETY-RELATED CONNECTION
31a	N/A	CONTROL	42FX	17	CONTROL	TBX	46	14 AWG	BRAID	NON SAFETY-RELATED CONNECTION SHALL BE PERFORMED ONLY IN MCC EE103MCCD125
31b	N/A	CONTROL	42FX	18	CONTROL	TBX	47	14 AWG	BRAID	NON SAFETY-RELATED CONNECTION SHALL BE PERFORMED ONLY IN MCC EE103MCCD125
32	N/A	CONTROL	42SX1	1	CONTROL	42FX	9	14 AWG		
33	N/A	CONTROL	42SX1	2	CONTROL	TBX	3	14 AWG	BRAID	
34	N/A	CONTROL	42SX1	3	CONTROL	42SX1	1	14 AWG		
36	3	CONTROL	42SX1	5	CONTROL	42FX1	4	14 AWG		
37	4	CONTROL	42SX1	6	CONTROL	3/49A	6	14 AWG		
38	H1	CONTROL	42SX	2	CONTROL	TBX	H1	14 AWG	BRAID	NON SAFETY-RELATED CONNECTION
39	H2	CONTROL	42SX	4	CONTROL	TBX	H2	14 AWG	BRAID	NON SAFETY-RELATED CONNECTION
40	3	CONTROL	42SX	5	CONTROL	42SX1	5	14 AWG		
41	4	CONTROL	42SX	6	CONTROL	42SX1	6	14 AWG		
42	B2	CONTROL	42SX	7	CONTROL	FU3	*	12 AWG		*FUSE LOAD-SIDE TERMINAL
44	42	CONTROL	42SX	9	CONTROL	TB	42	14 AWG		
45	X2	CONTROL	42SX	10	CONTROL	3/49A	4	14 AWG		
46	10	CONTROL	42SX	11	CONTROL	TB	10	14 AWG		
47	X2	CONTROL	42SX	12	CONTROL	42SX	10	14 AWG		
48	36	CONTROL	42SX	13	CONTROL	TB	36	14 AWG		
49	37	CONTROL	42SX	14	CONTROL	TB	37	14 AWG		
50	38	CONTROL	42SX	15	CONTROL	TB	38	14 AWG		
51	39	CONTROL	42SX	16	CONTROL	TB	39	14 AWG		
52	40	CONTROL	42SX	17	CONTROL	TB	40	14 AWG		
53	41	CONTROL	42SX	18	CONTROL	TB	41	14 AWG		
54	16	CONTROL	42FX1	1	CONTROL	TB	16	14 AWG		
55	17	CONTROL	42FX1	2	CONTROL	TB	17	14 AWG		
56	4	CONTROL	42FX1	6	CONTROL	42FX	6	14 AWG		
68	44	CONTROL	3/49A	1	CONTROL	TBX	44	14 AWG	BRAID	NON SAFETY-RELATED CONNECTION

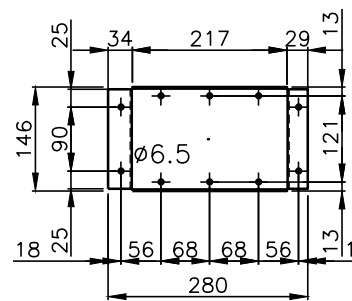
Attachment 2: Motor Control Center New Buckets Conceptual Design Drawings

Att. 2.8-2 Internal wiring connection table

CONN. NUMBER	INTERNAL WIREMARK	FROM			TO			WIRE SIZE	BRAID	NOTE
		BUCKET	DEVICE	TERMINAL	BUCKET	DEVICE	TERMINAL			
69	45	CONTROL	3/49A	2	CONTROL	TBX	45	14 AWG	BRAID	NON SAFETY-RELATED CONNECTION
70	11	CONTROL	3/49A	3	CONTROL	TB	11	14 AWG		
71	X2	CONTROL	3/49A	4	CONTROL	3/49A	6	14 AWG		
72	1	CONTROL	3/49A	5	CONTROL	TB	1	14 AWG		
73	4	CONTROL	3/49A	6	CONTROL	TB	X2	14 AWG		
77	N/A	CONTROL	XFR	X1	CONTROL	FU7	*	12 AWG		*FUSE LOAD-SIDE TERMINAL
78	X2	CONTROL	XFR	X2	CONTROL	TB	X2	14 AWG		
79	A1	CONTROL	XFR	H1	CONTROL	FU1	*	12 AWG		*FUSE LOAD-SIDE TERMINAL
80	B1	CONTROL	XFR	H2	CONTROL	FU2	*	12 AWG		*FUSE LOAD-SIDE TERMINAL
83	B	CONTROL	FU3	*	CONTROL	FU2	*	12 AWG		*FUSE SOURCE-SIDE TERMINAL
85	LN	CONTROL	FU5	*	CONTROL	TBX	1H2	12 AWG		*FUSE SOURCE-SIDE TERMINAL NON SAFETY-RELATED CONNECTION
86	L1	CONTROL	FU6	*	CONTROL	TBX	1H1	12 AWG		*FUSE SOURCE-SIDE TERMINAL NON SAFETY-RELATED CONNECTION
87	N/A	CONTROL	FU7	*	CONTROL	TB	1	12 AWG		*FUSE SOURCE-SIDE TERMINAL

Att. 2.9-1 Buckets Fabrication Design Drawing

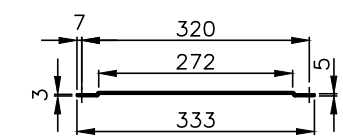
Pos 3 ISOMETRIC View (Sc1:10)



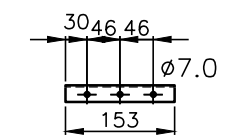
Pos 3 Top View (Sc1:10)
PLATE 484x346x2



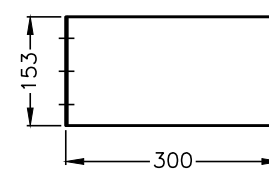
Pos 5 ISOMETRIC View (Sc1:10)



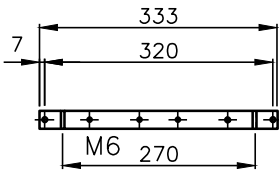
Pos. 5 Side View (Sc1:10)



