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SIST EN 61071-2:1999

Capacitors for power electronics

Kondensatoren der Leistungselektronik

Condensateurs pour électronique de puissance

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[SIST EN 61071:2007](#)

Ta slovenski standard je istoveten z: **EN 61071:2007**

[http://www.sist.si/caslog/standards/61071-2007-99-4440-b72f-ecaa94efc6d5/sist-en-61071-2007](#)

ICS:

31.060.70 T [] [• q ã [] å ^ } : æ [] lã Power capacitors

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English version

**Capacitors for power electronics
(IEC 61071:2007)**

Condensateurs
pour électronique de puissance
(CEI 61071:2007)

Kondensatoren
der Leistungselektronik
(IEC 61071:2007)

This European Standard was approved by CENELEC on 2007-04-01. 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.

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.

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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 33/432/FDIS, future edition 1 of IEC 61071, prepared by IEC TC 33, Power capacitors, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61071 on 2007-04-01.

This European Standard supersedes EN 61071-1:1996 and EN 61071-2:1996.

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) 2008-01-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2010-04-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61071:2007 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	NOTE Harmonized as EN 60077-1:2002 (modified).
IEC 60077-2	NOTE Harmonized as EN 60077-2:2002 (modified).
IEC 60146-1-1	NOTE Harmonized as EN 60146-1-1:1993 (not modified).
IEC 61287-1	NOTE Harmonized as EN 61287-1:2006 (not modified).
IEC 60110-1	NOTE Harmonized as EN 60110-1:1998 (not modified).
IEC 60143	NOTE Harmonized in EN 60143 series (partially modified).
IEC 60252-1	NOTE Harmonized as EN 60252-1:2001 (not modified).
IEC 60252-2	NOTE Harmonized as EN 60252-2:2003 (not modified).
IEC 60358	NOTE Harmonized as HD 597 S1:1992 (not modified).
IEC 60384-14	NOTE Harmonized as EN 60384-14:2005 (not modified).
IEC 60831-1	NOTE Harmonized as EN 60831-1:1996 (not modified).
IEC 60831-2	NOTE Harmonized as EN 60831-2:1996 (not modified).
IEC 60871-1	NOTE Harmonized as EN 60871-1:2005 (not modified).
IEC 60931-1	NOTE Harmonized as EN 60931-1:1996 (not modified).
IEC 60931-2	NOTE Harmonized as EN 60931-2:1996 (not modified).

IEC 61048	NOTE Harmonized as EN 61048:2006 (not modified).
IEC 61049	NOTE Harmonized as EN 61049:1993 (modified).
IEC 61270-1	NOTE Harmonized as EN 61270-1:1996 (not modified).
IEC 61881	NOTE Harmonized as EN 61881:1999 (not modified).

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. 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 60068-2-6	- ¹⁾	Environmental testing - Part 2: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	1995 ²⁾
IEC 60068-2-14	- ¹⁾	Environmental testing - Part 2: Tests - Test N: Change of temperature	EN 60068-2-14	1999 ²⁾
IEC 60068-2-20	- ¹⁾	Environmental testing - Part 2: Tests - Test T: Soldering	HD 323.2.20 S3	1988 ²⁾
IEC 60068-2-21	- ¹⁾	Environmental testing - Part 2-21: Tests - Test U: Robustness of terminations and integral mounting devices	EN 60068-2-21	2006 ²⁾
IEC 60068-2-78	- ¹⁾	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state	EN 60068-2-78	2001 ²⁾
IEC 60071-1	- ¹⁾	Insulation co-ordination - Part 1: Definitions, principles and rules	EN 60071-1	2006 ²⁾
IEC 60071-2	- ¹⁾	Insulation co-ordination - Part 2: Application guide	EN 60071-2	1997 ²⁾
IEC 60269-1	- ¹⁾	Low-voltage fuses - Part 1: General requirements	EN 60269-1	200X ³⁾
IEC 60664-1	- ¹⁾	Insulation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests	EN 60664-1	2003 ²⁾
IEC 60695-2-11	- ¹⁾	Fire hazard testing - Part 2-11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products	EN 60695-2-11	2001 ²⁾
IEC 60695-2-12	- ¹⁾	Fire hazard testing - Part 2-12: Glowing/hot-wire based test methods - Glow-wire flammability test method for materials	EN 60695-2-12	2001 ²⁾
IEC 60947-1	- ¹⁾	Low-voltage switchgear and controlgear - Part 1: General rules	EN 60947-1 + corr. November	2004 ²⁾ 2004

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

³⁾ To be published.

