SLOVENSKI STANDARD
SIST EN 168100:2002 + A1:2002 + A2:2002

01-september-2002

Sectional specification: Quartz crystal units (Capability approval)

Sectional Specification: Quartz crystal units (Capability approval)

Rahmenspezifikation: Schwingquarze (Befähigungsanerkennung)

Spécification intermédiaire: Résonateurs à quartz (Agrément de savoir-faire)

Ta slovenski standard je istoveten z: **EN 168100:1993**

ICS:

31.140	Piezoelektriļ ne in dielektriļ ne naprave	Piezoelectric and dielectric devices

SIST EN 168100:2002 + A1:2002 + A2:2002 **en**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 168 100

February 1993

+ A1 and A2

February 1993

Descriptors: Quality, electronic components, quartz crystal units

Supersedes CECC 68100 Issue 1 : 1989

English version

Sectional specification: quartz crystal units (Capability approval) (includes Amendments A1 and A2 : 1993)

Spécification intérmediaire: Résonateurs à quartz (Agrémente savoir-faire) (inclut les amendments A1 et A2 : 1993)

Rahmenspezifikation: Schwingquarze (Befähigungsanerkennung) (Einschlieβlich Änderungen A1 und A2 : 1993)

This European Standard was approved by the CENELEC Electronic Components Committee (CECC) on 14 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 committess 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 excpetion of the national electrotechnical committees of Greece, Iceland and Luxembourg.

CECC

CENELEC Electronic Components Committee
Comité des Composants Electroniques du CENELEC
CENELEC- Komitee für Bauelemente der Elektronik

General Secretariat: Gartenstr. 179, W- 6000 Frankfurt/Main 70

Ref. No. EN 168100 : 1993 E

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

The text of the draft based on documents CECC 68100 : Issue 1-1989 (with A1 and erratum) and CECC (Secretariat) 2852 and 2853 was submitted to the formal vote together with the voting report, circulated as document CECC (Secretariat) 2962. The text was approved by CECC as EN 168100 : 1993 on 14 January 1992.

The following dates were fixed:

- latest date of announcement of the EN at national level (doa) 1992-12-08
- latest date of publication of an identical national standard (dow) 1993-06-08
- latest date of declaration of national standards obsolescence 1993-06-08
- latest date of withdrawal of conflicting national standards (dow) 2002-12-08

CONTENTS

SECTION 1 - SCOPE

This sectional specification applies to quartz crystal units manufactured as custom built products or as standard catalogue items and whose quality is assessed on the basis of capability approval.

It prescribes the preferred ratings and characteristics, with the appropriate tests and measuring methods contained in the generic specification EN 168 000 (CECC 68 000), and gives the general performance requirements to be used in detail specifications for quartz crystal units.

The concept of preferred values is directly applicable to standard catalogue items but does not necessarily apply to custom built products.

SECTION 2 - GENERAL, PREFERRED RATINGS AND GUIDANCE ON DETAIL SPECIFICATIONS

2.1 Related Documents

IEC 68 : Basic environmental testing procedures.

EN 168 000 : 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 EN 168 000 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 EN 168 000.

2.3 Information to be prescribed in detail specifications (for both custom built and standard catalogue items)

Guidance on the preparation of detail specifications is given in the blank detail specification EN 168 101 (CECC 68 101).

For standard catalogue items 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.

The following information shall be given in each detail specification.

2.3.1 Outline drawing and dimensions

The detail specification shall include a dimensional drawing of the crystal unit, and/or 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 stated in mm.

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

When a detail specification covers more than one enclosure 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 crystal unit.

2.3.2 Marking

The detail specification shall prescribe the content of the marking on the crystal unit and on the primary package in accordance with 2.5 of EN 168 000.

2.3.3 Ordering information

The detail specification shall prescribe that the following information is required when ordering a crystal unit :

(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.

2.3.4 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 - CAPABILITY APPROVAL

3.1 Eligibility for capability approval

Prior to making an application for capability approval a manufacturer shall first obtain manufacturer's inspection approval in accordance with CECC 00 114 Part I.

The primary stage of manufacture shall be as defined in 3.1 of the generic specification EN 168 000.

3.2 Structural similarity

A Structural similarity exists where a range of crystal units incorporates one or more of the following features in common :

- materials, methods of sealing and agreed dimensional range for the enclosure
- crystal design and crystal processing.

3.3 Procedures for capability approval

3.3.1 General

Capability approval in quartz crystal technology covers :

- the complete design, material preparation and manufacturing techniques, including control procedures and tests
- the performance limits claimed for the processes and products, that is, those specified for the CQCs
- the range of mechanical structures for which approval is granted.

3.3.2 Application for capability approval

In order to obtain capability approval the manufacturer shall apply the rules of procedure given in §2.4 of CECC 00 114 Part III.

In an application for capability approval the manufacturer shall define the boundaries of the capability for which approval is sought in accordance with 3.5 of this specification.

3.3.3 Granting of capability approval

Capability approval shall be granted when the manufacturer has :

- prepared a capability manual describing the capability for which he wishes to be approved, to the satisfaction of the ONS
- agreed with the ONS the range of CQCs, as defined in §2.7 of CECC 00 114 Part III, to be used for the assessment of capability

- successfully demonstrated that he can design and manufacture components which satisfy the requirements of this sectional specification, within the limits of his capability

- prepared a capability approval test report to the satisfaction of the ONS.

3.4 Description of capability

The manufacturer shall prepare a manual describing his capability (see §2.5 of CECC 00 114 Part III), in relation to the technologies involved.

The manual shall be approved by the ONS who shall ensure that it is a true and complete record of procedures carried out by the manufacturer during the design, production, testing, inspection and release of his products. This manual is a document that shall be treated as 'commercial in confidence'.

