



SLOVENSKI STANDARD

SIST EN 61881:2001

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Železniške naprave – Oprema voznih sredstev – Kondenzatorji za močnostno elektroniko (IEC 61881:1999)

Railway applications - Rolling stock equipment - Capacitors for power electronics

Bahnanwendungen - Betriebsmittel auf Bahnfahrzeugen - Kondensatoren für Leistungselektronik

Applications ferroviaires - Matériel roulant - Condensateurs pour électronique de puissance

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English version

**Railway applications - Rolling stock equipment
Capacitors for power electronics
(IEC 61881:1999)**

Applications ferroviaires
Matériel roulant
Condensateurs pour électronique de
puissance
(CEI 61881:1999)

Bahnanwendungen
Betriebsmittel auf Bahnfahrzeugen
Kondensatoren für Leistungselektronik
(IEC 61881:1999)

This European Standard was approved by CENELEC on 1999-10-01. 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 members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, 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 document 9/522/FDIS, future edition 1 of IEC 61881, prepared by IEC TC 9, Electric railway equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61881 on 1999-10-01.

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) 2000-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2002-10-01

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

Endorsement notice

The text of the International Standard IEC 61881:1999 was approved by CENELEC as a European Standard without any modification.

In the official version, for annex D, Bibliography, the following notes have to be added for the standards indicated:

IEC 60146-1-1 NOTE: Harmonized as EN 60146-1-1:1993 (not modified).

IEC 61071 NOTE: Harmonized in the EN 61071 series (modified).

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Annex ZA (normative)

**Normative references to international publications
with their corresponding European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-3	1969	Environmental testing Part 2: Tests - Test Ca: Damp heat, steady state	HD 323.2.3 S2 ¹⁾	1987
IEC 60068-2-14	1984	Part 2: Tests - Test N: Change of temperature	EN 60068-2-14 ²⁾	1999
IEC 60068-2-20	1979	Part 2: Tests - Test T: Soldering	HD 323.2.20 S3 ³⁾	1988
IEC 60068-2-21	1999	Part 2-21: Tests - Test U: Robustness of terminations and integral mounting devices	EN 60068-2-21	1999
IEC 60077-1	1999	Railway applications - Electric equipment for rolling stock Part 1: General service conditions and general rules	-	-
IEC 60269-1	1998	Low-voltage fuses Part 1: General requirements	EN 60269-1	1998
IEC 60721-3-5	1997	Classification of environmental conditions Part 3: Classification of groups of environmental parameters and their severities Section 5: Ground vehicle installations	EN 60721-3-5	1997
IEC 61373	1999	Railway applications - Rolling stock equipment - Shock and vibration tests	EN 61373	1999

1) HD 323.2.3 S2 includes A1:1984 to IEC 60068-2-3.

2) EN 60068-2-14 enthält A1:1986 zu IEC 60068-2-14.

3) HD 323.2.20 S3:1988 enthält A2:1987 zu IEC 60068-2-20.

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International Electrotechnical Commission
Telefax: +41 22 919 0300

e-mail: inmail@iec.ch

3, rue de Varembé Geneva, Switzerland
IEC web site <http://www.iec.ch>



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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For price, see current catalogue*

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RAILWAY APPLICATIONS –
ROLLING STOCK EQUIPMENT –
CAPACITORS FOR POWER ELECTRONICS**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined on agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61881 has been prepared by IEC technical committee 9: Electric railway equipment.

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

FDIS	Report on voting
9/522/FDIS	9/530/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 3.

Annexes A and D are for information only.

Annexes B and C form an integral part of this standard.

The committee has decided that this publication remains valid until 2004. At this date, in accordance with the committee's decision, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition; or
- amended.

RAILWAY APPLICATIONS – ROLLING STOCK EQUIPMENT – CAPACITORS FOR POWER ELECTRONICS

1 General

1.1 Scope and object

This International Standard applies to capacitors for power electronics intended to be used on rolling stock.

The rated voltage of capacitors covered by this part is limited to 10 000 V.

The operating frequency of the systems in which these capacitors are used is usually below 2 500 Hz, while the pulse frequencies may go up to several thousand hertz, in some cases beyond 10 000 Hz.

It distinguishes between a.c. and d.c. capacitors.

