

Enclosure 19 to ET 07-0022

Requirements Traceability Matrix, Revision 0

MAIN STEAM & FEEDWATER ISOLATION SYSTEM (MSFIS) CONTROLS REPLACEMENT



REQUIREMENTS TRACEABILITY MATRIX

REVISION 0

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1. Requirements Traceability Matrix

1.1 Purpose

The purpose of the Requirements Traceability Matrix (RTM) is to ensure that each requirement of the WCNOC MSFIS Specification, J-105A(Q), has been addressed in the MSFIS design documents and test procedures. The following documents are included in the Traceability Matrix:

1. WCNOC
 - a. ALS MSFIS Specification, J -105A(Q), Rev. 2 (WC*)

2. CS Innovations
 - a. MSFIS System Specification Rev. 0.96 (SR)

3. Nutherm International
 - a. Qualification Plan WCN -9715P Rev. 1 (QP)
 - b. Dedication Plan WC N-9715DP Rev. 0 (DP)
 - c. Baseline Test Procedure TPS -9059 Rev. 1 (BTP)
 - d. Electromagnetic Compatibility Test Procedure 9715 -EMC-01, Rev. 4 (EMC)
 - e. Seismic Test Procedure S -128P Rev. 1 (SP)

* the letters in parentheses denote the prefix used in numbering the requirements on the attached tables.

Each of these documents is imported into "IBM Rational Requisite Pro", a requirements tracking and analysis program. Until such time as the Implementation Phase of the MSFIS life cycle is completed (Installation and Site Acceptance Testing), the RTM is only a snapshot in time of the project. A final version will be issued and archived following the Site Acceptance Test.

Revision 0 of the Traceability Matrix corresponds with Revision 0 of the System Validation and Verification Report, showing traceability from J-105A to the CSI MSFIS System Specification document.

Requirement Type: Feature

- WC1: 1.1 Work Included**
 - SR1: The scope of the MSFIS project is to replace the existing MSFIS controls, with a control system based on the Advanced Logic
 - SR9: The current channel separation scheme applied to the overall plant design will be maintained. The two redundant and...
 - SR10: 2.3[System Inputs/Outputs
 - SR12: 2.3.3[Operator Switch (OPERATE)
 - SR13: 2.3.4.1[Annunciator Output (ALARM)
 - SR14: The ALARM output is a dry-contact with 125VDC applied across the contacts; the current is < 25mA.
 - SR15: Status Outputs - one status output shall be provided for each actuation train for each valve.
 - SR17: 2.3.4.3[SSPS Testing Output (BYPASS)
 - SR20: The existing MSFIS design obeys the plant's separation criteria by use of two separate MSFIS Cabinets, one for each...
 - SR21: Physical separation shall be in accordance with IEEE 384 as modified by Regulatory Guide 1.75.
 - SR23: Wiring separated by barriers shall maintain a 1-inch separation
 - SR24: The system shall provide electrical isolation and physical separation to develop the required independence on the...
 - SR26: Modification is required to the existing MSFIS controls equipment and mechanical structures installed in the cabinet. All CCS
 - SR34: 5.2[Valve-Logic
 - SR35: Figure 26: Valve-Logic FSM (embedded in the valve logic module)
 - SR39: 5.3.1[STATUS Output
 - SR40: 5.3.2[BYPASS Output
 - SR42: The overall requirement for MSFIS rack/cabinet/system response time is < 100ms. MSFIS response time is defined from...
- WC1.1: Replacement of the existing MSFIS system components in the form of circuit cards. The existing system includes input...**
