



Specification for 25 kV AC Disconnectors, Earthing Switches and Switches

Network Rail Specification

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User information

This Network Rail standard contains colour-coding according to the following Red–Amber–Green classification.

Red requirements – no variations permitted

- Red requirements are to be complied with and achieved at all times.
- Red requirements are presented in a red box.
- Red requirements are monitored for compliance.
- Non-compliances will be investigated and corrective actions enforced.

Amber requirements – variations permitted subject to approved risk analysis and mitigation

- Amber requirements are to be complied with unless an approved variation is in place.
- Amber requirements are presented with an amber sidebar.
- Amber requirements are monitored for compliance.
- Variations can only be approved through the national non-compliance process.
- Non-approved variations will be investigated and corrective actions enforced.

Green guidance – to be used unless alternative solutions are followed

- Guidance should be followed unless an alternative solution produced a better result.
- Guidance is presented with a dotted green sidebar.
- Guidance is not monitored for compliance.
- Alternative solutions should be documented to demonstrate effective control.

Amendment marks

- First document amendments are presented with a single black line to the right of the affected text.
- Second document amendments are presented with a double black line to the right of the affected text.

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1 Scope

This document defines the specific requirements for Network Rail's 25 kV AC single-pole and two-pole disconnectors, earthing switches and switches for on-load applications, following as closely as possible those identified within the applicable British Standard BS EN 50152-2:2012 *Railway applications - Fixed installations - Particular requirements for alternating current switchgear – Part 2: Disconnectors, earthing switches and switches with nominal voltage above 1 kV*.

These specific requirements, in addition to the general requirements of BS EN 50152-2:2012, cover the following configurations of single-pole and two-pole indoor (open terminal and metal enclosed – GIS and AIS) and outdoor structure mounted switching devices that are used by Network Rail as part of their 25 kV AC overhead contact systems and associated distribution switchgear:

- a. Two position disconnector;
- b. Two position earthing switch;
- c. Three position, combined disconnector and earthing switch;
- d. Fault make, load break, two position switch;
- e. Three position, combined fault make, load break switch and earthing switch.

Note: The combined three position configurations can either be two independent devices mounted on a common frame or a purpose built, three position, disconnector/switch with an earth position.

Note: Two-pole switching devices can be implemented using mechanically coupled single-pole devices or discrete single-pole devices with common electrical control.

Note: Switching devices for OLE applications will normally be supported at high level on frames clamped to OLE structures and positioned directly above their operating gear which will be mounted at low level. The OLE structures may also provide support for the overhead conductor system,

Section 4 provides the switching device specific requirements using the lists of requirements given in BS EN 50152-2:2012 Clause 10 and the referenced normative standards BS EN 62271-102: 2002 and BS EN 62271-103: 2011 including any NR specific requirements where they fall within these lists.

Additional Network Rail specific requirements that fall outside the normative standards are given in Section 5.

2 Normative references

The requirements of BS EN 50152-2:2012 and its normative references are mandatory insofar as they are applicable to the scope of this specification.

2.1 Normative references from BS EN 50152-2:2012

BS EN 50152-2:2012 lists seven normative standards as follows. These documents are indispensable for the application of this specification. For dated references, only the edition cited applies. For undated references, the latest edition of the reference (including any amendments) applies.

EN 50121-5, *Railway applications - Electromagnetic compatibility - Part 5: Emission and immunity of fixed power supply installations and apparatus*

EN 50124-1:2001, *Railway applications - Insulation coordination Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment*

EN 50152-1:2012, *Railway applications - Fixed installations - Particular requirements for alternating current switchgear - Part 1: circuit breakers with nominal voltage above 1 kV*

EN 50163:2004, *Railway applications - Supply voltages of traction systems*

EN 62271-1:2008, *High-voltage switchgear and controlgear - Part 1: Common specifications* (IEC 62271-1:2007)

EN 62271-102:2002, *High-voltage switchgear and controlgear - Part 102: Alternating current disconnectors and earthing switches* (IEC 62271-102:2001 + corrigendum Apr. 2002 + corrigendum May 2003)

EN 62271-103:2011, *High voltage switchgear and controlgear - Part 103: Switches for rated voltages above 1 kV up to and including 52 kV* (IEC 62271-103:2011)

Note: The Introduction to BS EN 50152-2:2012 states 'References in subclauses in EN 62271-102:2002 need to be to EN 62271-1 instead of EN 60694.' It is assumed that this introduction statement also relates to the many references to IEC 60694.

2.2 Other normative references

The following standards are also referenced:

EN 60721-3-4:1995, *Classification of groups of environmental parameters and their severities*.

EN 50388:2005, *Railway Applications – Power supply and rolling stock technical criteria for the co-ordination between power supply (substation) and rolling stock to achieve interoperability*

IEC 60815-1:2008, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions*.

BS EN 50122-1: 2011, Railway Applications – Fixed Installation – Electrical Safety, Earthing and the return circuit. Part 1 – Protective provisions against electric shock

3 Abbreviations, terms and definitions

Abbreviations, terms and definitions are in accordance with the relevant standards referenced in the text, some of which are listed below for convenience as follows:

3.1 Abbreviations

AIS - Air Insulated Switchgear

GIS - Gas Insulated Switchgear

MTBF - Mean Time Between Failure

NC - Normally Closed

NO - Normally Open

OLE - Overhead Line Equipment

SCADA - Supervisory Control and Data Acquisition

VI - Vacuum Interrupter