They are considered as components mounted in enclosures.

NOTE – This standard covers an extremely wide range of capacitor technologies for numerous applications: overvoltage protection, d.c. and a.c. filtering, switching circuits, d.c. energy storage, auxiliary inverters, etc.

The following are excluded from this standard:

- capacitors for induction heat-generating plants operating at frequencies between 40 Hz and 24 000 Hz (see IEC 60110);
- capacitors for motor applications and the like (see IEC 60252);
- capacitors to be used in circuits for blocking one or more harmonics in power supply networks;
- small a.c. capacitors as used for fluorescent and discharge lamps (see IEC 61048 and IEC 61049);
- capacitors for suppression of radio interference (see IEC 60384-14);
- shunt capacitors for a.c. power systems having a rated voltage above 1 000 V (see IEC 60871-1 and IEC 60871-2);
- shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including 1 000 V (see IEC 60831-1 and IEC 60831-2);
- shunt power capacitor of the non self-healing type for a.c. systems having a rated voltage up to and including 1 000 V (see IEC 60931-1 and IEC 60931-2);
- electronic capacitors not used in power circuits (see IEC 60080 and IEC 60166);
- series capacitors for power systems (see IEC 60143);
- coupling capacitors and capacitors dividers (see IEC 60358);
- capacitors for applications requiring energy storage/high current discharge such as photocopies and lasers;
- capacitors for microwave ovens.

Examples are given in clause 6.

1.2 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 60068-2-3, *Environmental testing – Part 2: Tests. Test Ca: Damp heat, steady state*

IEC 60068-2-14, *Environmental testing – Part 2: Tests. Test N: Change of temperature*

IEC 60068-2-20, *Environmental testing – Part 2: Tests. Test T: Soldering*

IEC 60068-2-21, *Environmental testing – Part 2: Tests. Test U: Robustness of terminations and integral mounting devices*

IEC 60077-1, *Railway applications – Electrotechnical components – Part 1: General service conditions* ¹⁾

IEC 60269-1, *Low-voltage fuses – Part 1: General requirements*

IEC 60721-3-5, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Ground vehicle installations*

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

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1.3 Definitions

For the purpose of this International Standard, the following definitions apply.

1.3.1

capacitor element (or element)

indivisible part of a capacitor consisting of two electrodes separated by a dielectric

1.3.2

capacitor unit (or unit)

assembly of one or more capacitor elements in the same container with terminals brought out

1.3.3

capacitor bank

assembly of two or more capacitor units, electrically connected to each other

1.3.4

capacitor

general term used when it is not necessary to state whether reference is made to an element, a unit or a capacitor bank

1) To be published.

1.3.5

capacitor equipment

assembly of capacitor units and their accessories intended for connection to a network

1.3.6

capacitor for power electronics

power capacitor intended to be used in power electronic equipment and capable of operating continuously under sinusoidal and non sinusoidal current and voltage

1.3.7

metal-foil capacitor (non self-healing)

capacitor in which the electrodes usually consist of metal foils separated by a dielectric, in the event of a breakdown of the dielectric; the capacitor does not restore itself

1.3.8

self-healing metallized dielectric capacitor

capacitor, the electrodes of which are metallized (usually by evaporation); in the event of dielectric breakdown, the capacitor restores itself

1.3.9

a.c. capacitor

capacitor essentially designed for operation with alternating voltage

NOTE – AC capacitors may be used with d.c. voltage up to the rated voltage only when authorized by the capacitor manufacturer.

1.3.10

d.c. capacitor

capacitor essentially designed for operation with direct voltage

NOTE – DC capacitors may be used with a specified a.c. voltage only where authorized by the capacitor manufacturer.

1.3.11

model capacitor

smaller unit which simulates a complete unit or element in an electrical test, without reducing the severity of the electrical, thermal or mechanical conditions

NOTE – The combined sum of stresses should always be considered, for instance the sum of temperature, mechanical conditions and electrical stresses.

1.3.12

internal (element) fuse

device incorporated in the capacitor which disconnects an element or a group of elements in the event of breakdown

1.3.13

overpressure devices

1.3.13.1

overpressure disconnecter

disconnecting device inside a capacitor, designed to interrupt the current path in case of capacitor failure