

SLOVENSKI STANDARD
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Sectional specification: Quartz crystal units (Qualification approval)

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Rahmenspezifikation: Schwingquarze (Bauartanerkennung)

Spécification intermédiaire: Résonateurs à quartz (Homologation)

Ta slovenski standard je istoveten z: EN 168200:1993/A1:1993

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EUROPEAN STANDARD
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March 1993

+ A1

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Descriptors: Quality, electronic components, quartz crystal units

English version

Sectional Specification: Quartz Crystal Units (Qualification Approval)

(Includes Amendment A1:1993)

Spécification intermédiaire:
 Résonateurs à quartz
 (Homologation)
 (Inclut l'amendement A1:1993)

Rahmenspezifikation:
 Schwingquarze
 (Bauartanerkennung)
 (Einschließlich Änderung A1:1993)

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This European Standard was approved by the CENELEC Electronic Components Committee (CECC) on 14th January 1992. 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 General Secretariat of the CECC 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 CECC General 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. The membership of the CECC is identical, with the exception of the national electrotechnical committees of Greece, Iceland and Luxembourg.

CECC

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

The CENELEC Electronic Components Committee (CECC) is composed of those member countries of the European Committee for Electrotechnical Standardization (CENELEC) who wish to take part in a harmonized System for electronic components of assessed quality.

The object of the System is to facilitate international trade by the harmonization of the specifications and quality assessment procedures for electronic components, and by the grant of an internationally recognized Mark, or Certificate, of Conformity. The components produced under the System are thereby acceptable in all member countries without further testing.

This amendment to the European Standard was prepared by CECC WG 17, Piezoelectric devices for frequency control and selection.

The text of the draft based on document CECC (Secretariat) 2898 was submitted to the formal vote; together with the voting report, circulated as document CECC (Secretariat) 3111 it was approved by CECC as EN 168200/A1 on 25 May 1992.

The following dates were fixed:

- latest date of announcement of the EN at national level (doa) 1993-06-17
- latest date of publication of an identical national standard (dop) 1993-12-17
- latest date of declaration of national standards obsolescence 1993-12-17
- latest date of withdrawal of conflicting national standards (dow) 2003-06-17

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Section 1. Scope

This sectional specification applies to quartz crystal units whose quality is assessed on the basis of qualification approval.

It prescribes the preferred ratings and characteristics, with the appropriate tests and measuring methods contained in the generic specification CECC 68000, and gives the general performance requirements to be used in detail specifications for quartz crystal units.

Section 2. General, preferred ratings and guidance on detail specifications

2.1 Related Documents

IEC 68, *Basic environmental testing procedures*.

CECC 68000, *Generic specification: Quartz crystal units*.

NOTE The above references apply to the current editions except for IEC 68 for which the referred edition and the applicable test clauses of CECC 68000 shall be used.

2.2 Preferred ratings and characteristics

The values given in detail specifications shall preferably be selected from those stated in 2.4 of the generic specification CECC 68000.

2.3 Information to be prescribed in detail specifications

Guidance on the preparation of detail specifications shall be derived from the blank detail specification CECC 68201.

Each detail specification shall state all the tests and measurements required for inspection. This shall, as a minimum, include the relevant tests given in the blank detail specification, with methods and severities.

A single detail specification shall include only one enclosure type which may include different pin configurations.

The following information shall be given in each detail specification.

2.3.1 Outline drawing and dimensions

The detail specification shall include a dimensioned drawing of the crystal unit and/or a reference to an appropriate International Standard to permit easy recognition and to provide information for dimensioning and gauging procedures.

The dimensions shall include the overall dimensions of the body of the component and the size and spacing of the terminations. All dimensions shall be in mm.

Terminal connections shall be identified for enclosures with more than two terminations.

This information may be given in more detail in an annex.

2.3.2 Mounting of the component

The detail specification shall define any assembly restrictions on the use of the crystal unit. Where these restrictions apply special mounting fixtures may be required for the bump, shock, vibration and acceleration tests. Such fixtures shall be described in the detail specification.

Where no special mounting fixtures are indicated then the above tests shall be carried out as specified in Section 4 of CECC 68000.

2.3.3 Severities for environmental tests

The detail specification shall state the method of testing and the appropriate severities selected from Section 4 of CECC 68000.

2.3.4 Marking

The detail specification shall state the required marking on the crystal unit and on the primary package in accordance with 2.5 of CECC 68000.