Right View

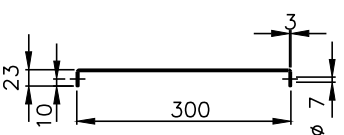


Pos 4 Top View (Sc1:10)
PLATE 340x153x2

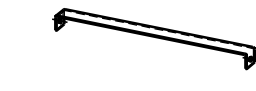


Pos 5 Top View (Sc1:10)
PLATE 341x25x5

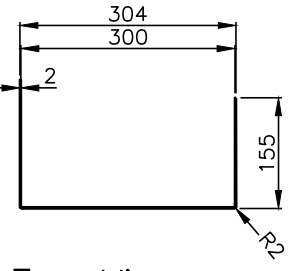
* Create a threaded hole M6



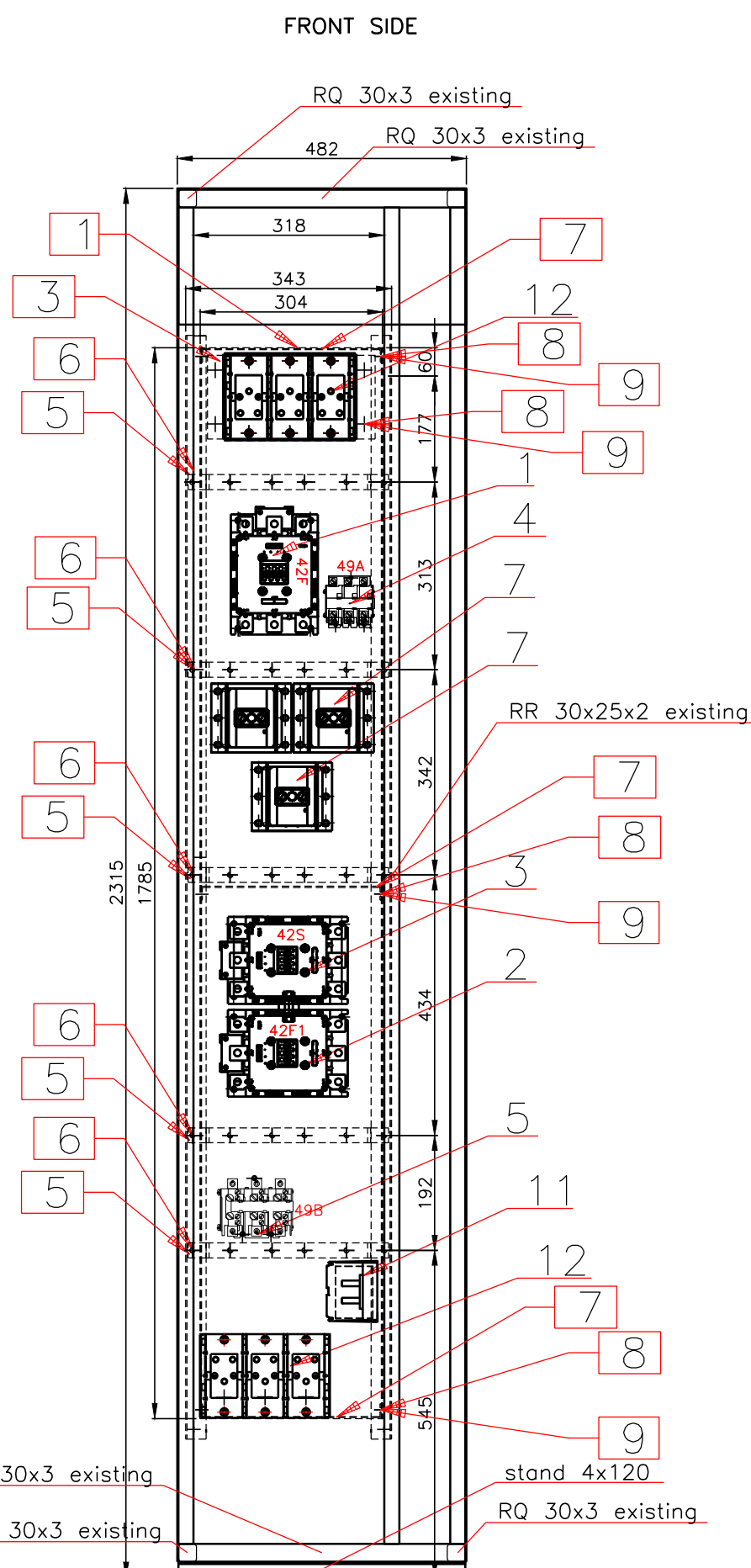
Pos 7 Front View



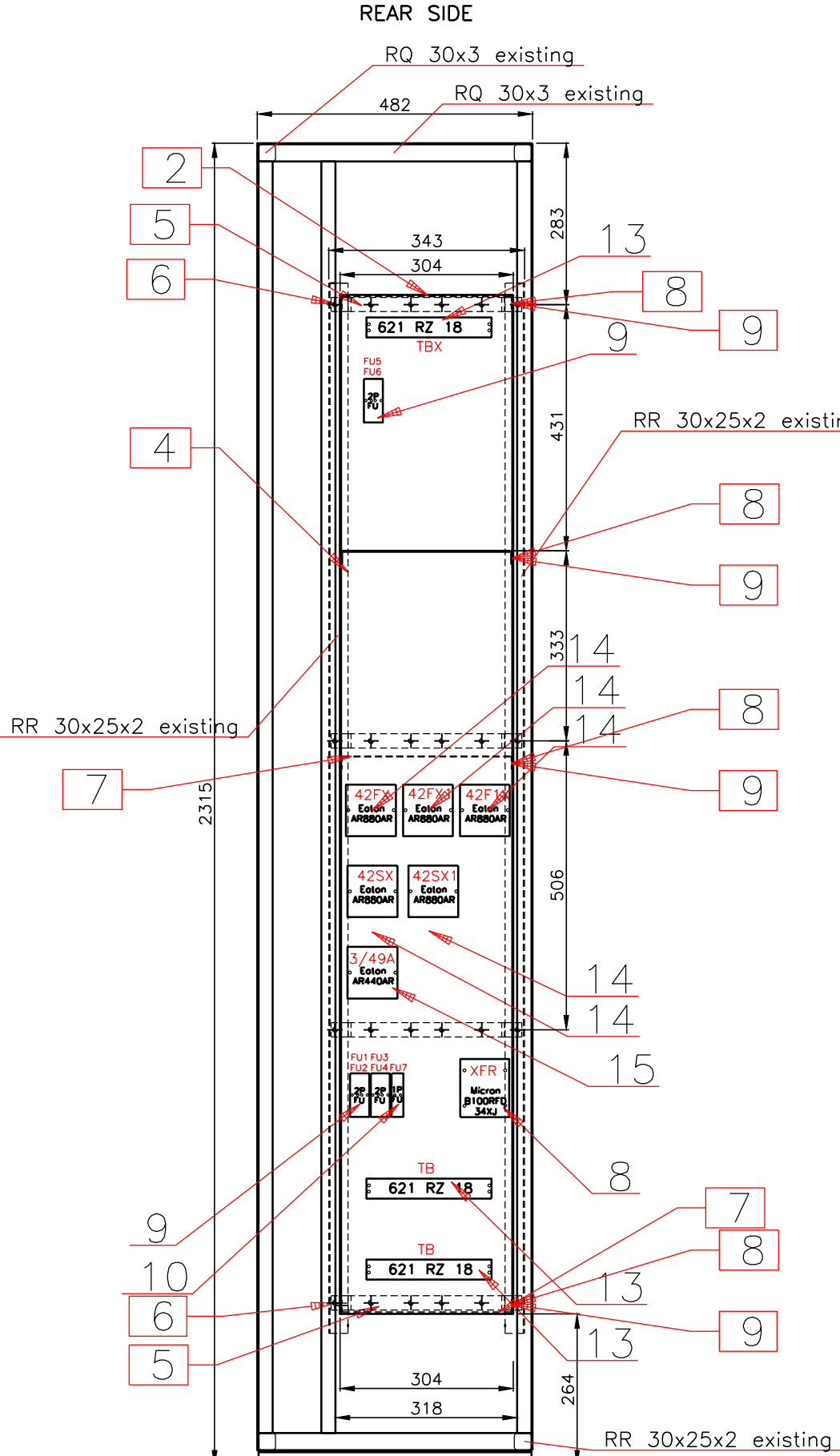
Isometric view



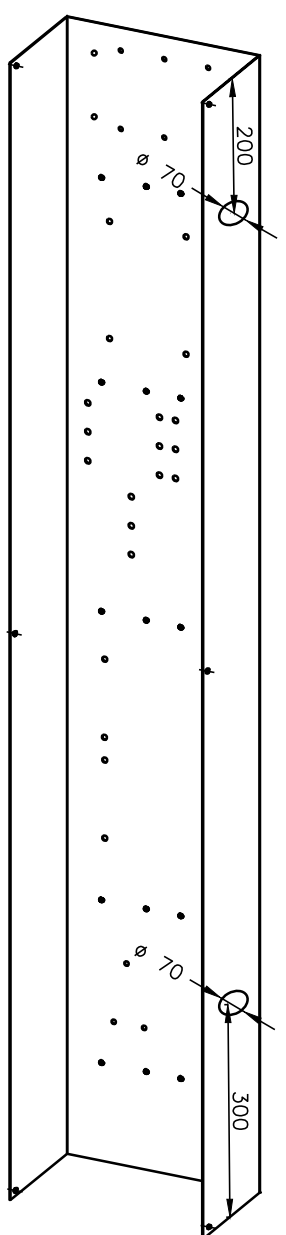
Top View



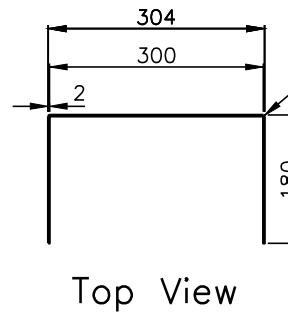
FRONT VIEW (Sc1:10)



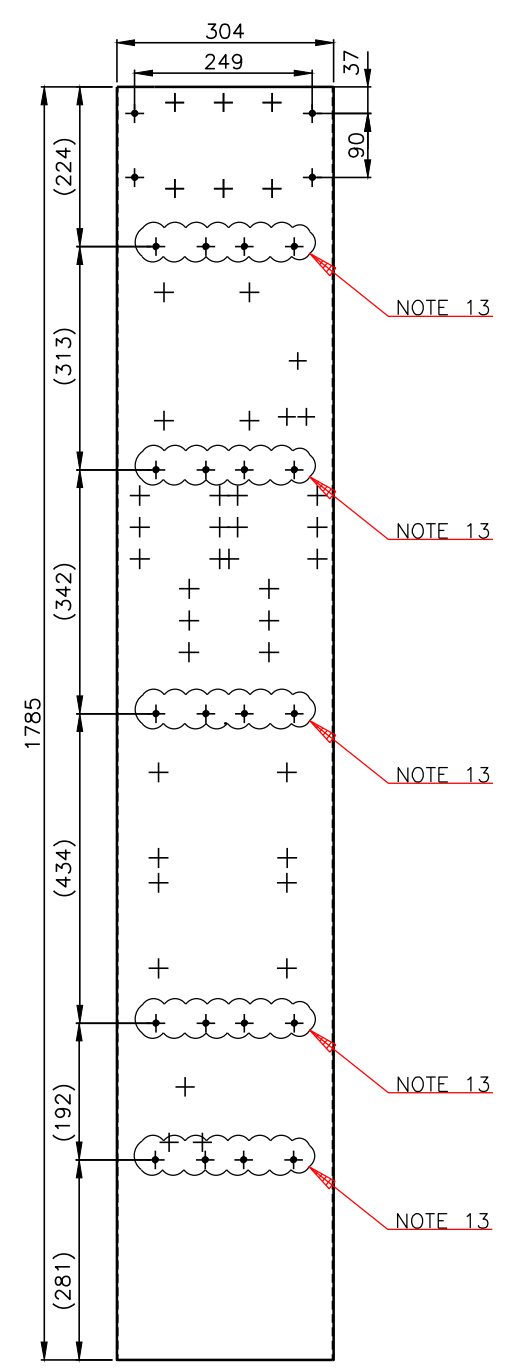
REAR VIEW (Sc1:10)



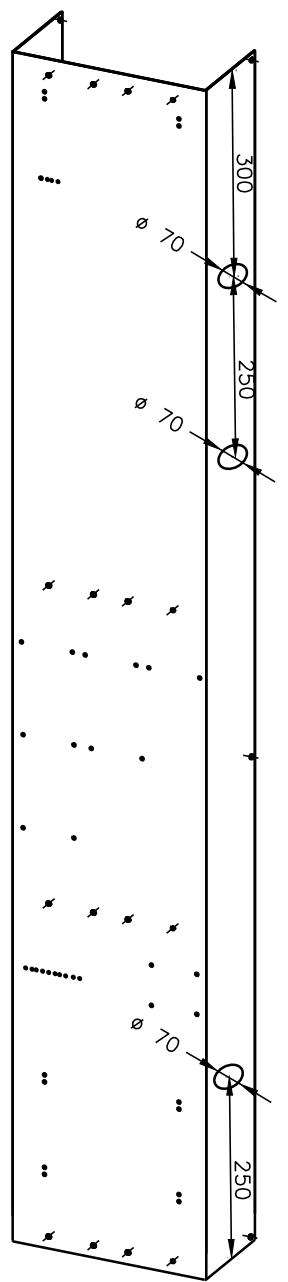
Pos 1 ISOMETRIC View (Sc1:10)



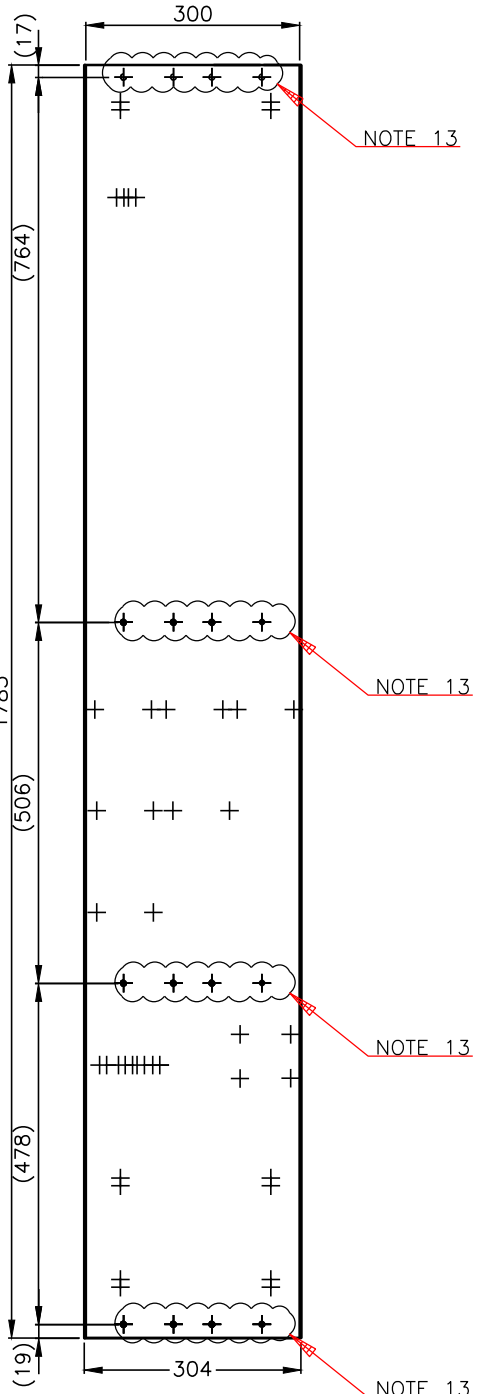
Top View



Pos 1 Top View (Sc1:10)
PLATE 1785x660x2



Pos 2 ISOMETRIC View (Sc1:10)



Pos 2 Top View (Sc1:10)
PLATE 1785x608x2

NOTES:

1. ALL DIMENSIONS ARE IN MM EXCEPT DORS ARE IN INCHES.
2. NEK SPECIFICATION SP-J501A "STRUCTURAL STEEL FABRICATION AND DELIVERY" SHALL BE APPLICABLY CONSIDERED.
3. CONSTRUCTION CLASS CO2 ACCORDING TO EN1090-2.
4. ALL STRUCTURAL STEEL MUST BE ASTM A 36, OR SIMILAR.
5. SCREW MATERIAL ASTM A 307 IN QUALITY CLASS.
6. BEFORE DRILLING HOLES FOR EQUIPMENT, THE DIMENSIONS SHALL BE VERIFIED AGAINST THE EQUIPMENT REQUIREMENTS.
7. EQUIPMENT AND REINFORCEMENT SHEET MOUNTINGS TO THE BUCKET STRUCTURE SHALL BE DONE BY THE BIDDING COMPANY.
8. BUCKETS WILL BE MOUNTED TO THE EXISTING WESTINGHOUSE MCC, TYPE W, 20-INCH-DEEP FRAME, THRU REINFORCEMENT SHEETS (POS. 5) USING M6 x 16 mm BOLTS (POS. 6).
9. SAFETY-RELATED AND NON-SAFETY RELATED COMPARTMENT SEPARATION PLATE SHALL BE BOLTED TO THE BUCKET FRAME.
10. DIMENSIONS OF THE BRACKETS ARE FINAL AND WILL NOT BE CHANGE.
11. THE DRILLING PLAN WILL BE PROVIDED LATER AFTER THE TRIAL INSTALLATION OF THE EQUIPMENT HAS BEEN CARRIED OUT.
12. FOR MOUNTING EQUIPMENT, USE PRESS-IN NUTS OF THE SAME SIZE.
13. Ø7 HOLES FOR FIXING THE BUCKETS ON THE REINFORCEMENT SHEETS MUST BE DRILL ON SITE.

