

A.C. motor capacitors

The European Standard EN 60252 : 1994 has the status of a British Standard

Condensateurs des moteurs à courant alternatif

Motorkondensatoren

UDC 621.319.4 : 621.313.333 : 620.1 : 614.8

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:

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Greece	Sweden
Iceland	Switzerland
Ireland	United Kingdom

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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 60252 : 1994 *A.C. motor capacitors*, published by the European Committee for Electrotechnical Standardization (CENELEC). It was derived by CENELEC from IEC 252 : 1993 published by the International Electrotechnical Commission (IEC).

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by a side line in the margin. Parts of the original IEC text that have been modified by CENELEC have been quoted in national annex NA.

This standard supersedes BS 5267 : 1976, which is withdrawn.

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

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Descriptors: Capacitors, power capacitors, alternating-current motors, definitions, safety requirements, routine tests, type testing, overload protection, installation, marking

English version

A.C. motor capacitors

(IEC 252 : 1993, modified)

Condensateurs des moteurs à courant
alternatif
(CEI 252 : 1993, modifiée)

Motorkondensatoren
(IEC 252 : 1993, modifiziert)

This European Standard was approved by CENELEC on 1993-12-08. 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.

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CENELEC

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

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Foreword

The text of document 33(CO)107, as prepared by IEC Technical Committee 33: Power capacitors, was submitted to the IEC-CENELEC parallel vote in March 1993.

The reference document with common modifications prepared by CENELEC Reporting Secretariat SR 33 was approved by CENELEC as EN 60252 on 8 December 1993.

The following dates were fixed:

- latest date of publication
of an identical national
standard (dop) 1994-12-01
- latest date of withdrawal
of conflicting national
standards (dow) 1994-12-01

For products which have complied with the relevant national standard before 1994-12-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1999-12-01.

Annexes designated 'normative' are part of the body of the standard. In this standard, annexes A and ZA are normative.

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A.C. MOTOR CAPACITORS

SECTION 1: GENERAL

1.1 Scope and object

This International Standard applies to motor capacitors intended for connection to windings of asynchronous motors supplied from a single-phase system having a frequency up to and including 100 Hz, and to capacitors to be connected to three-phase asynchronous motors so that these motors may be supplied from a single-phase system.

This standard covers impregnated or unimpregnated capacitors having a dielectric of paper, plastic film, or a combination of both, either metallized or with metal-foil electrodes, with rated voltages up to and including 660 V.

Electrolytic motor start capacitors will be covered by IEC 252-2 which is under consideration.

NOTE – The following are excluded from this standard:

- Shunt capacitors of the self-healing type for a.c. power systems of up to and including 1 000 V nominal voltage. (IEC 831-1)
- Shunt capacitors of non self-healing type for a.c. power systems of up to and including 1 000 V nominal voltage. (IEC 931-1)
- Shunt capacitors for a.c. power systems having a nominal voltage above 1 000 V. (IEC 871-1)
- Capacitors for induction heat-generating plants, operating at frequencies between 40 Hz and 24 000 Hz (IEC 110: Recommendation for capacitors for inductive heat generating plants operating at frequencies between 40 Hz and 24 000 Hz).
- Series capacitors (IEC 143: Series capacitors for power systems).
- Coupling capacitors and capacitor dividers (IEC 358: Coupling capacitors and capacitor dividers).
- Capacitors to be used in power electronic circuits (IEC 1071-1: Power electronic capacitors).
- Small a.c. capacitors to be used for fluorescent and discharge lamps (IEC 566: Capacitors for use in tubular fluorescent and other discharge lamp circuits).
- Capacitors for suppression of radio interference (IEC publication 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 a.c. voltage.

The object of this standard is:

- a) to formulate uniform rules regarding performance, testing and rating;
- b) to formulate specific safety rules;
- c) to provide a guide for installation and operation.

1.2 Normative references

The following normative documents 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 normative documents 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 normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 68-2-1: 1990, *Environmental testing. Part 2: Tests – Test A: Cold*

IEC 68-2-3: 1969, *Environmental testing. Part 2: Tests – Test Ca: Damp heat, steady state*

IEC 68-2-6: 1982, *Environmental testing. Part 2: Tests – Test Fc and guidance: Vibration (sinusoidal)*

IEC 68-2-20: 1979, *Environmental testing, Part 2: Tests – Test T: Soldering*

IEC 68-2-21: 1983, *Environmental testing. Part 2: Tests – Test U: Robustness of terminations and integral mounting devices*

IEC 529: 1989, *Degrees of protection provided by enclosures (IP Code).*

1.3 Definitions

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

1.3.1 motor running capacitor: A power capacitor which, when used in conjunction with an auxiliary winding of a motor, assists the motor to start and improves the torque under running conditions.