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International Electrotechnical Commission, 3, rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



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CONTENTS

FOREWORD.....	7
1 Scope.....	11
2 Normative references.....	13
3 Terms and definitions	13
4 Service conditions.....	23
4.1 Normal service conditions	23
4.2 Unusual service conditions	25
5 Quality requirements and tests.....	25
5.1 Test requirements.....	25
5.2 Classification of tests.....	27
5.3 Capacitance and $\tan \delta$ measurements (routine test)	29
5.4 Measurement of the tangent of the loss angle ($\tan \delta$) of a capacitor (type test)	29
5.5 Voltage test between terminals	31
5.6 AC voltage test between terminals and case	33
5.7 Test of internal discharge device.....	33
5.8 Sealing test	33
5.9 Surge discharge test.....	35
5.10 Thermal stability test.....	35
5.11 Self-healing test.....	37
5.12 Resonance frequency measurement	39
5.13 Environmental testing	39
5.14 Mechanical testing	39
5.15 Endurance test	41
5.16 Destruction test	45
5.17 Disconnecting test on internal fuses.....	55
6 Overloads.....	59
6.1 Maximum permissible voltages	59
7 Safety requirements.....	61
7.1 Discharge device	61
7.2 Case connections	61
7.3 Protection of the environment	61
7.4 Other safety requirements.....	61
8 Markings.....	63
8.1 Marking of the units	63
9 Guide to installation and operation	63
9.1 General	63
9.2 Choice of rated voltage	65
9.3 Operating temperature.....	65
9.4 Special service conditions.....	67
9.5 Overvoltages	69
9.6 Overcurrents	69
9.7 Switching and protective devices	69
9.8 Choice of creepage distance and clearance	69
9.9 Connections	71

9.10	Parallel connections of capacitors	71
9.11	Series connections of capacitors.....	71
9.12	Magnetic losses and eddy currents	73
9.13	Guide for internal fuse and disconnecter protection in capacitors.....	73
9.14	Guide for unprotected capacitors	73
Annex A (informative) Waveforms		75
Annex B (normative) Operational limits of capacitors with sinusoidal voltages as a function of frequency and at maximum temperature (θ_{max})		79
Annex C (normative) Resonance frequency measuring methods – Examples		83
Bibliography		87
Figure 1 – Destruction test arrangement.....		49
Figure 2 – N source d.c., type 1.....		53
Figure 3 – N source d.c., type 2.....		53
Figure A.1 – Example of waveforms and their circuits		77
Figure B.1 – Supply conditions		79
Figure C.1 – Measuring circuit.....		83
Figure C.2 – Relation between the voltage across the capacitor and the supply frequency.....		83
Figure C.3 – Discharge current wave shape.....		85
SIST EN 61071:2007		
Table 1 – Test voltage between terminals.....		31
Table 2 – Testing the robustness of terminals.....		41
Table 3 – Endurance test		43
Table 4 – Destruction test as a function of type of safety system.....		45
Table 5 – Maximum permissible voltages		59

INTERNATIONAL ELECTROTECHNICAL COMMISSION

CAPACITORS FOR POWER ELECTRONICS

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.
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International Standard IEC 61071-1 has been prepared by IEC technical committee 33: Power capacitors.

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

FDIS	Report on voting
33/432/FDIS	33/433/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.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

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CAPACITORS FOR POWER ELECTRONICS

1 Scope

This International Standard applies to capacitors for power electronics applications.

The operating frequency of the systems in which these capacitors are used is usually up to 15kHz, while the pulse frequencies may be up to 5 to 10 times the operating frequency.

The standard distinguishes between a.c. and d.c. capacitors which are considered as components when mounted in enclosures.

This standard covers an extremely wide range of capacitor technologies for numerous applications, e.g. 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 60110-1 and IEC 60110-2);
- capacitors for motor applications and the like (see IEC 60252-1 and IEC 60252-2);
- 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); <https://standards.iteh.ai/catalog/standards/sist/a667bf19-6c99-4440-b72f-999999999999/iec-61048-2007>
- 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;
- series capacitors for power systems (see IEC 60143);
- coupling capacitors and capacitors dividers (see IEC 60358);
- capacitors for microwave ovens (see IEC 61270-1);
- capacitors for railway applications (see IEC 61881).

