

Series capacitors for power systems

The European Standard EN 60143 : 1993 has the status of a
British Standard

Condensateurs série destinés à être installés
sur les réseaux

Reihenkondensatoren für Starkstromanlagen

UDC 621.319.4.016.2

Cooperating organizations

The European Committee for Electrotechnical Standardization (CENELEC), under whose supervision this European Standard was prepared, comprises the national committees of the following countries:

- Austria

Belgium

Denmark

Finland

France

Germany

Greece

Iceland

Ireland
- Italy

Luxembourg

Netherlands

Norway

Portugal

Spain

Sweden

Switzerland

United Kingdom

This British Standard, having been prepared under the direction of the Power Electrical Engineering Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 15 December 1993

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The following BSI references relate to the work on this standard:
Committee reference PEL/46
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Amendments issued since publication

Amd. No.	Date	Text affected

Amendment No. 1
published and effective from 15 August 1995
to BS EN 60143 : 1993

Series capacitors for power systems

NOTE. The English language version of European Standard EN 60143 : 1993 was implemented in the United Kingdom by the publication of BS EN 60143 : 1993. This amendment implements the corrigendum to EN 60143 issued in October 1994.

This corrigendum together with European Standard EN 60143 : 1993 has the status of a British Standard.

Corrections

Front cover

Delete the existing front cover and substitute the new front cover attached.

AMD 8725/August 1995

National foreword

In paragraph 1, line 3, after '*power systems*' insert 'including its corrigendum October 1994'.

Delete paragraphs 3, 4 and 5

Insert the following new paragraph.

As a consequence of publishing BS EN 60143-2, this British Standard has been renumbered as BS EN 60143-1.

AMD 8725/August 1995

EN text

Throughout the text, replace the EN number by 'EN 60143-1'.

AMD 8725/August 1995

EN title page

Replace the titles by:

Series capacitors for power systems Part 1: General — Performance, testing and rating — Safety requirements — Guide for installation

Condensateurs série destinés à être installés sur des réseaux Partie 1: Généralités — Caractéristiques fonctionnelles, essais et valeurs assignées — Règles de sécurité — Guide d'installation et d'exploitation

Reihen Kondensatoren für Starkstromanlagen Teil 1: Allgemeines — Betriebsverhalten, Prüfen und Bemessen — Sicherheitsanforderungen — Richtlinie zum Errichten

AMD 8725/August 1995

Clause 1.2 Normative references

Replace 'IEC 816' by 'IEC 815', and delete the associated footnote.

AMD 8725/August 1995

Annex ZA

Replace the reference to IEC 816** by:

815 1986 Guide for the selection of insulators in respect of polluted conditions — —

Delete the associated footnote.

AMD 8725/August 1995

Series capacitors for power systems

Part 1. General — Performance, testing and rating — Safety requirements — Guide for installation

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National foreword

This British Standard has been prepared under the direction of the Power Electrical Engineering Standards Policy Committee and is the English language version of EN 60143 : 1993 *Series capacitors for power systems*, published by the European Committee for Electrotechnical Standardization (CENELEC). It was derived by CENELEC from IEC 143 : 1992 published by the International Electrotechnical Commission (IEC) and includes common modifications agreed by CENELEC.

The CENELEC common modifications, which are quoted on page 2, have been implemented at the appropriate places in the text and are indicated by a side line in the margin.

Textual errors. When implementing the English language version of EN 60143 as the national standard, the textual errors listed below were discovered. They have been reported to the International Electrotechnical Commission (IEC) and the European Committee for Electrotechnical Standardization (CENELEC) in a proposal to amend the text of the European Standard.

In 1.2 the reference to 'IEC 816' should be 'IEC 815'.

In annex ZA the reference to 'IEC 816 : 1984 *Guide on methods of measurement of short duration transients on low voltage power and signal lines*' should be 'IEC 815 : 1986 *Guide for the selection of insulators in respect of polluted conditions*'.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Descriptors: Power capacitors, series capacitors, capacitors banks, classification, tests, insulated level, safety requirements, marking, characteristics

English version

Series capacitors for power systems

(IEC 143 : 1992)

Condensateurs série destinés à être installés
sur les réseaux
(CEI 143 : 1992)

Reihenkondensatoren für Starkstromanlagen
(IEC 143 : 1992)

This European Standard was approved by CENELEC on 1993-07-06. 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, 8-1050 Brussels

Foreword

The IEC/CENELEC Parallel Voting procedure, performed for finding out whether or not the International Standard IEC 143 : 1992 could be accepted without textual changes, has shown that some common modifications were necessary for acceptance as a European Standard.

