



**SLOVENSKI STANDARD**  
**SIST EN 134100:2002**  
**01-september-2002**

---

**Sectional specification: Variable capacitors (Qualification approval)**

Sectional Specification: Variable capacitors (Qualification approval)

Rahmenspezifikation: Einstellbare Kondensatoren (Bauartanerkennung)

Spécification intermédiaire: Condensateurs variables (Homologation)

**Ta slovenski standard je istoveten z: EN 134100:1995**

[SIST EN 134100:2002](https://standards.iteh.ai/catalog/standards/sist/61cc2fbc-e7be-42d9-9670-d8cf6869778d/sist-en-134100-2002)

<https://standards.iteh.ai/catalog/standards/sist/61cc2fbc-e7be-42d9-9670-d8cf6869778d/sist-en-134100-2002>

**ICS:**

31.060.60      Spremenljivi kondenzatorji      Variable capacitors

**SIST EN 134100:2002**

**en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 134100:2002](#)

<https://standards.iteh.ai/catalog/standards/sist/61cc2fbc-e7be-42d9-9670-d8cf6869778d/sist-en-134100-2002>

EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN 134100

November 1995

Descriptors: Quality, electronic components, capacitors

ccc/cenelec 452

English version

**Sectional Specification:  
Variable capacitors  
(Qualification approval)**

Spécification intermédiaire:  
Condensateurs variables  
(Homologation)

Rahmenspezifikation:  
Einstellbare Kondensatoren  
(Bauartanerkennung)

**iTeh STANDARD PREVIEW  
(standards.iteh.ai)**

SIST EN 134100:2002

<https://standards.iteh.ai/catalog/standards/sist/61cc2fbc-e7be-42d9-9670-d8cf6869778d/sist-en-134100-2002>

This European Standard was approved on 1993-07-29. 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 "Capacitors".

It is based wherever possible on the Publications of the International Electrotechnical Commission, and in particular on IEC 418, Variable capacitors.

The text of the draft based on document CECC(Secretariat)3096 was submitted to the formal vote; together with the voting report, circulated as document CECC(Secretariat)3377, and the editorially revised document CECC WG3(Hayward)3E, it was approved as EN 134100 on 1993-07-29.

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) 1996-05-31
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2003-11-30

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 134100:2002

<https://standards.iteh.ai/catalog/standards/sist/61cc2fbc-e7be-42d9-9670-d8cf6869778d/sist-en-134100-2002>

## CONTENTS

Section/Clause	Page
FOREWORD.....	2
1 GENERAL.....	4
1.1 Scope.....	4
1.2 Related documents.....	4
1.3 Information to be given in a detail specification.....	4
1.4 Terminology.....	6
1.5 Marking.....	6
2 PREFERRED RATINGS AND CHARACTERISTICS.....	7
2.1 Preferred climatic categories.....	7
2.2 Preferred values of ratings.....	7
3 QUALITY ASSESSMENT PROCEDURES.....	8
3.1 Primary stage of manufacture.....	8
3.2 Structurally similar components.....	8
3.3 Certified test records of released lots.....	8
3.4 Qualification approval.....	8
3.5 Quality conformance inspection.....	10
4 TEST AND MEASUREMENT PROCEDURES.....	11
4.1 Preconditioning.....	11
4.2 Visual examination and check of dimensions.....	11
4.3 Electrical tests.....	11
4.4 Operating torque.....	13
4.5 Locking.....	13
4.6 Locking torque proof.....	13
4.7 End stop torque.....	13
4.8 Thrust and pull (axial).....	13
4.9 Side thrust.....	14
4.10 Robustness of terminations.....	14
4.11 Solderability.....	14
4.12 Resistance to soldering heat.....	14
4.13 Component solvent resistance.....	14
4.14 Solvent resistance of marking.....	14
4.15 Rapid change of temperature.....	14
4.16 Vibration.....	15
4.17 Bump.....	15
4.18 Shock.....	16
4.19 Climatic sequence.....	16
4.20 Damp heat, steady state.....	17
4.21 Electrical endurance.....	17
4.22 Mechanical endurance.....	17
ANNEX A.1 TEST PLAN FOR QUALIFICATION APPROVAL.....	19
ANNEX A.2 TEST PLAN FOR QUALITY CONFORMANCE INSPECTION - LOT-BY-LOT TESTS.....	21
ANNEX A.3 TEST PLAN FOR QUALITY CONFORMANCE INSPECTION - PERIODIC TESTS.....	22
ANNEX A.4 TEST SCHEDULE FOR QUALIFICATION APPROVAL.....	23

## 1 - GENERAL

### 1.1 Scope

This specification applies to variable capacitors for use in electronic equipment. It covers capacitors for variable tuning, trimming and preset for general purpose applications. Capacitors for special purpose applications may require additional assessments.

The object of this specification is to prescribe preferred ratings and characteristics and to select from the generic specification EN 134 000 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 (1973)	Preferred numbers - series of preferred numbers
IEC 62 (1974)	Marking codes for resistors and capacitors
IEC 63 (1963) Amendment 1 (1967) Amendment 2 (1977)	Preferred number series for resistors and capacitors

IEC 68	Basic environmental testing procedures
--------	----------------------------------------

IEC 410 (1973)	Sampling plans and procedures for inspection by attributes
----------------	------------------------------------------------------------

EN 134 000	Generic specification: Variable Capacitors
------------	--------------------------------------------

NOTE - The above references apply to the current editions, except for IEC 68 for which the referenced edition shall 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 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 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 the height of the body and the wire spacing, or for cylindrical types, the body diameter and the length 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 should 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 features 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) 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 adequately to specify the component for design and application purposes.

