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| Technical Requirements for Electrical Equipment Rubrik / Title Network components | Beteckning / Document TBE 107 |
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1 Introduction

These Technical Requirements state the requirements imposed on network components intended for application in nuclear power plants. The technical requirements include only requirements for technical systems. Administrative computer systems are not covered by these requirements. The Supplier/Manufacturer shall comply with these requirements in order to attain the safety and reliability objectives of the Swedish nuclear power plant owners.

The purpose of this document is to set out general requirements on network components. Overall requirements on network components as well as other instructions for the Supplier/Manufacturer are stated in other requirements in accordance with the Technical Specification. In addition to the requirements stated in this document, applicable requirements in TBE 100:1, General Technical Requirements and Explanations, apply.

In function purchasing/package deliveries, the Supplier/Manufacturer shall impose requirements on the remaining network components, so that they, together with the network components defined in this TBE section 3, comply with the functional requirements imposed on the entire delivery. Information on reliability shall also be stated for these components.

2 Definitions

MTBF: Mean Time Between Failure

MTTR: Mean Time To Repair

3 Scope

The concept of network components is limited in this TBE as follows:

- Firewall
- Gateway
- Hub
- Modem
- Router
- Switch
- Bridge

4 Product requirements

4.1 Standardisation

In the Quotation, the Supplier/Manufacturer shall state how the requirements and applicable product standards are met.

Communication protocols applied shall be described with reference to what standard they comply with.

The Supplier/Manufacturer shall show that the production method applied have been performed in accordance with a documented and reviewable development process.

The equipment shall meet EU directives in force and be CE marked.

4.2 Hardware Requirements

Input and output circuits

Input and output circuits shall not be damaged in the event of short-circuits or discontinuity in cable in connected equipment.

Signal transmission/Communication

USB communication is only permitted for communication with peripheral units.

Cooling

The components shall at normal use (indoor temperature 20-40 degrees Celsius) not require additional cooling. Humidity, 40-60 % relative humidity.

Switches

Switches shall be firmly installed and have distinct switch positions.

Indication units

Sources of light for indication units shall preferably be of the light-emitting diode type. Interruption or short-circuit in an indication unit shall not affect the function of connected devices. Each indication unit shall be marked in a clear-cut manner regarding its function.

4.3 Software requirements

Check of software versions

It shall be possible to identify the current version of the software in the equipment by use of a superior system or other equipment.

Other requirements

The Supplier/Manufacturer shall for a minimum of ten years be able to offer service and customer support on supplied components, or that they may be replaced with compatible products.

4.4 Common equipment requirements (hardware and software)

Protocols

Communication protocols shall be stated by the Purchaser in a technical specification.

Upgrade of equipment

When upgraded equipment is offered, the changes made between the software versions shall be specified.

Reliability

The Supplier/Manufacturer shall state the reliability of the equipment. Information on MTBF and MTTR figures shall be specified. The Supplier/Manufacturer shall upon request from the Purchaser submit references on previously supplied equipment of equivalent size or complexity.

Monitoring of network components

Monitoring shall be included on the following components:

- switch
- router
- firewall

The tool/tools (often Web-based) shall be able to supervise different configurations and monitoring of the equipment, gather statistics etc.

See also TBE 100:2.

Security aspects (data communication)

The Supplier/Manufacturer shall state the possibility for encryption/alternative method/solution if reinforced security be required.

Requirement on Cyber Security is specified in TBE 100:2

The Supplier/Manufacturer shall be able to show that data are not distorted/number of retransmissions of telegrams is kept to a minimum.

Requirements in connection to system delivery

The Supplier/Manufacturer shall suggests a suitable configuration in order to attain redundancy and balance of the load under the following operating conditions.

- voltage interruption in a subsystem
- malfunction in a subsystem
- service/maintenance in a subsystem
- cable break

Other requirements

Regarding new versions of software, hardware and tools, the Supplier/Manufacturer shall guarantee the compatibility with older versions of systems/equipment.

4.5 Acquisition of spare parts

The Supplier/Manufacturer shall guarantee the compatibility with older versions of systems/equipment.

When compatible components are delivered, function and performance may not be affected in a negative manner. This shall be accounted for by the Supplier/Manufacturer.

5 Documentation

5.1 General

In addition to the documentation requirements in accordance with TBE 100:1, the following requirements apply.

The information below shall be documented and submitted to the Purchaser. The Supplier's/ Manufacturer's structure, content and designations for the documents may differ. The Supplier/Manufacturer shall describe their document structure and specify the documents in which the information in accordance with the list below, or corresponding information, is described. The Purchaser shall specify if the documentation is to be developed in a specific way.

5.2 Product documentation

The technical description shall, in addition to data sheets and specifications, also describe the function of the components, with the associated input and output terminals and required parameter settings. The version/revision number of the software shall be stated.

5.3 Design documentation

The design documentation shall describe how the network component is electrically connected to other equipment and shall include:

- Block/function diagram
- Connections for input and output terminals
- Parameter list (list of current settings)
- Dimension details
- Installation instructions

5.4 Maintenance documentation

The maintenance manual shall describe:

- Start and restart of the component
- Interpretation of fault recordings
- Identification of faults and localizing the fault
- Fault correction
- Change of parameters and associated equipment/equipment requirements for this
- Routines for the handling and storage of the component
- Back-up procedures

5.5 Inspection documentation

The Supplier/Manufacturer shall in writing account for inspection documentation in accordance with established inspection plan.

The Supplier/Manufacturer shall certify that the development process invoked for the development of the network component has been complied with. The Purchaser shall be provided with the

possibility to review the Supplier's/Manufacturer's development process for the network component in question.

The Supplier/Manufacturer shall in writing account for a final inspection plan with associated reports in the form of type inspection and production inspection.

The history of the product's version handling shall be stated.

The report shall include descriptions of failure corrections and/or functionality additions.

6 Agreement between Supplier/Manufacturer and Purchaser

This checklist should be used as a base between Manufacturer/Supplier and Purchaser when discussing tenders or orders.

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| 1 | Review and complementary additions to the Technical Specification | |
| 2 | Description of the development process | |
| 3 | Description of the configuration control plan | |
| 4 | Describe how applicable product standards have been complied with. Including standards for communication protocols | |
| 5 | Storage medium for software backup | |
| 6 | Aids and tools evaluated and approved | |
| 7 | Ability to perform tests after a replacement | |
| 8 | The reliability of the equipment Tasks + references | |
| 9 | Performance Capacity, including margins Response time + verification at tests | |
| 10 | Product maintenance Support and service after phasing out of the product by the supplier. Supply of compatible products for 10 years | |
| 11 | Statement of the document structure and where the information according to the description can be found | |
| 12 | Product documentation | |
| 13 | Design documentation | |
| 14 | Maintenance documentation | |
| 15 | Operating documentation | |
| 16 | Show in writing that the development process invoked for the method used to produce the software is fulfilled | |
| 17 | Interfaces to the other systems in the plant | |
| 18 | Logging function registering all attempts to penetrate the firewall | |
| 19 | Verification of that transmitted data information is equal to the received data information | |
| 20 | Cyber Security | |
| 21 | Need of multicast traffic | |