

Railway applications — Electric equipment for rolling stock —

Part 4: Electrotechnical components — Rules for AC circuit-breakers

The European Standard EN 60077-4:2003 has the status of a
British Standard

ICS 45.060

National foreword

This British Standard is the official English language version of EN 60077-4:2003. It is identical with IEC 60077-4:2003.

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.

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**Railway applications -
Electric equipment for rolling stock
Part 4: Electrotechnical components -
Rules for AC circuit-breakers
(IEC 60077-4:2003)**

Applications ferroviaires -
Équipements électriques pour le matériel
roulant
Partie 4: Composants électrotechniques -
Règles pour disjoncteurs à courant
monophasé
(CEI 60077-4:2003)

Bahnanwendungen -
Elektrische Betriebsmittel
auf Bahnfahrzeugen
Teil 4: Elektrotechnische Bauteile -
Regeln für AC-Leistungsschalter
(IEC 60077-4:2003)

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CENELEC

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Foreword

The text of document 9/718/FDIS, future edition 1 of IEC 60077-4, prepared by IEC TC 9, Electrical equipment and systems for railways, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60077-4 on 2003-04-01.

This European Standard shall be read in conjunction with EN 60077-1.

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) 2004-01-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2006-04-01

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

Endorsement notice

The text of the International Standard IEC 60077-4 was approved by CENELEC as a European Standard without any modification.

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INTRODUCTION

This International Standard is Part 4 of the IEC 60077 series.

The purpose of this product standard is to give additional or amended requirements on AC circuit-breakers as a supplement to those given by IEC 60077-2.

During preparation of this product standard, IEC 60056 and IEC 60694 have been considered and their requirements have been kept as far as it has been possible.

This product standard makes reference to the general rules for electrotechnical components given in IEC 60077-2, but for general conditions reference is made directly to IEC 60077-1.

RAILWAY APPLICATIONS – ELECTRIC EQUIPMENT FOR ROLLING STOCK –

Part 4: Electrotechnical components – Rules for AC circuit-breakers

1 Scope

In addition to the general requirements of IEC 60077-2, this part of IEC 60077 gives rules for AC circuit-breakers, the main contacts of which are to be connected to AC overhead contact lines; the nominal voltage of these circuits being in accordance with IEC 60850.

This standard, 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 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 standard may be provided with devices for automatic opening under pre-determined conditions other than those of over-current, for example, undervoltage and reversal of power current. This standard 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 the circuit-breakers should comply with the relevant standard for electronics (IEC 60571).

NOTE 3 Certain of these rules may, after agreement between user and manufacturer, be used for electrotechnical components installed on vehicles other than rail rolling stock.

This standard does not cover industrial circuit-breakers which have to comply with IEC 60056. For these, 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 circuit-breakers are to comply, for example:

- either to be adapted (e.g. for control voltage, environmental conditions, etc.);
- or to be installed and used so 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 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 60056:2001, *High voltage alternating-current circuit-breaker* *

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

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 60571:1998, *Railway applications – Electronic equipment used on rail vehicles*

IEC 60694:1996, *Common specification for high voltage switchgear and controlgear standards*

IEC 60850:2000, *Supply voltage of traction systems*

IEC 61373:1999, *Railway applications – Rolling stock equipment – Shock and Vibration test*

IEC 62271-100:2001, *High-voltage switchgear and controlgear – Part 100: High-voltage alternating-current circuit-breakers*

3 Definitions

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

3.1 Components

3.1.1

indoor circuit-breaker

circuit-breaker designed solely for protected installation against wind, rain, snow, abnormal dirt deposits, abnormal conditions, ice and hoar-frost

[IEV 441-11-04, modified]

3.1.2

outdoor circuit-breaker

circuit-breaker suitable for installation in open air, i.e. capable of withstanding wind, rain, snow, dirt deposits, condensation, ice and hoarfrost

[IEV 441-11-05, modified]

* In preparation.

3.1.3

oil circuit-breaker

circuit-breaker in which the contacts open and close in oil

[IEV 441-14-28]

NOTE Typical examples of oil circuit-breakers are live tank minimum oil circuit-breakers and dead tank bulk oil circuit-breakers.

3.1.4

vacuum circuit-breaker

circuit-breaker in which the contacts open and close within a highly evacuated envelope

[IEV 441-14-29]

3.1.5

air-blast circuit-breaker

circuit-breaker in which the contacts open in a blast of air

[IEV 441-14-32, modified]

3.1.6

gas circuit-breaker

circuit-breaker in which the contacts open and close in a gas other than air at atmospheric or higher pressure

NOTE An example of a gas circuit-breaker is the sulphur hexafluoride circuit-breaker.

3.1.7

semi-conductor circuit-breaker

circuit-breaker whose operation is produced by means of semi-conductors inserted into the main circuit in association with contacts

3.2 Component parts

3.2.1

release

device which releases the holding means and permits the opening or closing of the circuit-breaker

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

NOTE 2 These releases may be mechanically or electrically connected to the switching device.

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]

3.2.1.2

definite time-delay over-current release

over-current release which operates with a definite time-delay which may be adjustable, but is independent of the value of the over-current

[IEV 441-16-34]

3.2.1.3

direct over-current release

over-current release directly energised by the current in the main circuit of the circuit-breaker

[IEV 441-16-36, modified]