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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Railway applications – Fixed installations – DC switchgear – Part 1: General

Applications ferroviaires – Installations fixes – Appareillage à courant continu – Partie 1: Généralités

IEC 61992-1:2006-02+AMD1:2014-04 CSV(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

RAILWAY APPLICATIONS – FIXED INSTALLATIONS – DC SWITCHGEAR –

Part 1: General

FOREWORD

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IEC 61992-1 edition 2.1 contains the second edition (2006-02) [documents 9/886/FDIS and 9/908/RVD] and its amendment 1 (2014-04) [documents 9/1790/CDV and 9/1850/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 61992-1 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

This edition includes the following significant technical changes with respect to the previous edition:

– all requirements or procedures applying to more than one part of the IEC 61992 series are now grouped in this part;
– there have been new definitions added for Parts 4, 5, 6 and 7 and also new specifications concerning verification of the behaviour during short-time withstand current test and verification of the manual control device;
– specifications of short-circuit and load-switching tests have been improved.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

IEC 61992 consists of the following parts, under the general title *Railway applications – Fixed installations – DC switchgear:*

Part 1: General
Part 2: DC circuit-breakers
Part 3: Indoor d.c. disconnectors, switch-disconnectors and earthing switches
Part 4: Outdoor d.c. disconnectors, switch-disconnectors and earthing switches
Part 5: Surge arresters and low-voltage limiters for specific use in d.c. systems
Part 6: DC switchgear assemblies
Part 7-1: Measurement, control and protection devices for specific use in d.c. traction systems – Application guide
Part 7-2: Measurement, control and protection devices for specific use in d.c. traction systems – Isolating current transducers and other current measuring devices
Part 7-3: Measurement, control and protection devices for specific use in d.c. traction systems – Isolating voltage transducers and other voltage measuring devices

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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RAILWAY APPLICATIONS – FIXED INSTALLATIONS – DC SWITCHGEAR –

Part 1: General

1 Scope

The IEC 61992 series specifies requirements for d.c. switchgear and controlgear and is intended to be used in fixed electrical installations with nominal voltage not exceeding 3 000 V d.c., which supply electrical power to vehicles for public guided transport, i.e. railway vehicles, tramway vehicles, underground vehicles and trolley-buses.

This Part 1 specifies general requirements.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-441:1984, *International Electrotechnical Vocabulary (IEV) – Chapter 441: Switchgear, controlgear and fuses*

IEC 60050-446:1983, *International Electrotechnical Vocabulary (IEV) – Chapter 446: Electrical relays*

IEC 60050-605:1983, *International Electrotechnical Vocabulary (IEV) – Chapter 605: Generation, transmission and distribution of electricity – Substations*

IEC 60050-811:1991, *International Electrotechnical Vocabulary (IEV) – Chapter 811: Electric traction*

IEC 60060-1:1989, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60099-1:1999, *Surge arresters – Part 1: Non-linear resistor type gapped surge arresters for a.c. systems*

IEC 60099-4:2004, *Surge arresters – Part 4: Metal-oxide surge arresters without gaps for a.c. systems*

IEC 60269-1:1998, *Low-voltage fuses – Part 1:General requirements*

IEC 60721 (all parts), *Classification of environmental conditions*

IEC 60850:2000, *Railway applications – Supply voltage of traction systems*

IEC 60913:1988, *Electric traction overhead lines*

IEC 60947 (all parts), *Low-voltage switchgear and controlgear*

IEC 62271-200: 2003, *High-voltage switchgear and controlgear – Part 200*: *AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-441, IEC 60050-446, IEC 60050-605, IEC 60050-811, IEC 60099-1, IEC 60099-4, IEC 60947, IEC 62271-200, and EN 50124-1 as well as the following apply.

3.1 General terms

3.1.1
switchgear
general term covering switching devices and their combination with associated control, measuring, protective and regulating equipment; it covers also assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures

NOTE For the sake of simplicity, in this standard the term "switchgear" means "switchgear and controlgear".

3.1.2
d.c. switchgear and controlgear assembly
combination of one or more d.c. switching devices together with associated control, measuring, signalling, protective, regulating equipment, etc. completely assembled under the responsibility of the supplier, with all the internal electrical and mechanical interconnections and structural parts

NOTE 1 Throughout the IEC 61992 series, the abbreviation switchgear assembly is used for a d.c. switchgear and controlgear assembly.

NOTE 2 The components of the switchgear assembly may be electromechanical or electronic.

NOTE 3 An enclosure, but not an integral enclosure, when housing a switching device and some associated controlgear, may be considered as a switchgear assembly.

3.1.3
switching device
device designed to make or break the current in one or more electric circuits

[IEV 441-14-01]

3.1.4
d.c. circuit-breaker
switching device capable of making, carrying and breaking direct currents under normal circuit conditions and also making, carrying (up to a specified limit and for a specified time) and breaking currents under specified abnormal conditions, such as those of short-circuit

3.1.5
d.c. disconnector
mechanical switching device, which provides, in the open position, for safety reasons, an isolating distance in accordance with specified requirements

NOTE 1 The disconnector is capable of opening and closing a circuit when either negligible d.c. current is broken or made, or when no significant change in the voltage across the terminals of the disconnector occurs. It is also capable of carrying d.c. currents under normal circuit conditions and carrying, for a specified time, currents under abnormal conditions such as those of short-circuit.

NOTE 2 A disconnector is not suitable for making or breaking load current, fault current or other current arising from the effects of lightning or transient phenomena.

NOTE 3 A disconnector is only able to make or break current of very limited magnitude such as those arising from electrostatic charging or discharges across undamaged insulation. The ability to make or break minimum currents

due to eventual marginal transient conditions of the network is subject to agreement between purchaser and supplier.

