

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Railway applications – Fixed installations – Particular requirements for AC
switchgear –**

Part 1: Circuit-breakers with nominal voltage above 1 kV

**Applications ferroviaires – Installations fixes – Exigences particulières pour
appareillage à courant alternatif –**

Partie 1: Disjoncteurs avec tension nominale supérieure à 1 kV



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RAILWAY APPLICATIONS – FIXED INSTALLATIONS –
PARTICULAR REQUIREMENTS FOR AC SWITCHGEAR –****Part 1: Circuit-breakers with nominal voltage above 1 kV**

FOREWORD

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International Standard IEC 62505-1 has been prepared IEC technical committee 9: Electrical equipment and systems for railways.

This standard is based on EN 50152-1.

This second edition cancels and replaces the first edition issued in 2009. It constitutes a technical revision.

The main technical changes with regard to the previous edition are as follows:

This standard was revised to reflect the latest versions of standards referenced and to remove text already included in the IEC 62271 series. The scope was extended to include single-pole and two-pole circuit-breakers. Definitions were added to provide the necessary precision and to meet the needs of railway applications. Table 1 was reworked according to the changes of IEC 62497-1:2010, Table A.2 and Table B.1. Standard values of transient recovery voltage

have been taken from different tables to one, Table 2. Ratings of mechanical endurance previously given under the clause 'type tests' were moved to the new Table 4 'Mechanical endurance classes'. Standard values of prospective transient recovery voltage have been taken from different tables to one, Table 5. Table 6 'Coordination table of rated values for circuit-breakers' of the previous version was removed.

The text of this standard is based on the following documents:

FDIS	Report on voting
9/2097/FDIS	9/2133/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

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

A list of all parts of IEC 62505 series, under the general title *Railway applications – Fixed installations – Particular requirements for a.c. switchgear*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

INTRODUCTION

The IEC 62505 series under the generic title *Railway applications – Fixed installations – Particular requirements for a.c. switchgear*, is divided as follows:

- Part 1: Circuit-breakers with nominal voltage above 1 kV.
- Part 2: Disconnectors, earthing switches and switches with nominal voltage above 1 kV.
- Part 3-1: Measurement, control and protection devices for specific use in a.c. traction systems – Application guide.
- Part 3-2: Measurement, control and protection devices for specific use in a.c. traction systems – Single-phase current transformers.
- Part 3-3: Measurement, control and protection devices for specific use in a.c. traction systems – Single-phase inductive voltage transformers.

IEC 62505-1 has to be used in conjunction with IEC 62271-1:2007 and IEC 62271-100:2008 and its Amendment 1:2012.

References in subclauses of IEC 62271-1:2007 and IEC 62271-100:2008 need to be replaced by references to applicable subclauses in this standard as far as reasonably possible.

Where a particular clause of IEC 62271-1:2007 or IEC 62271-100:2008 is not mentioned in this standard, that clause applies as far as reasonable. Where requirements relate exclusively to three-phase systems or to voltages outside those in use in traction systems, they are not applicable. Where this standard states "addition" or "replacement", the relevant text of IEC 62271-1:2007 and IEC 62271-100:2008 needs to be adapted accordingly.

The numbering of clauses in the IEC 62271 series is not used in this Standard. The numbering in square brackets refers to the numbering of clauses in IEC 62271.

Where terms defined in IEC 62271-1:2007 and IEC 62271-100:2008 conflict with definitions of the same terms as given in IEC 60050-811:1991 or of the other railway applications documents listed in the normative references, the definitions in IEC 62271-1:2007 and IEC 62271-100:2008 need to be used.

NOTE The suffix N which appears in this Standard for rated values is not present in IEC 62271-100.

