
Železniške naprave - Oprema voznih sredstev - Kondenzatorji za močnostno elektroniko - 2. del: Aluminijevi elektrolitski kondenzatorji z elektrolitom, ki ni v trdnem stanju (IEC 61881-2:2012)

Railway applications - Rolling stock equipment - Capacitors for power electronics - Part 2: Aluminium electrolytic capacitors with non solid electrolyte (IEC 61881-2:2012)

Bahnanwendungen - Betriebsmittel auf Bahnfahrzeugen - Kondensatoren für Leistungselektronik - Teil 2: Aluminium Elektrolytkondensatoren mit nicht festen Elektrolyten (IEC 61881-2:2012)

Applications ferroviaires - Matériel roulant - Condensateurs pour électronique de puissance - Partie 2: Condensateurs électrolytiques à l'aluminium, à électrolyte non solide (IEC 61881-2:2012)

Ta slovenski standard je istoveten z: EN 61881-2:2012

ICS:

31.060.70	Močnostni kondenzatorji	Power capacitors
45.040	Materiali in deli za železniško tehniko	Materials and components for railway engineering

SIST EN 61881-2:2012

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 61881-2:2012](#)

<https://standards.iteh.ai/catalog/standards/sist/ec931cb5-2f6e-46e5-a3c7-bcc48f95263c/sist-en-61881-2-2012>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61881-2

September 2012

ICS 45.060

English version

**Railway applications -
Rolling stock equipment -
Capacitors for power electronics -
Part 2: Aluminium electrolytic capacitors with non solid electrolyte
(IEC 61881-2:2012)**

Applications ferroviaires -
Matériel roulant -
Condensateurs pour électronique de
puissance -
Partie 2: Condensateurs électrolytiques à
l'aluminium, à électrolyte non solide
(CEI 61881-2:2012)

Bahnanwendungen -
Betriebsmittel auf Bahnfahrzeugen -
Kondensatoren für Leistungselektronik -
Teil 2: Aluminium Elektrolytkondensatoren
mit nicht festen Elektrolyten
(IEC 61881-2:2012)

(standards.iteh.ai)

SIST EN 61881-2:2012

<https://standards.iteh.ai/catalog/standards/sist/ec931cb5-2f6e-46e5-a3c7-bcc48f95263c/sist-en-61881-2-2012>

This European Standard was approved by CENELEC on 2012-09-12. 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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 9/1679/FDIS, future edition 1 of IEC 61881-2, prepared by IEC/TC 9, "Electrical equipment and systems for railways" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61881-2:2012.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2013-06-12
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2015-09-12

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61881-2:2012 was approved by CENELEC as a European Standard without any modification.

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

IEC 60077-1:1999	NOTE	Harmonized as EN 60077-1:2002 (modified). https://standards.iteh.ai/catalog/standards/sist/ec951cb5-2f6e-46e5-a3c7-b4d87d4367e6/iec-60077-1-1999
IEC 60077-2:1999	NOTE	Harmonized as EN 60077-2:2002 (modified).
IEC 60664-1:2007	NOTE	Harmonized as EN 60664-1:2007 (not modified).
IEC 61287-1:2005	NOTE	Harmonized as EN 61287-1:2006 (not modified).
IEC 61881-1	NOTE	Harmonized as EN 61881-1.
IEC 61881-3	NOTE	Harmonized as EN 61881-3.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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 60062	2004	Marking codes for resistors and capacitors	EN 60062 + corr. January	2005 2007
IEC 60068-2-14	2009	Environmental testing - Part 2-14: Tests - Test N: Change of temperature	EN 60068-2-14	2009
IEC 60068-2-17	1994	Environmental testing - Part 2: Tests - Test Q: Sealing	EN 60068-2-17	1994
IEC 60068-2-20	-	Environmental testing - Part 2-20: Tests - Test T: Test methods for solderability and resistance to soldering heat of devices with leads	EN 60068-2-20	-
IEC 60068-2-21 + corr. January	2006 2012	Environmental testing - Part 2-21: Tests - Test U: Robustness of terminations and integral mounting devices	EN 60068-2-21	2006
IEC 60068-2-78	-	Environmental testing - Part 2-78: Tests - Test Cap: Damp heat, steady state	EN 60068-2-78	-
IEC 60384-1 + corr. November	2008 2008	Fixed capacitors for use in electronic equipment - Part 1: Generic specification	EN 60384-1	2009
IEC 60384-4	2007	Fixed capacitors for use in electronic equipment - Part 4: Sectional specification - Aluminium electrolytic capacitors with solid (MnO ₂) and non-solid electrolyte	EN 60384-4	2007
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 + corr. October	2010 2011	Railway applications - Rolling stock equipment - Shock and vibration tests	EN 61373	2010
IEC 62497-1	-	Railway applications - Insulation coordination -- Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment	-	-
IEC 62498-1 + corr. November	2010 2010	Railway applications - Environmental conditions for equipment - Part 1: Equipment on board rolling stock	-	-

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 61881-2:2012](https://standards.iteh.ai/catalog/standards/sist/ec931cb5-2f6e-46e5-a3c7-bcc48f95263c/sist-en-61881-2-2012)