Examples of applications are given in Clause 9.1.

2 Normative references

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

IEC 60068-2-6, *Environmental testing – Part 2: Tests. Test Fc: Vibration (sinusoidal)*

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

IEC 60071-1, *Insulation coordination – Part 1: Definitions, principle and rules*

IEC 60071-2, *Insulation coordination – Part 2: Application guide*

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

IEC 60664-1, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

IEC 60695-2-11, *Fire hazard testing – Part 2-11: Glowing/hotwire based test methods, Glow-wire flammability test method for end-products*

IEC 60695-2-12, *Fire hazard testing – Part 2-12: Glowing/hotwire based test methods, Glow-wire flammability test method for materials*

IEC 60947-1, *Low-voltage switchgear and controlgear – Part 1: General rules*

3 Terms and definitions

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

3.1

capacitor element (or element)

a device consisting essentially of two electrodes separated by a dielectric

[IEV 436-01-03]

3.2

capacitor unit (or unit)

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

[IEV 436-01-04]

3.3

capacitor bank

number of capacitor units connected so as to act together

[IEV 436-01-06]

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

3.5 capacitor equipment

assembly of capacitor units and their accessories intended for connection in power electronic equipment

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

3.7 metal-foil capacitor (non-self-healing)

capacitor in which the electrodes usually consist of metal foils separated by a dielectric

NOTE In the event of a breakdown of the dielectric, the capacitor does not restore itself.

3.8 self-healing metallized dielectric capacitor

capacitor, of which at least one electrode consists of a metallic deposit on the dielectric

NOTE In the event of local breakdown of the dielectric, the electric properties of the capacitor are rapidly and essentially self-restored.

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.

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.

3.11 model capacitor

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

NOTE 1 The model unit may be of a different size from the complete unit.

NOTE 2 The combined sum of stresses should always be considered, for instance the sum of temperature and mechanical conditions as well as electrical stresses.

3.12 internal (element) fuse

fuse connected inside a capacitor unit, in series with an element or a group of elements

[IEV 436-03-16]

3.13 safety devices

3.13.1

overpressure disconnecter

disconnecting device inside a capacitor, designed to interrupt the current path in case of abnormal increase of internal overpressure

3.13.2

overpressure detector

device designed to detect abnormal increase of the internal pressure, usually used to operate an electrical switch and indirectly interrupt the current path

3.13.3

segmented metallization design

design of the metal layer over the dielectric shaped in a way to allow a small part of it to be isolated in case of local short circuit or breakdown, in order to restore the full functionality of the unit with a negligible loss of capacitance

3.13.4

special unsegmented metallization design

design of the metal layer over the dielectric shaped in a way that safe self-healing features operating at a voltage up to U_s guarantee the full functionality of the unit with a negligible loss of capacitance.

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3.14

discharge device of a capacitor (standards.iteh.ai)

a device which may be incorporated in a capacitor, capable of reducing the voltage between the terminals practically to zero, within a given time, after the capacitor has been disconnected from a network

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[IEV 436-03-15 modified]

[eaa94efc6d5/sist-en-61071-2007](https://standards.iteh.ai/catalog/standards/sist/a667bfl9-6c99-4440-b72f-eaa94efc6d5/sist-en-61071-2007)

3.15

rated a.c. voltage

U_N

maximum operating peak recurrent voltage of either polarity of a reversing type waveform for which the capacitor has been designed

NOTE 1 The waveform can have many shapes. Examples are given in Annex A.

NOTE 2 The mean value of the waveform may be positive or negative.

NOTE 3 It is important to note that the rated a.c. voltage is not an r.m.s. value.

3.16

rated d.c. voltage

U_{NDC}

maximum operating peak voltage of either polarity but of a non-reversing type waveform, for which the capacitor has been designed, for continuous operation

NOTE 1 Damping capacitors, for gate turn-off thyristor (GTO) can be regarded as d.c. capacitors with a ripple voltage equal to the rated d.c. voltage $U_{NDC} = U_r$.

In the case of reversal voltage (U_{rev}), the use should be agreed between user and manufacturer.

NOTE 2 If the reversal voltage is small (less than 10 %), the voltage waveform can be considered to be non-reversing. For test purposes, U_{NDC} and U_r should be increased by U_{rev} , the reversal voltage.

3.17

ripple voltage

U_r

peak-to-peak alternating component of the unidirectional voltage