The manual shall include the following as a minimum :

- a general introduction and description of the technologies involved

- aspects of customer liaison including provisions of design rules (if appropriate) and assistance to customers in the formulation of their requirements

- a detailed description of the design rules to be used

- the procedure for checking that the design rules are complied with for quartz crystal units manufactured to a detail specification

- a list of all materials used, with references to the corresponding purchasing specifications and goods inward inspection

- a flow chart for the total process showing quality control points and permitted rework loops and containing references to all process and quality control procedures

- a declaration of processes for which approval has been sought in accordance with 3.5.1

- a declaration of boundaries for which approval has been sought in accordance with 3.5.2

- a list of capability qualifying components (CQCs) used to assess the capability, with a general description of each, supported by a detailed table showing where the declared boundaries of capability are demonstrated by a particular CQC design

- a detail specification for each CQC. These shall be produced to the satisfaction of the ONS (See Annexes B and C).

3.5 Capability qualifying components (CQC)

The manufacturer shall agree with the ONS the range of capability qualifying components that are necessary to cover the range specified in the capability manual.

The demonstration of the capability shall be made by testing the agreed range of CQCs which shall be designed and manufactured in accordance with the capability manual. The CQCs shall comply with the following requirements :

(1) the range of CQCs used shall cover all the processes and limits of the declared capability. The CQCs shall be chosen to demonstrate the most stringent mutually attainable combination of boundaries as agreed with the ONS.

(2) each CQC shall be one of the following :

- a test piece designed for assessment of a process or range of processes; or
- a quartz crystal unit in production; or
- a combination of both of these, provided the requirements of (1) are met.

When CQCs are designed and produced solely for capability approval, the manufacturer shall satisfy the ONS that the same design rules, materials and manufacturing processes will be applied to released products.

The CQC specifications may refer to internal control documentation which specifies production testing and recording in order to demonstrate control and maintenance of processes and boundaries.

3.5.1 Processes

When producing CQC specifications, the following processes shall be assessed. This list is not exclusive :

–	deposition of electrode material	see 3.11.3(1)
–	mounting methods	see 3.11.3(2)
–	frequency adjustment accuracy	see 3.11.3(3)
–	sealing of enclosure	see 3.11.4(1)
–	durability of marking	see 3.11.4(1).

3.5.2 Boundaries

Since the boundaries of crystal unit parameters are related to each type of cut and are also influenced by the enclosure used, CQCs shall demonstrate a set of boundaries which shall include the following :

–	frequency range(s)	see 3.11.5(1)
–	limits of range of motional parameters	see 3.11.5(2)
–	frequency tolerance(s)	see 3.11.5(1) and 3.11.3(3)
–	temperature range	see 3.11.5(1)

- range of drive levels see 3.11.5(1)
- unwanted responses see 3.11.5(1)
- ageing limits (frequency and resonance resistance change with time) see 3.11.5(4)
- types of enclosure see 3.11.4(1)
- modes of vibration and angle of cut see 3.11.5(1)
- overtone order see 3.11.5(1)
- climatic category see 3.11.5(3)
- mechanical test severities see 3.11.3(2)(b).

This list is not exclusive.

3.6 Inspection requirements for CQCs

The inspection requirements shall be contained in the CQC detail specifications together with environmental tests, measurements, severities and end point limits, where appropriate (see 3.11). Where possible the tests applied to CQCs shall be selected from section 4 of the generic specification EN 168 000.

For capability approval and the subsequent maintenance of that approval, the inspection requirements shall ensure that processes and design features meet the declared capability.

3.7 Programme for capability approval

The manufacturer shall prepare a programme for the assessment of the declared capability to the satisfaction of the ONS. This programme shall be designed so that each declared boundary condition is verified by the appropriate CQC (see §2.6.1 of CECC 00 114 Part III).

The programme shall contain the following :

- a bar chart or other means of showing the proposed timetable for the approval exercise
- details of all the CQCs to be used with references to their detail specifications
- a chart showing the features to be demonstrated by each CQC.

3.8 Capability approval report

The report shall contain the following information :

- the issue number and date of the capability approval manual
- a programme for capability approval in accordance with 3.7
- test results obtained during the performance of the programme
- the test methods used.

The report shall be signed by the Chief Inspector as a true statement of the results obtained and submitted to the ONS for approval (see §2.6.3 of CECC 00 114 Part III).

3.9 Abstract of description of capability

The abstract, as required by §2.8 of CECC 00 114 Part III, is intended for formal publication in CECC 00 200 when capability approval is granted by the National Authorised Institution (ONH) on the recommendation of the ONS.

It shall include a concise description of the manufacturer's capability and give sufficient information on the technology, methods of construction, packaging and range of products for which the manufacturer has been approved. The layout should conform with Annex A of this specification.

3.10 Modifications likely to affect the capability approval

Any modifications likely to affect the capability approval shall satisfy the requirements of §2.11 of CECC 00 114 Part III.

3.11 Initial capability approval

The test plans given below are to be applied to appropriately selected groups of CQCs.

The test plans are in categories as follows :

(1) Process CQCs
(2) Process/boundary CQCs
(3) Boundary CQCs

The tests referred to in each test plan are defined in Table 1. These tests have been grouped to prove particular design areas covering materials, processes, enclosure types, crystal unit performance and durability.

The tests in each group shall be carried out in the given order.

The approval is granted when the selected range of CQCs has collectively satisfied the assessment requirements of the CQC detail specifications with no defects allowed.

One defective is counted when a CQC has not satisfied the whole or part of the tests of a group.

3.11.1 Procedure in the event of failures

In the event of the failure of specimens to meet the test requirements, the manufacturer shall apply the procedures given in §2.6.2 of CECC 00 114 Part III.