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TB03-04E Metal-enclosed switchgear 12-52 kV		
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E.ON Energidistribution AB

Technical Requirements

Primary Equipment TB03

TB03-04E Metal-enclosed switchgear 12-52 kV

Summary

This regulation covers the general requirements that E.ON Energidistribution AB places on metal-enclosed switchgear. The regulation applies to the design voltage 12-52 kV, the rated frequency 50 Hz.

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1. General

1.1. Scope

These requirements cover the general demands of E.ON Energidistribution AB in respect of metal-enclosed switchgear.

This technical regulation covers the requirements E.ON Energidistribution AB imposes on metal-enclosed switchgear for rated frequency 50 Hz and design voltages 12-52 kV.

These requirements are subordinate to the requirements set out in the D10-0015685 Anläggningsdirektiv Regionnät.

These requirements are a translation from the Swedish requirements TB03-04. If the content of this document differs from the Swedish version, the Swedish requirements shall prevail.

1.2. Standards

Metal-enclosed switchgear must be designed, manufactured and tested in accordance with the latest edition of the standards SS-EN IEC 62271-200, SS-EN 62271-1 and SS-EN IEC 61936. In the event of deviations, the present technical regulation applies.

1.3. Labelling

The rating plate must be placed in the connection space for the first bay in each busbar.
Rating plates (resistant copies) for instrument transformers must be placed in the relevant connection space.

For terminal blocks, the manufacturer's labelling must be located on the equipment side. The cable side must be free of labelling; it is intended for the customers own labels.

The switch position for equipment in the switchgear must be indicated on the front of the switchgear bay as follows:

- The switch position of a circuit breaker must be indicated mechanically with labels TILL and FRÅN, alternatively 1 and 0.
- Disconnector and load-break switch position must be indicated with labels SLUTEN and ÖPPEN, alternatively 1 and 0.
- Earthing switch position must be indicated with labels 1 and 0, alternatively earth symbol and 0.
- The cassette or truck position must be indicated with labels FRÅNSKILJT LÄGE and DRIFTLÄGE.
- The standby position of the spring-drive operating mechanism must be indicated with the closing spring's position labels: SPÄND and EJ SPÄND.

The switchgear must be provided with phase labelling using the letters L1, L2 and L3, working from left to right, from front to back or from top to bottom, viewed from the front of the switchgear.

The instructions for earthing of a busbar must be clearly marked on the switchgear and labelled "SPÄNNINGSPROVNING SKA GÖRAS INNAN JORDNING".

Switchgear bays with access from the rear must be provided with bay numbering labels on the back. There must be one (1) label on the inside of the bay and one (1) label on the outside of the bay. The label on the outside must be placed on a fixed part of the switchgear bay.

2. Changes relative to previous issue

Changes from the previous issue are marked with a vertical line along the right-hand edge of the document. Previous issue is version 1.0.

3. Electrical and mechanical requirements

3.1. Cabinet design

Switchgear distances must comply with the requirements of D10-0015685 Anläggningsdirektiv Regionnät, but smaller clearances are acceptable on submission of an approved type test report. The switchgear must be provided with longitudinal earthing.

All switchgear doors must be equipped with IR glass with access for thermography of the cable terminations. If another type of temperature monitoring is used and this requires some form of peripheral equipment to read the temperature, this equipment must be included.

3.1.1. Enclosure

The bay structure of the switchgear must be of protection class IP3X or higher.

This also applies to the walls between connection space and a high-voltage space.

The space in switchgear bays must be dimensioned so that the bays can be equipped with current and voltage transformers in each phase and can be replaced through the front door. For switchgears with a rated voltage higher than 24 kV, the replacement of current and voltage transformers can alternatively be carried out through the rear of the switchgear bay.

3.1.2. Division into cells

Switchgear compartments must be divided into at least two cells: one for the busbar and one for the cable connection and switching devices in accordance with SS-EN IEC 62271-200, class LSC2A.

