

Railway applications — Electric equipment for rolling stock —

Part 3: Electrotechnical components — Rules for d.c. circuit-breakers

The European Standard EN 60077-3:2002 has the status of a
British Standard

ICS 29.280

National foreword

This British Standard is the official English language version of EN 60077-3:2002. It is identical with IEC 60077-3:2001.

The UK participation in its preparation was entrusted by Technical Committee GEL/9, Railway electrotechnical applications, to Subcommittee GEL/9/2, Rolling stock, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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English version

**Railway applications -
Electric equipment for rolling stock
Part 3: Electrotechnical components -
Rules for d.c. circuit-breakers
(IEC 60077-3:2001)**

Applications ferroviaires -
Equipements électriques
du matériel roulant
Partie 3: Composants électrotechniques -
Règles pour disjoncteurs
à courant continu
(CEI 60077-3:2001)

Bahnanwendungen -
Elektrische Betriebsmittel
auf Bahnfahrzeugen
Teil 3: Elektrotechnische Bauteile -
Regeln für DC-Leistungsschalter
(IEC 60077-3:2001)

This European Standard was approved by CENELEC on 2002-03-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 9/651/FDIS, future edition 1 of IEC 60077-3, prepared by IEC TC 9, Electric railway equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60077-3 on 2002-03-01.

This European Standard should be read in conjunction with EN 60077-1 and EN 60077-2.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2003-03-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2005-03-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes A and ZA are normative and annex B is informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60077-3:2001 was approved by CENELEC as a European Standard without any modification.

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RAILWAY APPLICATIONS – ELECTRIC EQUIPMENT FOR ROLLING STOCK –

Part 3: Electrotechnical components – Rules for d.c. circuit-breakers

1 Scope and object

In addition to the general requirements of IEC 60077-2, this part of IEC 60077 gives the rules for circuit-breakers, the main contacts of which are to be connected to d.c. power and/or auxiliary circuits. The nominal voltage of these circuits does not exceed 3 000 V d.c. according to IEC 60850.

This part of IEC 60077, together with IEC 60077-2, states specifically

- a) the characteristics of the circuit-breakers;
- b) the service conditions with which circuit-breakers have to comply with reference to
 - operation and behaviour in normal service;
 - operation and behaviour in the case of short circuit;
 - dielectric properties;
- c) the tests for confirming the compliance of the components with the characteristics under the service conditions and the methods to be adopted for these tests;
- d) the information to be marked on, or given with, the circuit breaker.

NOTE 1 Circuit-breakers which are dealt with in this part of IEC 60077 may be provided with devices for automatic opening under predetermined conditions other than those of over-current, for example, under-voltage and reversal of power current. This part of IEC 60077 does not deal with the verification of operation under such predetermined conditions.

NOTE 2 The incorporation of electronic components or electronic sub-assemblies into electrotechnical components is now common practice.

Although this standard is not applicable to electronic equipment, the presence of electronic components does not provide a reason to exclude such electrotechnical components from the scope.

Electronic sub-assemblies included in circuit-breakers should comply with the relevant standard for electronics (IEC 60571).

NOTE 3 Certain of these rules may, after agreement between the user and the manufacturer, be used for electro-technical components installed on vehicles other than rail rolling stock such as mine locomotives, trolleybuses, etc. In this case, particular additional requirements may be necessary.

This standard does not cover

- a) multi-connection of electro-technical components to achieve a particular duty;
- b) industrial circuit-breakers which have to comply with IEC 60947-2;
- c) d.c. circuit-breakers for fixed installations which have to comply with IEC 61992-2.

For b) and c), in order to ensure satisfactory operation, this standard should be used to specify only the particular requirements for rolling stock. In such cases, a specific document should state the additional requirements with which the industrial or fixed installations circuits breakers are to comply, for example:

- either to be adapted (for example, for control voltage, environmental conditions, etc.);
- or to be installed and used in such a way that they do not have to endure specific rolling stock conditions;
- or to be additionally tested to prove that these components can withstand satisfactorily the rolling stock conditions.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60077. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 60077 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

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

IEC 60077-1:1999, *Railway applications – Electric equipment for rolling stock – Part 1: General service conditions and general rules*

IEC 60077-2:1999, *Railway applications – Electric equipment for rolling stock – Part 2: Electrotechnical components – General rules*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 60571:1998, *Electronic equipment used on rail vehicles*

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

IEC/TR3 60943:1998, *Guidance concerning the permissible temperature rise for parts of electrical equipment, in particular for terminals*

IEC 60947-2:1989, *Low-voltage switchgear and controlgear – Part 2: Circuit-breakers*

IEC 61373:1999, *Railway applications – Rolling stock equipment – Shock and vibration tests*

IEC 61992-2:2001, *Railway applications – Fixed installations – DC switchgear – Part 2: Circuit-breakers*

3 Definitions

For the purpose of this part of IEC 60077, the definitions given in clauses 3 of IEC 60077-1 and IEC 60077-2 are applicable together with the following additional definitions.

3.1 Components

3.1.1

polarized circuit-breaker

circuit-breaker for which the breaking characteristics are defined for only one prescribed direction of current in the main circuit

3.1.2

bi-directional circuit-breaker

circuit-breaker for which the breaking characteristics are the same for both directions of current in main circuit

3.1.3

air circuit-breaker

circuit-breaker in which the contacts open and close in air at atmospheric pressure

[IEV 441-14-27]

3.1.4

semiconductor circuit-breaker

circuit-breaker designed to make and break the current in a circuit by means of the controlled conductivity of a semiconductor

3.1.5

hybrid circuit-breaker

circuit-breaker with mechanical contacts for isolation associated with a semiconductor for switching

NOTE Semiconductor circuit-breakers without mechanical isolation are not used on rolling stock.

3.2 Component parts

3.2.1

release

device, mechanically connected to a mechanical switching device, which releases the holding means and permits the opening or closing of the circuit-breaker

[IEV 441-15-17, modified]

NOTE 1 A circuit-breaker may have several releases each becoming operational according to specified conditions.

NOTE 2 A release may include mechanical, electromechanical or electronic parts.

3.2.1.1

over-current (instantaneous) release

device which causes a tripping operation without any intentional time delay when the current exceeds a specified value

[IEV 441-16-32, modified]