Following decision D71/016 taken by 71 Technical Board it was decided that the reference document, together with the common modifications prepared by the CENELEC Reporting Secretariat SR 33, would be submitted to the CENELEC members for formal vote.

The text of the draft was approved by CENELEC as EN 60143 on 6 July 1993.

This European Standard replaces HD 339 S1 : 1977.

The following dates were fixed:

- latest date of publication
of an identical national
standard (dop) 1994-08-01
- latest date of withdrawal
of conflicting national
standards (dow) 1994-08-01

Annexes designated 'normative' are part of the body of the standard. Annexes designated 'informative' are given only for information. In this standard, annexes A and ZA are normative and annexes B, C and D are informative.

Endorsement notice

The text of the International Standard IEC 143 : 1992 was approved by CENELEC as a European Standard with agreed common modifications as given below.

Common modifications

CLAUSE

- 5.3 Add a new paragraph at the end of the subclause:
Manufacture and installation of new capacitors containing PCB are forbidden.
- Annex C Modify the first line of the second paragraph as follows:
'... of PCB which are used in the impregnation of capacitors ...'.

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SERIES CAPACITORS FOR POWER SYSTEMS

SECTION 1: GENERAL

1.1 Scope and object

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

NOTES

- 1 Additional requirements for capacitors to be protected by internal fuses as well as the requirements for internal fuses are found in IEC 595.
- 2 Additional requirements for capacitors to be protected by external fuses as well as the requirements for external fuses are found in annex A.
- 3 This standard does not apply to capacitors of the self-healing metallized dielectric type.
- 4 The following capacitors, even if connected in series with a circuit, are excluded from this standard:
 - capacitors for inductive heat-generating plants (IEC 110);
 - capacitors for motor applications and the like (IEC 252);
 - capacitors to be used in power electronics circuits (IEC 1071);
 - capacitors for discharge lamps (IEC 566).
- 5 A separate standard for series capacitor accessories (spark-gaps, non-linear resistors, discharge reactors, damping resistors, breakers, etc.) is under consideration.
- 6 Standard type of accessories such as insulators, switches, instrument transformers, external fuses, etc., shall comply with the pertinent IEC standard.

The object of this standard is

- to formulate uniform rules regarding performance, testing and rating;
- to formulate specific safety rules;
- 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 International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 50(436): 1990, *International Electrotechnical Vocabulary (IEV) – Chapter 436: Power capacitors*.

IEC 60, *High-voltage test techniques*.

IEC 60-1:1989, *High-voltage test techniques – Part 1: General definitions and test requirements*.

IEC 60-2: 1973, *High-voltage test techniques – Part 2: Test procedures*.

IEC 60-3: 1976, *High-voltage test techniques – Part 3: Measuring devices*.

IEC 60-4: 1977, *High-voltage test techniques – Part 4: Application guide for measuring devices*.

IEC 71, *Insulation co-ordination*.

IEC 71-1: 1976, *Insulation co-ordination – Part 1: Terms, definitions, principles and rules*.

IEC 71-2: 1976, *Insulation co-ordination – Part 2: Application guide*.

IEC 71-3: 1982, IEC 71-1: 1976, *Insulation co-ordination – Part 3: Phase-to-phase insulation co-ordination. Principles, rules and application guide*.

IEC 549: 1976, *High-voltage fuses for the external protection of shunt power capacitors*.

IEC 595: 1977, *Internal fuses for series capacitors*.

* IEC 816: 1986, *Guide for the selection of insulators in respect of polluted conditions*.

IEC 871-2: 1987, *Shunt capacitors for a.c. power systems having a rated voltage above 660 V. Part 2: Endurance testing*.

IEC 996: 1989, *Method for verifying accuracy of tan delta measurements applicable to capacitors*.

*See national foreword for details of textual error.

1.3 Definitions

For the purposes of this International Standard, the following definitions apply:

1.3.1 capacitor element (or element): A device consisting essentially of two electrodes separated by a dielectric. [IEV 436-01-03 modified]

1.3.2 capacitor unit (or unit): An assembly of one or more capacitor elements in the same container with terminals brought out. [IEV 436-01-04 modified]