 - SR4: The replacement system will replace the existing hardware in both MSFIS cabinets, SA075A and SA075B. After...
 - SR5: The replacement project will implement new digital control systems, new power supplies, new assembly panels and new...
- WC1.2: Appropriate test capability for the replacement system. The existing system's Manual Test Panel may be re-**
 - SR8: The replacement project will not re-use existing electronic boards, sub-racks, interconnecting wiring/cables, fuse blocks,...
- WC1.3: Provide an output dry contact or equivalent in each MSFIS Cabinet for a new summary trouble alarm.**
 - SR13: 2.3.4.1[Annunciator Output (ALARM)
 - SR41: 5.4[Alarm-Logic
- WC1.4: Replacement of the existing system power supply modules with redundant hot-swappable power supply**
 - SR29: ALS boards are hot-swappable and slide into the powered rack
- WC1.5: Mounting hardware and wiring devices as necessary to mount the replacement components and interconnect them to each..**
 - SR4: The replacement system will replace the existing hardware in both MSFIS cabinets, SA075A and SA075B. After...
 - SR5: The replacement project will implement new digital control systems, new power supplies, new assembly panels and new...
- WC1.6: Required new portable test equipment.**
- WC1.7: Initial stock of repair parts for twenty years' use.**
- WC2: Buyer acknowledges that the nature of a replacement system intended for installation in existing cabinets in the Buyer's plant is...**
 - SR6: The replacement project will retain without modifications, the existing cabinets including mechanical structures used to mount...
 - WC2.1: Thus, the items are packed and shipped individually or in groups and require individual installation into the Buyer's cabinets...
 - WC2.2: Buyer acknowledges that some of the items specified may be delivered ready for use in the form of "One lot - mounting..."
- WC3: The MSFIS provides 125 Volt DC outputs to energize or de-energize control solenoids to operate and test the plant MSIVs and...**
 - SR18: To energize the coil the MSFIS must apply 125VDC across the two terminals.
- WC4: The MSFIS is divided into two actuation channels. Each of the two independent actuation channels monitors system inputs and,...**
 - SR19: The MSFIS is divided into two actuation channels - Train A and B. Each of the two independent actuation channels monitors...
- WC5: The MSFIS System is comprised of solid-state components.**
 - SR25: The ALS system utilizes
- WC6: The Replacement MSFIS System shall not involve software such as an application program for a digital computer in the...**
 - SR25: The ALS system utilizes
 - WC6.1: However, software is permitted in portable test equipment which is completely disconnected from the Replacement MSFIS...
- WC7: The Controls Seller shall configure the MSFIS control logic matrices to develop output states and**
 - SR30: 4.3[ALS Boards Configuration for MSFIS
- WC8: 5.2.2 Modular Design**
 - SR30: 4.3[ALS Boards Configuration for MSFIS
 - WC8.1: Items designed to be removable from the equipment, such as assemblies, subassemblies, electrical parts,
 - WC8.2: Hot swap capability shall be included for the logic-**
 - SR29: ALS boards are hot-swappable and slide into the powered rack
 - WC8.2.1: Hot swap capability includes the requirement that the controlled**

