



SLOVENSKI STANDARD
SIST EN 60758:2009

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SIST EN 60758:2005

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Synthetic quartz crystal - Specifications and guidelines for use (IEC 60758:2008)

Synthetischer Quarzkristall - Festlegungen und Leitfaden für die Anwendung (IEC 60758:2008)

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Cristal de quartz synthétique - Specifications et guide d'utilisation (CEI 60758:2008)

[SIST EN 60758:2009](#)

Ta slovenski standard je istoveten z: EN 60758:2009

[http://www.sist.si/log/start.asp?ID=60758-4feF-a21a-809b5078fcb2/sist-en-60758-2009](#)

ICS:

31.140

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Piezoelectric and dielectric devices

SIST EN 60758:2009

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EUROPEAN STANDARD
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English version

**Synthetic quartz crystal -
Specifications and guidelines for use
(IEC 60758:2008)**

Cristal de quartz synthétique -
Spécifications et
guide d'utilisation
(CEI 60758:2008)

Synthetischer Quarzkristall -
Festlegungen und Leitfaden
für die Anwendung
(IEC 60758:2008)

STANDARD PREVIEW
This European Standard was approved by CENELEC on 2008-12-01. 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.
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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.

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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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

Central Secretariat: avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 49/808/FDIS, future edition 4 of IEC 60758, prepared by IEC TC 49, Piezoelectric and dielectric devices for frequency control and selection, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60758 on 2008-12-01.

This European Standard supersedes EN 60758:2005.

EN 60758:2009 includes the following significant technical changes with respect to EN 60758:2005:

- preparation of AT-cut slice sample for etching is changed to make it easier;
- etch channel grade classification is changed considering request of the user;
- explanation of quartz axes difference between IEEE and IEC is added as Annex F.

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) 2009-09-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2011-12-01

Annex ZA has been added by CENELEC.

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Endorsement notice

[SIST EN 60758:2009](#)

The text of the International Standard IEC 60758:2008 was approved by CENELEC as a European Standard without any modification. [809b5078fcb2/sist-en-60758-2009](#)

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-1 + corr. October + A1	1988 1988 1992	Environmental testing - Part 1: General and guidance	EN 60068-1	1994
IEC 60122-1	2002	Quartz crystal units of assessed quality - Part 1: Generic specification	EN 60122-1	2002
IEC 60410	1973	Sampling plans and procedures for inspection by attributes	-	-
IEC/TS 61994	Series	Piezoelectric and dielectric devices for frequency control and selection - Glossary	-	-

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IEC 60758

Edition 4.0 2008-11

INTERNATIONAL STANDARD

Synthetic quartz crystal – Specifications and guidelines for use
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SYNTHETIC QUARTZ CRYSTAL –
SPECIFICATIONS AND GUIDELINES FOR USE**
FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60758 has been prepared by IEC technical committee 49: Piezoelectric and dielectric devices for frequency control and selection.

This fourth edition cancels and replaces the third edition, published in 2004. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- preparation of AT-cut slice sample for etching is changed to make it easier;
- etch channel grade classification is changed considering request of the user;
- explanation of quartz axes difference between IEEE and IEC is added as Annex F.

The text of this standard is based on the following documents:

FDIS	Report on voting
49/808/FDIS	49/814/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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SYNTHETIC QUARTZ CRYSTAL – SPECIFICATIONS AND GUIDELINES FOR USE

1 Scope

This International Standard applies to synthetic quartz single crystals intended for manufacturing piezoelectric elements for frequency control and selection.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*
Amendment 1: 1992

IEC 60122-1:2002, *Quartz crystal units of assessed quality – Part 1: Generic specification*

IEC 60410:1973, *Sampling plans and procedures, for inspection by attributes*

IEC 61994 (all parts), *Piezoelectric and dielectric devices for frequency control and selection – Glossary*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions, as well as those given in IEC 61994, apply.

3.1

hydrothermal crystal growth

literally, crystal growth in the presence of water, elevated temperatures and pressures by a crystal growth process believed to proceed geologically within the earth's crust. The industrial synthetic quartz growth processes utilize alkaline water solutions confined within autoclaves at supercritical temperatures (330 °C to 400 °C) and pressures (700 to 2 000 atmospheres).

