Shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including 1 000 V –
Part 1: General – Performance, testing and rating – Safety requirements – Guide for installation and operation

Condensateurs shunt de puissance autoregénérateurs pour réseaux à courant alternatif de tension assignée inférieure ou égale à 1 000 V –
Partie 1: Généralités – Caractéristiques fonctionnelles, essais et valeurs assignées – Règles de sécurité – Guide d’installation et d’exploitation
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SHUNT POWER CAPACITORS OF THE SELF-HEALING TYPE FOR A.C. SYSTEMS HAVING A RATED VOLTAGE UP TO AND INCLUDING 1 000 V –

Part 1: General – Performance, testing and rating – Safety requirements – Guide for installation and operation

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International Standard IEC 60831-1 has been prepared by IEC technical committee 33: Power capacitors and their applications.


This edition includes the following significant technical changes with respect to the previous edition:

a) Updating of the normative references;

b) Test conditions have been clarified;

c) Thermal stability test has been clarified;

d) Maximum permissible voltage and current have been clarified;

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e) The protection of the environment has been amended with safety concerns and plastic quality requirements.

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

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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 60831 series, published under the general title *Shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including, 1 000 V* 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 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- withdrawn,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.
1 Scope

This part of the IEC 60831 series is applicable to both capacitor units and capacitor banks intended to be used, particularly, for power-factor correction of a.c. power systems having a rated voltage up to and including 1 000 V and frequencies of 15 Hz to 60 Hz.

This part of IEC 60831 also applies to capacitors intended for use in power filter circuits. Additional definitions, requirements, and tests for power filter capacitors are given in Annex A.

The following capacitors are excluded from this part of IEC 60831:

- 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 60931-, -2 and -3).
- Shunt capacitors for a.c. power systems having a rated voltage above 1 000 V (IEC 60871-1, -2, -3 and -4).
- Capacitors for inductive heat-generating plants operating at frequencies between 40 Hz and 24 000 Hz (IEC 60110-1 and -2).
- Series capacitors (IEC 60143-1, -2, -3 and -4).
- AC motor capacitors (IEC 60252-1 and -2).
- Coupling capacitors and capacitor dividers (IEC 60358-1).
- Capacitors for power electronic circuits (IEC 61071).
- Small a.c. capacitors to be used for fluorescent and discharge lamps (IEC 61048 and IEC 61049).
- Capacitors for suppression of radio interference (under consideration).
- Capacitors intended to be used in various types of electrical equipment, and thus considered as components.
- Capacitors intended for use with d.c. voltage superimposed on the a.c. voltage.

Accessories such as insulators, switches, instrument transformers, fuses, etc., should be in accordance with the relevant IEC standards and are not covered by the scope of this part of IEC 60831.

The object of this part of IEC 60831 is to:

a) formulate uniform rules regarding performances, testing and rating;

b) formulate specific safety rules;

c) provide 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.

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

IEC 60269-1:2006, Low-voltage fuses – Part 1: General requirements

IEC 60831-2:2013, Shunt power capacitors of the self-healing type for a.c. systems having a rated voltage up to and including 1 000 V – Part 2: Ageing test, self-healing test and destruction test


IEC 61000-4-1:2006, Electromagnetic compatibility (EMC) – Part 4-1: Testing and measurement techniques – Overview of IEC 61000-4 series

3 Terms and definitions

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

3.1 capacitor element
device consisting essentially of two electrodes separated by a dielectric


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


3.3 self-healing capacitor
capacitor of which the electrical properties, after local breakdown of the dielectric, are rapidly and essentially restored


3.4 capacitor bank
number of capacitor units connected so as to act together
3.5 capacitor
generic term, encompassing the notions of capacitor unit and capacitor bank

Note 1 to entry: In this part of IEC 60831, the word capacitor is used when it is not necessary to lay particular stress upon the different meanings of the words capacitor unit or capacitor bank.

3.6 capacitor installation
one or more capacitor banks and their accessories

3.7 discharge device of a capacitor
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.

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

3.9 overpressure disconnector for a capacitor
disconnecting device designed to switch off the capacitor in the case of abnormal increase of the internal pressure

3.10 overtemperature disconnector for a capacitor
disconnecting device designed to switch off the capacitor in the case of abnormal increase of the internal temperature

3.11 line terminal
terminal intended for connection to a line conductor of a network

Note 1 to entry: In polyphase capacitors, a terminal intended to be connected to the neutral conductor is not considered to be a line terminal.

3.12 rated capacitance of a capacitor
$C_N$
capacitance value for which the capacitor has been designed
3.13 rated output of a capacitor
\( Q_N \)
reactive power derived from the rated values of capacitance, frequency and voltage

3.14 rated voltage of a capacitor
\( U_N \)
r.m.s. value of the alternating voltage for which the capacitor has been designed

Note 1 to entry: In the case of capacitors consisting of one or more separate circuits (such as single-phase units intended for use in polyphase connection, or polyphase units with separate circuits), \( U_N \) refers to the rated voltage of each circuit.

For polyphase capacitors with internal electrical connections between the phases, and for polyphase capacitor banks, \( U_N \) refers to the phase-to-phase voltage.

3.15 rated frequency of a capacitor
\( f_N \)
frequency for which the capacitor has been designed

3.16 rated current of a capacitor
\( I_N \)
r.m.s. value of the alternating current for which the capacitor has been designed

3.17 capacitor losses
active power dissipated in the capacitor

Note 1 to entry: All loss-producing components should be included, for example:
- for a unit, losses from dielectric, internal fuses, internal discharge resistor, connections, etc.,
- for a bank, losses from units, external fuses, busbars, discharge and damping reactors, etc.

3.18 tangent of the loss angle of a capacitor
\( \tan \delta \)
ratio between the equivalent series resistance and the capacitive reactance of the capacitor at specified sinusoidal alternating voltage and frequency
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