Requirement Type: Feature

- ↳ SR12: 2.3.3 Operator Switch (OPERATE)
 - [-] ▾ WC17.5.3: BYPASS Mode Initiation
 - ↳ SR12: 2.3.3 Operator Switch (OPERATE)
 - [-] ▾ WC17.5.4: Return to OPERATE Mode
 - ↳ SR12: 2.3.3 Operator Switch (OPERATE)
- [-] ▾ WC17.6: b. Testing of Replacement MSFIS System
 - ↳ SR3: The intelligence
 - [-] ▾ WC17.6.1: 1) Controls Seller may modify or replace the existing Manual Test Panel as necessary to
 - ↳ SR8: The replacement project will not re-use existing electronic boards, sub-racks, interconnecting wiring/cables, fuse...
 - ↳ SR26: Modification is required to the existing MSFIS controls equipment and mechanical structures installed in the cabinet...
 - ▾ WC17.6.2: 2) Provisions for testing of the Replacement MSFIS may include portable test equipment and capability to...
- [-] ▾ WC18: Controls Seller shall provide three test types or detection capabilities to verify the proper operation of the Replacement MSFIS...
 - ▾ WC18.1: Manual System Test:
 - [-] ▾ WC18.2: Manually Initiated Automatic Test:
 - ↳ SR17: 2.3.4.3 ISSPS Testing Output (BYPASS)
 - [-] ▾ WC18.3: Automatic Exception Detection:
 - ↳ SR3: The intelligence
- [-] ▾ WC19: The MSFIS test circuits shall provide one contact set for each actuation train for each valve.
 - ↳ SR17: 2.3.4.3 ISSPS Testing Output (BYPASS)
 - [-] ▾ WC19.1: The contacts shall
 - ↳ SR17: 2.3.4.3 ISSPS Testing Output (BYPASS)
 - [-] ▾ WC19.2: These contacts will
 - ↳ SR17: 2.3.4.3 ISSPS Testing Output (BYPASS)
- [-] ▾ WC20: The actuation train for a particular side of a particular valve shall enter BYPASS mode upon command.
 - ↳ SR40: 5.3.2 BYPASS Output
 - ▾ WC20.1: There shall be one exception to this, which is the situation where the output state is CLOSE and the 60 sec delay is active,.
- [-] ▾ WC21: An indicating light / LED shall be provided for each actuation train for each valve.
 - ↳ SR45: 13.4 ALS-401-1: Solid-state Output Board
 - [-] ▾ WC21.1: This light/ LED shall be "ON" whenever BYPASS mode is in effect.
 - ↳ SR45: 13.4 ALS-401-1: Solid-state Output Board
- [-] ▾ WC22: Upon initiation of BYPASS mode for a particular actuation train for a particular valve, the following must be accomplished:
 - ↳ SR38: A valve is placed in BYPASS mode using the OPERATE-switch on the ALS-201 service board, by toggling the switch from
 - [-] ▾ WC22.1: a) Latch the actuation outputs to the as found state.
 - ↳ SR38: A valve is placed in BYPASS mode using the OPERATE-switch on the ALS-201 service board, by toggling the switch...
 - [-] ▾ WC22.2: b) De-energize the status output.
 - ↳ SR38: A valve is placed in BYPASS mode using the OPERATE-switch on the ALS-201 service board, by toggling the switch...
 - [-] ▾ WC22.3: c) Light the BYPASS mode indicator light / LED
 - ↳ SR38: A valve is placed in BYPASS mode using the OPERATE-switch on the ALS-201 service board, by toggling the switch...
 - [-] ▾ WC22.4: d) Close the test contacts described in Section 5.2.6 to enable the test circuits in ESFAS.
 - ↳ SR38: A valve is placed in BYPASS mode using the OPERATE-switch on the ALS-201 service board, by toggling the switch...
 - [-] ▾ WC22.5: To prevent accidental valve operation, "a" must occur prior to "d."
 - ↳ SR38: A valve is placed in BYPASS mode using the OPERATE-switch on the ALS-201 service board, by toggling the switch...
- [-] ▾ WC23: Upon return to OPERATE mode, the following must be accomplished:
 - ▾ WC23.1: a) Open the test contacts (see Section 5.2.6).
 - ▾ WC23.2: b) Unlatch the actuation outputs, extinguish the BYPASS mode indicating light/LED,
- [-] ▾ WC24: b. Replacement MSFIS System Configuration
 - [-] ▾ WC24.1: The replacement MSFIS System shall be an advanced-hardware-based solid-state control system which will receive...
 - [-] ▾ WC24.2: The Replacement MSFIS System shall include the overall electronic functions of input buffers, system logic, and then...
 - [-] ▾ WC24.3: However, the Controls Seller shall configure the system, logic elements, circuit cards, and interconnections to perform the..
 - [-] ▾ WC24.4: Controls Seller may choose to re-use the existing card racks and interconnecting wiring to any extent
 - ↳ SR6: The replacement project will retain without modifications, the existing cabinets including mechanical structures used to...
 - ↳ SR8: The replacement project will not re-use existing electronic boards, sub-racks, interconnecting wiring/cables, fuse blocks,...
 - [-] ▾ WC24.5: In each Cabinet, Controls Seller shall place the operating logic for the four MSIVs on a separate
 - ↳ SR9: The current channel separation scheme applied to the overall plant design will be maintained. The two redundant and...
- [-] ▾ WC25: 5.4 Environmental Requirements

