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**Workplace air — Guidance for the  
measurement of respirable crystalline  
silica**

*Air des lieux de travail — Lignes directrices pour le mesurage de la  
fraction alvéolaire de la silice cristalline*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 2, *Workplace atmospheres*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

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## Introduction

Respirable crystalline silica (RCS) is a hazard to the health of workers in many industries through exposure by inhalation. Industrial hygienists and other public health professionals need to determine the effectiveness of measures taken to control workers' exposure. Taking samples of air during a work activity and then measuring the amount of RCS present is often done to assess the exposure of an individual, the effectiveness of their respiratory protection or effectiveness of other controls. Studies have found that procedures to ensure the quality of RCS measurements must be followed to ensure results are fit-for-purpose. This is especially true if it is desired to accurately measure RCS at levels below applicable occupational exposure limit values where greater measurement variability can be observed. Reasonable measurement uncertainty can be achieved with proper controls to limit bias and measurement variability and the usefulness of RCS measurements to make informed decisions to protect worker health can be upheld. This document is intended to be of benefit to those involved in the determination of RCS in the workplace, e.g. agencies concerned with health and safety at work; industrial hygienists; safety and health professionals; analytical laboratories; industrial users and their workers. Readers should be aware that in some countries there are legal requirements for the quality assurance of these measurements.

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# Workplace air — Guidance for the measurement of respirable crystalline silica

## 1 Scope

This document gives guidelines for the measurements of respirable crystalline silica in air using direct on-filter or indirect X-ray diffraction and infrared analysis methods, including quality aspects of the measurements. The scope of this document includes the following crystalline silica polymorphs: quartz and cristobalite.

These guidelines are intended for use in conjunction with the following specific analytical methods under the jurisdiction of ISO TC 146 SC 2: ISO 16258-1, ISO 16258-2, and ISO 19087. When used with any of these documents, this guidance will help to ensure measurement procedures meet the uncertainty requirements stipulated in ISO 20581, to enable the results to be compared to occupational exposure limit values (OELV) in accordance with EN 689<sup>[40]</sup>.

These guidelines are also relevant to the analysis of filters obtained from dustiness measurements in accordance with EN 15051<sup>[4]</sup> and EN 17289<sup>[35]</sup>.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 7708, *Air quality — Particle size fraction definitions for health-related sampling*

ISO 13137, *Workplace atmospheres — Pumps for personal sampling of chemical and biological agents — Requirements and test methods*

ISO 18158, *Workplace air — Terminology*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

EN 13205, *Workplace atmospheres — Assessment of performance of instruments for measurement of airborne particle concentrations*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18158 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

### 3.1

#### respirable crystalline silica (RCS)

##### RCS

particles of crystalline silica that can penetrate to the unciliated airways