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Project No. 2023/02978

Responsible committee: W/- Miscellaneous Standards # Consumer Products and Services

Interested committees:

Title: BS EN IEC 60931-1 Shunt power capacitors of the non-self-healing type for a.c. systems having a rated voltage up to and including 1000 V

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

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

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THIS DRAFT IS NOT CURRENT BEYOND 31 January 2024**

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

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## Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

## UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

## Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
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## Template for comments and secretariat observations

|                  |                        |
|------------------|------------------------|
| Date: xx/xx/20xx | Document: ISO/DIS xxxx |
|------------------|------------------------|

| 1  | 2                                          | (3)                          | 4               | 5                                                                                                                                  | (6)                                                                      | 7                                                  |
|----|--------------------------------------------|------------------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------|
| MB | Clause No./ Subclause No./Annex (e.g. 3.1) | Paragraph/Figure/ Table/Note | Type of comment | Commend (justification for change) by the MB                                                                                       | Proposed change by the MB                                                | Secretariat observations on each comment submitted |
|    | 3.1                                        | Definition 1                 | ed              | Definition is ambiguous and needs clarifying.                                                                                      | Amend to read '...so that the mains connector to which no connection...' |                                                    |
|    | 6.4                                        | Paragraph 2                  | te              | The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK. | Delete reference to UV photometer.                                       |                                                    |



# 33/700/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER:  
**IEC 60931-1 ED3**

DATE OF CIRCULATION:  
**2023-12-08**

CLOSING DATE FOR COMMENTS:  
**2024-03-01**

SUPERSEDES DOCUMENTS:  
**33/680/RR**

IEC TC 33 : POWER CAPACITORS AND THEIR APPLICATIONS

SECRETARIAT:  
Italy

SECRETARY:  
Mr Stefano Zunino

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:



Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☐ QUALITY ASSURANCE

☐ SAFETY

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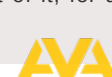
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TITLE:

**Shunt power capacitors of the non-self-healing type for a.c. systems having a rated voltage up to and including 1000 V - Part 1: General - Performance, testing and rating - Safety requirements - Guide for installation and operation**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SHUNT POWER CAPACITORS OF THE NON-SELF-HEALING TYPE FOR AC SYSTEMS HAVING A RATED VOLTAGE UP TO AND INCLUDING 1000 V –****Part 1: General – Performance, testing and rating –  
Safety requirements – Guide for installation and operation****FOREWORD**

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IEC 60931-1 has been prepared by IEC technical committee 33: Power capacitors and their applications. It is an International Standard.

This third edition cancels and replaces second edition published in 1996 and the Amendment 1:2002. This edition constitutes a technical revision.

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

- a) integration of IEC 60931-3 within IEC 60931-1;
- b) deletion of self-healing test.

174 The text of this International Standard is based on the following documents:

| Draft      | Report on voting |
|------------|------------------|
| 33/XX/FDIS | 33/XX/RVD        |

175

176 Full information on the voting for its approval can be found in the report on voting indicated in  
177 the above table.

178 The language used for the development of this International Standard is English.

179 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in  
180 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available  
181 at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are  
182 described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

183 The committee has decided that the contents of this document will remain unchanged until the  
184 stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the  
185 specific document. At this date, the document will be

- 186 • reconfirmed,
- 187 • withdrawn,
- 188 • replaced by a revised edition, or
- 189 • amended.

190

**SHUNT POWER CAPACITORS OF THE NON-SELF-HEALING TYPE FOR AC  
SYSTEMS HAVING A RATED VOLTAGE  
UP TO AND INCLUDING 1000 V –**

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

**1 Scope and object**

This part of IEC 60931 is applicable to both capacitor units and capacitor banks intended to be used, particularly, for power-factor correction of AC power systems having a rated voltage up to and including 1000 V and frequencies 15 Hz to 60 Hz.

This part of IEC 60931 also applies to capacitors intended for use in power filter circuits. Additional definitions, requirements, and tests for filter capacitors are given in Annex A.

The following capacitors are excluded from this part of IEC 60931:

- Shunt power capacitors of the self-healing type for AC systems having a rated voltage up to and including 1000 V (IEC 60831).
- Shunt capacitors for AC power systems having a rated voltage above 1000 V (IEC 60871).
- Capacitors for inductive heat-generating plants operating at frequencies between 40 Hz and 24 000 Hz (IEC 60110).
- Series capacitors (IEC 60143).
- Capacitors for motor applications and the like (IEC 60252).
- Coupling capacitors and capacitor dividers (IEC 60358).
- Capacitors to be used in power electronic circuits (IEC 61071).
- Small AC 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 DC voltage superimposed on the AC voltage.

Accessories such as insulators, switches, instrument transformers, fuses, etc., are to be in accordance with the relevant IEC standards.