#### (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

For terms and definitions see 2.4 of EN 134 000.

#### 1.5 Marking

See 2.5 of EN 134 000 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:

- (1) Range of capacitance
- (2) Rated voltage
- (3) Category voltage and category temperatures
- (4) Tolerance on capacitance range
- (5) Year and month (or week) of manufacture
- (6) Manufacturer's name and trade mark
- (7) Climatic category
- (8) Manufacturer's type designation
- (9) Reference to the detail specification
- (10) CECC mark.

1.5.2 The capacitor shall be clearly marked with (1) to (5) above and with as many 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 listed in 1.5.1. (standards.iteh.ai)

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 test shall be chosen from the following:

Lower category temperature: - 55°C, - 25°C  
Upper category temperature: + 85°C, + 100°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 maximum capacitance ( $C_R$ )

Preferred values of rated maximum capacitance are: 1 - 2,2 - 4,7 and their decimal multiples. These values conform to the E3 series of preferred values given in IEC 63: Preferred number series for resistors and capacitors.

If other values are required, they shall preferably be chosen from the E6 series.

#### 2.2.2 Tolerance on rated maximum capacitance

Preferred values of tolerances on rated maximum capacitance are  $\pm 10\%$ ,  $\pm 20\%$  and  $- 10\%$  + 30%

#### 2.2.3 Rated voltage ( $U_R$ )

Preferred values of d.c. rated voltages are:

For  $U_R < 250$  V: 1 - 1,6 - 2,5 - 4 - 6,3 V and their decimal multiples

For  $U_R \geq 250$  V: 250 - 315 - 350 - 400 - 450 V

These values are taken from the R5 and R10 series of ISO 3 with the addition of 350 V and 450 V.

### 3 - QUALITY ASSESSMENT PROCEDURES

#### 3.1 Primary stage of manufacture

The primary stage of manufacture is the manufacture of the stator(s) and its corresponding rotor(s).

#### 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 134 000 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, tangent of loss angle and the insulation resistance.

#### 3.4 Qualification approval

The procedures for qualification approval testing are given in 3.5 of the generic specification EN 134 000.

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. For the two procedures the sample sizes and the number of non-conforming items shall be of comparable order. The test conditions and requirements shall be the same. Qualification approval according to the fixed sample size procedure is preferred.

##### 3.4.1 Sampling

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.

When there are not more than four rated voltages in the range the sample shall consist of specimens of four values, chosen as follows:

- a) The highest rated voltage and highest rated capacitance
- b) The highest rated voltage and lowest rated capacitance
- c) The lowest rated voltage and highest rated capacitance
- d) The lowest rated voltage and lowest rated capacitance

When there are more than four rated voltages in the range, the sample shall contain two additional values, chosen as follows:

- e) An intermediate rated voltage and highest rated capacitance
- f) An intermediate rated voltage and lowest rated capacitance

Thus for the approval of a range, testing is required of either four or six values (capacitance/voltage combinations). 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 non-conforming item in Group "0".
- (2) One per value which may be used as replacements for specimens which are defective 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. The numbers given in Group "0" may also be reduced if, for example, for expensive capacitors the manufacturer chooses to carry out tests of a number of groups in sequence on the same specimens.

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 A.1 gives the number of samples to be tested in each group together with the number of non-conforming items for qualification approval tests.

#### 3.4.2 Tests

The complete series of tests specified in Annex A.1 and Annex A.4 is 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.

Specimens found defective during the tests of Group "0" shall not be used for the other groups.

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

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

NOTE (1) - Annex A.1 and Annex A.4 together form the fixed sample size test schedule, for which Annex A.1 includes the details for the sampling and non-conforming items for the different tests or groups of tests, whereas Annex A.4 together with the details of test 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

##### (1) Groups A and B inspection

These tests shall be carried out on a lot-by-lot basis according to Annex A.2.

Manufactured lots of separately identified capacitors may be aggregated into inspection lots formed for such tests as are relevant to structural similarities between those manufactured lots.

##### (2) Group C inspection

These tests shall be carried out periodically according to Annex A.3.

The specimens shall be representative of the current production in the specified period and shall be divided into high, medium and low voltage ratings. In order to cover the range of approvals in any period, one size shall be tested from each voltage group. In subsequent periods other sizes and/or voltage ratings in production shall be tested with the aim of covering the whole range of approval.

#### 3.5.2 Test schedules

See Annex A.2 and Annex A.3.

#### 3.5.3 Delayed delivery

When according to the procedures of 3.11 of EN 134 000 re-inspection has to be made, insulation resistance shall be checked as specified in Group A and solderability shall be checked according to Group B inspection.

#### 3.5.4 Assessment levels

The assessment level(s) given in the blank detail specification shall preferably be selected from Annex A.2 and Annex A.3.

TeH STANDARD PREVIEW

(standards.iteh.ai)

SIST EN 134100:2002

<https://standards.iteh.ai/catalog/standards/sist/61cc2fbc-e7be-42d9-9670-d8cf6869778d/sist-en-134100-2002>