



**SLOVENSKI STANDARD**  
**SIST EN 60143-1:2015**

**01-december-2015**

**Nadomešča:**  
**SIST EN 60143-1:2004**

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**Zaporedni kondenzatorji za elektroenergetske sisteme - 1. del: Splošno**

Series capacitors for power systems - Part 1: General

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**Ta slovenski standard je istoveten z: EN 60143-1:2015**

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**ICS:**

31.060.70      Močnostni kondenzatorji      Power capacitors

**SIST EN 60143-1:2015**

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EUROPEAN STANDARD

**EN 60143-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2015

ICS 31.060.70

Supersedes EN 60143-1:2004

English Version

**Series capacitors for power systems - Part 1: General  
(IEC 60143-1:2015)**

Condensateurs série destinés à être installés sur des  
réseaux - Partie 1: Généralités  
(IEC 60143-1:2015)

Reihenkondensatoren für Starkstromanlagen - Teil 1:  
Allgemeines  
(IEC 60143-1:2015)

This European Standard was approved by CENELEC on 2015-07-30. 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.

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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

**EN 60143-1:2015****European foreword**

The text of document 33/578/FDIS, future edition 5 of IEC 60143-1, prepared by IEC/TC 33 "Power capacitors and their applications" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60143-1:2015.

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) 2016-04-30
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-07-30

This document supersedes EN 60143-1:2004.

The main change with respect to EN is that the endurance test has been replaced by an ageing test because voltage cycling is already performed in the cold duty test. The guide section has been expanded regarding long line correction and altitude correction. In addition the insulation tables and references to other standards have been updated.

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

IEC 60060-2:2010	NOTE	Harmonized as EN 60060-2:2011.
IEC 60110-1:1998	NOTE	Harmonized as EN 60110-1:1998.
IEC 60252-1:2010	NOTE	Harmonized as EN 60252-1:2011.
IEC 61048:2006	NOTE	Harmonized as EN 61048:2006.
IEC 61049:1991	NOTE	Harmonized as EN 61049:1993.
IEC 61071	NOTE	Harmonized as EN 61071.
IEC 60270:2000	NOTE	Harmonized as EN 60270:2001.
IEC 60909-0:2001	NOTE	Harmonized as EN 60909-0:2001.

## 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 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050	series	International Electrotechnical Vocabulary	-	series
IEC 60060-1	2010	High-voltage test techniques -- Part 1: General definitions and test requirements	EN 60060-1	2010
IEC 60071-1	2006	Insulation co-ordination -- Part 1: Definitions, principles and rules	EN 60071-1	2006
IEC 60071-2	1996	Insulation co-ordination -- Part 2: Application guide	EN 60071-2	1997
IEC 60143-2	2012	Series capacitors for power systems -- Part 2: Protective equipment for series capacitor banks	EN 60143-2	2013
IEC 60143-3	1998	Series capacitors for power systems -- Part 3: Internal fuses	EN 60143-3	1998
IEC 60143-4	2010	Series capacitors for power systems -- Part 4: Thyristor controlled series capacitors	EN 60143-4	2010
IEC 60549	2013	High-voltage fuses for the external protection of shunt capacitors	EN 60549	2013
IEC 60871-1	2014	Shunt capacitors for a.c. power systems having a rated voltage above 1 000 V - Part 1: General	EN 60871-1	2014
IEC 62271-1	2007	High-voltage switchgear and controlgear -- Part 1: Common specifications	EN 62271-1	2008
IEEE Std 693	-	IEEE Recommended Practice for Seismic Design of Substations	-	-

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IEC 60143-1

Edition 5.0 2015-06

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



Series capacitors for power systems –  
Part 1: General

STANDARD PREVIEW  
(standards.iteh.ai)

Condensateurs série destinés à être installés sur des réseaux –  
Partie 1: Généralités

