

**Harmonized system of quality assessment
for electronic components**

Sectional specification:

**Fixed aluminium electrolytic
a.c. capacitors with non-solid
electrolyte for motor starter
applications —
Qualification approval**

The European Standard EN 137100 : 1995 has the status of a
British Standard

ICS 31.060.50

Committees responsible for this British Standard

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BSI Testing Services
Electrical Installation Equipment Manufacturers' Association
Federation of the Electronics Industry
Ministry of Defence
National Supervising Inspectorate (BSI-PC)
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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 137100 : 1995, *Sectional specification: Fixed aluminium electrolytic a.c. capacitors with non-solid electrolyte for motor starter applications – Qualification approval*, published by the European Electronic Components Committee (CECC) of the European Committee for Electrotechnical Standardization (CENELEC).

Cross-references

Publication referred to	Corresponding British Standard
IEC 62 : 1992	BS EN 60062 : 1994 <i>Marking codes for resistors and capacitors</i>
IEC 68-1 : 1988	BS 2011 <i>Environmental testing</i> Part 1.1 : 1989 <i>General and guidance</i>
EN 137000 : 1995	BS EN 137000 : 1996 <i>Generic specification: Fixed aluminium electrolytic a.c. capacitors with non-solid electrolyte for use with motors</i>

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

English version

Sectional specification:
Fixed aluminium electrolytic a.c. capacitors with non-solid
electrolyte for motor starter applications
Qualification approval

Spécification intermédiaire:

Condensateurs électrolytiques pour courant alternatif, à l'aluminium, à électrolyte non solide, pour application dans les démarreurs de moteur Homologation

Rahmenspezifikation:

Aluminium-Elektrolyt-Wechselspannungskondensatoren mit flüssigem Elektrolyten zur Verwendung im Motoranlaßbetrieb Bauartaberkennung

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.

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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)3248 was submitted to the formal vote; together with the voting report, circulated as document CECC(Secretariat)3660, it was approved as EN 137100 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 - GENERAL

1.1 Scope

This specification applies to aluminium electrolytic capacitors with non-solid electrolyte primarily intended for a.c. motor starting applications. It covers capacitors for connection to windings of asynchronous motors supplied from a single-phase system having a frequency up to and including 100 Hz, with rated voltages up to and including 500 V.

It prescribes preferred ratings and characteristics and selects from the specification EN 137000 the appropriate quality assessment procedures, tests and measuring methods and gives general performance requirements for this type of capacitor.

1.2 Related documents

IEC 62	Marking codes for resistors and capacitors
IEC 68	Basic environmental testing procedures
EN 137000:1995	Generic specification: Fixed a.c. aluminium electrolyte capacitors for use with motors
IEC 410	Sampling plans and procedures for inspection by attributes

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

1.3 Information to be prescribed in a detail specification

Detail specifications shall be derived from the relevant blank detail specification.

Detail specifications shall not specify requirements inferior to those of the generic, sectional or blank detail specification. When more severe requirements are included, they shall be listed in 1.9 of the detail specification and indicated in the test schedules, for example by an asterisk.

Note - The information given in 1.3.1 may for convenience be presented in tabular form.

The following information shall be given in each detail specification and the values quoted shall preferably be selected from those given in the appropriate clause of this sectional specification.

1.3.1 Outline drawing and dimensions

There shall be an illustration of the capacitor as an aid to easy recognition and for comparison of the capacitor with others. Dimensions and their associated tolerances, which affect interchangeability and mounting, shall be given in the detail specification. All dimensions are preferably to be stated in mm.

Normally numerical values shall be given for the length, the width and the height of the body and the wire spacing, or for cylindrical types, the body diameter, and the length and the diameter of the terminations. When necessary, for example when a number of items (capacitance values/voltage ranges) are covered by a detail specification, the dimensions and their associated tolerances shall be placed in a table below the drawing.

When the configuration is other than described above, the detail specification shall state such dimensional information as will adequately describe the capacitor. When the capacitor is not designed for use on printed boards, this shall be clearly stated in the detail specification.

1.3.2 Mounting

The detail specification shall specify the method of mounting to be applied for normal use and the method which is mandatory for the application of the vibration and the bump or the shock tests. The design of the capacitor may be such that special mounting fixtures are required in its use. In this case the detail specification shall describe the mounting fixtures and they shall be used in the application of the vibration, bump and or shock tests.

1.3.3 Ratings and characteristics

The ratings and characteristics shall be in accordance with the relevant clauses of this specification, together with the following:

(1) Rated capacitance range

See 2.2.1

Note - When products approved to the detail specification have different ranges, the following statement should be added: "The range of capacitance values available in each voltage range is given in the Register of Approvals".

(2) Particular characteristics

Additional characteristics may be listed, when they are considered necessary to specify adequately the component for design and application purposes.

(3) Soldering

The detail specification shall prescribe test methods, severities and requirements applicable for the solderability and resistance to soldering heat test.

1.3.4 Marking

The detail specification shall specify the content of the marking on the capacitor and on the package. Deviations from 1.5 of this sectional specification shall be specifically stated.

1.4 Terminology

In addition to the the applicable terms and definitions of EN 137000, the following definitions apply:

1.4.1 Capacitance of an electrolytic capacitor

The capacitance of an equivalent circuit having capacitance and resistance in series measured with an alternating current of approximately sinusoidal wave form of the specified frequency.

