



SLOVENSKI STANDARD SIST EN 60077-2:2003

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Railway applications - Electric equipment for rolling stock -- Part 2: Electrotechnical components - General rules

Bahnanwendungen - Elektrische Betriebsmittel auf Bahnfahrzeugen -- Teil 2: Elektrotechnische Bauteile - Allgemeine Regeln

Applications ferroviaires - Equipements électriques du matériel roulant -- Partie 2: Composants électrotechniques - Règles générales

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EUROPEAN STANDARD

EN 60077-2

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EUROPÄISCHE NORM

May 2002

ICS 45.060

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

Applications ferroviaires -
Equipements électriques du matériel
roulant
Partie 2: Composants électrotechniques -
Règles générales
(CEI 60077-2:1999, modifiée)

Bahnanwendungen -
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auf Bahnfahrzeugen
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Allgemeine Regeln
(IEC 60077-2:1999, modifiziert)

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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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 60077-2:1999, prepared by IEC TC 9, Electric railway equipment, together with the common modifications prepared by SC 9XB, Electromechanical material on board of rolling stock, of Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 60077-2 on 2002-03-01.

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

This Part 2 shall be read in conjunction with EN 60077-1.

In this European Standard the common modifications to the International Standard are indicated by a vertical line in the left margin of the text.

Subclauses, tables and figures which are additional to those in IEC 60077-2 are prefixed "Z".

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.

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Introduction

This product standard is Part 2 of the EN 60077 series of product standards:

Railway applications - Electric equipment for rolling stock

- Part 1: General service conditions and general rules,
- Part 2: Electrotechnical components - General rules,
- Part 3: Electrotechnical components - Rules for d.c. circuit-breakers,
- Part 4: Electrotechnical components - Rules for a.c. circuit-breakers,
- Part 5: Electrotechnical components - Rules for HV fuses.

This document has used IEC 60077-2 as its base and its form and structure have been modified to take account of already existing European Standards covering related subjects.

1 Scope

In addition to the rules given in EN 60077-1, this European standard provides general rules for all electrotechnical components installed in power circuits, auxiliary circuits and control circuits, etc., on rolling stock.

NOTE Certain of these rules may, after agreement between user and manufacturer, be used for electrotechnical components installed on vehicles other than rail rolling stock such as mine locomotives, trolleybuses, etc.

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The purpose of this standard is to adapt the general rules given in EN 60077-1 to all electrotechnical components for rolling stock, in order to obtain uniformity of requirements and tests for the corresponding range of components.

Electrotechnical components are mainly switchgear and controlgear, irrespective of their control, including also relays, valves, resistors, fuses, etc.

NOTE 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 should comply with the relevant standard.

This standard states

- a) the characteristics of the components,
- b) the constructional and performance requirements with which components have to comply,
- c) the tests intended to confirm compliance of the components with these characteristics under these service conditions, and the methods to be adopted for these tests,
- d) the information to be marked on, or given with the apparatus.

This standard does not cover industrial electrotechnical components which comply with their own product standard. In order to ensure satisfactory operation of these components for rolling stock, this standard should be used to specify only the particular requirements for railway application. In that case, a specific document should state the additional requirements with which the industrial components are to comply, e.g.

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

2 Normative references

NOTE Normative references to international publications are listed in annex ZA (normative).

3 Definitions

For the purposes of this part of EN 60077, the definitions given in clause 3 of EN 60077-1, together with the following additional definitions, apply.

NOTE The definitions are also given to be used as reference terminology for the other parts of this series of standards, as well as for other particular documents.

3.1 Components

3.1.1

active electrical component

simple device or assembly of devices which, in response to a control signal, executes a function or various inseparable functions by changing their state, for which the control or the function is electrical (e.g. contactor, relay, etc.)

3.1.2

passive electrical component

simple device or assembly of devices which are not included in the active electrical components group and have at least one electrical function (e.g. mounting insulator, permanent connection, resistor, capacitor, etc.)

3.1.3

switchgear and controlgear

a general term covering switching devices and their combination with associated control, measuring, protective and regulating equipment, also assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures [IEV 441-11-01]

3.1.4

switchgear

a general term covering switching devices and their combination with associated control, measuring, protective and regulating equipment, also assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures, intended in principle for use in connection with generation, transmission, distribution and conversion of electric energy [IEV 441-11-02]

3.1.5

controlgear

a general term covering switching devices and their combination with associated control, measuring, protective and regulating equipment, also assemblies of such devices and equipment with associated interconnections, accessories, enclosures and supporting structures, intended in principle for the control of electric energy consuming equipment [IEV 441-11-03]

3.1.6

switching device

a device designed to make or break the current in one or more electric circuits [IEV 441-14-01]

NOTE A switching device may perform one or both of these operations.

3.1.7**fuse**

a device that, by the fusing of one or more of its specifically designed and proportioned components, opens the circuit in which it is inserted by breaking the current when this exceeds a given value for a sufficient time. The fuse comprises all the parts that form the complete device [IEV 441-18-01]

3.1.8**switch (mechanical)**

a mechanical switching device capable of making, carrying and breaking currents under normal circuit conditions which may include specified operating overload conditions and also carrying for a specified time currents under specified abnormal circuit conditions such as those of short-circuit [IEV 441-14-10]

NOTE A switch may be capable of making but not breaking short-circuit currents.