RAILWAY APPLICATIONS – FIXED INSTALLATIONS – PARTICULAR REQUIREMENTS FOR AC SWITCHGEAR –

Part 1: Circuit-breakers with nominal voltage above 1 kV

1 Scope

This part of IEC 62505 is applicable to single-pole and two-pole alternating current (a.c.) circuit-breakers which are:

- designed for indoor or outdoor fixed installations in traction systems, and
- operated with an a.c. line voltage and frequency as specified in IEC 60850:2014.

NOTE 1 IEC 60850 specifies the a.c. traction systems:

15 kV 16,7 Hz,

12 kV 25 Hz,

12,5 kV, 20 kV also 25 kV with 50 Hz and

12,5 kV, 20 kV, 25 kV also 50 kV with 60 Hz.

NOTE 2 As rails of a.c. traction systems are typically connected to earth and included in the return current path all phase to earth voltages will be within the tolerances as specified in IEC 60850. Nevertheless phase to phase voltages are sometimes higher, e.g. in autotransformer systems.

This Standard is also applicable to the operating devices of circuit-breakers and to their auxiliary equipment.

This Standard does not address circuit-breakers with dependent manual operating mechanism.

NOTE 3 It is impossible to specify a short-circuit making current for these circuit-breakers and it is likely that such dependent manual operation is not meeting safety considerations.

2 Normative references

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

IEC 60850:2014, *Railway applications – Supply voltages of traction systems*

IEC 62236-5:2008, *Railway applications – Electromagnetic compatibility – Part 5: Emission and immunity of fixed power supply installations and apparatus*

IEC 62271-1:2007, *High-voltage switchgear and controlgear – Part 1: Common specifications*

NOTE IEC 62271-1 A1:2011 is not referenced. It refers to voltage levels beyond those used in railway systems.

IEC 62271-100:2008, *High-voltage switchgear and controlgear – Part 100: Alternating-current circuit-breakers*
Amendment 1:2012

IEC 62497-1:2010, *Railway applications – Insulation co-ordination – Part 1: Basic requirements – Clearances and creepage distances for all electrical and electronic equipment*
Amendment 1:2013

IEC 62498-2:2010, *Railway applications – Environmental conditions for equipment – Part 2: Fixed electrical installations*

IEC 62505-2:2016, *Railway applications – Fixed installations – Particular requirements for a.c. switchgear – Part 2: Disconnectors, earthing switches and switches with nominal voltage above 1 kV*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62271-1:2007 and IEC 62271-100:2008, as well as the following apply:

NOTE The index of definitions is the same as in 3.8 of IEC 62271-100:2008, but amended according to the definitions below.

3.1

single-pole circuit-breaker

circuit-breaker with one electrically separated conducting path for the main circuit suitable for use in a single phase circuit

3.2

two-pole circuit-breaker

circuit-breaker with two independent electrically separated conducting paths for the main circuit

Note 1 to entry: In some cases the two paths are connected in series for use in a single-phase circuit where the establishment and the separation of the two paths are simultaneous.

3.3

nominal voltage

U_n

suitable approximate voltage value used to designate or identify a given supply system

Note 1 to entry: This value is also assigned to the circuit-breaker to show its usability in the supply system.

Note 2 to entry: An AT-System which is supplied with 2 phases, having a phase shift of 180° between them, is commonly named $2 \times U_n$ according to the U_n supplied to the catenary system.

[SOURCE: IEC 62497-1:2010, 3.4.1]

3.4

rated voltage

U_{ne}

value of voltage assigned by the manufacturer to the equipment or part of it and to which operating and performance characteristics are referred

Note 1 to entry: This value is also used to determine its dielectric characteristics and will be used instead of the rated insulation voltage (U_{Nm}) as defined and used in IEC 62497-1.

Note 2 to entry: The abbreviation U_r is not used for railway circuit-breakers.

[SOURCE: IEC 62497-1:2010, 3.4.3, modified: "to a component, device or equipment" replaced by "equipment or part of it"]

3.5

Over Voltage category

OV

classification of the circuit protection against internal and external overvoltages