NOTE - The running capacitor is usually connected permanently to the motor winding and remains in circuit throughout the running period of the motor. During the starting period, if it is in parallel with the starting capacitor, it helps to start the motor.

1.3.2 motor starting capacitor: A power capacitor which provides a leading current to an auxiliary winding of a motor and which is switched out of circuit once the motor is running.

1.3.3 metal foil capacitor: A capacitor, the electrodes of which consist of metal foils or strips separated by a dielectric.

1.3.4 metallized capacitor: A capacitor, in which the electrodes consist of a metallic deposit on the dielectric.

1.3.5 self-healing capacitor: A capacitor, the electrical properties of which, after local breakdown of the dielectric, are rapidly and essentially self restored.

1.3.6 discharge device of a capacitor: A device which may be incorporated in a capacitor, capable of reducing the voltage between the terminals effectively to zero, within a given time, after the capacitor has been disconnected from a network.

1.3.7 continuous operation: Operation with no time limit within the normal life of the capacitor.

1.3.8 Intermittent operation: Operation in which periods with the capacitor energized are followed by intervals during which the capacitor is unenergized.

1.3.9 starting operation: A special type of intermittent operation in which the capacitor is energized for only a very short period while the motor is accelerating to rated speed.

1.3.10 rated duty cycle: A rated value indicating the type of intermittent or starting duty for which a capacitor is suitable. It is specified by the duty cycle duration, in minutes, and the percentage of the time during which the capacitor is energized.

1.3.11 duty cycle duration: Total time of one energized and one unenergized interval during the intermittent operation.

1.3.12 relative operation time: The percentage of the cycle duration in which the capacitor is energized.

1.3.13 capacitor for continuous and Intermittent operation: A capacitor designed to operate at one voltage when in continuous operation and at a different (usually higher) voltage when in intermittent operation.

1.3.14 class of operation: The minimum total life for which the capacitor has been designed at rated duty, voltage, temperature and frequency.

- Class A - 30 000 h
- Class B - 10 000 h
- Class C - 3 000 h
- Class D - 1 000 h

These classes of operation are intended to represent a true failure rate not exceeding 3 % during the life of the product.

A capacitor may have more than one class with corresponding voltages.

1.3.15 minimum permissible capacitor operating temperature: The minimum permissible temperature on the outside of the case at the moment of switching on the capacitor.

1.3.16 maximum permissible capacitor operating temperature (t_c): The maximum permissible temperature of the hottest area of the outside of the capacitor case during operation.

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

1.3.18 maximum voltage (only for motor starting capacitors): The maximum r.m.s. voltage permissible at the starting capacitor terminals between the point of starting and the instant at which the switch disconnects the capacitor.

1.3.19 rated frequency of a capacitor (f_N): The highest frequency for which the capacitor has been designed.

1.3.20 rated capacitance of a capacitor (C_N): The capacitance value for which the capacitor has been designed.

1.3.21 rated current of a capacitor (I_N): The r.m.s. value of the alternating current at the rated voltage and frequency.

1.3.22 rated output of a capacitor (Q_N): The reactive power derived from the rated values of capacitance, frequency and voltage (or current).

1.3.23 capacitor losses: The active power dissipated by a capacitor.

NOTE - Unless otherwise stated, the capacitor losses will be understood to include losses in fuses and discharge resistors forming an integral part of the capacitor.

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

1.3.25 capacitive leakage current (only for capacitors with a metal case): The current flowing through a conductor connecting the metallic case to earth, when the capacitor is energized from an a.c. supply system with an earthed neutral.

1.3.26 type of capacitor: Capacitors are considered to be of the same type when of similar constructional form, the same constructional technology, same rated voltage, same climatic category and same kind of operation. Capacitors of the same type can differ only in rated capacitance and size. Minor differences between terminations and mounting devices are permitted.

NOTE - The same construction includes, for example, the same dielectric material, dielectric thickness and type of case (metal or plastic).

1.3.27 model of capacitor: Capacitors are considered to be of the same model when they are of the same construction and have the same functional and dimensional characteristics within the tolerance limits and are consequently interchangeable.

1.3.28 class of safety protection: The degree of safety protection identified by one of three codes to be marked on the capacitor.

(P2) Indicates that the capacitor type has been designed to fail in the open-circuit mode only and is protected against fire or shock hazard. Compliance is verified by the test described in clause 2.16.