The purpose of this part of the IEC 60931 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.

**2 Normative references**

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies.

233 For undated references, the latest edition of the referenced document (including any  
234 amendments) applies.

235 IEC 60050-436: International Electrotechnical Vocabulary (IEV) - Chapter 436: Power  
236 capacitors

237 IEC 60060-1: High voltage test techniques - Part 1: General definitions and test requirements

238 IEC 60110: Recommendation for capacitors for inductive heat generating plants operating at  
239 frequencies between 40 and 24 000 Hz

240 IEC 60143: Series capacitors for power systems

241 IEC 60252: A.C. motor capacitors

242 IEC 60269-1: Low-voltage fuses - Part 1: General requirements

243 IEC 60358: Coupling capacitors and capacitor dividers

244 IEC 60831-1: Shunt power capacitors of the self-healing type for AC systems having a rated  
245 voltage up to and including 1000 V - Part 1: General - Performance, testing and rating - Safety  
246 requirements - Guide for installation and operation

247 IEC 60871-1: Shunt capacitors for AC power systems having a rated voltage above 1000 V -  
248 Part 1: General - Performance, testing and rating - Safety requirements - Guide for installation  
249 and operation

250 IEC 60931-2: Shunt power capacitors of the non-self-healing type for AC systems having a  
251 rated voltage up to and including 1000 V - Part 2: Ageing test and destruction test

252 IEC 61000-2-2: Electromagnetic compatibility (EMC) - Part 2: Environment - Section 2:  
253 Compatibility levels for low-frequency conducted disturbances and signalling in public low-  
254 voltage power supply systems

255 IEC 61000-4-1: Electromagnetic compatibility (EMC) - Part 4: Testing and measurement  
256 techniques - Section 1: Overview of immunity tests - Basic EMC publication

257 IEC 61048: Capacitors for use in tubular fluorescent and other discharge lamp circuits - General  
258 and safety requirements

259 IEC 61049: Capacitors for use in tubular fluorescent and other discharge lamp circuits -  
260 Performance requirements

261 IEC 61071: Capacitors for power electronic

### 262 **3 Terms and Definitions**

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

264 ISO and IEC maintain terminology databases for use in standardization at the following  
265 addresses:

- 266 • IEC Electropedia: available at <https://www.electropedia.org/>
- 267 • ISO Online browsing platform: available at <https://www.iso.org/obp>

**3.1****capacitor element (or element)**

device consisting essentially of two electrodes separated by a dielectric. [IEV 436-01-03]

**3.2****capacitor unit (or unit)**

assembly of one or more capacitor elements in the same container with terminals brought out. [IEV 436-01-04]

**3.3****non-self-healing capacitor**

capacitor in which the dielectric, after local break-down, is not restored.

**3.4****capacitor bank (or bank)**

number of capacitor units connected so as to act together. [IEV 436-01-06]

**3.5****capacitor**

In this part of IEC 60931, 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. [IEV 436-01-07]

**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. [IEV 436-03-15 modified]

**3.8****internal fuse of a capacitor**

fuse connected inside a capacitor unit, in series with an element or a group of elements. [IEV 436-03-16]

**3.9****overpressure disconnecter for a capacitor**

disconnecting device designed to switch off the capacitor in the case of abnormal increase of the internal pressure. [IEV 436-03-17 modified]

**3.10****overtemperature disconnecter 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. [IEV 436-03-01]

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. [IEV 436-01-12 modified]

**3.13****rated output of a capacitor ( $Q_N$ )**

reactive power derived from the rated values of capacitance, frequency and voltage. [IEV 436-01-16 modified]

**3.14****rated voltage of a capacitor ( $U_N$ )**

RMS value of the alternating voltage for which the capacitor has been designed. [IEV 436-01-15]

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. [IEV 436-01-14]

**3.16****rated current of a capacitor ( $I_N$ )**

RMS value of the alternating current for which the capacitor has been designed. [IEV 436-01-13]

**3.17****capacitor losses**

active power dissipated in the capacitor. [IEV 436-04-10]

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 ( $\tan \delta$ ) of a capacitor**

ratio between the equivalent series resistance and the capacitive reactance of the capacitor at specified sinusoidal alternating voltage and frequency. [IEV 436-04-11]

**3.19****maximum permissible AC voltage of a capacitor**

maximum RMS alternating voltage which the capacitor can sustain for a given time in specified conditions. [IEV 436-04-07]

**3.20****maximum permissible AC current of a capacitor**

maximum RMS alternating current which the capacitor can sustain for a given time in specified conditions. [IEV 436-04-09]

**3.21****ambient air temperature**

temperature of the air at the proposed location of the capacitor.

**3.22****cooling air temperature**

temperature of the cooling air measured at the hottest position in the bank, under steady-state conditions, midway between two units. If only one unit is involved, it is the temperature