2.3.5 Ordering information

The detail specification shall prescribe that the following information is required when ordering crystal units.

- 1) Quantity
- 2) Detail specification number, issue number and date and where applicable
- 3) Nominal frequency in kHz or MHz and overtone order
- 4) Enclosure type
- 5) Frequency tolerance(s) and operating temperature range
- 6) Circuit condition
- 7) Full description of any additional requirements.

2.3.6 Additional information (not for inspection purposes)

The detail specification may include information which is not normally required to be verified by the inspection procedure, such as circuit diagrams, curves, drawings and notes needed for clarification.

Section 3. Quality assurance procedures

3.1 Eligibility for qualification approval

Prior to making an application for qualification approval a manufacturer shall first obtain manufacturer's inspection approval in accordance with CECC 00114-I.

The primary stage of manufacture is the final surface finishing of the crystal element and shall be as defined in 3.1 of the generic specification EN 168000 (CECC 68000).

3.2 Structural similarity

Structural similarity exists where a range of quartz crystal units covered by a single detail specification, incorporate the same materials and method of sealing the enclosure and mode of vibration.

Extensions of the concept of structural similarity permitted by this specification are given in 3.4.3 1).

3.3 Certified test records

Certified test records shall comply with 3.11 of EN 168000. They shall be made available when prescribed in the detail specification and when requested by the customer.

3.4 Qualification approval

The procedures for qualification approval testing are defined in 3.7 of the generic specification EN 168000. Qualification approval may be obtained either by using a fixed sample drawn from current production (see 3.4.1), or on the basis of lot-by-lot tests on three inspection lots with periodic tests on a sample taken from at least one of these lots (see 3.4.2).

In either case, samples for qualification approval shall be selected as follows:—

Crystal units shall be from the same detail specification and may be either fundamental or overtone crystals and when fundamental and overtone crystals exist in the same specification, samples shall be taken from both types.

1) Fundamental crystal units.

Approximately one third shall be at the highest frequency, one third at the mid-frequency and one third at the lowest frequency of the range to be covered.

2) Overtone crystal units.

Half shall be at the highest frequency for the highest overtone and half at the lowest frequency for the lowest overtone of the range to be covered.

Both fundamental and overtone crystals shall have the same:

- enclosure type (which may include different pin configurations)
- type of seal (for example cold welded)
- cut (for example AT-Cut), and be demonstrable of the closest controlled angle of cut for which approval is sought
- mode of vibration (for example Thickness shear)
- environmental requirement (for example 85/105/56).

3.4.1 Fixed sample size procedure for initial approval

The manufacturer shall produce test evidence to show conformance to the requirements of the test schedule given in Table 1 of this specification.

Table 1 gives the number of samples to be tested in each group or subgroup together with the permissible number of defectives for qualification approval tests.

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

The complete series of tests given in Table 1 and Annex A, which together form the fixed sample size test schedule, are required for the qualification approval of quartz crystal units covered by one detail specification. The tests in 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.

"One defective" is counted when a quartz crystal unit has not satisfied the whole or a part of the tests of a group.

3.4.2 Lot-by-lot procedure for initial approval

The manufacturer shall produce test evidence to show conformance to the requirements of Table 2 and Table 3 and the detail specification. Tests in each group shall be carried out in the given order.

A minimum of three inspection lots, taken in the shortest possible period, shall be subjected to the tests given in Table 2 and a sample taken from at least one of these lots shall be subjected to the periodic tests given in Table 3. When additional groups are introduced into the test schedule the number of specimens shall be increased by the same number as that required for the additional groups. "One defective" is counted when a quartz crystal unit has not satisfied the whole or a part of the tests of a group.

3.4.3 Approval

For both procedures 3.4.1 and 3.4.2 approval may be granted when the number of defectives does not exceed the specified number of permitted defectives for each group provided the total number of defectives allowed is not exceeded.

1) Extensions of the concept of structural similarity

Having gained approval for specific frequency tolerances and temperature ranges it is permissible for the manufacturer to claim approval within the following framework:

- a) the same frequency tolerance over narrower operating temperature ranges
- b) wider frequency tolerances over the same operating temperature range
- c) the same adjustment tolerance at an elevated temperature (temperature controlled types only)
- d) smaller frequency tolerances over shorter temperature ranges provided they are within the same control capability for the angle of cut (see note)
- e) wider frequency tolerances over wider temperature ranges provided they are within the same control capability for the angle cut (see note)
- f) equivalent frequency/temperature coefficients (on temperature controlled types only) based on the same control capability for the angle of cut (see note)

g) inclusive tolerances, where the overall tolerance is not smaller than the sum of the adjustment tolerance and the frequency/temperature variation for the operating temperature ranges covered by a) to f)

NOTE From typical AT cut frequency/temperature curves it can be seen that the frequency variation with temperature is dependent upon the angle of cut. Control of the angle of cut validated by group A tests therefore gives a control of the frequency/temperature performance of the crystal unit.