P-E5031
REV. 1

NUCLEAR SAFETY RELATED

Position: ISO_128				Scale: M1:5, M1:10		Mass	
Date By				Name:			
Mode 27.08.2026 J. Jagric				EE103MCCD114, D125, D214 & D224 FRONT AND REAR BUCKET DESIGN			
Check 27.08.2026 R. Miskar							
App. 27.08.2026 N. Delavari							
Design Firm SPRO				Drawing No. SIP - 662-001		Sheet No. 1/1	
CK2 135c S-270 MKSO File Name: SIP-661-01-00-1A.dwg						Form: A1	
0 1297 -VAL- Rev.		27.08.26 Modification Date		JMKR			

Attachment 3: Motor Control Center New Buckets Preliminary Bill of Material

Att. 3.1-1 BOM of Electrical Equipment

Item No.	Quantity	Part Description	Manufacturer/Part No.
1.	12 pcs	Contactors NEMA size 5 UL/CSA standards: Yes Max operating voltage: 600 VAC NEMA continuous amp rating: 270 A NEMA max. HP ratings: @230 VAC: 100 HP @460 VAC: 200 HP Coil voltage: Us=380-420 VAC Coil operating range 0,8*Usmin-1,1*Usmax Coil min pull in value: 250 VA / (inductive P.F. 0,8) Coil max pull in value: 300 VA / (inductive P.F. 0,8) Coil min holding value: 4,8 VA / (inductive P.F. 0,8) Coil max holding value: 5,8 VA / (inductive P.F. 0,8) Aux contact: 2xN.O. and 2xN.C. Main circuit connecting capacity: - Busbar connection 2x 25x (..)mm M10x30 - Finely stranded with cable lug 2x70...240 mm2 (2x AWG 2/0... 500 kcmil) - Stranded with cable lug 2x50...240 mm2 (2x AWG 1/0 ... 500 kcmil) Main connections Width: 25mm Thickness: 6mm Diameter of holes: 11mm Manufacturer: Siemens Type: 3RT1066-6AV36-0UA0 MECL tags: 42F, 42F1, 42S	Siemens 3RT1066-6AV36-0UA0
2.	4 pcs	Mechanical interlock for two NEMA size 5 contactors without adaptation of mounting depth. Manufacturer: Siemens Type: 3RA1954-2A	Siemens 3RA1954-2A
3.	12 pcs	Metering current transformer Voltage class: 600 VAC, 10 kV BIL Primary current: 300 Secondary current: 5 A ANSI accuracy class and, 60 Hz burden: 0.3 B0.5 Continuous thermal current rating factor: 2.0 @ 30°C and 1.5 @ 55°C With high (EEI) base Secondary terminal: tin plated brass, compression type with a 0,275 in diameter cross-hole for wiring and a ¼-28 clamp screw. Manufacturer: General Electric Vernova Model: YCW-0C MECL tags: CT1, CT2, CT3	General Electric Vernova 750X132226 <i>Or equivalent</i>

Attachment 3: Motor Control Center New Buckets Preliminary Bill of Material**Att. 3.1-2 BOM of Electrical Equipment**

Item No.	Quantity	Part Description	Manufacturer/Part No.
4.	4	Three-pole thermal overload relay NEMA A200 Thermal type A, Class 20 Auxiliary contact: 1xNC Ambient compensated Full load range: 0,25-26,2 A Manufacturer: Eaton Type: AA13P MECL tag: 49A	Manufacturer: Eaton Type: AA13P
5.	12	OL relay bi-metal heater FLA of motor range for enclosed starter: -compensated: 2,84–3,11 A -non-compensated: 2,64–2,89 A FLA of motor with NEMA size 5 starter: 171-187 A Manufacturer: Eaton Type: FH28 For 49A	Manufacturer: Eaton Type: FH28
6.	4	Three-pole thermal overload relay NEMA A200 Thermal type A, Class 20 Auxiliary contact: 1xNC Ambient non-compensated Full load range: 19-135 A Manufacturer: Eaton Type: AN43P MECL tag: 49B	Manufacturer: Eaton Type: AN43P
7.	12	OL relay bi-metal heater FLA of motor range for enclosed starter: -compensated: 111–122 A -non-compensated: 100–110 A Manufacturer: Eaton Type: FH91 For 49B	Manufacturer: Eaton Type: FH91
8.	20 pcs	Auxiliary control relay Coil voltage 110/120 VAC Frequency range: 50-60 Hz Number of poles: 8 (6x N.O.; 2x N.C.) Terminals type: Screw Vendor: Trentec Manufacturer: Eaton Type: AR880AR MECL tags: 42FX; 42FX1; 42F1X, 42SX; 42SX1	Eaton AR880AR
9.	4 pcs	Auxiliary control relay Coil voltage 110/120 VAC Frequency range: 50-60 Hz Number of poles: 4 (2x N.O.; 2x N.C.) Terminals type: Screw Manufacturer: Eaton Type: AR440AR MECL tags: 3/49A	Eaton AR440AR

Attachment 3: Motor Control Center New Buckets Preliminary Bill of Material

Att. 3.1-3 BOM of Electrical Equipment

Item No.	Quantity	Part Description	Manufacturer/Part No.
10.	4 pcs	Control transformer Primary voltage: 400 VAC; Secondary voltage: 110 VAC Nominal power: 100 VA Manufacturer: Micron Part number: B100RFD34XJ MECL tags: XFR	Micron B100RFD34XJ <i>Or equivalent</i>
11.	24 pcs	FNQ-R Class CC 600Vac time-delay fuse UL/CSA listed Rated current: 3A Max. voltage: 600 Vac RoHS compliant Manufacturer: Eaton Bussman Type: FNQ-R-3 MECL tags: FU1, FU2, FU3, FU4, FU5, FU6	Eaton Bussmann FNQ-R-3 <i>Or equivalent</i>
12.	4 pcs	FNQ-R Class CC 600Vac time-delay fuse UL/CSA listed Rated current: 1A Max. voltage: 600 Vac RoHS compliant Manufacturer: Eaton Bussmann Type: FNQ-R-1 MECL tags: FU7	Eaton Bussmann FNQ-R-1 <i>Or equivalent</i>
13.	12 pcs	Modular ferule fuse block for FNQ-R Class CC 600 Vac time-delay fuse Number of poles: two-pole #10-32 Phil-slot screw Manufacturer: Eaton Bussmann Type BCM603-2S For fuses FU1, FU2, FU3, FU4, FU5, FU6	Eaton Bussmann BCM603-2S <i>Or equivalent for selected fuse</i>
14.	4 pcs	Modular ferule fuse block for FNQ-R Class CC 600 Vac time-delay fuse Number of poles: one-pole #10-32 Phil-slot screw Manufacturer: Eaton Bussmann Type BCM603-1S For fuse FU7	Eaton Bussmann BCM603-1S <i>Or equivalent for selected fuse</i>
15.	8 pcs	Freedom NEMA OL relay reset button kit Manufacturer: Eaton Type RSK-12	Eaton RSK-12
16.	As required	SIS Switchboard wire – Gray/Stranded Insulation: XLPE Voltage: 600 VAC Wire size: 4/0 AWG Manufacturer: Marmon Industrial Energy Infrastructure Type: Firewall SIS Product code: A82-1400 Fast motor speed branch power wiring	Type: A82-1400 <i>Or equivalent</i>

Attachment 3: Motor Control Center New Buckets Preliminary Bill of Material**Att. 3.1-4 BOM of Electrical Equipment**

Item No.	Quantity	Part Description	Manufacturer/Part No.
17.	As required	SIS Switchboard wire – Gray/Stranded Insulation: XLPE Voltage: 600 VAC Wire size: 1/0 AWG Manufacturer: Marmon Industrial Energy Infrastructure Type: Firewall SIS Product code: A82-1100 Slow motor speed branch power wiring	Type: A82-1100 Or equivalent
18.	As required	SIS Switchboard wire – Gray/Stranded Insulation: XLPE Voltage: 600 VAC Wire size: 10 AWG Manufacturer: Marmon Industrial Energy Infrastructure Type: Firewall SIS Product code: A82-0116 Current transformer secondary wiring	Type: A82-0116 Or equivalent
19.	As required	SIS Switchboard wire – Gray/Stranded Insulation: XLPE Voltage: 600 VAC Wire size: 12 AWG Manufacturer: Marmon Industrial Energy Infrastructure Type: Firewall SIS Product code: A82-0126 400 Vac control wiring	Type: A82-0126 Or equivalent
20.	As required	SIS Switchboard wire – Gray/Stranded Insulation: XLPE Voltage: 600 VAC Wire size: 14 AWG Manufacturer: Marmon Industrial Energy Infrastructure Type: Firewall SIS Product code: A82-0146 Control and signal wiring	Type: A82-0146 Or equivalent
21.	84 pcs	Cable compression lug 4/0 AWG One-hole, Standard Barrel UL listed 90°C up to 35 kV Uninsulated copper compression terminal with inspection window Wire size: 4/0 AWG: Stud size: 3/8 in Manufacturer: Burndy Type YA-L For connection field cables on incoming terminals A, B, C and for connection of internal wire to incoming terminals A, B, C and to 42F1 through Cu bar adapter	Manufacturer: Burndy Type YA28L4-BOX Or equivalent

Attachment 3: Motor Control Center New Buckets Preliminary Bill of Material

Att. 3.1-5 BOM of Electrical Equipment

Item No.	Quantity	Part Description	Manufacturer/Part No.
22.	24 pcs	Cable compression lug 4/0 AWG - metric One-hole, Standard Barrel UL listed 90°C up to 35 kV Uninsulated copper compression terminal with inspection window Wire size: 4/0 AWG: Stud size: M10 Manufacturer: Burndy Type YAV-M For connection on 42F	Manufacturer: Burndy Type: YAV120M10 <i>Or equivalent</i>
23.	48 pcs	Cable compression lug 1/0 AWG One-hole, Standard Barrel UL listed 90°C up to 35 kV Uninsulated copper compression terminal with inspection window Wire size: 1/0 AWG Stud size: 3/8 in Manufacturer: Burndy Type YA-L For connection of internal wire on F42S via Cu bar	Manufacturer: Burndy Type: YA25L4-BOX <i>Or equivalent</i>
24.	12 pcs	Cable compression lug 1/0 AWG One-hole, Standard Barrel UL listed 90°C up to 35 kV Uninsulated copper compression terminal with inspection window Wire size: 1/0 AWG: Stud size: 5/16 in Manufacturer: Burndy Type YA-L For connection to OL relay 49B-only one side (Hole size must be verified and aligned with the actual equipment)	Manufacturer: Burndy Type YA25L-BOX <i>Or equivalent</i>
25.	12 pcs	Cable compression lug 12 AWG - metric One-hole, Standard Barrel UL listed 90°C up to 35 kV Uninsulated copper compression terminal with inspection window Wire size: 12 AWG: Stud size: M10 Manufacturer: Burndy Type YAV-M For connection on F42S input for 400 VAC control voltage derived from the mains.	Manufacturer: Burndy Type: YAV06M10 <i>Or equivalent</i>
26.	As required	Ring tongue terminals for 14 -16 AWG wire, with insulation 600 VAC Stud size: #6 Max Insul. Dia. Accom.: 0.15 in Stock Thickness: 0.03 in Code color: Blue Manufacturer: Burndy Type; YAES-K For connection on terminal blocks TB and TBX	Burndy YAES14K7 <i>Or equivalent</i>

