

Harmonized system of quality assessment for electronic components

Generic specification: Fixed aluminium electrolytic a.c. capacitors with non-solid electrolyte for use with motors

The European Standard EN 137000 : 1995 has the status of a
British Standard

ICS 31.060.50

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee EPL/40, Capacitors and resistors for electronic equipment, to Subcommittee EPL/40/1, Capacitors and EMI suppression components for electronic equipment, upon which the following bodies were represented:

- BSI Testing Services
- Electrical Installation Equipment Manufacturers' Association
- Federation of the Electronics Industry
- Ministry of Defence
- National Supervising Inspectorate (BSI-PC)
- Society of British Aerospace Companies Ltd.

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National foreword

This British Standard has been prepared by Subcommittee EPL/40/1, and is the English language version of EN 137000 : 1995 *Generic Specification: Fixed aluminium electrolytic a.c capacitors with non-solid electrolyte for use with motors*, published by the European Electronic Components Committee (CECC) of the European Committee for Electrotechnical Standardization (CENELEC).

Cross-references

Publication referred to	Corresponding British Standard
EN 100114 : Part I : 1994	BS EN 100114-1 /Issue 2 : 1994 <i>Rule of procedure 14. Quality assessment procedures. Approval of manufacturers and other organizations</i> BS CECC 00114 <i>Rule of procedure 14. Quality assessment procedures.</i>
CECC 00114 : Part II : 1992	Part 2 : 1993 <i>Qualification approval of electronic components</i>
CECC 00114 : Part III : 1993	Part 3 : 1993 <i>Capability approval of an electronic component manufacturing activity</i>
ISO 1000 : 1992	BS 5555 : 1993 <i>Specification for SI units and recommendations for the use of their multiples and of certain other units</i>
IEC 62 : 1992	BS EN 60062 : 1994 <i>Marking codes for resistors and capacitors</i>
IEC 68	BS 2011 <i>Environmental testing</i>
IEC 68-1 : 1988	Part 1.1 : 1989 <i>General and guidance</i> BS EN 60068 <i>Environmental testing</i> BS EN 60068-2 <i>Test methods</i>
IEC 68-2-1 : 1990	BS EN 60068-2-1 : 1993 <i>Test A. Cold</i>
IEC 68-2-2 : 1974	BS EN 60068-2-2 : 1993 <i>Test B. Dry heat</i> BS 2011 <i>Environmental testing</i> Part 2.1 <i>Tests</i>
IEC 68-2-3 : 1969	Part 2.1Ca : 1977 <i>Test Ca. Damp heat, steady state</i>
IEC 68-2-6 : 1982	Part 2.1Fe : 1983 <i>Test Fe. Vibration (sinusoidal)</i>
IEC 68-2-13 : 1983	Part 2.1M : 1984 <i>Test M. Low air pressure</i>
IEC 68-2-14 : 1984	Part 2.1N : 1985 <i>Test N. Change of temperature</i>
IEC 68-2-17 : 1978	Part 2.1Q : 1981 <i>Test Q. Sealing</i>
IEC 68-2-20 : 1979	Part 2.1T : 1981 <i>Test T. Soldering</i>
IEC 68-2-21 : 1983	Part 2.1U : 1984 <i>Test U. Robustness of terminations and integral mounting devices</i> BS EN 60068 <i>Environmental testing</i> BS EN 60068-2 <i>Test methods</i>
IEC 68-2-27 : 1987	BS EN 60068-2-27 : 1993 <i>Environmental testing procedures. Tests. Test Ea and guidance. Shock</i>
IEC 68-2-29 : 1987	BS EN 60068-2-29 : 1993 <i>Environmental testing procedures. Tests. Test Eb and guidance. Bump</i>

	BS 2011 <i>Environmental testing</i> Part 2.1 <i>Tests</i>
IEC 68-2-30 : 1980	Part 2.1Db : 1981 <i>Test Db and guidance: Damp heat, cyclic (12 + 12 hour cycle)</i>
	BS EN 60068 <i>Environmental testing</i> BS EN 60068-2 <i>Test methods</i>
IEC 68-2-45 : 1980	BS EN 60068-2-45 : 1993 <i>Environmental testing procedures. Tests. Test XA and guidance. Immersion in cleaning solvents</i>
IEC 68-2-47 : 1982	BS EN 60068-2-47 : 1993 <i>Environmental testing procedures. Tests. Mounting of components, equipment and other articles for dynamic tests including shock (Ea), bump (Eb), vibration (Fc and Fd) and steady-state acceleration (Ga) and guidance</i>
IEC 294 : 1969	BS 5692 : 1979 <i>Method for measurement of the dimensions of a cylindrical electronic component having two axial terminations</i>
IEC 529 : 1989	BS EN 60529 : 1992 <i>Specification for degrees of protection provided by enclosures (IP code)</i>

