



SLOVENSKI STANDARD
SIST EN 130300:2002

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Sectional specification: Aluminium electrolytic capacitors with solid non-solid electrolyte

Sectional Specification: Aluminium electrolytic capacitors with solid and non-solid electrolyte

Rahmenspezifikation: Aluminium-Elektrolyt-Kondensatoren mit festem und flüssigem Elektrolyten

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Spécification intermédiaire: Condensateurs électrolytiques à l'aluminium à électrolyte solide et non solide

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EUROPEAN STANDARD
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EN 130300

March 1998

Supersedes CECC 30 300:1988 and its amendments

English version

**Sectional Specification:
Aluminium electrolytic capacitors
with solid and non-solid electrolyte**

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l'aluminium à électrolyte solide et
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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

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FOREWORD

At the request of CLC/TC CECC/SC 40XA (former WG 3), the text of CECC 30 300:1988, Issue 2, with its amendments A1 through A4 and documents CECC(Secretariat)3061 and 3062, was submitted to the formal vote for conversion into a European Standard.

The text of the draft, together with the voting report, circulated as document CECC(Secretariat)3205, was approved as EN 130300 on 1992-10-14.

The text of document CECC(Secretariat)3451 was submitted to the formal vote and, together with the voting report, circulated as document CECC(Secretariat)3551, was approved as an amendment to EN 130300 on 1994-05-15.

The texts of documents CECC(Secretariat)3499 and 3501 were submitted to the formal vote; together with the voting reports, circulated as documents CECC(Secretariat)3599 and 3600, they were approved as amendments to EN 130300 on 1994-08-22.

Two draft amendments were submitted to the formal vote in November 1995 and were approved by CENELEC as amendments to EN 130300 on 1996-07-02.

All the above amendments have been incorporated in this European Standard.

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) 1998-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1998-10-01



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1 - GENERAL

1.1 Scope

This specification applies to aluminium electrolytic capacitors with solid or non-solid electrolyte primarily intended for d.c. applications for use in electronic equipment. SMD capacitors are not covered.

The object of this specification is to prescribe preferred ratings and characteristics and to select from the generic specification EN 130000 the appropriate quality assessment procedures, tests and measuring methods and to give general performance requirements for this type of capacitor.

1.2 Related documents

ISO 3	Preferred numbers - Series of preferred numbers
IEC 62	Marking codes for resistors and capacitors
IEC 63 Amendment 1 (1967) Amendment 2 (1977)	Preferred number series for resistors and capacitors
IEC 68	Basic environmental testing procedures
IEC 384-4	Sectional specification: Aluminium electrolytic capacitors with solid or non-solid electrolyte
IEC 410	Sampling plans and procedures for inspection by attributes
EN 130000	Generic specification: Fixed capacitors

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

1.3 Information to be given 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.

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 Dimensions and outline drawing

The detail specification shall give 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. All dimensions shall be stated in mm.

NOTE - The information may be presented in tabular form.

Normally the numerical values shall be given for the length, the width and height of the body and the wire spacing or for cylindrical types the body diameter, and the length and diameter of the terminations. When necessary, for example when a number of case sizes 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 the application of the vibration and the bump or 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 and bump or shock tests.

NOTE - If recommendations for mounting for "normal" use are made, they shall be included in the detail specification under 1.8 "Additional information (not for inspection purposes)". If they are included, a warning can be given that the full vibration, bump and shock performance may not be available if mounting methods other than those specified in 1.1 of the detail specification are used.

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:

1.3.3.1 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 Qualified Products List (QPL)".

1.3.3.2 Particular characteristics

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

1.3.3.3 Soldering

The detail specification shall prescribe the test methods, severities and requirements applicable for the solderability test and the 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 applicable terms and definitions of EN 130000 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 alternating current of approximately sinusoidal wave form of the specified frequency.

1.4.2 Rated voltage (U_R)

The maximum d.c. voltage which may be applied continuously to the terminations of a capacitor at the rated temperature.

NOTE - The sum of the d.c. voltage and the peak alternating voltage applied to the capacitor shall not exceed the rated voltage.

1.4.4 Reverse voltage (for polar capacitors only)

See 2.2.22 of EN 130000.

1.5 Marking

See 2.4 of EN 130000 with the following details:

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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:

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- (1) Rated capacitance
- (2) Rated voltage; (d.c. voltage may be indicated by the symbol U_R or U)
- (3) Polarity of the terminations: For multi-section capacitors, the rated capacitance and rated voltage of the sections connected to each terminations shall be shown in an unambiguous way. The termination of a capacitor section which is intended for direct connection to the rectifier (so called reservoir section) shall be marked with the number 1 or with the colour red. Bipolar capacitors shall be marked positive at both ends and, if space permits, in addition with the letters "BP".
- (4) Tolerance on rated capacitance
- (5) Year and month (or week) of manufacture
- (6) Manufacturer's name or trade mark
- (7) Indication of the sub-family (for example 1, 2 or 3)
- (8) Climatic category
- (9) Manufacturer's type designation
- (10) Reference to the detail specification.
- (11) CECC mark

1.5.2 The capacitor shall be clearly marked with item (1) to (4) inclusive and with as many as possible of the remaining items as is considered necessary. 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 all the information given by the items (1), (2), (4), (5), (6), (9) and (11) and as many of the remaining items as is considered necessary by the manufacturer.