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## CONTENTS

FOREWORD .....	6
1 Scope and object .....	8
2 Normative references .....	8
3 Terms and definitions .....	9
4 Service conditions .....	15
4.1 Normal service conditions .....	15
4.2 Ambient air temperature categories .....	15
4.3 Abnormal service conditions .....	16
4.4 Abnormal power system conditions .....	16
5 Quality requirements and tests .....	16
5.1 Test requirements for capacitor units .....	16
5.1.1 General .....	16
5.1.2 Test conditions .....	16
5.1.3 Voltage limits as established by overvoltage protector .....	17
5.1.4 Determination of protective level voltage $U_{pl}$ and $U_{lim}$ .....	18
5.2 Classification of tests .....	18
5.2.1 General .....	18
5.2.2 Routine tests .....	18
5.2.3 Type tests .....	19
5.2.4 Special test (ageing test) .....	19
5.3 Capacitance measurement (routine test) .....	19
5.3.1 Measuring procedure .....	19
5.3.2 Capacitance tolerance .....	20
5.4 Capacitor loss measurement (routine test) .....	20
5.4.1 Measuring procedure .....	20
5.4.2 Loss requirements .....	21
5.4.3 Losses in external fuses .....	21
5.5 Voltage test between terminals (routine test) .....	21
5.6 AC voltage test between terminals and container (routine test) .....	21
5.7 Test on internal discharge device (routine test) .....	21
5.8 Sealing test (routine test) .....	22
5.9 Thermal stability test (type test) .....	22
5.9.1 Measuring procedure .....	22
5.9.2 Capacitor loss measurement .....	23
5.10 AC voltage test between terminals and container (type test) .....	23
5.11 Lightning impulse voltage test between terminals and container (type test) .....	24
5.12 Cold duty test (type test) .....	24
5.13 Discharge current test (type test) .....	25
6 Insulation level .....	26
6.1 Insulation voltages .....	26
6.1.1 Standard values .....	26
6.1.2 Insulation to earth and between phases .....	26
6.1.3 Insulation levels for insulators and equipment on the platform .....	26
6.2 Creepage distance .....	33
6.3 Air clearances .....	34
7 Overloads, overvoltages and duty cycles .....	38



7.1	Currents .....	38
7.2	Transient overvoltages .....	38
7.3	Duty cycles .....	39
8	Safety requirements .....	39
8.1	Discharge device .....	39
8.2	Container connection .....	39
8.3	Protection of the environment.....	40
8.4	Other safety requirements.....	40
9	Markings and instruction books.....	40
9.1	Markings of the unit .....	40
9.1.1	Rating plate .....	40
9.1.2	Warning plate .....	41
9.2	Markings of the bank.....	41
9.2.1	Instruction sheet or rating plate.....	41
9.2.2	Warning plate .....	41
9.3	Instruction book .....	41
10	Guide for selection of ratings, installation and operation.....	42
10.1	General .....	42
10.2	Reactance per line, rated reactance per bank and number of modules per bank .....	42
10.2.1	Capacitive reactance per line .....	42
10.2.2	Number of series capacitor banks in a transmission line .....	43
10.2.3	Number of modules in a capacitor bank.....	44
10.2.4	Future requirements for series capacitors.....	44
10.3	Current ratings for the bank.....	44
10.3.1	General .....	44
10.3.2	Typical bank overload and swing current capabilities.....	45
10.3.3	Analysis to determine the continuous and emergency overload current rating.....	46
10.3.4	Analysis to determine the swing current rating.....	46
10.4	Overvoltage protection requirements .....	46
10.5	Voltage limitations during power system faults.....	47
10.5.1	General .....	47
10.5.2	Voltage limitation when the inductance between the primary overvoltage protector and the capacitors is not significant .....	47
10.5.3	Voltage limitation when the inductance between the primary overvoltage protector and the capacitors is significant .....	48
10.6	Protective and switching devices.....	48
10.6.1	Capacitor fusing.....	48
10.6.2	Other devices .....	48
10.6.3	Connection diagrams .....	48
10.7	Choice of insulation level .....	49
10.7.1	Normal cases.....	49
10.7.2	Altitude exceeding 1 000 m .....	49
10.8	Long line correction .....	50
10.9	Other application considerations .....	51
10.9.1	General .....	51
10.9.2	Ferro-resonance .....	51
10.9.3	Sub-synchronous resonance .....	51