Attachment 3: Motor Control Center New Buckets Preliminary Bill of Material

Att. 3.1-6 BOM of Electrical Equipment

Item No.	Quantity	Part Description	Manufacturer/Part No.
27.	As required	Ring tongue terminals for 14 -16 AWG wire, with insulation 600 VAC Stud size: #8 Max. Insul. Dia. Accom.: 0.15 in Stock Thickness: 0.03 in Code color: Blue Manufacturer: Burndy Type; YAES-K For 14 AWG connections to control equipment (Hole size must be verified and aligned with the actual equipment.)	Burndy YAES14K53 <i>Or equivalent</i>
28.	As required	Ring tongue terminals for 14 -16 AWG wire, with insulation 600 VAC Stud size: #10 Max. Insul. Dia. Accom.: 0.15 in Stock Thickness: 0.03 in Code color: Blue Manufacturer: Burndy Type; YAES-K For 14 AWG connections to equipment (Hole size must be verified and aligned with the actual equipment.) FU1, FU3, FU4 – outer side FU2, FU5, FU6, FU7 - both sides	Burndy YAES14K8 <i>Or equivalent</i>
29.	24 pcs	Ring tongue terminals for 10-12 AWG wire, with insulation 600 VAC Stud size: #10 Max. Insul. Dia. Accom.: 0.15 in Stock Thickness: 0.03 in Code color: Blue Manufacturer: Burndy Type; YAES-K For 12 AWG connections: FU1, FU3, FU4 – input side	Burndy YAES10K12 <i>Or equivalent</i>
30.	24 pcs	Ring tongue terminals for 10 AWG and 12 AWG wire, with insulation 600 VAC Stud size: #8 Max Insul. Dia. Accom.: 0.21 in Stock Thickness: 0.04 in Code color: Yellow Manufacturer: Burndy Type; YAES-K 10 AWG connections to OL relay 49A (Hole size must be verified and aligned with the actual equipment.) 12 AWG connection to control XFR	Burndy YAES10K56 <i>Or equivalent</i>
31.	12 pcs	Terminal block Allowed wire size: #10-#22 AWG with listed crimp type ring lug Screw type; #6-32x .2 [6.4] BD HD SCREW Voltage: 600 VAC Number of poles: 18 Manufacturer: Marathon Type: 621 RZ 18	Marathon 621 RZ 18 <i>Or equivalent</i>

Attachment 3: Motor Control Center New Buckets Preliminary Bill of Material**Att. 3.1-7 BOM of Electrical Equipment**

Item No.	Quantity	Part Description	Manufacturer/Part No.
32.	8 pcs	Three pole power terminal block Rated current: 360 A Voltage: 600 VAC connection: -line: one 3/8 x 16 x 1 7/16 stud -load: two 3/8 x 16 x 1 7/16 stud Manufacturer: Marathon Type: 1453573	Manufacturer: Marathon Type: 1453573 <i>Or equivalent</i>
33.	4 pcs	Three pole power terminal block Rated current: 310 A Voltage: 600 VAC connection: -line: one 3/8 x 16 x 1 7/16 stud -load: one 3/8 x 16 x 1 7/16 stud Manufacturer: Marathon Type: 1333563	Manufacturer: Marathon Type: 1333563 <i>Or equivalent</i>
34.	As required	Metallic cable sleeve braid for 14 AWG SIS wire	
35.	As required	Metallic cable sleeve braid for 12 AWG SIS wire	
36.	As required	Metallic cable sleeve braid for 10 AWG SIS wire	
37.	As required	Flat copper busbar size 25x6 mm or equivalent for intendent purpose: - contactor connection adapters. The busbar shall be sized in accordance with current capacity requirements.	
38.	As required	Marker thermal-shrinking sleeve, color: white, inside diameter: various sizes Marker sleeves for wire and cable marking Color: White	Manufacturer: Raychem Corp. or equivalent
39.	As required	Cable Tie, various sizes	

Attachment 3: Motor Control Center New Buckets Preliminary Bill of Material

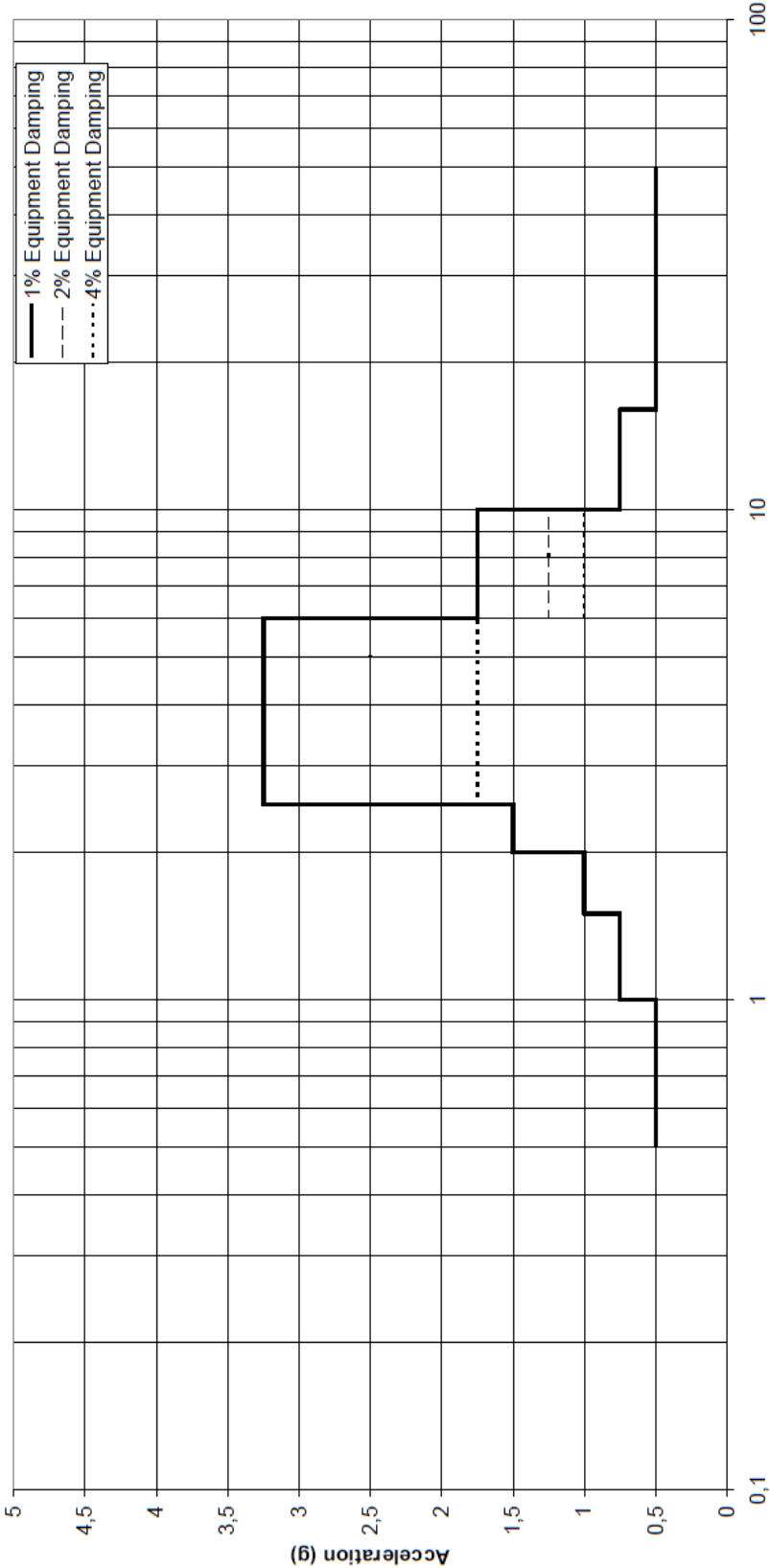
Att. 3.2-1 BOM of Electrical Equipment Spare Parts

Item No.	Quantity	Part Description	Manufacturer/Part No.
1.	5 pcs	Contactora NEMA size 5 <i>Electrical Equipment BoM Item No. 1</i>	Siemens 3RT1066-6AV36-0UA0
2.	6 pcs	Metering current transformer 300:5 A <i>Electrical Equipment BoM Item No. 3</i>	General Electric Vernova 750X132226 <i>Or supplied equivalent</i>
3.	2 pcs	Control transformer 400/110 VAC 100VA <i>Electrical Equipment BoM Item No. 10</i>	Micron B100RFD34XJ <i>Or supplied equivalent</i>
4.	5 pcs	Mechanical interlock <i>Electrical Equipment BoM Item No. 2</i>	Siemens 3RA1954-2A
5.	3 pcs	Terminal block - 18 poles <i>Electrical Equipment BoM Item No. 31</i>	Marathon 621 RZ 18 <i>Or supplied equivalent</i>
6.	3 pcs	Three pole power terminal block connections: - line: one; load: two <i>Electrical Equipment BoM Item No. 32</i>	Marathon 1453573 <i>Or supplied equivalent</i>
7.	3 pcs	Three pole power terminal block connections: - line: one; load: one <i>Electrical Equipment BoM Item No. 33</i>	Marathon 1333563 <i>Or supplied equivalent</i>

Attachment 4: Seismic Response Curves

Att. 4.1-1 CB El. 107.62 Rooms 011 and 012 Floor Response Spectra – Horizontal OBE (Operating Basis Earthquake) – *ref. SP-S702-044687-000 rev. 11*

