

<i>Document type</i> Verksamhetsstyrande			<i>Page</i> 1 (6)
<i>Company</i> E.ON Elnät Sverige AB	<i>Replaces previous document</i> Ny engelsk utgåva	<i>Document ID</i> D17-0008996	<i>Issue</i> 1.0
<i>Organisation</i> Regionnätssaffärer	<i>Valid from</i> 2017-06-02	<i>Valid until</i>	
<i>Responsible for the document</i> Claes Ahlrot	<i>Secrecy class</i> Öppen	<i>Approved by</i> Roger Appelberg	

*Title*

## Technical requirements Metal-enclosed switchgear

### TABLE OF CONTENTS

<b>1</b>	<b>General.....</b>	<b>2</b>
1.1	Scope .....	2
1.2	Changes relative to previous issue .....	2
1.3	Standards .....	2
1.4	Labelling.....	2
<b>2</b>	<b>Electrical and mechanical requirements.....</b>	<b>3</b>
2.1	Cabinet design .....	3
2.1.1	Enclosure.....	3
2.1.2	Division into cells .....	3
2.1.3	Pressure relief.....	3
2.1.4	Arc monitor .....	4
2.2	Servicing.....	4
2.2.1	Partition.....	4
2.2.2	Voltage indicators .....	4
2.2.3	Temporary earthing for work.....	4
2.2.4	Interlocking .....	4
2.2.5	Locking .....	4
2.2.6	Interchangeability.....	5
2.2.7	Removal .....	5
2.2.8	Operation.....	5
2.2.9	Tools.....	5
2.2.10	Instructions.....	5
2.3	Connection space.....	5
2.3.1	Function .....	5
2.3.2	Secondary connection .....	5
<b>3</b>	<b>Testing.....</b>	<b>6</b>

## **1 General**

### **1.1 Scope**

These requirements cover the general demands of E.ON Elnät Sverige AB in respect of metal-enclosed switchgear  
The requirement applies to the system voltage of 12-145 kV, rated frequency 50 Hz for indoor or outdoor designs.

These requirements are complement to the requirements set out in the Facility Directive Regional Network.

These requirements are a translation from the Swedish requirements D14-0007569. If the content of this document differs from the Swedish version, the Swedish requirements shall prevail.

### **1.2 Changes relative to previous issue**

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

### **1.3 Standards**

Metal-enclosed switchgear must be designed, manufactured and tested in accordance with the most recent edition of applicable Swedish standards. These are SS-EN 62271-200, SS-EN 62271-1 and SS-EN 61936.

In the absence of such standards, the European Standard (EN) and IEC publications apply.

In the event of disparities between this document and the relevant standard, these Technical Regulations shall apply.

### **1.4 Labelling**

The rating plate should be located in the connection space for the first bay in the relevant busbar.

Rating plates (resistant copies) for instrument transformers shall be positioned 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 E.ON's 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 should be indicated mechanically via the labels **TILL** and **FRÅN** respectively, or **1** and **0** respectively.

- For a disconnecter and switch disconnecter, indication should be via the labels **SLUTEN** and **ÖPPEN** respectively, or **1** and **0** respectively.
- For an earthing switch, indication should be via the labels **1** and **0** respectively, or **earth symbol** and **0** respectively.
- Indication of a cassette or truck position should be via the label **FRÅNSKILJT LÄGE** and **DRIFTLÄGE** respectively.
- The standby position of the spring-drive operating mechanism should be indicated by the position of the closing spring: **SPÄND** and **EJ SPÄND** respectively.

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**”.

## **2 Electrical and mechanical requirements**

### **2.1 Cabinet design**

Switchgear distances must comply with the requirements of Anläggningsdirektiv Regionnät, but smaller clearances are acceptable on submission of an approved type test report. Unless otherwise specified, the switchgear must be erected against a wall.

The switchgear must be provided with longitudinal earthing.

All switchgear doors shall be equipped with IR glass with access for thermovision cable termination.

#### **2.1.1 Enclosure**

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

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

The space in switchgear bays shall be dimensioned that the bays can be equipped with current and voltage transformers in each phase, and be able to be replaced through the front door.

#### **2.1.2 Division into cells**

Switchgear shall be divided into at least two cells, one for the busbar and one for the bay, in accordance with IEC 62271-200, class LSC2A.

#### **2.1.3 Pressure relief**

The switchgear must be equipped with a pressure relief system.

The pressure relief system shall be designed that accumulation of a dangerous concentration of gas and/or degradation products in the switchgear room is prevented.

The system must be type-tested (arc test) together, at the same time as the switchgear .

#### **2.1.4 Arc monitor**

The switchgear must be provided with protection that is activated if arcing occurs in the switchgear.

### **2.2 Servicing**

#### **2.2.1 Partition**

When servicing of switchgear requires that doors or hatches are opened or removed, measures must be taken to prevent following:

- Contact with live parts
- Injury at mechanical movements.

#### **2.2.2 Voltage indicators**

For each bay, there shall be voltage indicators against cable side.

#### **2.2.3 Temporary earthing for work**

Permanently installed earthing switches shall be operated in a three-pole configuration with instantaneous closure, and shall be dimensioned for the short-circuit current in question. Earthing via a circuit breaker is permitted.

Earthing of a busbar shall 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 shall be supplied for each switchgear. Tools needed for attaching the earthing shall be included with each switchgear delivery.

#### **2.2.4 Interlocking**

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

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

#### **2.2.5 Locking**

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

It shall be possible to combine locking with a ”**Arbete pågår ....**” notice.

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

#### **2.2.6 Interchangeability**

It shall not be possible to put withdrawable switch disconnectors and disconnectors in bays intended for circuit breakers.

It shall 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.

#### **2.2.7 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. It shall be possible to operate the equipment by hand and without oil-based hydraulics.

#### **2.2.8 Operation**

Circuit breakers shall be provided with isolated mechanical opening. No mechanical closing operation provided.

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

#### **2.2.9 Tools**

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

A phase comparator shall also be supplied with the switchgear on delivery.

#### **2.2.10 Instructions**

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

### **2.3 Connection space**

#### **2.3.1 Function**

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

#### **2.3.2 Secondary connection**

According to Facility Directive Regional Network.

**3 Testing**

Unless otherwise specified, testing shall conform to the scope and requirements for test results set down in applicable standards. All testing is to be performed with a factory-fitted busbar, and, for pressure-relief hatches fitted in the casing, in accordance with 62271-200, IAC AFL. The switchgear shall be subjected to arc testing in accordance with the standard, using the same current value as applies for a short circuit. Time duration shall be one (1) second.

The pressure relief system shall be tested in accordance with applicable standards.