Technical Requirements for Electrical Equipment	Beteckning/Document TBE 118
	Utgåva/Issue 8 (E)
Rubrik/Title Low and medium voltage switchgears and control gears	Datum/Date 2017-05-22
	Ersätter / Supersedes 7 (E)

Contents

1 General

These Technical Requirements specify requirements for factory-built, metal enclosed switchgear and control gear assemblies intended for use in nuclear power plants. The requirements concern design, construction and documentation. Some requirements are therefore applicable only for certain types of equipment.

The Manufacturer/Supplier shall fulfil the requirements in order to meet the safety and reliability objectives of the Swedish Nuclear Power Plant (NPP) Owners.

The purpose of this document is to provide Technical Requirements for factory-built, metal enclosed switchgear and control gear assemblies, up to and including 12 kV, intended for location indoor in electrical equipment rooms.

In addition to the requirements in this document, applicable parts of TBE 100:1 “General Technical Requirements and Explanations”, shall apply.

Detailed Technical Data, and in some cases other technical requirements to be followed, for the equipment is given in the Technical Specification. If the requirements in various documents differ, the Technical Specification shall have precedence.

Section 6 is a checklist that should be used when making an inquiry or an order.

2 Definitions

For general definitions see TBE 100:1 and KBE 100.

Exposed conductive part

A conductive part of electrical equipment, which can be touched and which is normally not live, but which may become live under faulty conditions (IEC 60439-1)

3 General product requirements

3.1 Standardisation

Switchgears and control gears shall comply with Swedish regulations and the standards listed below, except for items specified in section 3.1.1:

IEC 60439	Low-voltage switchgear and control gear assemblies
IEC 62271-200	High-voltage switchgear and control gear - Part 200: A.C. metal-enclosed switchgear and control gear for rated voltages above 1 kV and up to and including 52 kV

Specific requirements on standards will be found in the Technical Specification.

In the tender, the Manufacturer/Supplier shall specify standards to which the product or delivery conforms.

3.1.1 Deviations/Modifications from standards

Concerning EMC and immunity the equipment shall fulfil the requirements in TBE 101, table 5.

For emission the equipment shall fulfil the requirements in KBE EP-153.

3.2 Other technical requirements

Since the greatest degree of uniformity in the plant is desirable, the Manufacturer/Supplier is to choose manufacturer including type of equipment and components in consultation with the Purchaser.

3.2.1 Bus bar

If not otherwise specified in Technical Specification the bus bar shall be of copper. Splices shall be avoided and shall, when necessary, be performed with a reliable and well-documented method.

3.2.2 Circuit breaker and disconnector

Circuit breakers shall be of reliable type and fulfil requirements according to standard specified in Technical Specification. The circuit breaker shall be able to cut out short-circuit current and voltage transients given in Technical Specification without need for maintenance. Purchaser shall agree type and Manufacturer/Supplier of circuit breaker. The circuit breaker shall be off truck or cassette type.

Maneuverer of disconnector shall be able with closed door. The disconnector shall have auxiliary contacts that in a safe way indicate the disconnector position. Disconnectors shall be able to carry the short circuit current specified in the Technical Specification.

3.2.3 Current and voltage transformer

Current and voltage transformer shall be of reliable type. Specifications according number of cores and accuracy class will be stated in Technical Specification.

3.2.4 Fuses

Fuses for switchgear and control gears with rated voltage <1 000 V will normally be provided by the Purchaser if nothing else is agreed upon.

3.2.5 Lifting eyes

To facilitate transport, the cubicles shall be provided with a sufficient number of lifting eyes or prepared to allow mounting of lifting eyes.

3.2.6 Protection of personnel

Local manoeuvring shall be possible only if doors and hatches are closed and locked in the prescribed manner. Bypassing of door latches shall be made by tools and performed by qualified personnel.

When doors and hatches are closed and locked in the prescribed manner and if a fault occurs, no personal injury shall come to those who are in the immediate vicinity of the equipment. The Manufacturer/Supplier has to provide detailed description of the protecting devices.

3.2.7 Earthing requirements

In order to enable future extension or exchange of equipment in operating plants the following requirements shall be subject to agreement between the Purchaser and the Manufacturer/Supplier.

General

Each low-voltage cubicle shall be provided with a busbar for protective earthing (PE) and if necessary a busbar for neutral connection. It shall be possible to connect a 120 mm² protective earth wire at each end of the PE busbar.

All exposed chassis, metal covers and other metallic parts shall be designed for connection to protective earth.

Earthing for maintenance work

It shall be possible to connect devices at maintenance work for earthing of the busbar and on the supply side of the incoming circuit breaker. Marking shall be provided on labels, approved by the Purchaser, indicating in text and location the connection points for earth at maintenance work.

Current and voltage transformers

The secondary side of current transformer shall be earthed close to the current transformer in such a manner that the earthing is made on the side facing the busbar.

The secondary sides of voltage transformers shall be earthed close to the voltage transformer.

4 Nuclear specific requirements

4.1 Isolation of faulty part

Defect in material or malfunction by a feeding out devices shall not cause that the bus bar or other feeding out devices will be de-energized. Defect in material or malfunction by a feeding in devices shall be able to isolate so the bus bar can be supplied from other feeding in devices if such exist.

4.2 Isolation by external fault

Fault in a feeding cable or in the supplied device shall not cause that other devices in the switchgear will be de-energized.

5 Documentation

Documentation requirements are given in TBE 100:1 and KBE 100.

6 Agreement between Manufacturer/Supplier and Purchaser

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

1	Review and completing Technical Specification	
2	Review of actual Inspection Plan and Examination Procedures	
3	Verification of seismic requirements	
4	Personal safety if fault occurs in switchgear, verification	
5	Blocking of e.g. hinges, disconnector and circuit breaker	
6	Availability at operation for people with special permission	
7	Availability at maintenance and service	
8	Choice of preventive measures against direct contact	
9	Choice of preventive measures against indirect contact	
10	Protection class after dismantling of removable part	
11	Portable equipment for earthing or earthing and short-circuiting	
12	Equipment for earthing or earthing and short-circuiting of bus bar	
13	Arc testing time	
14	Arc protecting devices, localisation, functionality	
15	Pressure relief at short circuit, design	
16	Current in neutral phase at short circuit test	
17	Marking of bus bar horizontal and vertical	
18	Connections of external cables	
19	Connection of earth wire	
20	Current-carrying capacity of neutral phase	
21	Splitting into switchgear modules	
22	Selection of equipment e.g. change-over switches, signal system, pilot lamps etc.	
23	Replace ability between components with the same function, both mutually and to spare parts, without influence upon equipment performance	
24	Cable and wiring	
25	Area for cables in main circuits and auxiliary circuits (including current and voltage transformer) that will be connected	
26	Coordination of short circuit protection (selective protection)	
27	Value of prospective current when more feeding-in or feeding-out devices with rotating machines with great power	
28	Availability for expansion with electric voltage	
29	Environmental temperature at temperature rise test	
30	Marking plates outside cabinets, performance and location	
31	Marking plates upon devices, performance and location	
32	Documentation	
33	Mounting, orientation and earthing of current and voltage transformers	
34	Plant designation and marking	