

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

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**Synthetic quartz crystal – Specifications and guidelines for use**

**Cristal de quartz synthétique – Spécifications et lignes directrices d'utilisation**





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**Cristal de quartz synthétique – Spécifications et lignes directrices d'utilisation**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
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## CONTENTS

|  |    |
|--|----|
| FOREWORD.....  | 6  |
| INTRODUCTION.....  | 8  |
| 1 Scope.....   | 9  |
| 2 Normative references .....   | 9  |
| 3 Terms and definitions .....  | 9  |
| 4 Specification for synthetic quartz crystal.....  | 13 |
| 4.1 Standard values.....   | 13 |
| 4.1.1 Shape of synthetic quartz for optical applications .....   | 13 |
| 4.1.2 Orientation of the seed .....  | 13 |
| 4.1.3 Inclusion density.....   | 13 |
| 4.1.4 Striae in synthetic quartz for optical applications .....  | 14 |
| 4.1.5 Infrared quality indications of $\alpha_3 500$ and $\alpha_3 585$ for piezoelectric applications ..... | 14 |
| 4.1.6 Grade classification by $\alpha$ value and Schlieren method for optical applications .....             | 15 |
| 4.1.7 Frequency-temperature characteristics of synthetic quartz for piezoelectric applications.....          | 15 |
| 4.1.8 Etch channel density $\rho$ .....  | 15 |
| 4.1.9 Internal transmittance for optical applications .....  | 16 |
| 4.2 Requirements and measuring methods .....   | 17 |
| 4.2.1 Orientation.....   | 17 |
| 4.2.2 Handedness .....   | 18 |
| 4.2.3 Synthetic quartz crystal dimensions .....  | 18 |
| 4.2.4 Seed dimensions .....  | 19 |
| 4.2.5 Imperfections.....   | 19 |
| 4.2.6 Evaluation of infrared quality by $\alpha$ measurement .....   | 22 |
| 4.2.7 Frequency versus temperature characteristics for piezoelectric applications .....                      | 24 |
| 4.2.8 Striae in synthetic quartz for optical applications .....  | 25 |
| 4.2.9 Growth band in synthetic quartz for optical applications.....  | 25 |
| 4.2.10 Etch channel density .....  | 26 |
| 4.2.11 Internal transmittance for optical applications .....   | 27 |
| 4.3 Marking.....   | 27 |
| 4.3.1 General .....  | 27 |
| 4.3.2 Shipping requirements.....   | 28 |
| 5 Specification for lumbered synthetic quartz crystal .....  | 28 |
| 5.1 Standard values.....   | 28 |
| 5.1.1 Tolerance of dimensions.....   | 28 |
| 5.1.2 Reference surface flatness .....   | 29 |
| 5.1.3 Angular tolerance of reference surface .....   | 29 |
| 5.1.4 Centrality of the seed.....  | 30 |
| 5.2 Requirements and measuring methods .....   | 31 |
| 5.2.1 As-grown quartz bars used for lumbered quartz bars .....   | 31 |
| 5.2.2 Dimensions of lumbered synthetic quartz crystal.....   | 31 |
| 5.2.3 Identification on reference surface .....  | 31 |
| 5.2.4 Measurement of reference surface flatness .....  | 31 |
| 5.2.5 Measurement of reference surface angle tolerance.....  | 31 |