1.4.2 Type of capacitor

Aluminium electrolytic capacitors used in motor applications are of two types: "Elyt glatt" i.e. plain foil and "Elyt rauh" i.e. etched foil.

1.5 Marking

See 2.4 of EN 137000 with the following details:

1.5.1 The information given in the marking is normally selected from the following list; the relative importance of each item is indicated by its position in the list:

- a) Manufacturer's name, abbreviated name or trademark
- b) Manufacturer's type designation
- c) Rated capacitance (C_R) in μF
- d) Tolerance on rated capacitance as a percentage (when the tolerance is asymmetric, the range of capacitance may also be given)
- e) Rated voltage (U_R) in "V a.c." or "V~"
- f) Rated frequency (f_R) in Hz
- g) Type of application e.g. "Motor Starting"
- h) Rated duty cycle e.g. "3/1,67"
- i) Type of capacitor: "Elyt glatt" or "Elyt rauh"
- j) Climatic category
- k) Year month (or week) of manufacture (if a code is used, it shall be according to IEC 62)
- l) Discharge device, if any, shall be indicated by wording or the symbol 
- m) CECC mark
- n) Reference to the detail specification

1.5.2 The capacitor shall be clearly marked with a) to m) above. Any duplication of information in the marking on the capacitor should be avoided.

1.5.3 The package containing the capacitor(s) shall be clearly marked with items a), b), c), e), g), and k) with any other of the remaining items as is considered necessary.

1.5.4 Any additional marking shall be so applied that no confusion can arise.

2 - PREFERRED RATINGS AND CHARACTERISTICS

2.1 Preferred climatic categories

The capacitors covered by this specification are classified into climatic categories according to the general rules given in IEC 68-1.

The minimum and the maximum temperature and the duration of the damp heat, steady state test shall be chosen from the following:

Rated minimum temperature: - 40 °C, - 25 °C and - 10 °C

Rated maximum temperature: + 55 °C, + 60 °C, + 70 °C and + 85 °C

Duration of the damp heat steady state test: 4, 10, 21 and 56 days

2.2 Preferred values of ratings

2.2.1 Rated capacitance (C_R)

Preferred values of rated capacitance are: 1,0 - 1,25 - 1,60 - 2,0 - 2,5 - 3,0 - 4,0
- 5,0 - 6,5 - 8,0 - 0,9 μ F and their
decimal multiples

Other values may be used.

2.2.2 Tolerance on rated capacitance

Preferred values of tolerance on rated capacitance are:

- 10/+ 10 %
- 20/+ 20 %

Asymmetric tolerances are permitted but no tolerance shall exceed 25 %.

2.2.3 Rated voltage (U_R)

Preferred values of rated a.c. voltage are: 110 - 120 - 150 - 220 - 240 - 250 - 260
- 280 - 320 - 330 V r.m.s.

Other values may be used.

2.2.4 Category voltage (U_C)

The category voltage is equal to the rated voltage unless otherwise stated in the detail specification.

2.2.5 Maximum voltage

The maximum voltage shall be 1,25 times the rated voltage or the category voltage.

3 - QUALITY ASSESSMENT PROCEDURES

3.1 Primary stage of manufacture

The primary stage of manufacture is the winding of the capacitor element or equivalent operation.

3.2 Structurally similar components

Capacitors considered as being structurally similar are capacitors produced with similar processes and materials, though they may be of different case sizes and capacitance and voltage values. Structural similarity may be utilised in the sampling of capacitors for testing under quality conformance inspection.

3.3 Certified test records

The information required in 3.9 of EN 137000 shall be made available when prescribed in the detail specification and when requested by a purchaser. After the endurance test the parameters for which variables information is required are the capacitance change, $\tan \delta$ and the insulation resistance.

3.4 Qualification approval

The procedures for qualification approval testing are given in 3.5 of EN 137000. The schedule to be used for qualification approval testing on the basis of lot-by-lot and periodic tests is given in 3.5 of this specification. The procedure using a fixed sample size schedule is given in 3.4.1 and 3.4.2 below.

3.4.1 Sampling

The fixed sample size procedure is described in 3.5.3(2) of EN 137000. The sample shall be representative of the range of capacitors for which approval is sought. This may or may not be the complete range covered by the detail specification.

The sample shall consist of specimens having the lowest and the highest capacitance values for a given rated voltage; if a range of rated voltages is offered for qualification, then the sample shall consist of specimens having the highest and the lowest capacitance in the largest and the smallest case size at the highest and the lowest voltages of the range. When three or more rated voltages form part of the range, the endurance and dielectric stability tests shall be performed on samples from an intermediate voltage value of the range offered for qualification. The manufacturer shall provide data on the capacitance per unit of total outer surface area of the case for each capacitance value in the range. The capacitor with the maximum capacitance per unit area shall also be tested if this value exceeds that of the highest capacitance value in the range by 10 % or greater; similarly, the capacitor with the minimum capacitance per unit area shall also be tested if this value is less than that of the lowest capacitance in the range by 10 % or greater.

Note - In calculating the total surface area small protrusions, terminals and fixing studs shall be ignored.

Thus for the approval of a single voltage, the testing is required of at least two or three values; for the approval of a range of voltages, the testing is required of at least four or six values.