
Power electronic capacitors -- Part 1: General (IEC 61071-1:1991, modified)

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EUROPEAN STANDARD

EN 61071-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 1996

ICS 31.060.70

Descriptors: Electronic equipment, power capacitors, definitions, operating requirements, tests, classifications, quality, safety requirements, installation, marking

English version

Power electronic capacitors
Part 1: General
(IEC 1071-1:1991, modified)

Condensateurs pour l'électronique
de puissance
Partie 1: Généralités
(CEI 1071-1:1991, modifiée)

Kondensatoren der Leistungselektronik
Teil 1: Allgemeines
(IEC 1071-1:1991, modifiziert)

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This European Standard was approved by CENELEC on 1996-07-02. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, 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 the International Standard IEC 1071-1:1995, prepared by IEC TC 33, Power capacitors, was submitted to the formal vote.

Following a decision by the 86th Technical Board, a draft amendment, prepared by Reporting Secretariat SR 33, was submitted to the formal vote.

The two texts were combined and approved by CENELEC as EN 61071-1 on 1996-07-02.

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) 1997-06-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 1997-06-01

For products which have complied with the relevant national standard before 1997-06-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2002-06-01.

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

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Endorsement notice

The text of the International Standard IEC 1071-1:1995 was approved by CENELEC as a European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS

1.3 Definitions

Replace "1.3.13" by "1.3.13.1".

Add:

1.3.13.2 Overpressure sensing device: A device designed to detect excessive internal overpressure.

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 68-2-6	1982	Basic environmental testing procedures Part 2: Tests - Test Fc and guidance: Vibration (Sinusoidal)	HD 323.2.6 S2 ¹⁾	1988
IEC 146	series	Semiconductors converters	-	-
IEC 411	series	Power converters for electric traction	-	-
IEC 664	1980	Insulation coordination within low-voltage systems including clearances and creepage distances for equipment	-	-
IEC 664A	1981 ²⁾	First supplement	-	-

1) HD 323.2.6 S2 is superseded by EN 60068-2-6:1995, which is based on IEC 68-2-6:1995.

2) IEC 664 + IEC 664A are superseded by IEC 664-1:1992. IEC 664-1:1992, mod., is harmonized as HD 625.1 S1:1996.

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Condensateurs pour l'électronique
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Partie 1:
Généralités

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Power electronic capacitors

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Part 1:
General

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International Electrotechnical Commission
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For price, see current catalogue

CONTENTS

	Page
FOREWORD	7
Clause	
SECTION 1 - GENERAL	
1.1 Scope and object	9
1.2 Normative references	11
1.3 Definitions	11
1.4 Service conditions	17
SECTION 2 - QUALITY REQUIREMENTS AND TESTS	
2.1 Test requirements	21
2.2 Classification of tests	23
2.3 Capacitance and $\tan \delta$ measurements (routine test)	25
2.4 Capacitor loss tangent ($\tan \delta$) measurement (type test)	27
2.5 Voltage test between terminals	27
2.6 A.C. voltage test between terminals and container	29
2.7 Test of internal discharge device	29
2.8 Sealing test	31
2.9 Surge discharge test	31
2.10 Thermal stability test	31
2.11 Self-healing test (under consideration)	33
2.12 Resonance frequency measurement	35
2.13 Climatic tests	35
2.14 Mechanical tests	35
2.15 Endurance test (under consideration)	35
SECTION 3 - OVERLOADS	
3.1 Maximum permissible voltage	37
SECTION 4 - SAFETY REQUIREMENTS	
4.1 Discharge device	37
4.2 Container connections	39
4.3 Protection of the environment	39
4.4 Other safety requirements	39

Clause	Page
--------	------

SECTION 5 - MARKINGS

5.1 Marking of the units.....	39
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SECTION 6 - GUIDE TO INSTALLATION AND OPERATION

6.1 General	41
6.2 Choice of the rated voltage	43
6.3 Operating temperature	43
6.4 Special service conditions	49
6.5 Overvoltages	49
6.6 Overload currents	51
6.7 Switching and protective devices	51
6.8 Connections	51
6.9 Choice of creepage distance	53
6.10 Parallel connections of capacitors	53
6.11 Series connections of capacitors	53
6.12 Magnetic losses and eddy currents	53

[SIST EN 61071-1:1999](https://standards.iteh.ai/catalog/standards/sist/be5e7136-0dd7-4ff4-8c85-b1b5e04e213e/sist-en-61071-1-1999)

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ANNEXES (normative)

A Waveforms	55
B Operational limits of capacitors with sinusoidal voltages as a function of frequency, and at maximum temperature (θ_{max})	59
C Resonance frequency measuring methods	63

INTERNATIONAL ELECTROTECHNICAL COMMISSION

POWER ELECTRONIC CAPACITORS

Part 1: General

FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.
- 4) The IEC has not laid down any procedure concerning marking as an indication of approval and has no responsibility when an item of equipment is declared to comply with one of its recommendations.

