

WORK GROUP FOR THE IMPROVEMENT OF THE EVALUATION OF EXPOSURE TO RESPIRABLE CRYSTALLINE SILICA

**⁽¹⁾ M.P. Gómez, ⁽¹⁾ M.J. Ibáñez, ⁽¹⁾ A. Escrig, ⁽²⁾ R. Pou, ⁽³⁾ A. Freixa,
⁽³⁾ E. Gadea, ⁽³⁾ A. Martí, ⁽⁴⁾ J.J. Elvira**

⁽¹⁾ Instituto de Tecnología Cerámica (ITC)

Asociación de Investigación de las Industrias Cerámicas (AICE)

Universitat Jaume I. Castellón. Spain

⁽²⁾ SGS Tecnos S.A.

⁽³⁾ Centro Nacional de Condiciones de Trabajo (CNCT)

Instituto Nacional de Seguridad e Higiene en el Trabajo (INSHT)

⁽⁴⁾ Instituto de Ciencias de la Tierra Jaume Almera (ICTJA) – C.S.I.C.

1. EXPOSURE LIMITS TO RCS

In 2002, the Scientific Committee on Occupational Exposure Limits to Chemical Agents (SCOEL) of the European Commission recommended that concentrations of respirable crystalline silica (RCS) in the form of quartz or cristobalite should be kept below 0.05 mg/m^3 [1]. This recommendation is based on the premise that silicosis increases the risk of lung cancer, and there does not appear to be a safety threshold between RCS exposure and the risk of contracting silicosis [2].

The Spanish National Institute for Occupational Health and Safety (INSHT) established its inhalation exposure limit VLA-ED at 0.025 mg/m^3 [3], this being one quarter of the value currently in force. Although this limit is still in the consultation stage, there is uncertainty as to whether evaluation of compliance is possible with the available techniques.

2. EVALUATION OF EXPOSURE TO RCS

The analytical methods recommended for quantifying exposure to free silica are usually based on X-ray diffraction (XRD) or infrared spectroscopy (IRS) [4]-[9].

Several publications are available [10]-[12] that study the precision that is attainable with these techniques. The findings from these studies agree that, for the limit proposed by the SCOEL and the currently used sampling volumes, the minimum precision limits [13] set out in table 1 would not be achieved [14].

Measurement range relative to the Exposure Limit	Expanded uncertainty relative to the Exposure Limit
10% - 50%	$\leq 50\%$
50% - 200%	$\leq 30\%$

Table 1. UNE-EN 482:2007 requirements for the overall expanded uncertainty in long-term measurements.

3. WORK GROUP

In the light of this situation, a Work Group has been formed comprising technicians from the Spanish National Centre on Working Conditions (CNCT) of the INSHT, the Institute of Ceramic Technology (ITC), the Jaime Almera Earth Sciences Institute (ICTJA) of the CSIC, and SGS Tecnos, S.A. The purpose of this group is to perfect existing sampling and analytical methods in order to adapt them to the new demands that will be imposed by lower exposure limits.

Among the tasks conducted to date, the following may be noted:

- Verified quartz and cristobalite standards have been prepared and samples have been exchanged by the laboratories in the Group to fuse the analytical techniques.
- The XRD analysis method for RCS on 25 mm vinyl polychloride filters has been optimised. The detection limits (DL) and quantification limits (QL) for this technique can probably be reduced to 5 and 10 µg/filter, respectively.
- Instructions have been drawn up for sampling with conventional sampling equipment (2.2 l/min) suitable for the optimised analysis method.
- Tests with other non-filter-based sampling systems have been started, which will enable sampling at a higher flow rate (10 l/min). The results obtained to date have been promising.

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