3.1.6
switch-disconnector
mechanical switching device capable of making, carrying and breaking currents in normal circuit conditions and, when specified, in given operating overload conditions. In addition, it is able to carry, for a specified time, currents under specified abnormal circuit conditions, such as short-circuit conditions. Moreover, it complies with the requirements for a disconnector (see 3.1.5)

NOTE 1 When specified, a switch-disconnector may be designed for making short-circuit currents, but not for breaking the same.

NOTE 2 Outdoor switch-disconnectors, in given special conditions, may be required to be suitable for breaking overload currents of specified amplitude.

3.1.7
earthing switch
mechanical switching device for earthing parts of the circuit, capable of withstanding for a specified time, currents under abnormal conditions such as those of short circuit, but not required to carry current under normal conditions of the circuit

NOTE An earthing switch may have a short-circuit making capacity (see 3.2.23).

[IEV 441-14-11]

3.1.8
low-voltage limiter
device intended to be in parallel in those parts of a traction system where overvoltages are expected having the function of limiting the voltage to predetermined values

3.1.9
d.c. sensor
device used for detecting a current or a voltage in a d.c. main circuit, which produces an output signal, proportional to and linear (over a range) with the primary input, for connection to a secondary device which acts on the signal

3.1.10
d.c. shunt
device connected in the primary circuit, usually composed of metal grids, that provides a millivolt output proportional to the current following in the primary circuit

3.1.11
isolating transducer
device which is interposed between the output of a sensor in the main circuit and the input of a secondary device used for measurement or protection, and used to provide an output isolated from the main circuit and, usually, at lower voltage

3.1.12
Hall effect sensor
type of sensor which fits around the main circuit current carrying conductor and uses a single or multiple Hall effect cells situated in the magnetic field of an iron circuit and which is energised by the current in the main conductor

3.1.13
divider
bank of resistors connected across the main supply with a footing resistor used as the output, which gives a voltage proportional to the main supply. This output is connected either directly or indirectly through an isolation transducer to the voltage terminals of the secondary device

3.1.14
operation
motion of the moving contact(s) from one position to another position, for example open to close or open to earth

NOTE 1 This may be a closing operation or an opening operation.

NOTE 2 If a distinction is necessary, the terms "electrical operation" (for example make and break) and "mechanical operation" (for example closing and opening) should be used.

NOTE 3 The position of a switching device where the continuity of the main circuit is assured is indicated as "close" position.

NOTE 4 The position of a switching device where the prescribed distance between the contacts of the switching device is assured is indicated as "open" position.

3.1.15
operating cycle (of a mechanical switching device)
succession of operations from one position to another and back to the first position through all other positions, if any

[IEV 441-16-02]

3.1.16
dependent manual operation (of a mechanical switching device)
operation solely by means of directly applied manual energy, such that the speed and force of the operation are dependent upon the action of the operator

[IEV 441-16-13]

3.1.17
stored energy operation (of a mechanical switching device)
operation by means of energy stored in the device itself prior to the completion of the operation and sufficient to complete it under predetermined conditions

NOTE This kind of operation may be subdivided according to

a) the energy storage mode (spring, weight, etc.);

b) the origin of the energy (manual, electric, etc.);

c) the energy releasing mode (manual, electric, etc.).

[IEV 441-16-15]

3.1.18
independent manual operation (of a mechanical switching device)
stored-energy operation where the energy originates from manual power, stored and released in one continuous operation, in such a way that the speed and force of the operation are independent from the action of the operator

[IEV 441-16-16]

3.1.19
independent power operation
operation by means of energy where the energy originates from an external power source and is released in a single continuous operation, in such a way that the speed and force of the operation are independent from the action of the operator

3.1.20
switching device with interlock preventing opening and/or closing operations
switching device in which an operation (closing and/or opening) is prevented by interlocking means reflecting given system conditions

3.1.21
utilisation category (of a switching device)
combination of specified requirements related to the condition in which the switching device fulfils its purpose, selected to represent a characteristic group of practical applications

[IEV 441-17-19, modified]

NOTE The specified requirements may concern, for example the values of the making capacities, if applicable, breaking capacities and other characteristics, the associated circuits and the relevant conditions of use and behaviour. The term "duty" used elsewhere in the standard corresponds to a particular aspect of the utilisation category.

3.1.22
unidirectional switching device
switching device (for example a circuit-breaker), the purpose of which is to interrupt d.c. current which is flowing in a prescribed direction through that device, and which is identified accordingly

3.1.23
bidirectional switching device
switching device (for example a circuit-breaker), the purpose of which is to interrupt d.c. current which flows in either direction through that device, and which is identified accordingly

NOTE Proof of bidirectional ability is included in the interrupting type tests.

3.2 Performance characteristics

3.2.1
Voltages

3.2.1.1
nominal voltage
U_n
voltage by which an installation or part of an installation is designated

3.2.1.2
Limits of system voltages

3.2.1.2.1
highest system voltage
U_{max}
highest value given for the voltage in the continuous operating conditions U_{max1} specified in IEC 60850

3.2.1.2.2
lowest system voltage
U_{min}
lowest value given for the voltage in the continuous operating conditions U_{min1} specified in IEC 60850

3.2.1.3
rated insulation voltage
U_{Nm}
maximum value of the d.c. voltage for which the equipment is designed in respect to its insulation

3.2.1.4
rated voltage
U_{Ne}
voltage value, given by the manufacturer, which, combined with rated service current, determines the utilisation of the equipment and to which the corresponding tests and utilisation categories, if any, relate