Krsko NPP
Floor Response Spectra
Control Building EL. 107.62 M
Horizontal OBE



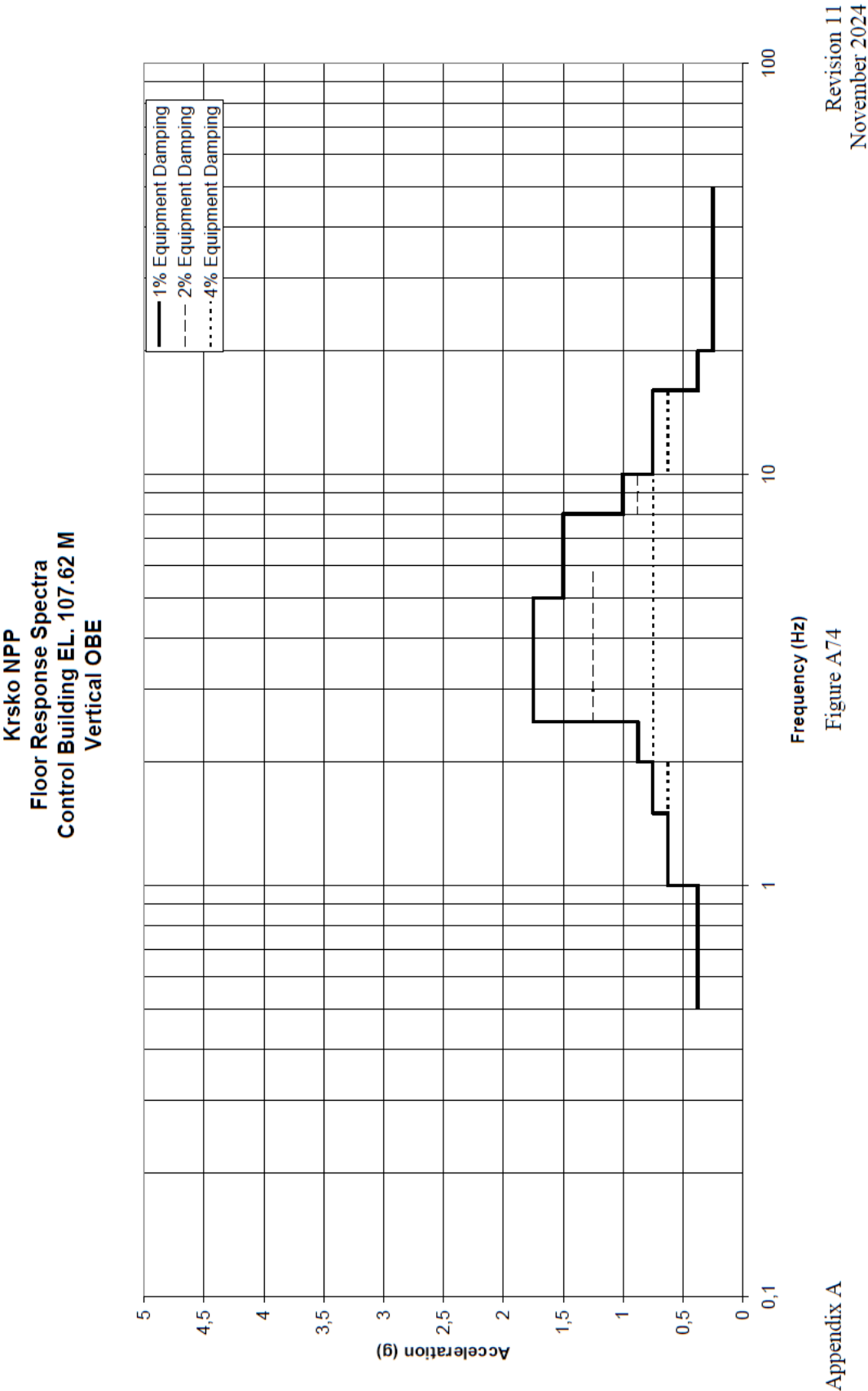
Revision 11
November 2024

Figure A73

Appendix A

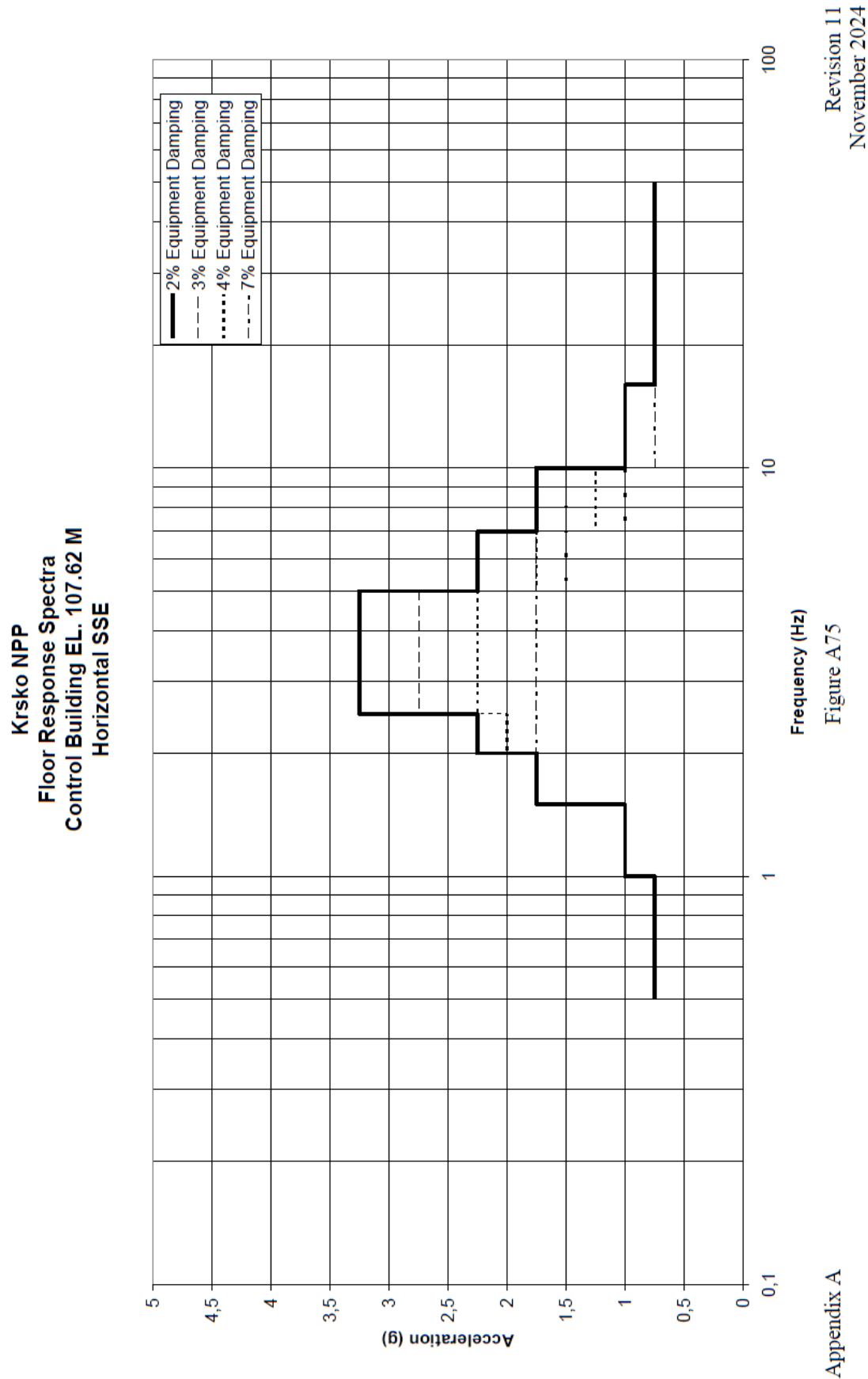
Attachment 4: Seismic Response Curves

Att. 4.2-1 CB El. 107.62 Rooms 011 and 012 Floor Response Spectra – Vertical OBE (Operating Basis Earthquake) – ref. SP-S702-044687-000 rev. 11



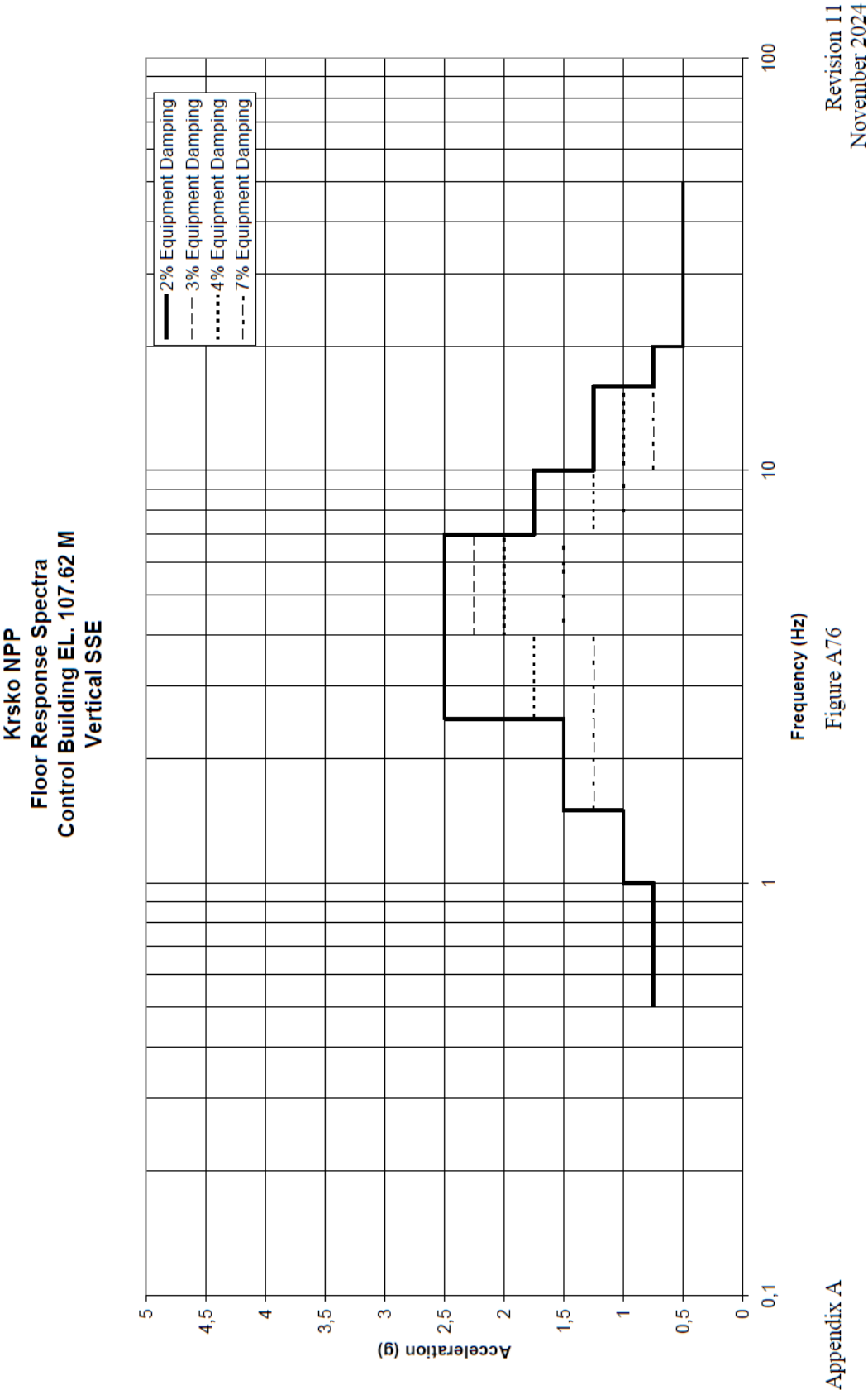
Attachment 4: Seismic Response Curves

Att. 4.3-1 CB EL. 107.62 Rooms 011 and 012 Floor Response Spectra – Horizontal SSE (Safe-Shutdown Earthquake) – ref. SP-S702-044687-000 rev. 11



Attachment 4: Seismic Response Curves

Att. 4.4-1 CB EL. 107.62 Rooms 011 and 012 Floor Response Spectra – Vertical SSE (Safe-Shutdown Earthquake) – ref. SP-S702-044687-000 rev. 11





Nuklearna Elektran: Krško	
MASTER DOCUMENT	
Date Received:	04 - 11 - 2020
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NUCLEAR POWER PLANT KRŠKO

