Characterization of bulk materials - Determination of a size-weighted fine fraction and crystalline silica content - Part 1: General information and choice of test methods

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NATIONAL FOREWORD

See Eesti standard EVS-EN 17289-1:2020 sisaldab Euroopa standardi EN 17289-1:2020 ingliskeelset teksti.	This Estonian standard EVS-EN 17289-1:2020 consists of the English text of the European standard EN 17289-1:2020.
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Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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English Version

Characterization of bulk materials - Determination of a size-weighted fine fraction and crystalline silica content - Part 1: General information and choice of test methods

Caractérisation des matériaux en vrac - Détermination de la fraction fine pondérée par taille et de la teneur en silice cristalline - Partie 1 : Informations générales et choix des méthodes d'essai

Charakterisierung von Schüttgütern - Bestimmung einer größengewichteten Feinfraktion und des Anteils an kristallinem Quarz - Teil 1: Allgemeine Information und Auswahl der Prüfverfahren

This European Standard was approved by CEN on 4 October 2020.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 17289-1:2020) has been prepared by Technical Committee CEN/TC 137 "Assessment of workplace exposure to chemical and biological agents", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2021, and conflicting national standards shall be withdrawn at the latest by June 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

A method was developed in the industrial minerals industry for the purpose of determining the "size-weighted relevant fine fraction" within the bulk material. This document sets out the methods which can be used to measure and calculate the fine fraction of the bulk material and the fine fraction of the crystalline silica, in several types of bulk materials. This information provides additional information to users for their risk assessment and to compare bulk materials. It has been used in the industry and by institutes previously under the acronym SWeRF. EN 17289 (all parts) is based on that industrial method and specifies the analytical methods to determine the difference between materials with coarse quartz and fine quartz, for example, sands versus flour.

As further activities with the material (intentional or otherwise) can change the particle size distribution, the size-weighted fine fraction can also change. Therefore, the method reports (in terms of the mass fraction in the bulk material in percent) both, the total crystalline silica (CS) and the estimated size-weighted fine fraction of CS.

Conventions as specified in EN 481 [1] can be used as input for this document. However, the output of this document is not related to the respirable fraction and cannot be used to replace workplace exposure measurements.

EN 17289 (all parts) specifies two procedures that can be used to estimate the size-weighted fine fraction (SWFF) in bulk materials. It also specifies how the SWFF, once separated, can be further analysed to measure the content of crystalline silica (SWFFCS). The method can be used for comparing the fine fraction in different bulk samples. EN 17289 (all parts) uses the term fine fraction to indicate that it does not analyse airborne particles, but it evaluates the proportion of particles in a bulk material that, based on their particle size, have a potential to be respirable if they were to become airborne.

EN 17289 (all parts) also allows for the size-weighted fine fraction of crystalline silica (SWFFCS) particles in bulk materials to be evaluated in terms of mass fraction in percent, if the fraction separated is subsequently analysed by a suitable method.

In a comparison of similar bulk materials, in which the particle size distribution is the only variable, the SWFF can provide useful information to guide material selection. For example, leaving all other factors aside, a bulk material with a lower SWFF value can pose less of a risk in terms of potential occupational exposure. For the actual exposure at the workplace, the handling etc. of the material, will play a major role.

Concentrations of respirable dust, or respirable crystalline silica (RCS), in the workplace air, resulting from processing and handling of bulk materials, will depend on a wide variety of factors and these concentrations cannot be estimated using SWFF or SWFFCS values. SWFF and SWFFCS values are not intended for workplace exposure assessments as they have no direct relationship with occupational exposure.

The evaluation of bulk materials using SWFF is complementary to determining the dustiness according to EN 15051-1 [2].

The difference between EN 17289 (all parts) and EN 15051-1 is that SWFF quantifies the fine fraction in a bulk material while dustiness quantifies the respirable, thoracic and inhalable dust made airborne from the bulk material after a specific activity (dustiness characterizes the material with relation to the workplace atmosphere when working with the bulk material).

EN 17289 *Characterization of bulk materials — Determination of a size-weighted fine fraction and crystalline silica content* consists of the following parts:

— *Part 1: General information and choice of test methods;*

— *Part 2: Calculation method;*

— *Part 3: Sedimentation method.*

NOTE This document is intended for use by laboratory experts who are familiar with FT-IR, XRD methods, PSD measurements and other analytical procedures. It is not the intention of this document to provide instruction in the fundamental analytical techniques.

1 Scope

This document specifies the requirements and choice of test method for the determination of the size-weighted fine fraction (SWFF) and the size-weighted fine fraction of crystalline silica (SWFFCS) in bulk materials.

This document gives also guidance on the preparation of the sample and the determination of crystalline silica by X-ray Powder Diffractometry (XRD) and Fourier Transform Infrared Spectroscopy (FT-IR).

NOTE EN 17289-2 specifies a method to calculate the size-weighted fine fraction from a measured particle size distribution and assumes that the particle size distribution of the crystalline silica particles is the same as the other particles present in the bulk material. EN 17289-3 specifies a method using a liquid sedimentation technique to determine the size-weighted fine fraction of crystalline silica. Both methods are based upon a number of limitations and assumptions, which are listed in EN 17289-2 and EN 17289-3, respectively. The method in EN 17289-3 can also be used for other constituents than CS, if investigated and validated.

This document is applicable for crystalline silica containing bulk materials which have been fully investigated and validated for the evaluation of the size-weighted fine fraction and crystalline silica.

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.

EN 1540, *Workplace exposure — Terminology*

EN 17289-2, *Characterization of bulk materials — Determination of a size-weighted fine fraction and crystalline silica content — Part 2: Calculation method*

EN 17289-3:2020, *Characterization of bulk materials — Determination of a size-weighted fine fraction and crystalline silica content — Part 3: Sedimentation method*

ISO 16258-2:2015, *Workplace air — Analysis of respirable crystalline silica by X-ray diffraction — Part 2: Method by indirect analysis*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1540 and the following apply.

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
10th–percentile particle diameter

d_{10}

particle diameter corresponding to 10 % of the cumulative undersize distribution (by volume or by mass)