

Railway applications — Electric equipment for rolling stock — Rules for power resistors of open construction

The European Standard EN 60322:2001 has the status of a
British Standard

ICS 45.060; 31.040.99

National foreword

This British Standard is the official English language version of EN 60322:2001. It is identical with IEC 60322:2001. It supersedes BS 4846:1972 (1990) and HD 91 S1:1977 which are withdrawn.

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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Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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This British Standard, having been prepared under the direction of the Electrotechnical Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 October 2001

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English version

**Railway applications -
Electric equipment for rolling stock -
Rules for power resistors of open construction
(IEC 60322:2001)**

Applications ferroviaires -
Équipements électriques du matériel
roulant -
Règles relatives aux résistances de
puissance de construction ouverte
(CEI 60322:2001)

Bahnanwendungen -
Elektrische Ausrüstung für Bahnfahrzeuge -
Regeln für Leistungswiderstände in offener
Bauweise
(IEC 60322:2001)

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

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Foreword

The text of document 9/607/FDIS, future edition 2 of IEC 60322, prepared by IEC TC 9, Electric railway equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60322 on 2001-05-01.

This European Standard supersedes HD 91 S1:1977.

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) 2002-02-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2004-05-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annexes A and ZA are normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60322:2001 was approved by CENELEC as a European Standard without any modification.

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RAILWAY APPLICATIONS – ELECTRIC EQUIPMENT FOR ROLLING STOCK – RULES FOR POWER RESISTORS OF OPEN CONSTRUCTION

1 Scope and object

This International Standard gives the rules for all power resistors (for example, braking, heating, snubber and filter) used in the power and auxiliary circuits on board rolling stock irrespective of the circuit and the type of vehicle where they are used.

These resistors are generally of open construction and are used in polluted areas. The construction consists of resistor elements of grids, plates, strips, ribbons or wires.

NOTE Certain of these rules may, after agreement between user and manufacturer, be used for electrical equipment installed on other vehicles such as mine locomotives, trolley buses, etc.

This standard states

- the characteristics of the resistors;
- the service conditions with which the power resistors have to comply;
- the tests intended for confirming that these conditions have been met and the methods to be adopted for these tests;
- the information to be marked on, or given with, the resistors.

This standard does not give requirements relating to general service conditions and general rules which are given in IEC 60077-1.

The object of this standard is to adapt the general rules given in IEC 60077-1 to power resistors for rolling stock in order to obtain uniformity of requirements and tests throughout the corresponding range of components and to avoid the need for testing to two different standards.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard 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(811):1991, *International Electrotechnical Vocabulary (IEV) – Chapter 811: Electric traction*

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

IEC 60364-4-41:1992, *Electrical installations of buildings – Part 4: Protection for safety – Chapter 41: Protection against electric shock*

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

IEC 61133:1992, *Electric traction – Rolling stock – Test methods for electric and thermal/electric rolling stock on completion of construction and before entry into service*

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

3 Definitions

For the purpose of this International Standard, the definitions of IEC 60050(811) and the following definitions apply.

3.1

resistor element

resistive conductor forming part of a resistor case or frame, usually in the form of grids, plates, strips, ribbons or wires and which may have intermediate tapings
[IEV 811-27-11]

NOTE A resistor element is usually a removable assembly.

3.2

resistor

general term used in this standard to designate any of the following forms of electrical resistance

3.2.1

resistor case

resistor frame

set of resistor elements assembled into a single structure
[IEV 811-27-12]

NOTE 1 Resistor case is used for resistors having one or more resistor elements installed in an enclosure intended to form part of a forced air cooling duct.

NOTE 2 Resistor frame is used for resistors having one or more resistor elements installed on a common frame for natural cooling in open air.

3.2.2

resistor section

resistive circuit contained between two terminals, dedicated to an electrical function and connected to external equipment
[IEV 811-27-14 modified.]

NOTE A resistor section may consist of a part or more than one resistor case or frame.

3.3

double insulation

two-stage insulation, the first between the live conductors and an intermediate frame and the second between the intermediate frame and the body of the vehicle
[IEV 811-27-15]

NOTE 1 The intermediate frame is metallic (see annex A).

NOTE 2 Double insulation in this context does not refer to double insulation used for protection against electric shock (see IEC 60364-4-41).

3.4

multi-stage insulation

insulation system having more than one stage of insulation and an intermediate frame between consecutive stages

NOTE 1 An insulation system having no more than one stage is termed "single insulation".

NOTE 2 For an insulation system having more than one stage, those stages other than the primary insulation are commonly known as "secondary insulation".

3.5

primary insulation

first stage of a multi-stage insulation between live conductors and the intermediate frame

3.6

functional insulation

insulation between conductive parts which is necessary only for the proper function

3.7

basic insulation

insulation applied to live parts to provide basic protection against electric shock (human safety)

3.8

maximum temperature (T_m)

temperature of the hottest point of the resistor element under the specified conditions (duty, cooling, materials, etc.)

3.9

maximum permissible temperature

temperature of the resistor element that can be withstood without any resulting damage (for example, permanent distortion) to any part of the resistor frame or case and its external connections

3.10

rated operational current (I_e)

current value assigned by the manufacturer for a duty cycle under specified conditions

NOTE This may include a value of current capable of being carried continuously.