Requirement Type: Feature

- WC25.1: The MSFIS cabinets are located in the Control Room equipment cabinet area, which will normally be air conditioned;...
- WC26: 5.5 Structural Requirements
 - WC26.1: Channel identification is required throughout the system.
 - WC26.1.1: Engraved lamicoid nameplates shall be used to identify all cabinets, channels, and devices.
 - WC26.1.2: Colors for the nameplates shall be white letters on a red background in Channel I / Cabinet SA075A and black letters.
 - WC26.1.3: Nameplates for non-safety-related Groups 5 and 6 items
 - WC26.2: Cabinets have been designed to permit both top and bottom cable entry.
- WC27: 5.5.2 Seismic Requirements
- WC28: 5.6 Electrical Requirements
 - WC28.1: 5.6.1 Noise Rejection and Tolerance
 - EMC1: Nutherm EMC Test Procedure**
 - WC28.2: 5.6.2 Electrical Wiring
 - SR43: 6.6 Assembly Panel wiring
 - WC28.2.1: Wiring within the cabinet enclosure shall be suitable for a general-purpose, non-hazardous location.
 - SR43: 6.6 Assembly Panel wiring
 - WC28.2.2: Wiring shall be so arranged that instruments or devices may be removed and / or serviced without undue...
 - SR43: 6.6 Assembly Panel wiring
 - WC28.2.3: No wiring shall be routed across the face or rear of an instrument, junction box, or other device in a manner that will...
 - SR43: 6.6 Assembly Panel wiring
 - WC28.2.4: All wiring to field terminal blocks, except coaxial and triaxial, shall be made with solder-less ring-
 - SR43: 6.6 Assembly Panel wiring
 - WC28.2.5: Where wiring must cross sharp metal edges, protection in the form of grommets or similar devices
 - SR43: 6.6 Assembly Panel wiring
 - WC28.2.6: Wires shall be grouped in bundles and secured with nonflammable, nonmetallic tie bands.
 - SR43: 6.6 Assembly Panel wiring
 - WC28.2.7: Wiring shall not cross a panel door opening or be fixed to a panel door.
 - SR43: 6.6 Assembly Panel wiring
 - WC28.2.8: Internal wiring shall be identified with the Controls Seller's wire number at each termination to field
 - SR43: 6.6 Assembly Panel wiring
 - WC28.2.9: All wiring shall be subject to Buyer's approval.
 - SR43: 6.6 Assembly Panel wiring
 - WC29: The wiring shall be capable of meeting all requirements of IEEE 383 as modified by Regulatory Guide
 - SR43: 6.6 Assembly Panel wiring
 - WC30: Wiring shall be installed as shown on the Controls Seller's wiring diagrams.
 - SR43: 6.6 Assembly Panel wiring
 - WC30.1: During installation,
 - WC30.2: Any wire that is disconnected as a result of rework shall be completely
 - WC31: 5.6.3 Power Supply
 - WC31.1: a. Sources
 - WC31.1.1: The incoming voltage level on all power supply modules will be a nominal 125 Volts DC, normally operated at 135...
 - WC31.2: b. Replacement Power Supply Modules
 - SR46: 13.10 ALS-905: Power Supply Unit Board
 - WC31.2.1: For the Replacement MSFIS System, the Controls Seller shall provide
 - WC31.2.2: The replacement power supplies shall have an input voltage operating range of 105VDC - 140VDC.
 - WC31.2.3: The Controls Seller shall also determine whether any separate supplies are required at a given voltage level to...
 - WC31.2.4: The existing 125 Volt DC System has the capability to deliver a short circuit current of 11,070
 - WC31.2.5: Each voltage level in each cabinet shall have a pair of redundant and parallel power supply modules
 - SR46.1: The PSUs are the boards in slot # 9 and #10 when facing the ALS Rack. There are two identical boards for...
 - WC31.2.6: Each pair of redundant power supply modules shall have provision for hot replacement "swapping" of one module...
 - WC31.2.7: Hot replacement by front-pull-out is preferred, but other configurations
 - SR29: ALS boards are hot-swappable and slide into the powered rack
 - WC31.2.8: Controls Seller may choose to modify or totally replace the existing power supply
 - SR26: Modification is required to the existing MSFIS controls equipment and mechanical structures installed in the cabinet...
 - WC31.2.9: Each replacement power supply module shall have sufficient capacity to supply all assigned loads with
 - WC31.2.10: The system shall have the capability ("health") to detect loss of each power supply module's capability to assume...