QA SPECIFICATION

GENERIC QUALITY ASSURANCE PROGRAM REQUIREMENTS

QS-610, Rev. 2

Safety Related

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1.0 GENERAL

- 1.1 This specification establishes the requirements for Supplier's QA program that shall apply to all activities affecting the quality of the supplied equipment, materials, or services.
- 1.2 Supplier shall ensure that its Subsuppliers conform to the applicable requirements of this specification.
- 1.3 For Safety Related products and services (SR), Supplier shall ensure compliance with the requirements of Title 10, Code of Federal Regulations, Part 50, Appendix B (10CFR50, Appendix B), "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants", and ANSI/ASME N45.2-1977, "Quality Assurance Program Requirements for Nuclear Facilities" or ASME NQA-1-2008, Addenda 2009/2011, "Quality Assurance Requirements for Nuclear Facility Applications". Additionally, IAEA GSR part 2, 2016 "Leadership and Management for Safety" and all other codes or standards referenced herein and in the purchase order could be applied.
- 1.4 For SR ASME Code Section III components, Supplier shall ensure compliance with the requirements of ASME Code Section III, NCA-4000 "Quality Assurance" and NCA-3800 "Metallic Material Organization's Quality System Program". In addition to ASME Code Section III requirements, Supplier shall ensure compliance with the requirements of 10CFR50 Appendix B and 10CFR Part 21.
- 1.5 The reporting and posting requirements of Title 10, Code of Federal Regulations, Part 21 (10CFR21), "Reporting of Defects and Noncompliance", shall apply for SR products and services.
- 1.6 For Non-Safety Related products and services with Augmented Quality requirements (AQ), Supplier shall ensure compliance with the requirements of international standards as ISO 9001, "Quality management systems – Requirements" or ISO/IEC 17025, "General requirements for the competence of testing and calibration laboratories" or other relevant recognized standards. Compliance with the requirements of international standards shall be certified by accredited organization. Additional QA requirements to the Supplier commercial QA Program shall be specified and selected in accordance with this Quality Specification and scope of supply referenced in the purchase order.
- 1.7 The Purchaser shall have the right of access to enter the premises of the Supplier to witness inspection/test activities or to conduct surveillances or quality assurance audits. This right shall extend to the Subsuppliers and will be coordinated through the Supplier.

2.0 DEFINITIONS

- 2.0 Definitions shall be as stated in ANSI N45.2.10-1973, "Quality Assurance Terms and Definitions" and in other standards referenced herein.



- 2.1 PURCHASER - Utility issuing the purchase order.
- 2.2 SUPPLIER - The person or organization to whom a purchase order from the Purchaser has been issued.
- 2.3 SUBSUPPLIER - The person or organization that furnishes items and services to the Supplier that will be used to complete the Purchaser's purchase order requirements.
- 2.4 ABBREVIATIONS:
- | | |
|----------|---|
| ANSI | American National Standards Institute |
| ASME | American Society of Mechanical Engineers |
| ASNT | American Society for Nondestructive Testing |
| CFR | Code of Federal Regulation, USA |
| ILAC MRA | International Laboratory Accreditation Cooperation Mutual Recognition Arrangement |
| ISO | International Organization for Standardization |
| NEK | Nuclear Power Plant Krško |
| NRC | Nuclear Regulatory Commission, USA |
| QA | Quality Assurance |
| SR | Safety Related |
| USA | United States of America |

3.0 DOCUMENTS FOR SUBMISSION

- 3.1 The Supplier shall submit a full description of its QA program, proposed for the scope of work to be performed, as controlled copy document, for the Purchaser's review and acceptance/approval.
- 3.2 If the Purchaser has already approved the Supplier's QA program, it does not have to be submitted for acceptance/approval. However, if the Purchaser's copy of the QA program is not current, all portions of the program that have been revised since the Purchaser's previous approval shall be submitted for review and acceptance/approval.

4.0 QUALITY ASSURANCE PROGRAM REQUIREMENTS

Supplier shall develop and implement a QA program consistent with the requirements defined herein and in the purchase order. As a minimum, the program shall encompass the following quality assurance criteria.



4.1 Organization

The organizational structure, functional responsibilities, levels of authority and lines of communication for personnel performing activities affecting quality shall be documented in organizational charts and written procedures.

- 4.1.1 Quality Assurance and Quality Control inspection and audit personnel shall have sufficient and well-defined responsibility, authority, and organizational freedom to identify and evaluate quality problems, to require implementation of approved corrective action, and to verify implementation of corrective actions. Such persons or organizations shall report to a management level so that required authority and organizational freedom are provided, including sufficient independence from cost and schedule considerations.
- 4.1.2 Personnel responsible for verifying if Supplier's work conforms to established requirements shall not have direct responsibility for the work being performed.
- 4.1.3 Where more than one organization is involved in the execution of activities, the responsibilities, interfaces, and authority of each organization shall be clearly defined and documented. The external interfaces between organizations and the internal interfaces between organizational units, and changes thereto, shall be documented.

4.2 QA Program

The documented QA program shall be planned, implemented, and maintained to identify the items and services to which it applies and to comply with requirements of the relevant Code and/or Standard (See Attachment A).

- 4.2.1 The program shall provide for planning and accomplishing activities which affect quality under suitably controlled conditions. Controlled conditions include the use of appropriate equipment, suitable environmental conditions for accomplishing the activity, and assurance that prerequisites for the given activity have been satisfied.
- 4.2.2 The program shall provide for any special controls, processes, test equipment, tools, and skills necessary to attain the required quality and provide for verification of quality by inspection and test, as necessary.
- 4.2.3 The program shall provide for indoctrination and training of personnel, who is performing activities affecting quality, to ensure that suitable proficiency is achieved and maintained.
- 4.2.4 The Supplier's management shall regularly review the status and adequacy of the documented QA program.
- 4.2.5 For items which are supplied to the Purchaser as "Commercial Grade," the Supplier's program, as a minimum, shall contain procedures, processes, etc., necessary to ensure the Purchaser that the items being supplied meet



industry standards, purchase order requirements, and performance or technical requirements specified in the Suppliers catalog.

4.3 Design Control

The Supplier's program for controlling design activities shall satisfy the requirements of ANSI N45.2.11-1974, "Quality Assurance Requirements for the Design of Nuclear Power Plants," or requirements of relevant Code and Standard (See Attachment A), and shall include as a minimum, the following:

- 4.3.1 Design activities shall be prescribed and accomplished in accordance with procedures of a type sufficient to ensure that applicable design inputs are correctly translated into specifications, drawings, procedures, or instructions.
- 4.3.2 Interface between organizations performing work, affecting quality of design, shall be identified in writing and shall include those organizations that provide criteria, design, specifications, and technical direction.
- 4.3.3 Applicable design inputs, such as design bases, regulatory requirements, codes and standards, shall be identified, documented, and their selection reviewed and approved. Changes from specified design inputs, including the reasons for the changes, shall be identified, approved, documented, and controlled.
- 4.3.4 Documentation of design/analysis shall be verifiable and include the following:
 - 1. The objective of the analysis,
 - 2. Design inputs and their sources,
 - 3. Results of reference document searches or other applicable background data,
 - 4. Assumptions with indication of those that must be verified as the design proceeds,
 - 5. Computer calculations, including computer type, computer program identification, revision, inputs, evidence of, or reference to computer program verification, and the bases, or reference thereto, supporting the application of the computer program to the specific problem,
 - 6. Independent review and approval.
- 4.3.5 Design verification methods shall be established to provide assurance that the design meets the specified design inputs. Acceptable verification methods include design reviews, alternate calculations, and qualification testing.



- 4.3.6 Design verification shall be performed by individuals or groups other than those who performed the original design. This verification may be performed by the originator's supervisor, if the supervisor is the only individual in the organization competent to perform the verification, and the need is documented and approved in advance by the supervisor's management.
- 4.3.7 Changes to design documents shall be reviewed and approved by the same organizations that performed the original review and approval, unless other organizations are specifically designated. This shall ensure that the impact of the change is carefully considered, required actions documented, and information concerning the change transmitted to the affected persons and organizations.
- 4.3.8 When material substitutions or modifications in the design are made, Supplier shall:
1. Review prior design qualification tests to determine any adverse effect,
 2. Evaluate whether or not new qualification tests are required,
 3. Provide documented justification for not having to perform new qualification tests.
- 4.3.9 The software design process is documented, approved by the responsible design organization, and controlled in accordance with criteria defined in ASME NQA-1, "Quality Assurance Requirements for Nuclear Facility Applications", Part I: Requirement 3, Section 800 – Software Design Control, Part II: Subpart 2.7, or equal standard.
- 4.3.10 To procure and utilize a Commercial Grade items and services for nuclear power plants pursuant to 10CFR21, dedication activities and controls shall be implemented in accordance with ASME NQA-1, "Quality Assurance Requirements for Nuclear Facility Applications", Subpart 2.14 to ensure the item or service is adequate for its intended safety function.

4.4 Procurement Document Control

The Supplier's program for controlling procurement documents of items and services, which are not considered to be Commercial Grade, shall satisfy the requirements of ANSI N45.2.13-1976, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants" or requirements of relevant Code and Standard (See Attachment A), and shall include as a minimum, the following:

- 4.4.1 Applicable design bases, quality assurance requirements, and other requirements necessary to ensure adequate quality shall be included or referenced in documents for procurement of items and services.
- 4.4.2 Procurement documents shall require Subsuppliers to have a QA program consistent with the applicable requirements of this specification.



- 4.4.3. The procurement documents shall provide for access to the Subsupplier's facilities and records for inspection or audit by Supplier's and Purchaser's representatives.
- 4.4.4. Procurement documents shall identify the documentation required to be submitted.
- 4.4.5. Procurement documents shall include the Purchaser's requirements for reporting and approving dispositions of nonconformances.
- 4.4.6. A review of the procurement documents shall be performed to ensure that the documents include appropriate technical and quality requirements.
- 4.4.7. Procurement document changes that affect technical or quality requirements shall be subject to the same degree of control as used in preparing the original document.
- 4.4.8. Procurement documents for Safety-Related equipment or services shall include statement informing Subsuppliers of their responsibility to report any defect of basic component in accordance with 10CFR21 Requirements.
- 4.4.9. Procurement documents shall include the Purchaser's requirements for ordering materials, parts or components from original Subsuppliers/Manufacturers and/or authorized distributors, to prevent supply of counterfeit/fraudulent material, items or components.

4.5 Instructions, Procedures, and Drawings

- 4.5.1 The Supplier shall ensure that all activities affecting quality and services are prescribed by and performed in accordance with documented instructions, procedures, or drawings that include or reference appropriate quantitative or qualitative criteria for determining that prescribed activities have been satisfactorily accomplished.
- 4.5.2 The need for and level of detail in written procedures or instructions shall be determined based upon complexity of the task, the significance of the item or activity, work environment, and worker proficiency and capability (education, training, experience).

4.6 Document Control

The Supplier shall ensure that quality-related documents, including changes, are reviewed for adequacy, approved for release by authorized personnel, and properly distributed to and used at locations where the prescribed activity is performed.

- 4.6.1 Document changes shall be reviewed and approved by the same organization that performed the original review and approval, unless other organizations are specifically designated.