10.9.4	Relay protection of the power system .....	51
10.9.5	Attenuation of carrier-frequency transmission .....	52
10.9.6	Non-transposed transmission lines .....	52
10.9.7	Power system harmonic currents .....	52
10.9.8	TRV across line circuit-breakers .....	52
10.9.9	Delayed line current zero crossing .....	53
10.9.10	Prolonged secondary arc current .....	53
Annex A (normative) Test requirements and application guide for external fuses and units to be externally fused .....		54
A.1	Overview .....	54
A.2	Purpose .....	54
A.3	Terms employed in Annex A .....	54
A.4	Performance requirements .....	54
A.5	Tests .....	55
A.5.1	Tests on fuses .....	55
A.5.2	Type tests on capacitor container .....	55
A.6	Guide for coordination of fuse protection .....	55
A.6.1	General .....	55
A.6.2	Protection sequence .....	55
A.7	Choice of fuses .....	56
A.7.1	General .....	56
A.7.2	Non current-limiting fuses .....	56
A.7.3	Current-limiting fuses .....	56
A.8	Information needed by the user of the fuses .....	56
Annex B (informative) Economic evaluation of series capacitor bank losses .....		57
Annex C (informative) Capacitor bank fusing and unit arrangement .....		58
C.1	General .....	58
C.2	Internally fused capacitor bank .....	58
C.3	Externally fused capacitor bank .....	58
C.4	Fuseless capacitor bank .....	59
Annex D (informative) Examples of typical connection diagrams for large series capacitor installations for transmission lines .....		61
Annex E (informative) Precautions to be taken to avoid pollution of the environment by polychlorinated biphenyls .....		62
Bibliography .....		63
Figure 1 – Typical nomenclature of a series capacitor installation .....		12
Figure 2 – Classification of overvoltage protection .....		17
Figure 3 – Time and amplitude limits for an overvoltage period waveform .....		25
Figure 4 – Air clearance versus a.c. power frequency withstand voltage .....		38
Figure 5 – Typical current-time profile of an inserted capacitor bank following the fault and clearing of parallel line .....		45
Figure C.1 – Typical connections between capacitor units in a segment or phase .....		59
Figure C.2 – Typical connections between elements within a capacitor unit .....		60
Figure D.1 – Diagrams for smaller banks .....		61
Table 1 – Letter symbols for upper limit of temperature range .....		15

Table 2 – Ambient air temperature in thermal stability test.....	22
Table 3 – Standard insulation levels for range I ( $1 \text{ kV} < U_m \leq 245 \text{ kV}$ ) .....	29
Table 4 – Standard insulation levels for range II ( $U_m > 245 \text{ kV}$ ) (1 of 2).....	30
Table 5 – Typical insulation levels for platform-to-ground insulators (1 of 2) .....	32
Table 6 – Specific creepage distances .....	34
Table 7 – Correlation between standard lightning impulse withstand voltages and minimum air clearances .....	36
Table 8 – Correlation between standard switching impulse withstand voltages and minimum phase-to-earth air clearances.....	37
(reproduced from IEC 60071-2:1996, Table A.2) .....	37
Table 9 – Correlation between standard switching impulse withstand voltages and minimum phase-to-phase air clearances .....	37
Table 10 – Typical bank overload and swing current capabilities .....	45

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## INTERNATIONAL ÉLECTROTECHNICAL COMMISSION

**SERIES CAPACITORS FOR POWER SYSTEMS –****Part 1: General**

## 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 60143-1 has been prepared by IEC technical committee 33: Power capacitors and their applications.

This fifth edition cancels and replaces the fourth edition, published in 2004. This edition constitutes a technical revision.

The main change with respect to the previous edition is that the endurance test has been replaced by an ageing test because voltage cycling is already performed in the cold duty test. The guide section has been expanded regarding long line correction and altitude correction. In addition the insulation tables and references to other standards have been updated.