|                       |  |    |
|-----------------------|--|----|
| 5.2.6                 | Centrality of the seed.....  | 31 |
| 5.3                   | Delivery conditions.....   | 32 |
| 5.3.1                 | General .....  | 32 |
| 5.3.2                 | Marking .....  | 32 |
| 5.3.3                 | Packing .....  | 32 |
| 5.3.4                 | Making batch .....   | 32 |
| 6                     | Inspection rule for synthetic quartz crystal and lumbered synthetic quartz crystal ..... | 32 |
| 6.1                   | Inspection rule for as-grown synthetic quartz crystal .....                              | 32 |
| 6.1.1                 | Inspection.....  | 32 |
| 6.1.2                 | Lot-by-lot test .....  | 32 |
| 6.2                   | Inspection rule for lumbered synthetic quartz crystal .....                              | 33 |
| 6.2.1                 | General .....  | 33 |
| 6.2.2                 | Lot-by-lot test .....  | 34 |
| 7                     | Guidelines for the use of synthetic quartz crystal for piezoelectric applications.....   | 34 |
| 7.1                   | General.....   | 34 |
| 7.1.1                 | Overview .....   | 34 |
| 7.1.2                 | Synthetic quartz crystal .....   | 34 |
| 7.2                   | Shape and size of synthetic quartz crystal .....   | 35 |
| 7.2.1                 | Crystal axis and face designation .....  | 35 |
| 7.2.2                 | Seed.....  | 36 |
| 7.2.3                 | Shapes and dimensions.....   | 36 |
| 7.2.4                 | Growth zones .....   | 37 |
| 7.3                   | Standard method for evaluating the quality of synthetic quartz crystal.....              | 37 |
| 7.4                   | Other methods for checking the quality of synthetic quartz crystal.....                  | 38 |
| 7.4.1                 | General .....  | 38 |
| 7.4.2                 | Visual inspection .....  | 38 |
| 7.4.3                 | Infrared radiation absorption method .....   | 38 |
| 7.4.4                 | Miscellaneous.....   | 39 |
| 7.5                   | $\alpha$ grade for piezoelectric quartz.....   | 40 |
| 7.6                   | Optional grading (only as ordered), in inclusions, etch channels, Al content.....        | 40 |
| 7.6.1                 | Inclusions .....   | 40 |
| 7.6.2                 | Etch channels.....   | 40 |
| 7.6.3                 | Al content .....   | 40 |
| 7.6.4                 | Swept quartz .....   | 41 |
| 7.7                   | Ordering .....   | 42 |
| Annex A (informative) | Frequently used sampling procedures .....  | 43 |
| A.1                   | Complete volume counting.....  | 43 |
| A.2                   | Commodity Y-bar sampling – Method 1 .....  | 43 |
| A.3                   | Commodity Y-bar sampling – Method 2.....   | 43 |
| A.4                   | Use of comparative standards for 100 % crystal inspection .....                          | 44 |
| Annex B (informative) | Numerical example .....  | 45 |
| Annex C (informative) | Example of reference sample selection .....  | 46 |
| Annex D (informative) | Explanations of point callipers .....  | 47 |
| Annex E (informative) | Infrared absorbance $\alpha$ value compensation .....                                    | 48 |
| E.1                   | General.....   | 48 |
| E.2                   | Sample preparation, equipment set-up and measuring procedure .....                       | 48 |
| E.2.1                 | General .....  | 48 |
| E.2.2                 | Sample preparation .....   | 48 |

