Quality and Inspection Requirements for Electrical Equipment Rubrik / Title General Quality and Inspection Requirements	Beteckning / Document KBE 100-1 Utgåva / Issue 3 Datum / Date 2018-10-03 Ersätter / Supersedes 2 (E)

Contents

1 Requirement levels

Depending on physical location and other plant specific aspects KBE 100 is divided into 3 requirement levels. These levels are not directly related to the specific classification principals applied for each power plant concerning electrical function classes therefore an assessment on applicable requirement level has to be done for each specific case.

The requirement levels are KBE 100-1, KBE 100-2 and KBE 100-3 where level -1 is the top level.

For 1E-and category A-equipment according to IEC 61226, KBE 100-1 shall apply.

2 Quality Assurance System

2.1 QA Requirements on the Manufacturer/Supplier

The Manufacturer/Supplier shall have an implemented quality management system which meets the requirements in appropriate standard in the ISO 9000 series or other equivalent standard.

The requirements shall be applied on all activities with impact on quality regarding development, design, manufacturing, final inspection, shipping, installation, and service to the extent which they are performed by the Manufacturer/Supplier or his subcontractors.

Programmable equipment shall be developed according to IEC 60987 for hardware, IEC 60880 for software and IEC 61513 for general requirements for systems. Other comparable and reviewable development models may also be acceptable.

The Manufacturer/Supplier shall possess and follow an IT-security program for programmable electronics, implemented in the QA management system. The IT-security program shall meet the requirements in ISO 27001 or other equivalent standards.The quality management system shall be documented and authorized by the Manufacturers/Suppliers management. A registered copy of the Manufacturers/Suppliers quality management system certificate shall be given to the Purchaser.

The Purchaser shall be given the opportunity to assess the manufactures quality system by conducting on site audit at the Manufacturer/Supplier and subsuppliers.

2.2 Requirements on supplier assessment

A common system for assessment of Manufacturers and Suppliers has been arranged for the Swedish nuclear power industry. Methods and procedures for the performance and reporting of supplier assessments are uniform for the Swedish nuclear industry.

An approval is valid for the supplier’s quality system, and not automatically for a certain product in a certain application. Approval may be issued for up to three years. Approval may be limited to a specific order, product or product family. Such a judgement is the responsibility for each plant owner.

The above mentioned rule also requires that each plant owner maintains a register of approved suppliers. Changes in these registers are reported to the other plant owners, but otherwise these files are confidential. Except for strict authorized personnel, information from these files may only be given to the Swedish Nuclear Inspectorate (SSM) on their request.

3 Definitions

FAT, Factory Acceptance Test

A functionally targeted test program for electrical equipment

The Manufacturer/Supplier shall perform the test in the presence of the Purchaser, before delivery release. The test is normally also performed as a SAT following installation in the plant. **SAT,** Site Acceptance Test

A functionally targeted test program for electrical equipment performed in conjunction with the installation in the plant.

OAT, Operational Acceptance Test

A functionally targeted operational test for electrical equipment after installation and start-up

4 Quality and Inspection Requirements

4.1 General requirements

The Manufacturer/Supplier shall take full responsibility for the quality of the products and pay for all expenses for the required inspections and tests. The Manufacturer/Supplier shall also pay for the expenses which may arise from deviations, nonconformities or delays due to re-inspection caused by the Manufacturer/Supplier .

This document describes the quality requirements for electrical and instrumentation equipment. However many components such as venturis, thermowells, condensation pots, etc. may also be regarded as mechanical equipment. For these, requirements according to TBM (Technical Regulations for Mechanical Equipment) are valid. Inspections regarding this type of equipment are specified in a separate Inspection Plan according to KBM (Quality Regulations Requirements for Mechanical Equipment).

4.2 Regulations and Standards

The Manufacturer/Supplier is responsible for the compliance to regulations and standards valid at the time of quotation. This applies in addition to what the Purchaser may have specified in the inquiry or purchase order.

Primarily Swedish regulations and IEC standards shall be applied. Other international or national regulations and standards may be applied after approval from the Purchaser.

From the quotation it should be clear bywhich regulations and standards the product is designed. The Manufacturer/Supplier shall provide copies of the standards on request from the Purchaser.

4.3 Product Verification

4.3.1 General Inspection Requirements

The Manufacturer/Supplier is requested to prove that the products performance, environmental endurances and other attributes are verified.

In the Inquiry The Purchaser defines the basis for the inspection extent to be performed by the Manufacturer/Supplier. This is done in the following documents:

- Technical Specification
- Quality- and inspection requirements (this document)
- Inspection Plan with corresponding inspection procedures (KBE IP and KBE EP)

This information is the Purchasers opinion about the minimal required content of inspections and tests and how they should be documented. The Manufacturer/Supplier may add inspections and tests which he regards as necessary. The Manufacturer/Supplier may also use his own inspection plan and inspection and test procedures. In such case the Manufacturer/Supplier has to identify deviations from the Purchasers Inspection Plan and add his own routines for the actual purchase order.