<https://standards.iteh.ai/catalog/standards/sist/ec931cb5-2f6e-46e5-a3c7-bcc48f95263c/sist-en-61881-2-2012>



IEC 61881-2

Edition 1.0 2012-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Railway applications – Rolling stock equipment – Capacitors for power electronics –

Part 2: Aluminium electrolytic capacitors with non-solid electrolyte

Applications ferroviaires – Matériel roulant – Condensateurs pour électronique de puissance –

Partie 2: Condensateurs électrolytiques à l'aluminium, à électrolyte non solide

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

U

ICS 45.060

ISBN 978-2-83220-259-3

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	8
4 Service conditions	10
4.1 Normal service conditions	11
4.1.1 General	11
4.1.2 Altitude.....	11
4.1.3 Temperature.....	11
4.2 Unusual service conditions.....	11
5 Quality requirements and tests	12
5.1 Test requirements	12
5.1.1 General	12
5.1.2 Test conditions	12
5.1.3 Measurement conditions.....	12
5.1.4 Voltage treatment.....	12
5.1.5 Thermal treatment.....	12
5.2 Classification of tests	12
5.2.1 General	12
5.2.2 Type tests	13
5.2.3 Routine tests	13
5.2.4 Acceptance tests	14
5.3 Capacitance and tangent of loss angle ($\tan\delta$)	14
5.3.1 Capacitance	14
5.3.2 Tangent of loss angle ($\tan\delta$)	14
5.4 Leakage current	14
5.4.1 Capacitor cell	14
5.4.2 Capacitor module or bank.....	14
5.5 Insulation test between terminals and case	14
5.5.1 Capacitor cell	14
5.5.2 Capacitor module or bank.....	15
5.6 Sealing test	15
5.7 Surge discharge test (under consideration)	15
5.7.1 General	15
5.7.2 Preconditioning.....	15
5.7.3 Initial measurement	15
5.7.4 Test methods.....	15
5.7.5 Post treatment.....	16
5.7.6 Final measurement.....	16
5.7.7 Acceptance criteria	16
5.8 Environmental testing	16
5.8.1 Change of temperature	16
5.8.2 Damp heat, steady state.....	17
5.9 Mechanical testing	18
5.9.1 Mechanical tests of terminals	18

5.9.2	External inspection	18
5.9.3	Vibration and shocks	18
5.10	Endurance test	18
5.10.1	General	18
5.10.2	Preconditioning	18
5.10.3	Initial measurements	18
5.10.4	Test methods	18
5.10.5	Post treatment	19
5.10.6	Final measurement	19
5.10.7	Acceptance criteria	19
5.11	Pressure relief test	19
5.12	Passive flammability	19
6	Overloads	19
6.1	Maximum permissible voltage	19
6.2	Maximum permissible current	20
7	Safety requirements	20
7.1	Discharge device	20
7.2	Case connections (grounding)	20
7.3	Protection of the environment	20
7.4	Other safety requirements	20
8	Marking	21
8.1	Marking of the capacitor	21
8.1.1	Capacitor cell	21
8.1.2	Capacitor module or bank	21
8.2	Data sheet	21
9	Guidance for installation and operation	22
9.1	General	22
9.2	Choice of rated voltage	22
9.3	Operating temperature	22
9.3.1	Life time of capacitor	22
9.3.2	Installation	22
9.3.3	Unusual cooling conditions	23
9.4	Over voltages	23
9.5	Overload currents	23
9.6	Switching and protective devices	23
9.7	Dimensioning of creepage distance and clearance	24
9.8	Connections	24
9.9	Parallel connections of capacitors	24
9.10	Series connections of capacitors	24
9.11	Magnetic losses and eddy currents	24
9.12	Guide for unprotected capacitors	24
Annex A (informative)	Terms and definitions of capacitors	25
Bibliography	26
Figure 1	– Examples of preferred vent and anode position	23
Figure A.1	– Example of capacitor application in capacitor equipment	25
Table 1	– Classification of tests	13

Table 2 – Damp heat steady-state test.....	17
Table 3 – Testing the robustness of terminals.....	18

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 61881-2:2012

<https://standards.iteh.ai/catalog/standards/sist/ec931cb5-2f6e-46e5-a3c7-bcc48f95263c/sist-en-61881-2-2012>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 2: Aluminium electrolytic capacitors with non-solid electrolyte

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of 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 IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61881-2 has been prepared by technical committee 9: Electrical equipment and systems for railways.

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

FDIS	Report on voting
9/1679/FDIS	9/1707/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 2.

A list of all parts of IEC 61881 series, under the general title *Railway applications – Rolling stock equipment – Capacitors for power electronics*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 61881-2:2012](https://standards.iteh.ai/catalog/standards/sist/ec931cb5-2f6e-46e5-a3c7-bcc48f95263c/sist-en-61881-2-2012)

<https://standards.iteh.ai/catalog/standards/sist/ec931cb5-2f6e-46e5-a3c7-bcc48f95263c/sist-en-61881-2-2012>