This International Standard has been prepared by IEC Technical Committee No. 33: Power capacitors.

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

Six Months' Rule	Report on Voting
33(CO)90	33(CO)95

Full information on the voting for the approval of this part can be found in the Voting Report indicated in the above table.

Annexes A, B and C form an integral part of this part of IEC 1071.

POWER ELECTRONIC CAPACITORS

Part 1: General

SECTION 1 - GENERAL

1.1 Scope and object

This part of IEC 1071 applies to capacitors intended to be used in power electronic equipment, particularly for:

- semiconductor switching and protection,
- filtering and energy storage.

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 1 000 Hz, while the pulse frequencies may go up to several 1 000 Hz in some cases beyond 10 000 Hz.

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

They are considered as components mounted in enclosures.

Capacitors within the scope of this part include those capacitors intended for use in power electronic equipment such as: Semiconductor converters according to IEC 146 or IEC 411.

NOTES

1 The following are excluded from this part:

- Capacitors for induction heat-generating plants operating at frequencies between 40 and 24 000 Hz (IEC 110).
- Capacitors for motor applications and the like (IEC 252).
- 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 (IEC 566).
- Capacitors for suppression of radio interference (IEC 384-14).
- Shunt capacitors for a.c. power systems having a rated voltage above 1 000 V (IEC 871-1, 2).
- Shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including 1 000 V (IEC 831-1, 2).
- Shunt power capacitors of the non self-healing type for a.c. systems having a rated voltage up to and including 1 000 V (IEC 931-1, 2).
- Electronic capacitors not used in power circuits, (IEC 80 and 166).
- Series capacitors for power systems (IEC 143).
- Coupling capacitors and capacitor dividers (IEC 358).
- Capacitors for applications requiring energy storage/high current discharge such as photocopiers and lasers.
- Capacitors for microwave ovens.

2 Additional requirements for capacitors to be protected by internal fuses and internal disconnecting devices, as well as requirements for self-healing tests, endurance tests and destruction tests are under consideration.

3 This standard covers an extremely wide range of capacitor technologies for numerous applications.

Examples are given in section 6.

The object of this standard is:

- a) to formulate uniform rules regarding performances, testing and rating;
- b) to formulate specific safety rules;
- c) to provide a guide for installation and operation.

1.2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of IEC 1071. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of IEC 1071 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 68: *Environmental testing.*

IEC 68-2-6: 1982, *Environmental testing - Part 2: Tests - Test Fc and guidance: Vibration (sinusoidal).*

IEC 146: *Semiconductor converters* (standards.iteh.ai)

IEC 411: *Power converters for electric traction.* 61071-1:1999
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IEC 664A: 1981, *Insulation co-ordination within low-voltage systems, including clearances and creepage distances for equipment. First supplement.*

1.3 Definitions

1.3.1 capacitor element (or element): An indivisible part of a capacitor consisting of two electrodes separated by a dielectric.

1.3.2 capacitor unit (or unit): An assembly of one or more capacitor elements in the same container with terminals brought out.

1.3.3 capacitor bank: An assembly of two or more capacitor units, electrically connected to each other.

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

1.3.5 capacitor equipment: An assembly of capacitor units and their accessories intended for connection to a network.

1.3.6 power electronic capacitor: A power capacitor intended to be used in power electronic equipment and capable of operating continuously under non-sinusoidal current and voltage.

1.3.7 metal-foil capacitor (non self-healing): A capacitor in which the electrodes usually consist of metal foils separated by a dielectric, in the event of breakdown of the dielectric, the capacitor does not restore itself.

1.3.8 self-healing metallized dielectric capacitor: A 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: A capacitor essentially designed for operation with alternating voltage.

NOTE - A.C. capacitors may be used with d.c. voltage up to the rated voltage only where authorized by the capacitor manufacturer.

1.3.10 d.c. capacitor: A capacitor essentially designed for operation with direct voltage.

NOTE - D.C. capacitors may be used with a.c. voltages only where authorized by the capacitor manufacturer.

1.3.11 model capacitor: A 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: A device incorporated in the capacitor which disconnects an element or a group of elements in the event of breakdown.

1.3.13 overpressure disconnecter: A disconnecting device designed to interrupt the current path in the case of abnormal increase of the internal pressure.

1.3.14 Internal discharge device: A device incorporated in the capacitor connecting the terminals of the unit, capable of reducing the residual voltage effectively to zero after the capacitor has been disconnected from the supply.

1.3.15 rated a.c. voltage (U_N): The maximum operating peak recurrent voltage of either polarity of a reversing type waveform for which the capacitor has been designed.

NOTES

- 1 The waveform can have many shapes - examples are given in annex A.
- 2 The mean value of the waveform may be positive or negative.
- 3 It is important to note that the rated a.c. voltage is not an r.m.s. value.