4.6.2 Procedures governing document control shall be established and provide for:

1. The identification of controlled documents,
2. The specified distribution of controlled documents for use at the appropriate location,
3. The identification of individuals responsible for the preparation, review, approval, and distribution of controlled documents,
4. Changes to documents shall be reviewed and approved by the same organizations that performed the original review and approval unless other organizations are specifically designated,
5. The review of controlled documents for adequacy, completeness, and approval prior to distribution,
6. A method to ensure the correct documents are being used.

4.7 Control of Purchased Items and Services

The Supplier's program for controlling purchased items and services shall satisfy the requirements of ANSI N45.2.13-1976, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants" or requirements of relevant Code and Standard (See Attachment A), and shall include as a minimum, the following:

- 4.7.1 The selection of Subsuppliers shall be based on evaluation of their capability to provide items or services in accordance with the requirements of the procurement documents.
- 4.7.2. Methods to be utilized in evaluation of Subsuppliers, and the results therefrom shall be documented and shall include the following:
 1. Evaluating the Subsupplier's history of providing a product which performs satisfactorily in actual use.
 2. Determining the Subsupplier's technical and quality capability by a review of its QA program and a direct evaluation of its facilities and the QA program implementation.
 3. Verifying if Subsupplier possesses an ASME Certificate of Authorization for the items/services, or other relevant Certificate/ Accreditation related to the scope of supply.
- 4.7.3. Procedures shall be established and implemented for verification activities (surveillance, receipt inspection, and audit) as appropriate, to ensure conformance of procured items and services to identified requirements.



- 4.7.4. Where acceptance is based on certifications from Subsuppliers, the Supplier shall validate the certifications via surveillance, audit and/or independent testing.
- 4.7.5 When Commercial Grade items or services are utilized in SR applications, the dedicating entity shall apply requirements in accordance with ASME NQA-1, "Quality Assurance Requirements for Nuclear Facility Applications", Subpart 2.14, "Quality Assurance Requirements for Commercial Grade Items and Services" to ensure the item or service is adequate for its intended safety function. The Supplier shall:
1. Identify the critical characteristics (form, fit, function, material and process) of the commercial grade items and the methods for verifying that these critical characteristics have been met.
 2. Establish and document measures to ensure that any changes (by Subsuppliers) in materials, product, design or manufacturing are identified and evaluated.

4.8 Identification and Control of Items

Supplier shall establish and document measures to identify and control materials, parts and components. These measures shall prevent the use of an incorrect or defective item, and suspicious (including counterfeit/fraudulent) material, parts or components that may not be as ordered. Items for production shall be identified (batch, lot, component, part) from the initial receipt and fabrication of items up to and including installation and use. This identification shall relate an item to an applicable design or other pertinent specifying document.

- 4.8.1 Traceability for these items shall be maintained with records and/or markings. Physical identification shall be used to the maximum extent possible, but if physical identification on the item is impractical or insufficient, physical segregation, procedural control or other appropriate means shall be used. Identification markings shall be applied using materials and methods that provide a clear and legible identification and do not degrade the function or service life of the item. Markings shall be transferred to each part of an item when subdivided and shall not be obliterated or hidden by surface treatment or coating unless other means of identification are substituted.

4.9 Control of Special Processes

Supplier shall establish and document measures to ensure that special processes, including welding, heat treating, cleaning, coating and nondestructive examination, are accomplished under controlled conditions in accordance with applicable codes, standards, specifications, criteria, and other special requirements.

- 4.9.1 Special process personnel, procedures, and equipment shall be qualified and comply with the requirements of applicable codes and standards. For special processes not covered by existing codes or standards, or where item quality requirements exceed the requirements of established codes or standards, the



necessary qualifications of personnel, procedures, or equipment shall be defined.

- 4.9.2 All personnel performing nondestructive examination shall be qualified and certified in accordance with Recommended Practice ASNT SNT-TC-1A "Personnel Qualification and Certification in Nondestructive Testing" or shall be qualified in accordance with requirements of relevant Code and Standard (See Attachment A).
- 4.9.3 Documentation shall be maintained for currently qualified personnel, processes, or equipment in accordance with the requirements of pertinent codes and standards.

4.10 Inspection

The Supplier shall ensure that activities affecting quality are inspected for conformance to the documented instructions, procedures, and drawings used in the accomplishment of the activity.

- 4.10.1 Inspection activities shall be performed by persons other than those who performed the activity being inspected. Such persons shall not report directly to the immediate supervisors who are responsible for the work being inspected.
- 4.10.2 Inspection and test personnel shall be appropriately qualified. The program for qualifying inspection and test personnel shall be in accordance with the requirements of ANSI/ASME N45.2.6-1978, "Qualifications of Inspection, Examination, and Test Personnel for Nuclear Power Plants" or requirements of relevant Code and Standard (See Attachment A), and shall satisfy, as a minimum, the following:
 - 1. Provisions shall be made for the indoctrination of inspection and test personnel as to the technical objectives of the work, the codes and standards that are to be used, and the quality assurance elements that are to be employed.
 - 2. The need for formal training programs shall be determined, and such training activities shall be conducted, as required, to qualify inspection and test personnel.
 - 3. Any special physical characteristics needed in order to perform inspection and test activities shall be identified. Inspection and test personnel requiring these characteristics shall have them verified by examination at intervals which shall not exceed one year.
 - 4. The capabilities of inspection and test personnel shall be initially determined by an evaluation of the individual's education, experience training, test results, or proficiency demonstration.
 - 5. The job performance of inspection and test personnel shall be reevaluated at periodic intervals not to exceed three years. Reevaluation



shall be performed by evidence of continued satisfactory performance or redetermination of capability in accordance with item 4, above.

6. Inspection and test personnel who have not performed inspection/test activities for a period of one year shall be reevaluated in accordance with item 4, above.
 7. Inspection and test personnel shall be certified based on their qualifications. The certification shall be documented in an appropriate form including, as a minimum, the following information:
 - a. Employer's name,
 - b. Identification of the person being certified,
 - c. Activities certified to perform,
 - d. Basis used for certification (one or more of the following):
 - i) Records of education, experience, and training,
 - ii) Test results, where applicable,
 - iii) Results of capability demonstration,
 - e. Results of periodic evaluations,
 - f. Results of physical examinations, when required,
 - g. Signature of employer's designated representative who is responsible for such certification,
 - h. Date of certification and date of certification expiration.
- 4.10.3 Written procedures shall require that inspections are performed according to instructions or checklists that are based on the instructions, procedures, and drawings used in accomplishing the inspected activity. Inspection procedures shall also require documentation of the qualitative or quantitative results of the specific parameters being inspected.
- 4.10.4 Examinations, measurements, or tests of items processed shall be performed for each work operation, where necessary to ensure quality. Where a sample is used to verify acceptability of a batch of items, the sampling procedure shall be based on recognized standard practices and adequately justify the sample size and selection process.
- 4.10.5 If inspection of processed items is impossible or disadvantageous, indirect control by monitoring processing methods, equipment, and personnel shall be provided. Process monitoring shall be performed by qualified personnel or qualified automated means. Both inspection and process monitoring shall be provided when control is inadequate without both.



- 4.10.6 Witness/hold points imposed by the Purchaser shall be indicated in appropriate documents.
- 4.10.7 Final inspection shall include a records review of the process results and resolution of nonconformances identified by prior inspection. Completed items shall be inspected for completeness, marking, calibration, adjustments, protection from damage, or other characteristics as required, to verify the quality and conformance of the item according to specified requirements. The acceptance of the item shall be approved by authorized personnel. Any modifications, repairs, or replacements of items performed subsequent to final inspection shall require reinspection or retest, as appropriate, to verify acceptability.

4.11 Test Control

The Supplier shall establish a test program to identify and document all testing required, demonstrating that the equipment will perform satisfactorily in service. All testing shall be performed in accordance with written test procedures that incorporate all requirements and test limits specified in the design documents.

- 4.11.1 Test procedures shall ensure that prerequisite such as calibrated instrumentation, appropriate equipment, qualified personnel, condition of test equipment and the item to be tested, suitable environmental conditions, and provisions for data acquisition, are met.
- 4.11.2 Test requirements, results, and acceptance criteria shall be documented and evaluated by authorized personnel to ensure that all requirements have been satisfied.
- 4.11.3 Equipment that fails testing shall be dispositioned to ensure appropriate corrective action and retest. If dispositioned as "use as is," adequate justification shall be documented.
- 4.11.4 Test personnel shall be qualified in accordance with the requirements of paragraph 4.10.2 of this specification.
- 4.11.5 Computer program test procedures shall provide for demonstrating the adherence of the computer program to documented requirements.
 - 1. For computer programs used in design activities, computer program test procedures shall provide for assuring that the computer program produces correct results.
 - 2. For computer programs used for operational control, computer program test procedures shall provide for demonstrating required performance over the range of operation of the controlled function or process.
 - 3. The procedures shall also provide for evaluating technical adequacy through comparison of test results from alternative methods such as



hand calculation, calculations using comparable proven programs, or empirical data and information from technical literature.

4. In-use test procedures shall be developed and documented to permit confirmation of acceptable performance of the computer program in the operating system. In-use test procedures shall be performed after the computer program is installed on a different computer, or when there are significant changes in the operating system.
5. Periodic in-use manual or automatic self-check-in-use tests shall be prescribed and performed for those computer programs in which computer program errors, data errors, computer hardware failures, or instrument drift can affect required performance.
6. Test procedures or plans shall specify the following, as applicable:
 - a. Required tests and test sequence,
 - b. Required ranges of input parameters,
 - c. Identification of the stages at which testing is required,
 - d. Criteria for establishing test cases,
 - e. Requirements for testing logic branches,
 - f. Requirements for hardware integration,
 - g. Anticipated output values,
 - h. Acceptance criteria,
 - i. Reports, records, standard formatting, and conventions.
7. Test results shall be documented and maintained. Test results shall be evaluated by the responsible authority to ensure that test requirements have been satisfied.

4.12 Control of Measuring and Test Equipment

The Supplier shall ensure that all tools, gauges, instruments, calibration standards, and other measuring and test equipment used in activities affecting quality are of the proper range, type, and accuracy to verify conformance to established requirements. Measuring and test equipment shall be controlled, calibrated, adjusted, and maintained at prescribed intervals against certified equipment having known valid relationships to nationally recognized standards. If no national standard exists, the basis for calibration shall be documented.

- 4.12.1 Documentation shall be maintained that provides the following information for measuring and test equipment used in activities affecting quality:



1. The identification of the items.
2. As-found calibration data or conditions.
3. As-left calibration data or conditions.
4. A list of the standards used to perform the calibration.
5. A statement or information that standards or equipment are traceable to the National Bureau of Standards or accepted values of natural physical constraints.
6. Calibration requirements that were not met.
7. Signature of the person within the calibrator's organization who is responsible for the quality of the service provided.

4.12.2 Suppliers of external calibration services must be accredited to ISO/IEC 17025 standard by a National Accreditation Body that is a signatory to the ILAC MRA. The service must be provided in accordance with their accredited ISO/IEC 17025 program and scope of accreditation. Subcontracting is prohibited. The customer must be notified of any conditions that adversely impact the laboratory's ability to maintain the scope of accreditation.

4.12.3 When measuring and test equipment is out-of-calibration, the validity of previous inspection or test results and of the acceptability of items previously inspected or tested shall be evaluated and documented.

4.12.4 Inspection, measuring, or test equipment consistently found to be out-of-calibration shall be repaired or replaced.

4.12.5 Records shall be maintained and equipment suitably marked to indicate calibration status.

4.12.6 Measuring and test equipment shall be properly handled and stored to maintain accuracy.

4.12.7 Measuring and test equipment shall be used and calibrated in environments that are controlled to the extent necessary to ensure that the required accuracy and precision are maintained.