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

2 - PREFERRED RATINGS AND CHARACTERISTICS

The values given in detail specifications shall preferably be selected from the following:

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 lower and upper category temperature and the duration of the damp heat, steady state tests shall be chosen from the following:

Lower category temperature:	-55 °C, -40 °C, -25 °C and -10 °C
Upper category temperature:	+70 °C, +85 °C, +100 °C, 105 °C and +125 °C
Duration of the damp heat, steady state test:	4, 10, 21 and 56 days

The severities for the cold and dry heat tests are the lower and upper category temperatures respectively.

2.2 Preferred values of ratings

2.2.1 Rated capacitance (C_R)

Preferred values of rated capacitance are chosen from the E3 series of IEC 63 and their decimal multiples. If other values are needed, they shall preferably be chosen from the E6 or the E12 series.

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2.2.2 Tolerance on the rated capacitance

Preferred values of tolerances on rated capacitance are:

-10/+10 %	-10/+75 %
-10/+30 %	-10/+100 %
-10/+50 %	-20/+20 %

2.2.3 Rated voltage (U_R)

Preferred values of rated direct voltages are taken from R5 (and their decimal multiples) and R10 series of ISO 3 are. The values are given below:

6,3 - 10 - 16 - 25 - 40 - 63 - 100 - 200 - 250 - 315 - 350 - 385 - 400 - 450 V.

NOTE - 200, 385 and 450 V though outside R5 and R10 series are permitted due to common usage.

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 Ripple voltage

An alternating voltage may be applied provided that the peak voltage resulting from the alternating voltage superimposed on the direct voltage does not exceed the value of the rated direct voltage and that the rated ripple current (see 2.2.8) and the permissible reverse voltage (see detail specification) are not exceeded.

2.2.6 Reverse voltage

The permissible reverse voltage (if specified) shall be given in the detail specification.

2.2.7 Surge voltage

The surge voltage shall be 1,15 times the rated or category voltage for rated voltages ≤ 315 V, or 1,10 times the rated or category voltage for rated voltages > 315 V.

See also 4.14.

2.2.8 Rated ripple current

The rated ripple current at 100 Hz or 120 Hz and at upper category temperature shall be given in the detail specification. Alternatively, for capacitors for switched mode power supply application or similar, the rated ripple current shall be stated at the relevant frequency.

NOTE - This value is determined by the dimensions of the capacitor and several other factors, for example the ESR and the permissible temperature rise.

See also 2.2.5.

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3 - QUALITY ASSESSMENT PROCEDURES

3.1 Primary stage of manufacture

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

3.3 Certified test records of released lots

The information required in 3.9 of EN 130000 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, $\tan \delta$ or ESR and the leakage current.

3.4 Qualification approval

The procedures for qualification approval testing are given in 3.5 of the generic specification EN 130000.

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 130000. 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 highest voltages, and for these voltages the smallest and largest case size. When the range of rated voltages exceeds 200 V, an intermediate voltage shall also be tested. In each of these case size/voltage combinations (values) the highest capacitance shall be chosen. Thus for the approval of a range, testing is required of either four or six values. When the range consists of less than four values, the number of specimens to be tested shall be that required for four values.

Spare specimens are permitted as follows:

- (1) One per value which may be used to replace the permitted non-conforming items in Group "0".
- (2) One per value which may be used as replacements for specimens which are non-conforming items because of incidents not attributable to the manufacturer.

The numbers given in Group "0" assume that all groups are applicable. If this is not so, the numbers may be reduced accordingly.

When additional groups are introduced into the qualification approval test schedule, the number of specimens required for Group "0" shall be increased by the same number as that required for the additional groups.

Annex A1 or B1 gives the number of samples to be tested in each group or sub-group together with the permissible number of non-conforming items for qualification approval tests.

3.4.2 Tests

The complete series of tests indicated in Annex A1 to A3 or Annex B1 to B3 and Annex C are required for the approval of capacitors covered by one detail specification. The tests of each group shall be carried out in the order given.

The whole sample shall be subjected to the tests of Group "0" and then divided for the other groups.

Non-conforming specimens found during the tests of Group "0" shall not be used for the other groups.

When a capacitor has not satisfied the whole or part of the tests of a group, the capacitor is counted as "one non-conforming item".

The approval is granted when the number of non-conforming items does not exceed the specified number of permissible non-conforming items for each group or sub-group and the total number of permissible non-conforming items.

NOTE 1 - Annex A1 and Annex C or Annex B1 and Annex G together form the fixed sample size test schedule. Annex A or B includes the details for the sampling and permissible non-conforming items for the different tests or groups of tests, whereas Annex C together with the details of tests contained in Section 4 gives a complete summary of test conditions and performance requirements and indicates where, for example, for the test method or conditions of test, a choice has to be made in the detail specification.

NOTE 2 - The conditions of test and performance requirements for the fixed sample size test schedule shall be identical to those prescribed in the detail specification for quality conformance inspection.

3.5 Quality conformance inspection

3.5.1 Formation of inspection lots

3.5.1.1 Groups A and B inspection

These tests shall be carried out on a lot-by-lot basis according to Annex A2 or B2.

A manufacturer may aggregate the current production into inspection lots subject to the following safeguards:

- (1) The inspection lot shall consist of structurally similar capacitors (see 3.2).
- (2a) The sample tested shall be representative of the values and dimensions contained in the inspection lot:
 - in relation to their number
 - with a minimum of 5 of any one value.