Requirement Type: Feature

- WC31.2.11: Loss of any power supply module's capability ("health") shall be one
- WC31.2.12: Each pair of redundant power supply modules shall have provision for load sharing whenever both are in service...
- WC31.3: c. Outputs
- WC31.4: d. Operation
 - WC31.4.1: The MSFIS shall operate as required with the stated power supply without producing spurious actuation or failure to...
- WC32: 5.6.4 Interconnections
 - WC32.1: Controls Seller shall provide wiring harnesses as required to interconnect all equipment provided.
 - WC32.2: Controls
 - SR26: Modification is required to the existing MSFIS controls equipment and mechanical structures installed in the cabinet. All...
 - WC32.3: Wrap-type terminals are not permitted
 - WC32.4: If Controls Seller
- WC33: 5.6.7 Trouble Alarm
 - SR13: 2.3.4.1 Annunciator Output (ALARM)
 - WC33.1: Controls Seller shall develop a summary trouble alarm in each system cabinet.
 - SR13: 2.3.4.1 Annunciator Output (ALARM)
 - WC33.2: The alarm shall
 - SR14: The ALARM output is a dry-contact with 125VDC applied across the contacts; the current is < 25mA.
 - WC33.3: The alarm shall be wired to spare points on an existing terminal block in each cabinet.
 - WC33.4: The following items are suggested as a minimum list of conditions which should be alarmed:
 - WC33.4.1: Any DC power supply module loss of capability
 - WC33.4.2: Any circuit card removed
 - WC33.4.3: Any external test apparatus is connected to the system
 - WC33.4.4: Any output sequence incomplete
 - WC33.5: The trouble alarm logic shall include a means to indicate which trouble condition caused the alarm.
 - WC33.6: The trouble alarm shall include the equivalent of a "reflash" feature. When the alarm logic is already indicating an alarm to...
 - SR41: 5.4 Alarm-Logic
- WC34: The indication shall be displayed at the MSFIS Cabinet.
 - SR41: 5.4 Alarm-Logic
- WC35: 5.6.8 Fuses and Fuse Blocks
 - WC35.1: Distribution of 125 Volt DC power to the output solenoid valves is shown in Appendix B. The
 - WC35.2: The scope of work
- WC36: 5.6.9 EMI / RFI Requirements
 - WC36.1: The Replacement MSFIS System shall comply with the EMI / RFI requirements of EPRI TR-102323
 - WC36.2: The Controls Seller's
- WC37: 5.9 Redundancy, Separation, and Diversity
 - SR20: The existing MSFIS design obeys the plant's separation criteria by use of two separate MSFIS Cabinets, one for each...
 - SR21: Physical separation shall be in accordance with IEEE 384 as modified by Regulatory Guide 1.75.
 - SR23: Wiring separated by barriers shall maintain a 1-inch separation
 - WC37.1: 5.9.1 Independence
 - SR20: The existing MSFIS design obeys the plant's separation criteria by use of two separate MSFIS Cabinets, one for each...
 - SR21: Physical separation shall be in accordance with IEEE 384 as modified by Regulatory Guide 1.75.
 - SR23: Wiring separated by barriers shall maintain a 1-inch separation
 - WC37.1.1: Separation Groups (trains) are to be electrically and physically isolated from each other so that events (including
 - SR2: The primary concept behind ALS is to provide a high integrity safety actuation system to ensure the plant system's...
 - WC37.1.2: The Controls Seller shall provide electrical isolation and physical separation to develop the required
 - SR20: The existing MSFIS design obeys the plant's separation criteria by use of two separate MSFIS Cabinets, one for...
 - WC37.2: 5.9.3 Separation
 - SR20: The existing MSFIS design obeys the plant's separation criteria by use of two separate MSFIS Cabinets, one for each...
 - SR21: Physical separation shall be in accordance with IEEE 384 as modified by Regulatory Guide 1.75.
 - SR23: Wiring separated by barriers shall maintain a 1-inch separation
 - WC37.2.1: Physical separation shall be in accordance with IEEE 384 as modified by Regulatory Guide 1.75.
 - SR21: Physical separation shall be in accordance with IEEE 384 as modified by Regulatory Guide 1.75.
 - WC37.2.2: Equipment for one actuation channel or one measurement channel shall be separated physically by a barrier from...
 - WC37.2.3: The wiring and terminal block arrangement within a given cabinet or isolated compartment shall allow for a minimum...
 - WC37.2.4: Wiring separated by barriers shall maintain a 1-inch separation (or an equivalent of thermal insulation) between the...