Quotation should include the Manufacturers/Suppliers suggestions for the Final Inspection Plan, which takes into consideration both the requirements from the Purchaser and the Manufacturers/Suppliers normal scope of inspections and tests. The proposal shall include references to applicable inspection and test procedures and type tests performed.

Deviations from the Purchasers inspection plan concerning scope and performance shall be approved by the Purchaser before manufacturing of the product may start.

The Manufacturer/Supplier shall continuously list all approved and issued manufacturing, inspection and test documents. This record shall contain the identities of the documents and actual revision notes. The list shall be continuously updated by the Manufacturer/Supplier and be included in the delivered documentation.

The Purchaser or his representatives shall have the right to, if requested, be present in discussions concerning quality issues which may take place between the Manufacturer/Supplier and by him hired inspection agencies or subcontractors.

4.3.2 Type Inspection

In the quotation the Manufacturer/Supplier shall specify those type tests which have been performed on the product as well as applied standards and acceptance criteria.

Possible differences between the actual product and the specimens which have undergone type tests, i.e. if the product or the manufacturing process has been modified, shall be analysed. Such an analysis shall prove that performed type tests are applicable to the delivered product. Eventually additional type tests may be needed.

If the Purchaser in his Inspection Plan has specified a certain type test not performed for the product, the Manufacturer/Supplier shall have the test performed and the cost shall be included in the quotation.

Specimens which have undergone a type test may not be included in the delivery without the Purchasers approval.

4.3.3 Routine Inspection

The Manufacturer/Supplier shall specify all inspections and tests performed on the product during and after manufacturing, with reference to inspection and test procedures. The procedures shall be available for the Purchaser to review.

The inspections and tests may be performed in any order if otherwise is not specified by the inspection plan. Exception from this is visual inspection, which usually should be performed after other inspections and tests are completed.

The Purchaser or his representative shall have the right to be present at the Manufacturers/Suppliers inspections and tests. At such occasions the Purchaser shall be allowed to perform inspections and tests of his own without any extra costs..

The Manufacturer/Supplier shall be prepared to perform extra inspections and tests, in addition to the original agreement, at the Purchasers expense.

4.3.4 Delivery inspection

The Manufacturer/Supplier shall as soon as possible but no later than 14 days in advance announce time and place for delivery inspection.

At the delivery inspection the inspection and test documentation shall be available and clearly arranged for the Purchasers review. The inspection documentation shall have been reviewed internally and approved by the Manufacturer/Supplier before the delivery inspection.

Delivery Inspection shall be performed in accordance with KBE EP-191.

The delivery inspection normally includes an acceptance test (FAT), according to KBE EP-192 which is specified in the Inspection Plan. The fact that the Purchaser may have taken part in the acceptance test or other inspections does not relieve the Manufacturer/Supplier from his contractual commitments and responsibilities for the products quality.

Shipping may not occur until delivery permission has been issued by the Purchaser. Possible remaining issues shall be listed in a joint report from the proceedings.

4.3.5 Commissioning

Normally the Manufacturer/Supplier shall produce a commissioning programme, which in the inspection plan is defined as Site Acceptance Test(SAT) and in some cases also Operating Acceptance Test (OAT) (KBE EP-193 and KBE EP-194)

Participation from the Manufacturer/Supplier at the site for other activities is specified in the purchase order.

4.3.6 Deviations

The Manufacturer/Supplier shall continuously document all deviations and non-conformances. Reports of remaining deviations shall be included in the final documentation.

Modifications carried out after completion of inspections and tests, has to be analysed to what extent earlier inspections and tests needs to be re-performed. This shall be approved by the Purchaser.

Costs for repeated tests related to deviations and non-conformances shall be born by the Manufacturer/Supplier.

4.3.7 Inspection and Test Documentation

The Manufacturer/Supplier shall arrange the documents for all inspections and tests defined in the contract and the inspection plan in a clear manner. A cover sheet shall list all underlying documents and contain information about the authorization of the documents.

Certificates shall be identifiable to the inspection plan and to the actual component.

The inspection documentation shall be delivered in the extent defined in the inspection plan and in the number defined in the contract. Additionally the Manufacturer/Supplier shall confirm that the product is approved and fulfils all contractual requirements.

The Purchaser shall by review of the inspection documents convince himself that all inspections and tests have been performed to the required extent and with satisfactory results.

The delivery shall not be regarded as complete until all documentation including inspection documents are delivered to and approved by the Purchaser.

5 Other Requirements

For standard type products the Manufacturer/Supplier shall have a system for fault reporting, statistics and experience feedback valid for all users of the product. Experiences regarding product faults shall be communicated to the Purchaser, as soon as they become known to the Manufacturer/Supplier. The quotation shall include a description of the experience feedback system and statistics for the product.