

**Railway applications - Rolling stock equipment -
Capacitors for power electronics - Part 3: Electric
double-layer capacitors**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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**Railway applications -
Rolling stock equipment -
Capacitors for power electronics -
Part 3: Electric double-layer capacitors
(IEC 61881-3:2012)**

Applications ferroviaires -
Matériel roulant -
Condensateurs pour électronique de
puissance -
Partie 3: Condensateurs électriques à
double couche
(CEI 61881-3:2012)

Bahnanwendungen -
Betriebsmittel auf Bahnfahrzeugen -
Kondensatoren für Leistungselektronik -
Teil 3: Doppelschichtkondensatoren
(IEC 61881-3:2012)

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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 9/1680/FDIS, future edition 1 of IEC 61881-3, 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 61881-3:2012.

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- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2015-09-12

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Endorsement notice

The text of the International Standard IEC 61881-3:2012 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).
IEC 60077-2:1999	NOTE	Harmonized as EN 60077-2:2002 (modified).
IEC 60384-1:2008	NOTE	Harmonized as EN 60384-1:2009 (not 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 61881-1:2010	NOTE	Harmonized as EN 61881-1:2011 (not modified).
IEC 61881-2	NOTE	Harmonized as EN 61881-2.

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 60068-1 + corr. October + A1	1988 1988 1992	Environmental testing - Part 1: General and guidance	EN 60068-1 - ¹⁾	1994 -
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	-	Environmental testing - Part 2-21: Tests - Test U: Robustness of terminations and integral mounting devices	EN 60068-2-21	-
IEC 60068-2-78	-	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	-
IEC 60571 +A1	1998 2006	Electronic equipment used on rail vehicles	-	-
IEC 60721-3-5	-	Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 5: Ground vehicle installations	EN 60721-3-5	-
IEC 61373 + corr. October	2010 2011	Railway applications - Rolling stock equipment - Shock and vibration tests	EN 61373	2010
IEC 62236-3-2	-	Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock - Apparatus	-	-
IEC 62391-1	2006	Fixed electric double-layer capacitors for use in electronic equipment - Part 1: Generic specification	EN 62391-1	2006
IEC 62391-2	2006	Fixed electric double-layer capacitors for use in electronic equipment - Part 2: Sectional specification - Electric double-layer capacitors for power application	EN 62391-2	2006
IEC 62497-1	-	Railway applications - Insulation coordination -- Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment	-	-

¹⁾ EN 60068-1 includes A1 to IEC 60068-1+ corr. October .

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 62498-1	2010	Railway applications - Environmental conditions for equipment -	-	-
+ corr. November	2010	Part 1: Equipment on board rolling stock		
IEC 62576	2009	Electric double-layer capacitors for use in hybrid electric vehicles - Test methods for electrical characteristics	EN 62576	2010

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

Part 3: Electric double-layer capacitors

1 Scope

This part of IEC 61881 applies to d.c. electric double-layer capacitors (cell, module and bank) for power electronics intended to be used on rolling stock.

This standard specifies quality requirements and tests, safety requirements, and describes installation and operation information.

NOTE Example of the application for capacitors specified in this Standard; d.c. energy storage, etc.

Capacitors not covered by this Standard:

- IEC 61881-1: Paper/plastic film capacitors;
- IEC 61881-2: Aluminium electrolytic capacitors with non-solid electrolyte.

Guidance for installation and operation is given in Clause 9.

2 Normative references

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.

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*
and Amendment 1:1992

IEC 60068-2-14:2009, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-17:1994, *Environmental testing – Part 2-17: Tests. Test Q: Sealing*

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*

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

IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60571:1998, *Electronic equipment used on rail vehicles*
and Amendment 1:2006

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

IEC 61373:2010, *Railway applications – Rolling stock equipment – Shock and vibration tests*

IEC 62236-3-2, *Railway applications – Electromagnetic compatibility – Part 3-2: Rolling stock – Apparatus*

IEC 62391-1:2006, *Fixed electric double-layer capacitors for use in electronic equipment – Part 1: Generic specification*

IEC 62391-2:2006, *Fixed electric double-layer capacitors for use in electronic equipment – Part 2: Sectional specification – Electric double-layer capacitors for power application*

IEC 62497-1, *Railway applications – Insulation coordination – Part 1: Basic requirements – Clearances and creepage distances for all electrical and electronic equipment*

IEC 62498-1:2010, *Railway applications – Environmental conditions for equipment – Part 1: Equipment on board rolling stock*

IEC 62576:2009, *Electric double-layer capacitors for use in hybrid electric vehicles – Test methods for electrical characteristics*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

capacitor element

indivisible part of a capacitor consisting of two electrodes (typically made of carbon) separated by an electrolyte impregnated separator

Note 1 to entry: In the literature this type of capacitor element is often called EDLC (Electric double layer capacitor) element. An electric double-layer capacitor element utilizes the ability to accumulate electric charge in an electric double layer which is formed at the boundary surface between an electrode material (electronic conductor) and an electrolyte. This capacitor is essentially designed for operation with direct current voltage.

3.2

capacitor cell

one or more capacitor elements, packaged in the same enclosure with terminals brought out

SEE: Annex A

3.3

capacitor module

assembly of two or more capacitor cells, electrically connected to each other with or without additional electronics

SEE: Annex A

3.4

capacitor bank

assembly of two or more capacitor modules

SEE: Annex A

3.5

capacitor

general term used when it is not necessary to state whether a reference is made to capacitor cell, module or bank

[SOURCE: IEC 61881-1:2010, 3, modified]