Requirement Type: Feature

- SR21: Physical separation shall be in accordance with IEEE 384 as modified by Regulatory Guide 1.75.
- SR23: Wiring separated by barriers shall maintain a 1-inch separation
- WC37.2.5: Wiring of any separation group shall be separated from any other group except as permitted by IEEE Standard 384...
- WC38: 6.0 SPARE PARTS AND SPECIAL TOOLS
 - WC38.1: 6.1 Spare Parts
 - WC38.1.1: 6.1.1 Special Spare Parts
 - WC38.1.1.1: a. Per Section 1.1 item 9, the initial stock of spare parts included in the basic scope shall be the quantity
 - WC38.1.1.2: b. Controls Seller shall maintain the documentation, tooling, personnel expertise, access to materials, and
 - WC38.1.1.3: Parts shall be provided as Commercial Grade items.
 - WC38.1.1.4: Controls Seller shall maintain this capability for the foreseeable future.
 - WC38.1.2: 6.1.2 List
 - WC38.2: 6.2 Special Tools
 - WC38.2.1: 6.2.1 Test Regime
 - WC38.2.1.1: Controls Seller shall develop a portable test regime for use during production and prototype testing
 - WC38.2.1.2: After
 - WC38.2.1.3: The test regime shall have the capability to test the complete Replacement MSFIS System from input to final...
 - WC38.2.1.4: This test regime is intended to perform complete system functional testing or individual card by card testing
 - WC38.2.1.5: The test regime will be used for performing the Site Acceptance Test (SAT) of the MSFIS control system
 - WC38.2.2: 6.2.2 Other Special Tools
 - WC38.2.2.1: Controls Seller shall provide to Buyer one set of any special tools required for maintenance or testing of the
 - WC38.2.2.2: Special tools are defined as tools not commonly available to the trade, involving non-standard dimensions,...
 - WC38.2.2.3: The special tools also include electrical test equipment involving non- standard ranges of parameters or...
 - WC38.2.2.4: The special tool scope also includes submittal of test or calibration procedures or set-point documents, if...
- WC39: 7.0 STAMPING REQUIREMENTS
 - WC39.1: All engineering documents developed specifically for this project shall be stamped by a Kansas Professional Engineer.
- WC40: 9.0 INSTALLATION
 - WC40.1: Installation will be performed by the Buyer. However, Controls Seller shall provide documentation of an appropriate
- WC41: 10.0 TESTING
 - WC41.1: For the Replacement MSFIS System, the Qualification Seller shall meet the requirements for all testing, inspection,
 - WC41.2: Prior to shipment, the assembled and wired equipment shall be tested at the factory in the presence of the Buyer.
 - WC41.3: 10.1 Seismic
 - WC41.4: 10.2 System Reliability Analysis
 - WC41.4.1: 10.2.1 The Buyer or Buyer's consultant will perform failure-mode-and-effects analysis and reliability predictions.
 - WC41.4.2: The final report of analysis-and-reliability data will be in accordance with IEEE 352.
 - WC41.4.3: The failure-mode-and-effects analysis will be presented in tabular form and shall list the following for each
 - WC41.4.3.1: a. Descriptive name of each element
 - WC41.4.3.2: b. A concise statement of the function performed by the element
 - WC41.4.3.3: c. A statement of the possible failure modes such as open, short circuit, high voltage, or burnout applicable for...
 - WC41.4.3.4: d. The failure mechanism(s) for each failure mode
 - WC41.4.3.5: e. The effect of each postulated failure on the system performance
 - WC41.4.3.6: f. Method of detection for component failure
 - WC41.4.4: 10.2.2 Components and modules used in the manufacture of the actuation system shall exhibit a quality consistent...
 - WC41.4.5: 10.2.3 Scope of the analysis shall be limited to the elements of the MSFIS required to perform the safety-related...
 - WC41.4.6: 10.2.4 The basis for module reliability estimates shall follow the method described in MIL-HDBK-217B, December
 - WC41.4.7: 10.2.5 The Buyer will incorporate into an MSFIS reliability analysis the module reliability prediction values
 - WC41.4.8: 10.2.6 The Buyer will assume that the time from the detection of a failure to normal after repair is eight hours, and
 - WC41.4.9: 10.2.7 For the purposes of this analysis, the Buyer will use a MTBF value of five years for each channel of DC
 - WC41.4.10: 10.2.8 The Buyer will provide a reliability analysis defining the system unreliability, assuming one system
 - WC41.4.11: 10.2.9 The Buyer will also supply a failure effects analysis arranged according to type of failure or effect and shall
 - WC41.4.12: 10.2.10 The Controls Seller shall not substitute any alternate or equivalent components in the system that would
 - WC41.4.12.1: If a change or modification must be made, for any reason, the Controls Seller shall
 - WC41.4.12.2: A revised copy of the respective report, incorporating the revised analysis, must then be completed prior to...
 - WC41.5: 10.3 Components
 - WC41.5.1: 10.3.1 Replacement MSFIS System components shall be tested in accordance with the Controls Seller's and
 - WC41.5.2: 10.3.2 All Controls Seller wiring outside of the card rack shall be given a dielectric test in accordance with NEMA