Items d), e) and f) are based on the fact that if a control capability for angle measurement can be rated, that same degree of control can be applied at any angle of cut to give known frequency/temperature performances over different operating temperature ranges.

h) operation at other circuit conditions than the one for which approval has been given

i) drive levels below that for which approval has been given

j) less severe tolerances on the electrical parameters including ageing

k) less environmental requirements.

The maintenance of approval shall be in accordance with §1.7 of CECC 00114-II.

3.5 Quality conformance inspection

Quality conformance inspection shall be carried out in accordance with §2.3 of CECC 00114-II.

The blank detail specification shall prescribe the minimum test schedule which shall be included in each detail specification for 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 Table 2 of this specification.

The inspection lot shall consist of structurally similar quartz crystal units formed from current production.

2) Group C inspection

These tests shall be carried out periodically according to Table 3 of this specification.

The samples shall be representative of the current production over the specified periods.

Table 1 — Sampling plan together with numbers of permissible defectives for Qualification Approval tests

Group Number	Clause number of CECC 68000 and Test	Sample size	Permissible defectives	
			Per Group	Total for Groups 1 to 8
0	4.5.1 <i>Visual test A</i> 4.7.9 <i>Insulation resistance</i> 4.8.2 <i>Sealing</i> 4.7.1 <i>Frequency and resonance resistance</i>	150	0	
1	4.6.2 <i>Dimensions test B</i> 4.7.2 <i>Drive level dependency</i> 4.7.3 <i>Frequency and resonance resistance as a function of temperature</i>	150	1	
2	4.7.4 <i>Unwanted responses</i> 4.7.5 <i>Shunt capacitance</i> 4.7.8 <i>Motional parameters</i>	150	1	
3	4.9.1 <i>Ageing</i>	8	1	
4	4.8.4) <i>Rapid change of temperature</i> or) 4.8.5) 4.8.3 1) Solderability 4.8.3 2) Resistance to soldering heat	8	1	1
5	4.8.16 <i>Immersion in cleaning solvents</i> 4.8.1 <i>Robustness of terminations</i>	8	1	
6	4.8.6 <i>Bump</i> 4.8.7 <i>Vibration</i> 4.8.8 <i>Shock</i>	8	1	
7	4.8.14 <i>Climatic sequence</i>	8	1	
8	4.8.15 <i>Damp heat steady state</i>	8	1	

Table 2 — Lot-by-lot tests

Group	Clause number of CECC 68000 and Test	Inspection level	AQL %
A0	4.5.1 <i>Visual test A</i> 4.7.1 <i>Frequency and resonance resistance</i>	100 %	—
A1	4.7.9 <i>Insulation resistance</i>	II	0,25
A2	4.7.2 <i>Drive level dependency</i> 4.7.3 <i>Frequency and resonance resistance as a function of temperature</i>	II	0,25
A3	4.7.4 <i>Unwanted responses</i> 4.7.5 <i>Shunt capacitance</i> 4.7.8 <i>Motional parameters</i>	II	0,25
B1	4.6.2 <i>Dimensions test B</i> 4.8.2 <i>Sealing</i>	II	0,25
B2	4.8.4 <i>Rapid change of temperature</i> or 4.8.5	II	0,25

Table 3 — Periodic Tests

Group	Clause number of CECC 68000 and Test	Periodicity (months)	Sample size	Permitted defectives
C1	4.8.16 <i>Immersion in cleaning solvents</i> 4.8.1 <i>Robustness of terminations</i>	3	8	0
C2	4.8.3 1) Solderability 4.8.3 2) Resistance to soldering heat	3	8	0
C3	4.9.1 <i>Ageing</i>	3	8	0
C4	4.8.14 <i>Climatic sequence</i>	12	8	0
C5	4.8.6 <i>Bump</i> 4.8.7 <i>Vibration</i> 4.8.8 <i>Shock</i>	12	8	0
C6	4.8.15 <i>Damp heat steady state</i>	12	8	0