3.1.9**circuit breaker**

a mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions such as those of short-circuit [IEV 441-14-20]

3.1.10**contactor (mechanical)**

a mechanical switching device having only one position of rest, operated otherwise than by hand, capable of making, carrying and breaking currents under normal circuit conditions including operating overload conditions [IEV 811-29-07]

NOTE Contactors may be designated according to the method by which the force for closing the main contacts is provided.

3.1.11**surge arrester**

a device designed to protect the electrical apparatus from high transient overvoltages and to limit the duration and frequently the amplitude of the follow-on current [IEV 604-03-51]

3.1.12**disconnecter (isolator)**

a mechanical switching device which provides, in the open position, an isolating distance in accordance with specified requirements [IEV 811-29-17]

NOTE A disconnecter is capable of opening and closing a circuit only when negligible current is broken or made.

3.2 Component parts**3.2.1****pole of a switching device**

the portion of a switching device associated exclusively with one electrically separated conducting path of its main circuit and excluding those portions which provide a means for mounting and operating all poles together [IEV 441-15-01]

NOTE A switching device is called single-pole if it has only one pole. If it has more than one pole, it may be called multiple (two-pole, three-pole, etc.) provided the poles are or can be coupled in such a manner as to operate together.

3.2.2

main circuit (of a switching device)

all the conductive parts of a switching device included in the circuit which it is designed to close or open [IEV 441-15-02]

NOTE This does not include parts that are included in the auxiliary circuit of the switching device (see 3.2.4).

3.2.3

control circuit (of a switching device)

all the conductive parts (other than the main circuit) of a switching device which are included in a circuit used for the closing operation or opening operation, or both, of the device [IEV 441-15-03]

3.2.4

auxiliary circuit (of a switching device)

all the conductive parts of a switching device which are intended to be included in a circuit other than the main circuit and the control circuits of the device [IEV 441-15-04]

NOTE Some auxiliary circuits fulfil supplementary functions such as signalling, interlocking, etc., and, as such, they may be part of the control circuit of another switching device.

3.2.5

contact (of a mechanical switching device)

conductive parts designed to establish circuit continuity when they touch and which, due to their relative motion during an operation, open or close a circuit or, in the case of hinged or sliding contacts, maintain circuit continuity [IEV 441-15-05]

3.2.6

main contact

a contact included in the main circuit of a mechanical switching device, intended to carry, in the closed position, the current of the main circuit [IEV 441-15-07]

3.2.7

auxiliary contact

a contact included in an auxiliary circuit and mechanically operated by the switching device [IEV 441-15-10]

3.2.8

make contact (normally open)

a control or auxiliary contact which is closed when the main contacts of the mechanical switching device are closed and open when they are open [IEV 811-31-03, mod]

NOTE See complementary information in annex A of this standard.

3.2.9

break contact (normally closed)

a control or auxiliary contact which is open when the main contacts of the mechanical switching device are closed and closed when they are open [IEV 811-31-04, mod]

NOTE See complementary information in annex A of this standard.

3.2.10

relay (electrical)

a device designed to produce sudden, predetermined changes in one or more electrical output circuits when certain conditions are fulfilled in the electrical input circuits controlling the device [IEV 446-11-01, mod]

NOTE This definition may also be applied to relays for which the actuation is not electrical.

3.2.11

release (of a mechanical switching device)

advice, mechanically connected to a mechanical switching device, which releases the holding means and permits the opening or the closing of the switching device [IEV 441-15-17]

3.3 Operational features

3.3.1

operation (of a mechanical switching device)

the transfer of the moving contact(s) from one position to an adjacent position [IEV 441-16-01]

NOTE 1 For example, for a circuit-breaker, this may be a closing operation or an opening operation.

NOTE 2 If distinction is necessary, an operation in the electrical sense, e.g. make or break, is referred to as a *switching operation*, and an operation in the mechanical sense, e.g. close or open, is referred to as a *mechanical operation*.

3.3.2

operating cycle (of a mechanical switching device)

a succession of operations from one position to another and back to the first position through all other positions, if any [IEV 441-16-02]

3.3.3

operating sequence (of a mechanical switching device)

a succession of specified operations with specified time intervals [IEV 441-16-03]

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3.3.Z1

operational frequency

the number of operations for which the component is designed to perform

3.3.4

manual control

control of an operation by human intervention [IEV 441-16-04]

3.3.5

closed position (of a mechanical switching device)

the position in which the predetermined continuity of the main circuit of the device is secured [IEV 441-16-22]

3.3.6

open position (of a mechanical switching device)

the position in which the predetermined dielectric withstand voltage requirements are satisfied between open contacts in the main circuit of the device [IEV 441-16-23, mod]

NOTE This definition differs from IEV 441-16-23 to meet the requirements of dielectric properties.

3.3.7

breaking current (of switching device or a fuse)

the current in a pole of a switching device or in a fuse at the instant of initiation of the arc during a breaking process [IEV 441-17-07]

NOTE For a.c., the current is expressed as the symmetrical r.m.s. value of the a.c. component.