BS EN 60143-2:2013

BSI Standards Publication

Series capacitors for power systems

Part 2: Protective equipment for series capacitor banks

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 60143-2:2013. It is identical to IEC 60143-2:2012. It supersedes BS EN 60143-2:1995 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PEL/33, Power capacitors.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2013

ISBN 978 0 580 75148 6
ICS 29.240.99; 31.060.70

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2013.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60143-2

June 2013

ICS 29.240.99; 31.060.70

Supersedes EN 60143-2:1994

English version

Series capacitors for power systems - Part 2: Protective equipment for series capacitor banks

(IEC 60143-2:2012)

Condensateurs série destinés à être installés sur des réseaux - Partie 2: Matériel de protection pour les batteries de condensateurs série (CEI 60143-2:2012)

Reihenkondensatoren für Starkstromanlagen - Teil 2: Schutzeinrichtungen für Reihenkondensatorbatterien (IEC 60143-2:2012)

This European Standard was approved by CENELEC on 2013-01-15. 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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 60143-2:2013 E

Foreword

The text of document 33/517/FDIS, future edition 2 of IEC 60143-2, prepared by IEC/TC 33 "Power capacitors and their applications" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60143-2:2013.

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)	2013-12-14
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-01-15

This document supersedes EN 60143-2:1994.

EN 60143-2:2013 includes the following significant technical changes with respect to EN 60143-2:1994:

- updated with respect to new and revised component standards;
- updates with respect to technology changes. Outdated technologies have been removed, i.e. series capacitors with dual self-triggered gaps. New technologies have been added, i.e. current sensors instead of current transformers;
- the testing of spark gaps has been updated to more clearly specify requirements and testing procedures. A new bypass making current test replaces the old discharge current test;
- Clause 5, Guide, has been expanded with more information about different damping circuits and series capacitor protections.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

Endorsement notice

The text of the International Standard IEC 60143-2:2012 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 60068-1	NOTE	Harmonised as EN 60068-1.
IEC 60068-2-2	NOTE	Harmonised as EN 60068-2-2.
IEC 60068-2-78	NOTE	Harmonised as EN 60068-2-78.
IEC 60068-2-30	NOTE	Harmonised as EN 60068-2-30.
IEC 60071-1	NOTE	Harmonised as EN 60071-1.
IEC 60071-2	NOTE	Harmonised as EN 60071-2.
IEC 60143-3	NOTE	Harmonised as EN 60143-3.
IEC 60255-1	NOTE	Harmonised as EN 60255-1.
IEC 60383-1	NOTE	Harmonised as EN 60383-1.

IEC 60383-2	NOTE	Harmonised as EN 60383-2.
IEC 60507	NOTE	Harmonised as EN 60507.
IEC 60549	NOTE	Harmonised as EN 60549.
IEC 60654-1	NOTE	Harmonised as EN 60654-1.
IEC 60654-4	NOTE	Harmonised as EN 60654-4.
IEC 60871-1	NOTE	Harmonised as EN 60871-1.
IEC 60909 Series	NOTE	Harmonised as EN 60909 Series (not modified).
IEC 61000-4-2	NOTE	Harmonised as EN 61000-4-2.
IEC 61000-4-11	NOTE	Harmonised as EN 61000-4-11.
IEC 62217	NOTE	Harmonised as EN 62217.
IEC 62271-100	NOTE	Harmonised as EN 62271-100.
IEC 62223	NOTE	Harmonised as EN 62223.

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.