NOTE The autoclave is divided into two chambers: the dissolving chamber, containing raw quartz chips at the higher temperature; the growing chamber, containing cut seeds at the lower temperature (see 7.1.2)

3.2

synthetic quartz crystal

single crystal of α quartz grown by the hydrothermal method. The crystal is of either handedness and in the as-grown condition. Cultured quartz has the same meaning as synthetic quartz crystal

3.2.1

as-grown synthetic quartz crystal

single crystal quartz grown hydrothermally. As-grown refers to the state of processing and indicates a state prior to whatever treatment might occur after growth, excluding quality control operations

3.2.2**as-grown Y-bar**

crystals which are produced using seed with the largest dimension in the Y-direction

3.2.3**as-grown Z-bar**

crystals in which the Z-grown sector is much larger than the X-grown sector. The relative size of the growth sector is controlled by the X-dimension of the seed

3.3**synthetic quartz crystal batch**

synthetic quartz crystals grown at the same time in one autoclave

3.4**seed**

rectangular parallelepiped quartz plate or bar to be used as a nucleus for crystal growth

3.5**growth zones**

regions of a synthetic quartz crystal resulting from growth along different crystallographic directions (see Figure 1)

3.6**orientation of a synthetic quartz crystal**

orientation of its seed with respect to the orthogonal axes specified in 3.7

3.7**orthogonal axial system of α quartz crystal**

orthogonal axis system consists of three axes with a mutually vertical X axis, Y axis, and Z axis

3.7.1**axial system for quartz (illustrated in Figure 2)**

NOTE The z-cut seed may be oriented at an angle of less than 20' to the Y-axis, in this case the axial system becomes x, Y', z'.

3.7.2**AT-cut plate**

rotated Y-cut crystal plate oriented at an angle of about +35° around the X-axis or about -3° from the z (minor rhombohedral)-face as shown in Figure 3

3.7.3**z (minor rhombohedral)-cut plate**

crystal plate parallel to the z (minor rhombohedral)-face as shown in Figure 3a

3.7.4**X-cut plate**

crystal plate perpendicular to the X-axis as shown in Figure 3b

3.7.5**Y-cut plate**

crystal plate perpendicular to the Y-axis as shown in Figure 3b

3.7.6**Z-cut plate**

crystal plate perpendicular to the Z-axis as shown in Figure 3b

3.8 dimensions

dimensions pertaining to growth on Z-cut seed rotated less than 20° from the Y-axis

3.8.1 gross dimensions

maximum dimensions along the X-, Y-, or Y' and Z or Z' axes measured along the X-, Y'- and Z'-axes

3.8.1.1 effective Z-dimension

as-grown effective Z dimension defined as the minimum measure in the Z ($\theta=0^\circ$) or Z' direction in usable Y or Y' area of an as-grown crystal and described by Z_{eff} , as shown in Figure 1

3.8.1.2 minimum Z-dimension

minimum distance from seed surface to Z-surface described by Z_{min} as shown in Figure 1d

3.8.2 dimensions pertaining to growth on a Z-cut seed rotated more than 20° from the X-axis (under consideration)

3.9 inclusions

any foreign material within a synthetic quartz crystal, visible by examination of scattered light from a bright source with the crystal immersed in a refractive index-matching liquid.

A particularly common inclusion is the mineral acmite (sodium iron silicate)

3.9.1 seed veil

array of inclusions or voids at the surface of the seed upon which a crystal has been grown

3.9.2 etch channel

roughly cylindrical void that is present along the dislocation line after etching a quartz crystal

3.10 do pant

any additive used in the growth process which may change the crystal habit, chemical composition, physical or electrical properties of the synthetic quartz batch

3.11 pre-dimensioned bar

any bar whose as-grown dimensions have been altered by sawing, grinding, lapping, etc., to meet a particular dimensional requirement

3.12 impurity concentration

concentration of impurities relative to silicon atoms