

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

Section specification: Piezoelectric filters (Capability approval)

The European Standard EN 167100:1995 has the status of a
British Standard

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee EPL/49, Piezoelectric devices for frequency control and selection, upon which the following bodies were represented:

- Federation of the Electronics Industry
- Institute of Physics
- Institute of Electrical Engineers
- Ministry of Defence
- National Supervising Inspectorate (BSI-PC)

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Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
Foreword	2
Text of EN 167100	3
List of references	Inside back cover

National foreword

This British Standard has been prepared by Technical Committee EPL/49, Piezoelectric devices for frequency control and selection, and is the English language version of EN 167100:1995, *Sectional Specification: Piezoelectric filters (Capability 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 68	BS 2011 <i>Environmental testing</i>
EN 167000:1993	BS EN 167000:1993 <i>Harmonized system of quality assessment for electronic components. Generic specification: Piezoelectric filters</i>
EN 168000:1993	BS EN 168000:1996 ^a <i>Harmonized system of quality assessment for electronic components. Generic specification: Quartz crystal units</i>
EN 100114-1:1993 (CECC 00114-I:1992)	BS EN 100114 <i>Rule of Procedure 14. Quality assessment procedures</i> Part 1:1994 <i>Approval of manufacturers and other organizations</i>
CECC 00114-III:1993	BS CECC 00114 <i>Rule of Procedure 14. Quality assessment procedures</i> Part 3:1993 <i>Capability approval of an electronic component manufacturing activity</i>

^a In preparation

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 24, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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English version

Sectional Specification: Piezoelectric filters (Capability approval)

Spécification intermédiaire:
Filtres piézoélectriques
(Agrément de savoir-faire)

Rahmenspezifikation:
Piezoelectrische Filter
(Befähigungsanerkennung)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This European Standard was prepared by Working Group CLC/TC CECC/WG 17.

The text of the draft based on document CECC(Secretariat)3112 was submitted to the formal vote; together with the voting report, circulated as document CECC(Secretariat)3252, it was approved as EN 167100 on 1992-11-28.

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) 1996-03-22
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2003-12-22

Contents

	Page
Foreword	2
1 Scope	3
2 General, preferred ratings and guidance on detail specifications	3
2.1 Related documents	3
2.2 Preferred ratings and characteristics	3
2.3 Information to be prescribed in detail specifications	3
3 Capability approval	4
3.1 Eligibility for capability approval	4
3.2 Structural similarity	4
3.3 Procedures for capability approval	4
3.4 Description of capability	4
3.5 Capability qualifying components (CQC)	5
3.6 Inspection requirements for CQCs	6
3.7 Programme for capability approval	6
3.8 Capability approval report	6
3.9 Abstract of description of capability	6
3.10 Modifications likely to affect capability approval	7
3.11 Initial capability approval	7
3.12 Maintenance of capability approval	19
3.13 Rework and repair work	20
3.14 Quality conformance inspection	20
3.15 Screening procedures	20
4 Test and measurement procedures	20

Annex A Example layout of an abstract of description of capability for inclusion in CECC 00200	21
Annex B Layout of the front page of a CQC specification for process control	22
Annex C Layout of the front page of a CQC specification to demonstrate boundary or limit	23
Figure 1 — Selection of CQCs — all methods of construction	8
Figure 2 — Test plan for deposition of electrode material CQCs	9
Figure 3 — Test plan for bonding CQCs	10
Figure 4 — Test plan for frequency adjustment CQCs	10
Figure 5 — Test plan for frequency alignment CQCs (monolithic multiple pole vibrators only)	11
Figure 6 — Test plan for component assembly CQCs	11
Figure 7 — Test plan for alignment CQCs	12
Figure 8 — Test plan for enclosure CQCs	13
Figure 9 — Test plan for mounting CQCs	13
Figure 10 — Test plan for filter design and performance	14
Figure 11 — Test plan for climatic performance CQCs	14
Table 1 — Test schedule for initial capability approval	15
Table 2 — Periodic tests for maintenance of capability approvals	19

Section 1. Scope

This sectional specification applies to piezoelectric filters 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 167000, and gives the general performance requirements to be used in detail specifications for piezoelectric filters.

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 168000, *Generic specification: Quartz crystal units*.

EN 167000, *Generic specification: Piezoelectric filters*.

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 167000 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 167000.

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.

Each detail specification shall state all the tests and measurements required for inspection. For standard catalogue items 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 piezoelectric filter, 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 all enclosures.

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 piezoelectric filter.

2.3.2 Marking

The detail specification shall prescribe the content of the marking on the piezoelectric filter and on the primary package in accordance with **2.5** of EN 167000.

2.3.3 Ordering information

The detail specification shall prescribe that the following information is required when ordering a piezoelectric filter:

- 1) Quantity
- 2) Detail specification number, issue number and date and where applicable
- 3) Nominal frequency in kHz or MHz
- 4) Full description of any additional requirements to identify the piezoelectric filter

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 00114-I.

The primary stage of manufacture shall be as defined in 3.1 of the generic specification EN 167000.

3.2 Structural similarity

Structural similarity is not applicable to Capability Approval. However, it is applicable to released lots as defined in clause 3.14.1 of this specification.

3.3 Procedures for capability approval

3.3.1 General

Capability approval in piezoelectric filter 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 Capability Qualifying Components (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 00114-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.

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 00114-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 00114-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. The 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 piezoelectric filters 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 (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 Annex B and Annex C).

3.5 Capability qualifying components (CQC)

There are basic methods of construction of piezoelectric filters which include:

i) Leaded component techniques

Comprises assembly of wire leaded components in Printed Circuit Board (PCB) Laminates.

ii) Surface mounting techniques

Comprises assembly of components designed for surface mounting.

iii) Thick and Thin Film techniques

Comprises assembly of components in either Thick or Thin Film on Substrates.

iv) Monolithic techniques

Comprises assembly of one or more monolithic multiple pole vibrators.

These methods of construction, or combinations thereof, may incorporate either sealed crystal units or unencapsulated crystal units. These methods are not exclusive but if other methods of construction are to be used then the appropriate CQCs must be agreed with the ONS.

The manufacturer shall agree with the ONS the range of capability qualifying components, selected in accordance with the general plan (see **3.11.2**) specified in the capability manual. The CQCs shall comply with the following requirements:

- 1) The range of CQCs used shall cover all the processes, component types and limits of the declared capability.
- 2) The CQCs shall be one of the following:
 - test pieces designed for assessment of a process or range of processes; or
 - piezoelectric filters 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

The CQC specifications shall include the following processes to be assessed. This list is not exclusive:

- deposition of electrode material on the crystal blank see **3.11.3** 1)
- bonding of crystal vibrator to the mounting see **3.11.3** 2)
- frequency adjustment or alignment see **3.11.3** 3)
or **3.11.3** 4)

NOTE the above apply only when a monolithic multiple pole vibrator or unencapsulated crystal is used.

- enclosure (for multiple pole vibrators only) see **3.11.4** 1)