Requirement Type: Feature

- WC41.5.3: The dielectric testing shall be performed by the Qualification Seller.
- WC41.5.4: 10.3.3 Wiring tests shall include point-to-point continuity tests.
- WC41.5.5: 10.3.4 The Controls Seller shall be responsible for proper preparation of instruments and devices that may be
- WC41.6: 10.4 Actuation (Manual)
 - WC41.6.1: 10.4.1 The Qualification Seller shall submit, for Buyer's approval, the proposed factory acceptance test procedures
 - WC41.6.2: The procedures shall be approved by Buyer prior to the completion of system fabrication and assembly.
 - WC41.6.3: 10.4.2 The MSFIS equipment shall undergo a complete functional test that shall prove the correct performance...
 - WC41.6.4: Tests shall be initiated in manual mode, applying simulated signals at the input terminals.
 - WC41.6.5: 10.4.3 The MSFIS equipment shall be tested at the input terminals by applying all possible trip combinations as
 - WC41.6.6: 10.4.4 Each actuation interface shall be individually tested through manual inputs and through the relative actuation...
- WC41.7: 10.5 Actuation (Automatic)
 - WC41.7.1: 10.5.1 After successfully performing the tests in manual mode, the MSFIS equipment shall be tested in the...
 - WC41.7.2: 10.5.2 The duration of the test in the automatic mode shall be determined by the Qualification Seller but shall not be
 - WC41.7.3: 10.5.3 Combinations of trip signals shall be supplied at the input terminals during the automatic mode to test the
- WC41.8: 10.6 Environmental Qualification
 - WC41.8.1: The environment at the equipment location is considered MILD with respect to the Equipment Qualification (EQ)
- WC41.9: 10.7 EMI / RFI Testing
 - WC41.9.1: Testing shall be conducted to demonstrate compliance with the EMI / RFI requirements of EPRI TR-102323 as...
- WC42: 11.0 INSPECTION
- WC43: 12.0 HANDLING, SHIPPING, AND STORAGE
 - WC43.1: 12.1.1 The equipment shall not be prepared for shipment or shipped before the Buyer has either inspected the equipment...
 - WC43.2: 12.1.2 Handling, shipping, and storage procedures shall be in accordance with ANSI N45.2.2, Level B.
- WC44: 13.0 DOCUMENTATION REQUIREMENTS
 - WC44.1: 13.1 Drawings - Outline
 - WC44.2: 13.2 Assembly, Erection, and Installation
 - WC44.3: 13.3 Wiring Diagrams
 - WC44.4: 13.4 Logic Diagrams
 - WC44.5: 13.5 Instruction Manuals
 - WC44.6: 13.6 Seismic Data Report and Test Procedures
 - WC44.7: 13.7 Engineering Performance Test Procedures and Quality Verification Reports
 - WC44.8: 3.8 Schedule
 - WC44.9: 13.9 Inspection Requirements
 - WC44.10: Repair Parts List
- WC45: Appendix A - Input Signals and Sources
 - SR10: 2.3 System Inputs/Outputs
- WC46: Appendix C - Modified Power Supply Fuses and Functions Assigned
- WC47: Appendix R - Buyer's Inspection Procedures
- WC48: IEEE Standard 379-2000, Application of the Single Failure Criterion to Nuclear Power Generating Station
 - SR27: The primary concept behind ALS is to provide a high integrity safety actuation system to ensure the plant system's safety...