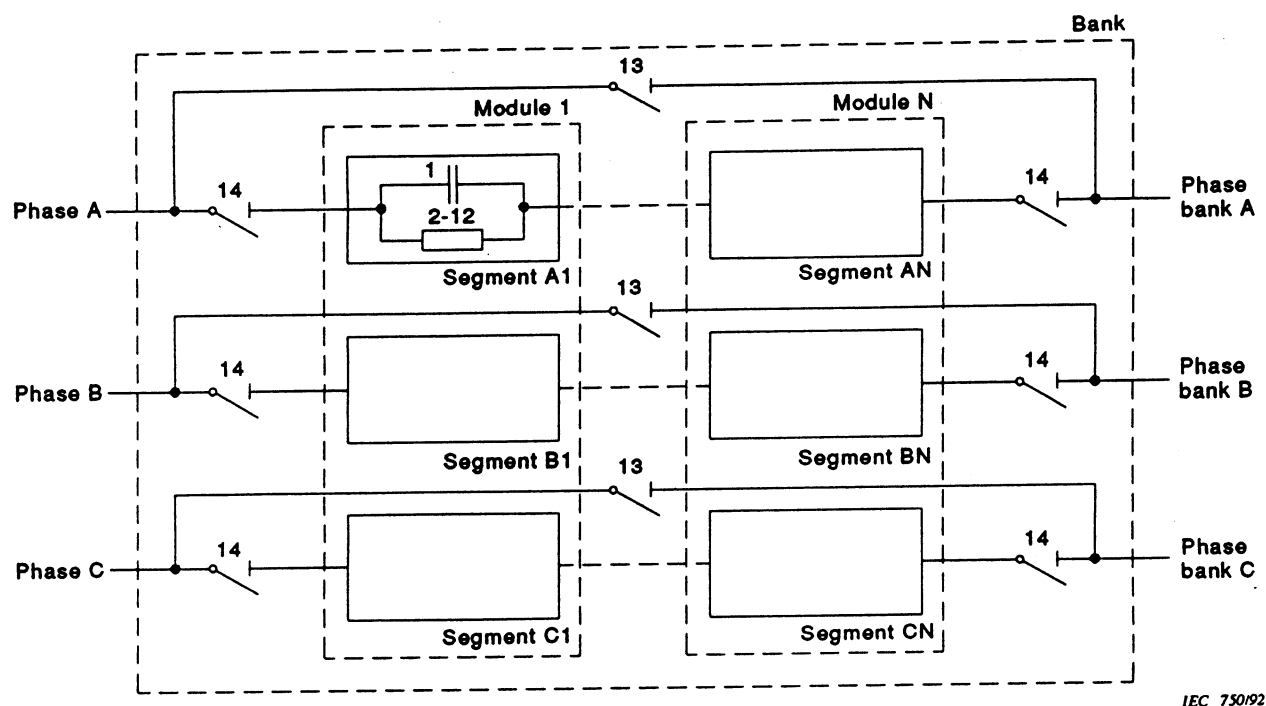
1.3.3 series capacitor phase bank (or phase bank): An assembly of capacitor units connected in one phase so as to act together, the protection system(s) for these capacitors, etc. (see figure 1).

1.3.4 segment (of a series capacitor): Where the phase bank is divided into several series-connected parts of which each part contains its own assembly of capacitor units and protection system(s) each such complete part is called segment (see figure 1).

1.3.5 series capacitor bank (or bank): The three-phase banks operated in common (see figure 1). [IEV 436-01-06 modified]

1.3.6 module (of a series capacitor): A switchable step of a series capacitor consisting of identical segments in each phase (see figure 1), which furthermore also are equipped with provisions for a common operation of the by-pass device at each of these segments.

NOTE - If maintenance is required on the segment(s) of a by-passed module when the remaining module(s) of the series capacitor remains in operation also series disconnecting devices (and other personal safety requirements) are needed for the segments.



- 1 = Assembly of capacitor units
 - 2-12 = Main protective equipment
 - 13 = By-pass disconnector
 - 14 = Series disconnector
- (See also figure B3 of annex B)

Figure 1 – Series capacitor bank definitions

1.3.7 capacitor: In this standard, the word "capacitor" is used when it is not necessary to lay particular stress upon the different meanings of the words capacitor unit, segment or phase bank.

1.3.8 capacitor installation: A series capacitor bank and its accessories. [IEV 436-01-07 modified]

1.3.9 overvoltage protector (of a series capacitor): A quick-acting device which limits the instantaneous voltage across the capacitor to a permissible value when that value would otherwise be exceeded as a result of a circuit fault or other abnormal network conditions. [IEV 436-03-14 modified]

1.3.10 discharge device (of a capacitor): A device connected across the terminals of the capacitor or built into the capacitor unit, capable of reducing the residual voltage across the capacitor effectively to zero after the capacitor has been disconnected from the supply. Further requirements on the size of the discharge device are found in clause 5.1. [IEV 436-03-15 modified]