|                       |   |    |
|-----------------------|---|----|
| E.2.3                 | Equipment set-up .....  | 48 |
| E.2.4                 | Measurement procedure .....   | 49 |
| E.3                   | Procedure to establish correction terms .....   | 49 |
| E.4                   | Calculation of compensated (corrected) absorbance values .....  | 51 |
| Annex F (informative) | Differences of the orthogonal axial system for quartz between IEC standard and IEEE standard .....  | 52 |
| Annex G (informative) | $\alpha$ value measurement consistency between dispersive infrared spectrometer and fourier transform infrared spectrometer .....         | 54 |
| G.1                   | General.....  | 54 |
| G.2                   | Experiment .....  | 54 |
| G.3                   | Experimental result.....  | 55 |
|                       | Bibliography.....   | 58 |
|                       |   |    |
| Figure 1              | – Quartz crystal axis and cut direction.....  | 17 |
| Figure 2              | – Idealized sections of a synthetic quartz crystal grown on a Z-cut seed .....  | 19 |
| Figure 3              | – Typical example of cutting wafers of AT-cut plate, minor rhombohedral-cut plate, X-cut plate, Y-cut plate and Z-cut plate .....         | 21 |
| Figure 4              | – Frequency-temperature characteristics deviation rate of the test specimen .....   | 25 |
| Figure 5              | – Typical schlieren system setup.....   | 25 |
| Figure 6              | – Lumbered synthetic quartz crystal outline and dimensions along X-, Y- and Z-axes .....  | 29 |
| Figure 7              | – Angular deviation for reference surface .....   | 30 |
| Figure 8              | – Centrality of the seed with respect to the dimension along the Z- or Z'-axis.....   | 31 |
| Figure 9              | – Quartz crystal axis and face designation .....  | 36 |
| Figure 10             | – Synthetic quartz crystal grown on a Z-cut seed of small X-dimensions .....  | 37 |
| Figure 11             | – Example of a relation between the $\alpha$ value and the Q value at wave number $3\,500\text{ cm}^{-1}$ .....                           | 39 |
| Figure D.1            | – Point callipers.....  | 47 |
| Figure D.2            | – Digital point callipers .....   | 47 |
| Figure E.1            | – Schematic of measurement set-up .....   | 49 |
| Figure E.2            | – Graph relationship between averaged $\alpha$ and measured $\alpha$ at two wave numbers of $\alpha_{3\,500}$ and $\alpha_{3\,585}$ ..... | 50 |
| Figure F.1            | – Left- and right-handed quartz crystals .....  | 53 |
| Figure G.1            | – Relationship of $\alpha$ between measuring value and reference value .....  | 57 |
|                       |   |    |
| Table 1               | – Inclusion density grades for piezoelectric applications.....  | 14 |
| Table 2               | – Inclusion density grades for optical applications .....   | 14 |
| Table 3               | – Infrared absorbance coefficient grades for piezoelectric applications.....  | 14 |
| Table 4               | – Infrared absorbance coefficient grades and Schlieren method for optical applications .....  | 15 |
| Table 5               | – Etch channel density grades for piezoelectric applications .....  | 16 |
| Table 6               | – Test conditions and requirements for the lot-by-lot test for group A .....  | 33 |
| Table 7               | – Test conditions and requirements for the lot-by-lot test for group B .....  | 33 |
| Table 8               | – Test conditions and requirements for the lot-by-lot test.....   | 34 |
| Table B.1             | – Commodity bar sampling, method 1 .....  | 45 |
| Table B.2             | – Commodity bar sampling.....   | 45 |

Table E.1 – Example of calibration data at  $\alpha_3$  585 ..... 50  
Table E.2 – Example of calibration data at  $\alpha_3$  500 ..... 50

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

### FOREWORD

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

This bilingual version (2017-11) corresponds to the monolingual English version, published in 2016-05.

This fifth edition cancels and replaces the fourth edition, published in 2008. This edition constitutes a technical revision.

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

- order rearrangement and review of terms and definitions;
- abolition as a standard of the infrared absorbance coefficient  $\alpha_{3\ 410}$ ;
- addition of the  $\alpha$  value measurement explanation by FT-IR equipment in annex;
- addition of the synthetic quartz crystal standards for optical applications.

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

| FDIS         | Report on voting |
|--------------|------------------|
| 49/1185/FDIS | 49/1190/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.

The French version of this standard has not been voted upon.

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 stability date indicated on the IEC website 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.

## INTRODUCTION

The reason for adding synthetic quartz crystal for optical application to this International Standard is as follows.

Quartz crystal produced for optical applications is produced by many of the same suppliers manufacturing quartz for electronic applications. The equipment and methods to produce optical quartz are similar to those used in the production of electronic quartz. Also, with a few exceptions the characterization methods of electronic and optical material are similar. Therefore, IEC 60758 serves as the proper basis for including addenda related to quartz crystal for optical applications.

# 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, selection and optical applications.

## 2 Normative references

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

IEC 60068-1:2013, *Environmental testing – Part 1: General and guidance*

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

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

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

## 3 Terms and definitions

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

### 3.1

#### **hydrothermal crystal growth**

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

Note 1 to entry: 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 2 to entry: 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  $\alpha$  quartz grown by the hydrothermal method

Note 1 to entry: Cultured quartz has the same meaning as synthetic quartz crystal.

### 3.3

#### **as-grown synthetic quartz crystal**

state of synthetic quartz crystal prior to grinding or cutting

### 3.4

#### **as-grown Y-bar**

crystals which are grown by using long stick seed in the Y-direction