3.1.3. Pressure relief

The switchgear must be equipped with a pressure relief system including hatches on the outside wall. The pressure relief system must be designed to prevent the accumulation of dangerous concentrations of gas and degradation products in the switchgear room. If the switchgear is sectioned, each section must have its own pressure relief system so that work can be carried out on the de-energized section without interruption on the remaining switchgear.

3.1.4. Arc monitor

The switchgear must be provided with arc flash protection in accordance with D10-0016467 "Tekniska bestämmelser för ljusbågsvakt".

3.2. Servicing

3.2.1. Partition

When operating switchgears that requires opening or removing doors or hatches, measures must be taken to prevent following:

- Contact with live parts
- Personal injury from mechanical movements.

3.2.2. Voltage indicators

For each bay, there must be voltage indicators in all phases towards the cable side. The voltage indication must be equipped with at least two changeover auxiliary contacts.

3.2.3. Temporary earthing for work

Fixed earthing switches must be operated three-pole with instantaneous closing and must be dimensioned for the short-circuit current of the switchgear. Earthing through a circuit breaker is permitted.

Earthing of a busbar must be done with external earthing devices or via earthing trucks.
In a bay with power cable connection with uninsulated termination, it must be possible to earth an outgoing cable with external earthing devices.

If special external earthing devices are needed to earth a busbar and/or a power cable connection, at least two (2) earthing devices must be supplied for each switchgear. Tools needed for attaching the earthing must be included with each switchgear delivery.

3.2.4. Interlocking

Circuit breakers, load-break switches, disconnectors and earthing switches in same bay must be mechanically interlocked with each other in such a way that incorrect operation is prevented and personal safety is guaranteed when carrying out operation.

It must be possible to override any interlocking of bay doors for the purposes of maintenance, interlocking must not be dependent on the position of the earthing switch.

3.2.5. Outer sheath

It must be possible to lock circuit breakers, load-break switch disconnectors, disconnectors and earthing switches in position where a change of position might involve a risk of personal injury. The locking device must be approved by the Client.

It must be possible to combine locking with a sign ”Arbete pågår ….”.

If locking is performed with a padlock, it must be possible to use a shackle that is 9 mm in diameter.

3.2.6. Interchangeability

It must not be possible to put withdrawable load-break switch disconnectors and disconnectors in bays intended for circuit breakers.

It must only be possible to position a withdrawable switching device for a higher rated current in a bay intended for the same or a lower rated current.

3.2.7. Removal

If a special device is needed to remove withdrawable equipment, at least two (2) of these must be supplied for each size in the switchgear. If a universal trolley is used for all sizes, at least three (3) of these must be supplied to each switchgear. It must be possible to operate the equipment by hand and without oil-based hydraulics.

3.2.8. Operation

Circuit breakers must be provided with an isolated mechanical disconnect.

No mechanical closing operation provided.

At least two (2) operating tools of each type required must be supplied for each switchgear.

3.2.9. Tools

At least one (1) set of any special tools needed for assembly, dismantling/ and installation of equipment and devices for the switchgear must be supplied with the switchgear.

The delivery must also include a phase comparator.

3.2.10. Instructions

Simplified instructions in Swedish for handling the relevant switchgear equipment items involved must be included, as well as instructions on earthing of busbars.

3.3. Connection space

3.3.1. Function

All low-voltage equipment for protection, monitoring, operation and measurement must be positioned in a separate connection space.

3.3.2. Operation and indication

All switchgear bays must be equipped with a separate symbol diagram for operation and indication of the bay. The symbol diagram must be placed on the door of the low-voltage compartment.

3.3.3. Secondary connection

According to D10-0015685 Anläggningsdirektiv Regionnät.

4. Testing

The test must be carried out in its entirety with the busbar assembled in the factory. The pressure relief system must be type tested (arc and heat test) together with the switchgear, i.e. tested together.

Pressure relief hatches must be mounted in accordance with SS-EN IEC 62271-200, IAC AFL. The switchgear must be arc tested in accordance with the standard using the same current value as applies for the short circuit. The duration must be one (1) second.