Publication	Year	Title	EN/HD	Year
IEC 60044	Series	Instrument transformers	EN 60044	Series
IEC 60044-1	-	Instrument transformers - Part 1: Current transformers	EN 60044-1	-
IEC 60044-8	-	Instrument transformers - Part 8: Electronic current transformers	EN 60044-8	-
IEC 60060	Series	High-voltage test techniques	EN 60060	Series
IEC 60076-1	-	Power transformers - Part 1: General	EN 60076-1	-
IEC 60076-6	2007	Power transformers - Part 6: Reactors	EN 60076-6	2008
IEC 60099-4 (mod) + A1 + A2	2004 2006 2009	Surge arresters - Part 4: Metal-oxide surge arresters without gaps for a.c. systems	EN 60099-4 +A1 +A2	2004 2006 2009
IEC 60143-1	2004	Series capacitors for power systems - Part 1: General	EN 60143-1	2004
IEC 60255-5	-	Electrical relays - Part 5: Insulation coordination for measuring relays and protection equipment - Requirements and tests	EN 60255-5	-
IEC 60255-21-1	-	Electrical relays - Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment - Section 1: Vibration tests (sinusoidal)	EN 60255-21-1	-
IEC 60270	-	High-voltage test techniques - Partial discharge measurements	EN 60270	-
IEC 60358-1	-	Coupling capacitors and capacitor dividers - Part 1: General rules	EN 60358-1	-
IEC 60358-2	-	Coupling capacitors and capacitor dividers - Part 2: AC or DC single-phase coupling capacitor connected between line and ground for power line carrier-frequency (PLC) application	EN 60358-2	-
IEC 60794-1-1	-	Optical fibre cables - Part 1-1: Generic specification - General	EN 60794-1-1	-
IEC 60794-2	-	Optical fibre cables - Part 2: Indoor cables - Sectional specification	EN 60794-2	-

Publication	Year	Title	EN/HD	Year
IEC 61000-4-29	-	Electromagnetic compatibility (EMC) - Part 4-29: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests	EN 61000-4-29	-
IEC 61109	-	Insulators for overhead lines - Composite suspension and tension insulators for a.c. systems with a nominal voltage greater than 1 000 V - Definitions, test methods and acceptance criteria	EN 61109	-
IEC 61300-3-4	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-4: Examinations and measurements - Attenuation	EN 61300-3-4	-
IEC 61869-3	-	Instrument transformers - Part 3: Additional requirements for inductive voltage transformers	EN 61869-3	-
IEC 61869-5	-	Instrument transformers - Part 5: Additional Requirements for capacitor voltage transformers	EN 61869-5	-
IEC 62271-1	-	High-voltage switchgear and controlgear - Part 1: Common specifications	EN 62271-1	-
IEC 62271-102 + corr. April + corr. May + corr. February	2001 2002 2003 2005	High-voltage switchgear and controlgear - Part 102: Alternating current disconnectors and earthing switches	EN 62271-102 + corr. March + corr. July	2002 2005 2008
IEC 62271-109	2008	High-voltage switchgear and controlgear - Part 109: Alternating-current series capacitor by-pass switches	EN 62271-109	2009

CONTENTS

SERIES CAPACITORS FOR POWER SYSTEMS –

Part 2: Protective equipment for series capacitor banks

1 Scope

This part of IEC 60143 covers protective equipment for series capacitor banks, with a size larger than 10 Mvar per phase. Protective equipment is defined as the main circuit apparatus and ancillary equipment, which are part of a series capacitor installation, but which are external to the capacitor part itself. The recommendations for the capacitor part are given in IEC 60143-1:2004. The protective equipment is mentioned in Clause 3 and 10.6 of IEC 60143-1:2004.

The protective equipment, treated in this standard, comprises the following items listed below:

– overvoltage protector,
– protective spark gap,
– varistor,
– bypass switch,
– disconnectors and earthing switches,
– discharge current-limiting and damping equipment,
– voltage transformer,
– current sensors,
– coupling capacitor,
– signal column,
– fibre optical platform links,
– relay protection, control equipment and platform-to-ground communication equipment.

See Figure 1.

Principles involved in the application and operation of series capacitors are given in Clause 5.

Examples of fault scenarios are given in Clause 5.

Examples of protective schemes utilizing different overvoltage protectors are given in 4.1.