4.13 Handling, Storage, and Shipping

The Supplier's program for handling, storage, cleaning, packaging, shipping, and preservation of items shall be controlled to prevent damage or loss and to minimize deterioration. These activities shall satisfy the requirements of ANSI/ASME N45.2.2-1978, "Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants" or requirements of relevant Code and Standard (See Attachment A), and shall include, as a minimum, the following:



- 4.13.1. When required for critical, sensitive, perishable, or high-value items, specific procedures for handling, storage, packaging, shipping, and preservation shall be used.
- 4.13.2. Item shall be stored within a fire resistant, weathertight, and well ventilated building or equivalent enclosure and shall be placed on skids or shoring to permit air circulation.
- 4.13.3 A preventive maintenance program for item in storage shall be maintained.
- 4.13.4 Item shall be suitably packaged to protect against detrimental contamination and physical damage during shipping. Caps and plugs shall be used to seal openings with sensitive internal surfaces and to protect threads and weld end preparations.
- 4.13.4 When required, special equipment (such as containers, shock absorbers, and accelerometers) and special protective environment (such as inert gas atmosphere, specific moisture content levels, and temperature levels) shall be specified and provided and their existence verified.
- 4.13.5 Special handling tools and equipment shall be utilized and controlled where necessary to ensure safe and adequate handling. Special handling tools and equipment shall be inspected and tested in accordance with procedures at specified time intervals or prior to use.
- 4.13.6 Marking or labeling shall be utilized as necessary to adequately maintain and preserve the item, including indication of the presence of special environments or the need for special controls.

4.14 Inspection, Test, and Operating Status

The Supplier shall establish measures to identify the status of inspection and test activities either on the items or in documents traceable to the items. These measures are necessary to ensure that required inspections and tests are performed and to ensure that items that have not passed the required inspections and tests are not inadvertently used.

- 4.14.1 Status shall be maintained through indicators such as physical location and tags, markings, shop travelers, stamps, inspection records, or other suitable means.
- 4.14.2 The authority for application and removal of tags, markings, labels, and stamps shall be specified.

4.15 Control of Nonconforming Items

The Supplier shall ensure that items, services, or activities that do not conform to requirements are identified, documented, evaluated and dispositioned (use-as-is, rework, repair, or reject) in accordance with documented procedures.



- 4.15.1 Written procedures shall define the responsibility and authority of those personnel involved in issuing and dispositioning nonconforming items or conditions.
- 4.15.2 Procedures shall provide for evaluation of nonconforming items or conditions for reportability in accordance with 10CFR21. For Safety Related items and/or services ordered from the USA, Supplier and Subsupplier reporting pursuant to 10CFR21 shall be made to the NRC and NEK. For Safety Related items and/or services supplied from outside the USA, Supplier and Subsupplier shall be subject to the reporting pursuant to 10CFR21 to the NEK, only.
- 4.15.3 Written descriptions of nonconformances dispositioned "use-as-is" or "repair" shall include appropriate technical justification to substantiate the disposition and shall be submitted to the Purchaser for review and acceptance of those changes affecting customer design requirements.
- 4.15.4 Repaired and reworked items shall be reexamined in accordance with applicable procedures and with the original acceptance criteria. Repaired items can be reexamined in accordance with alternate acceptance criteria, if disposition has been approved by the Purchaser.
- 4.15.5 When a nonconforming item has been dispositioned as "reject", controls shall be implemented and adequate records shall be maintained to verify the item has not been used.
- 4.15.6 Nonconforming items shall be segregated, when practical, by placing items in clearly identified and designated hold areas until properly dispositioned. When size, weight, or access limitations preclude segregation, other precautions shall be employed to prevent inadvertent use of the item.
- 4.15.7 Nonconforming items shall not be shipped or installed without the prior written approval of the Purchaser's responsible personnel.

4.16 Corrective Action

The Supplier shall ensure that conditions adverse to quality are promptly identified and corrected.

- 4.16.1 In the case of significant conditions adverse to quality, the cause of the condition shall be determined and corrective action taken to preclude recurrence.
- 4.16.2 The identification of significant conditions adverse to quality, the cause of the conditions, and the corrective action taken shall be documented and reported to appropriate levels of management. Follow-up action shall be taken to verify completion of corrective action.
- 4.16.3 Review of corrective actions shall be performed to determine if they were timely and effectively implemented.



4.17 Quality Assurance Records

The Supplier shall establish procedures to identify the specific records that will be generated and maintained and to prescribe their retention periods and storage requirements.

- 4.17.1 Records shall include drawings, specifications, purchase documents, work orders, material certifications, calculations, inspection and test reports, work procedures, nonconformance and corrective action reports, audit reports, software design verification and computer program testing records, personnel, process, and equipment qualification records.
- 4.17.2 Inspection, test, and work performance monitoring records shall indicate the nature of observations, the acceptable limits of parameters checked, the qualitative or quantitative results, the actions taken in connection with any identified deficiencies, the date of the observation, and the identity of personnel involved.
- 4.17.3 Required records shall be legible, identifiable, and retrievable.
- 4.17.4 A system for controlling and monitoring legibility and accuracy for radiograph reproductions shall be included in the quality assurance program. This system shall include procedures for exposure, scanning, focusing, contrast, resolution, and distinguishing film artifacts.
- 4.17.5 All maintained records shall have clear identification markings that can be traced to a specific job or item and shall be entered into a system that provides for timely retrieval.
- 4.17.6 Records retention periods and storage requirements shall satisfy the requirements of ANSI/ASME N45.2.9-1979, "Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants" or requirements of relevant Code and Standard (See Attachment A), or the Supplier shall, as a minimum, transmit identifiable and reproducible copies of all records as delineated by Purchaser at the time of shipment.

4.18 Audits

The Supplier shall establish a system of audits to ensure compliance with all aspects of the quality assurance program and to determine its effectiveness. Written procedures and controls shall comply with the requirements of ANSI/ASME N45.2.12-1977, "Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants" or requirements of relevant Code and Standard (See Attachment A), and shall include, as a minimum, the following:

- 4.18.1 Audits shall be scheduled at a frequency commensurate with the status and importance of the activity.
- 4.18.2 An audit plan which identifies the audit scope, requirements, audit personnel, activities to be audited, organizations to be notified, applicable



documents scheduled and audit procedures or checklists shall be developed and documented for each audit.

- 4.18.3 Auditors shall not have any direct responsibility for performance of the activities they audit.
- 4.18.4 Audit team shall be identified prior to the beginning of the audit, consisting of one or more auditors, and shall include an individual, who is a qualified Lead Auditor, appointed to lead the team.
- 4.18.5 Audits shall be performed in accordance with written procedures or checklist.
- 4.18.6 Audit results shall be documented by the auditing personnel and shall be reviewed by management responsible for the area audited. Conditions requiring prompt corrective action shall be reported immediately to management of the audited organization.
- 4.18.7 Audit reports shall be signed by the audit team leader and shall include the following information:
 1. Description of the audit scope.
 2. Identification of the auditors.
 3. Identification of persons contacted during audit activities.
 4. Summary of audit results.
 5. A statement on the effectiveness of the program elements which were audited.
 6. Description of each reported adverse audit finding in sufficient detail to enable corrective action to be taken by the audited organization.
- 4.18.8 Follow-up action shall be taken to verify that corrective action is implemented as scheduled.
- 4.18.9 Audit records shall be maintained and shall include audit plans, audit reports, written replies, and the record of completion of corrective action.
- 4.18.10 Lead Auditors shall be qualified in accordance with the requirements of ANSI/ASME N45.2.23-1978, "Qualification of Quality Assurance Program Audit Personnel for the Nuclear Power Plants", or requirements of relevant Code and Standard (See Attachment A), and shall satisfy, as a minimum, the following requirements:
 - I. Lead Auditors shall be trained to the extent necessary to ensure their competence in auditing skills. Training in the following areas shall be given based upon management evaluation of the needs of each Lead Auditor: nuclear-related codes, standards and regulations; general structure of quality assurance programs; auditing techniques of examining, evaluating, and reporting; and audit planning.



2. Initial qualification of Lead Auditors shall be determined according to the individual's education, experience, training, auditing skills, and capabilities.
3. Lead Auditors shall pass an examination which shall evaluate their competence in auditing skills.
4. The proficiency of each Lead Auditor shall be assessed by management on an annual basis. Based on this assessment, management may extend the qualification, require retraining or require requalification.
5. The qualification of Lead Auditors shall be certified in writing in an appropriate form, including the following information:
 - a. Employer's name,
 - b. Lead Auditor's name,
 - c. Date of certification or recertification,
 - d. Basis for qualification (i.e., education, experience, training, examination, etc.),
 - e. Signature of employee's designated representative who is responsible for this certification.
6. Records for each Lead Auditor shall be maintained and updated annually.

Attachment A
QA Program Requirements - Cross Reference Table

QA PROGRAM ELEMENTS	SAFETY RELATED ITEMS NON ASME CODE	SAFETY RELATED ITEMS ASME CODE		AUGMENTED QUALITY ITEMS	
	10CFR50 App. B ASME NQA-1/ANSI N45.2	ASME III NCA-4000	ASME III NCA-3800	ISO 9001*	ISO 17025*
1.0 GENERAL					
1.1; 1.2; 1.7	X	X	X	X	X
1.3	X				
1.4	X	X	X		
1.5	X	X	X		
1.6				X	X
2.0 DEFINITIONS	X	X	X	X	X
3.0 DOCUMENTS FOR SUBMISSION	X	X	X	X	X
4.0 QA PROGRAM REQUIREMENTS					
4.1 Organization	X	X	X	X	X
4.2 QA Program	X	X	X	X	X
4.3 Design Control					
4.3.1 – 4.3.9	X	X	X	X	
4.3.10	X	X	X		
4.4 Procurement					
4.4.1 – 4.4.7; 4.4.9	X	X	X	X	X
4.4.8	X	X	X		
4.5 Instructions, Procedures, and Drawings	X	X	X	X	X
4.6 Document Control	X	X	X	X	X
4.7 Control of Purchased Items and Services					
4.7.1 – 4.7.4	X	X	X	X	X
4.7.5	X	X	X		



Attachment A
QA Program Requirements - Cross Reference Table

QA PROGRAM ELEMENTS	SAFETY RELATED ITEMS NON ASME CODE	SAFETY RELATED ITEMS ASME CODE		AUGMENTED QUALITY ITEMS	
	10CFR50 App. B ASME NQA-1/ANSI N45.2	ASME III NCA-4000	ASME III NCA-3800	ISO 9001*	ISO 17025*
4.8 Identification and Control of Items	X	X	X	X	X
4.9 Control of Special Processes	X	X	X	X	X
4.10 Inspection	X	X	X	X	X
4.11 Test Control	X	X	X	X	X
4.12 Control of Measuring and Test Equipment	X	X	X	X	X
4.13 Handling, Storage, and Shipping	X	X	X	X	X
4.14 Inspection, Test, and Operating Status	X	X	X	X	X
4.15 Control of Nonconforming Items					
4.15.1; 4.15.3 – 4.15.7	X	X	X	X	X
4.15.2	X	X	X		
4.16 Corrective Action	X	X	X	X	X
4.17 Quality Assurance Records	X	X	X	X	X
4.18 Audits	X	X	X	X	X

Note: * Compliance with the requirements of international standards shall be certified by accredited organization.