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

English version

Generic Specification
**Fixed aluminium electrolytic a.c. capacitors with non-solid
electrolyte for use with motors**

Spécification générique:
Condensateurs électrolytiques pour courant
alternatif, à l'aluminium, à électrolyte non
solide, à utiliser pour des moteurs

Fachgrundspezifikation:
Aluminium-Elektrolyt-Wechsel-
spannungskondensatoren mit flüssigem
Elektrolyten zum Betrieb mit Motoren

This European Standard was approved by CENELEC on 1995-06-24. 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, B-1050 Brussels

Foreword

This European Standard was prepared by Working Group CLC/TC CECC/WG 3.

The text of the draft based on document CECC(Secretariat)3247 was submitted to the formal vote; together with the voting report, circulated as document CECC(Secretariat)3659, it was approved as EN 137000 on 1995-06-24.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1996-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1997-07-01

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1 - SCOPE

This specification is applicable to fixed a.c. aluminium electrolytic capacitors intended:

- for connection to windings of asynchronous motors supplied from a single-phase system having a frequency up to and including 100 Hz.
- to be connected to three-phase asynchronous motors so that the motors may be supplied from a single-phase system.

This specification is not applicable to radio interference suppression capacitors, covered by EN 132 400.

Neither is it applicable to capacitors for use in electronic equipment, covered by EN 130 000.

It establishes standard terms, inspection procedures, methods of test for use in sectional and detail specifications within the CECC System, guide-lines for safety rules and for installation and operation.

2 - GENERAL

2.1 Related Documents

EN 100 114 Part I (1994)	Approval of manufacturers and other organizations (with amendment 1)
Issue 2 (1991)	Internal Regulations of the FEN e.V. (supersedes CECC 00 100 Issue 2 1988)
CECC 00 114 Part II (1992)	Qualification approval of electronic components (with amendment 1)
CECC 00 114 Part III (1993)	Capability approval of an electronic component manufacturing activity (with amendment and erratum)
ECQAC 1220 (1992)	ECQAC Policy on Uncertainty of Measurement
ISO 497	Guide to the choice of series of preferred numbers and of series containing more rounded values of preferred numbers
ISO 1000	SI units and recommendations for the use of their multiples and of certain other units
IEC 27-1	Letter symbols to be used in electrical technology: Part 1: General
IEC 50	International Electrotechnical Vocabulary
IEC 62	Marking codes for resistors and capacitors
IEC 68	Basic environmental testing procedures

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IEC 68-1 (1988)	General
IEC 68-2-1 (1990)	Test A: Cold
IEC-68-2-2 (1974) 68-2-2A (1976)	Test B: Dry heat First supplement
IEC 68-2-3 (1969)	Test Ca: Damp heat, steady state
IEC 68-2-6 (1982) Amendment 1 (1983) Amendment 2 (1985)	Test Fc: Vibration (sinusoidal)
IEC 68-2-13 (1983)	Test M: Low air pressure
IEC 68-2-14 (1984) Amendment 1 (1986)	Test N: Change of temperature
IEC 68-2-17 (1978) Amendment 3 (1989)	Test Q: Sealing
IEC 68-2-20 (1979) Amendment 1 (1986) Amendment 2 (1987)	Test T: Soldering
IEC 68-2-21 (1983) Amendment 1 (1985)	Test U: Robustness of terminations and integral mounting devices
IEC 68-2-27 (1987)	Test Ea: Shock
IEC 68-2-29 (1987)	Test Eb: Bump
IEC 68-2-30 (1980) Amendment 1 (1985)	Test Db: Damp heat, cyclic ((12 + 12) hour cycle)
IEC 68-2-45 (1980) Amendment 1 (1993)	Test XA and guidance: Immersion in cleaning solvents
IEC 68-2-47 (1982)	Mounting of components, equipment and other articles for dynamic tests, including shock (Ea), bump (Eb), vibration (Fc and Fd) and steady-state acceleration (Ga) and guidance)
IEC 117	Recommended graphical symbols
IEC 241	Fuses for domestic and similar purposes
IEC 294	Measurement of the dimensions of a cylindrical component having two axial terminations
IEC 410	Sampling plans and procedures for inspection by attributes
IEC 529	Classification of degrees of protection provided by enclosures

Note - The above references apply to the current editions, except for IEC 68 for which the referenced edition shall be used.