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

FDIS	Report on voting
33/578/FDIS	33/580/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 in the IEC 60143 series, published under the general title *Series capacitors for power systems*, 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 website 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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## SERIES CAPACITORS FOR POWER SYSTEMS –

### Part 1: General

#### 1 Scope and object

This part of IEC 60143 applies both to capacitor units and capacitor banks intended to be used connected in series with an a.c. transmission or distribution line or circuit forming part of an a.c. power system having a frequency of 15 Hz to 60 Hz.

The primary focus of this standard is on transmission application.

The series capacitor units and banks are usually intended for high-voltage power systems. This standard is applicable to the complete voltage range.

This standard does not apply to capacitors of the self-healing metallized dielectric type.

The following capacitors, even if connected in series with a circuit, are excluded from this standard:

- capacitors for inductive heat-generating plants (IEC 60110-1);
- capacitors for motor applications and the like (IEC 60252 (all parts));
- capacitors to be used in power electronics circuits (IEC 61071);
- capacitors for discharge lamps (IEC 61048 and IEC 61049).

For standard types of accessories such as insulators, switches, instrument transformers, external fuses, etc. see the pertinent IEC standard.

NOTE 1 Additional requirements for capacitors to be protected by internal fuses, as well as the requirements for internal fuses, are found in IEC 60143-3. See also Annex C.

NOTE 2 Additional requirements for capacitors to be protected by external fuses, as well as the requirements for external fuses, are found in Annex A and Annex C.

NOTE 3 A separate standard for series capacitor accessories (spark-gaps, varistors, discharge reactors, current-limiting damping reactors, damping resistors, circuit-breakers, etc.), IEC 60143-2, has been revised and was completed in 2012. A separate standard for internal fuses for series capacitors, IEC 60143-3 has been revised and was completed in 2013.

NOTE 4 Some information regarding fuseless capacitor units and fuseless capacitor banks is found in Annex C.

The object of this standard is:

- to formulate uniform rules regarding performance, testing and rating;
- to formulate specific safety rules;
- to serve as a guide for installation and operation.

#### 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.

NOTE If there is a conflict between this standard and a standard listed below, the text of IEC 60143-1 prevails.

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– 9 –

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at [www.electropedia.org](http://www.electropedia.org))

IEC 60060-1:2010, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60071-1:2006, *Insulation co-ordination – Part 1: Definitions, principles and rules*

IEC 60071-2:1996, *Insulation co-ordination – Part 2: Application guide*

IEC 60143-2:2012, *Series capacitors for power systems – Part 2: Protective equipment for series capacitor banks*

IEC 60143-3:1998, *Series capacitors for power systems – Part 3: Internal fuses*

IEC 60143-4: 2010 *Series capacitors for power systems – Part 4: Thyristor controlled series capacitors*

IEC 60549:2013, *High-voltage fuses for the external protection of shunt capacitors*

IEC 60871-1: 2014 *Shunt capacitors for a.c power systems having a rated voltage above 1000V – Part 1: General*

IEC 62271-1:2007, *High-voltage switchgear and controlgear – Part 1: Common specifications*

IEEE Std. 693:1997, *IEEE Recommended Practice for Seismic Design of Substations*

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**3 Terms and definitions** <http://standards.iteh.ai/catalog/standards/sist/33d30c5c-aac2-4e23-be41-a3a55905496a/sist-en-60143-1-2015>

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

### 3.1

#### **ambient air temperature (for capacitors)**

temperature of air at the proposed location of the capacitor installation

### 3.2

#### **bypass switch**

device such as a switch or circuit-breaker used in parallel with a series capacitor and its overvoltage protector to shunt line current for some specified time or continuously

Note 1 to entry: This device shall also have the capability of bypassing the capacitor during specified power system fault conditions. The operation of the device is initiated by the capacitor bank control, remote control or by an operator. The device may be mounted on the platform or on the ground near the platform. Besides bypassing the capacitor, this device shall also have the capability of inserting the capacitor into a circuit carrying a specified level of current.

### 3.3

#### **capacitor**

word used when it is not necessary to distinguish between the different meanings of the words capacitor unit and the assembly of capacitors associated with a segment

### 3.4

#### **capacitor unit**

unit

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