2.2 Units, symbols and terminology

2.2.1 General

Units, graphical symbols, letter symbols and terminology shall, whenever possible, be taken from the following publications:

ISO 1000: SI units and recommendations for the use of their multiples and of certain other units

IEC 27: Letter symbols to be used in electrical technology

IEC 50: International Electrotechnical Vocabulary

IEC 117: Recommended graphical symbols

When further items are required they shall be derived in accordance with the principles of the documents listed above.

2.2.2 Type

Capacitors are considered of the same type, when of similar constructional form, the same constructional technology, same temperature category, same kind of operation.

Capacitors of the same type may differ in rated voltage, rated capacitance, rated tolerance and size.

Capacitors of the same type are generally covered by a single detail specification.

2.2.3 Style

A sub-division of a type, generally based on dimensional factors.

A style may include several variants, generally of a mechanical order.

2.2.4 Family (of capacitors)

A group of capacitors which predominantly displays a particular physical attribute and/or fulfils a defined function. A family of capacitors will normally be described by a single generic specification.

2.2.5 Sub-family (of capacitors)

A group of capacitors within a family manufactured by similar technological methods. A sub-family is covered by a single sectional specification.

2.2.6 Range

A range of capacitors is a group of capacitors of the same type, same rated voltage and same cross-sectional shape.

Note - Cross-sectional shape means round, rectangular, oval.

2.2.7 Model

Capacitors are considered to be 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.

2.2.8 A.C. capacitor

A capacitor designed essentially for application with alternating voltages.

2.2.9 Motor starting capacitor

A 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.

2.2.10 Motor running capacitor

A capacitor which, when used in conjunction with an auxiliary winding of a motor, assists the motor to start and increases 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 it is in parallel with the starting capacitor.

2.2.11 Motor electrolytic capacitor

An electrolytic capacitor specifically designed for a.c. operation and normally used for starting a motor.

2.2.12 Discharge device of a capacitor

A device, usually a resistor, fitted to a capacitor capable of reducing the voltage between the terminals to a safe value after the capacitor has been disconnected from a network.

2.2.13 Continuous operation

Operation with no time limit within the normal life of the capacitor.

Note - Motor electrolytic capacitors are not normally designed for continuous operation.

2.2.14 Intermittent operation

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

2.2.15 Starting operation

A special kind of intermittent operation in which the capacitor is energized for only a very short period while the motor is accelerating to working speed.

2.2.16 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. See Fig.1.

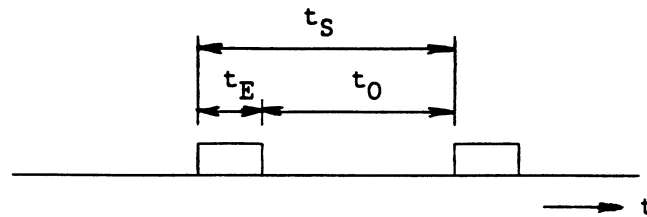


Fig. 1: Intermittent operation

t_E = duration of energized period, in min
 t_0 = duration of unenergized period, in min
 $t_S = t_E + t_0$, duration of one cycle, in min
 $t_E/t_S \times 100$ = relative operation time, in %

Note - A marking on a capacitor such as "3/1,67" means that the duration of the duty cycle is 3 min and the actual operation time of 1,67 % of 3 min is 3s.

2.2.17 Duty cycle duration

Total time of one energized and one unenergized interval during the intermittent operation.

2.2.18 Relative operation time

The percentage of the cycle duration which the capacitor is energized. See Fig.1

2.2.19 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.

2.2.20 Rated capacitance (C_R)

The capacitance value for which the capacitor has been designed and which is indicated upon it.

2.2.21 Operating temperature range

The range of ambient temperatures for which the capacitor has been designed to operate; this is defined by the temperature limits of the appropriate category.

2.2.22 Rated maximum temperature

The temperature, in degrees Celsius, which shall not be exceeded by the hottest part of the capacitor surface during operation.

2.2.23 Rated minimum temperature

The temperature, in degrees Celsius, of any part of the surface of the capacitor below which the capacitor shall not be energized.

2.2.24 Rated voltage (U_R)

The r.m.s. value of the sinusoidal voltage at rated frequency and rated operation for which the capacitor has been designed, and which may be applied at any temperature between the rated minimum temperature and the rated maximum temperature.