Guidance Manual for Addressing Risks from Worker Exposure to Respirable Crystalline Silica (RCS) on Construction Sites

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Uncontrolled Once Printed

CONTENTS

1.0 BACKGROUND

Historically, dust within the construction industry has been an acceptable aspect of particular tasks. This perception has changed hugely over the last 20 years with more and more controls being introduced at the design and construction phases of projects.

A working group of the CIF was formed in 2017 to raise awareness of risks from construction dusts and to promote safer work practices in the industry. This included participation in social dialogue meetings on dust management with the European Construction Industry Federation (FIEC) and the European Federation of Building and Woodworkers (EFBWW). The approach taken by the working group was to focus on dust management rather than Respirable Crystalline Silica (RCS) singularly on the basis that the hierarchy of controls are comparable, and RCS is not always present.

An information pack was developed to complement existing Guidance provided by the European Commission for National Labour Inspectors on addressing risks from worker exposure to respirable crystalline silica (RCS) on construction sites (available to download at: https://osha.europa.eu/en/guidance-national-labour-inspectors-on-addressing-risks-from-worker-exposure-to-respirable-crystalline-silica). This includes:

- A practical guidance manual for the construction industry for dust management;
- A Frequently Asked Questions (FAQ) on RCS;
- Guide for monitoring and measurement of dust exposure for workers;
- Information sheets on dust management for specific work tasks to facilitate toolbox talks.

The respirable fraction of the dust is invisibly fine and the OELV for Respirable Crystalline Silica (RCS) is 0.1mg/m^3 averaged over 8 hours, as set down in the 2018 HSA' Code of Practice for the Chemical Agents Regulations under the Safety, Health and Welfare at Work (Chemical Agents) Regulations 2001 (S.I. No. 619 of 2001), as amended by S.I. No. 623/2015 - Safety, Health and Welfare at Work (Chemical Agents) (Amendment) Regulations 2015.

2.0 WHERE DOES RCS COME FROM?

Crystalline silica is a naturally occurring substance typically found in stone (particularly sandstone, shale, granite and slate), in sand and in products such as bricks, tiles, concrete and cement. Refer to Table 1.

Table 1 – Crystalline Silica concentrations in common materials	
1. Silica containing composites, e.g. manufactured stone	Up to/ or > 90%
2. Sandstone, gritstone, quartzite, flint	More than 70%
3. Concrete, mortar	25% to 70%
4. Shale	40% to 60%
5. China stone	Up to 50%
6. Tile	30% to 45%
7. Slate	Up to 40%
8. Granite	Up to 30%
9. Brick	Up to 30%
10. Ironstone	Up to 15%
11. Basalt, dolerite	Up to 5%
Source *Material 1* - https://www.osha.gov/Publications/OSHA3768.pdf *Materials 2-10* - http://www.hse.gov.uk/pubns/guidance/cnseries.htm *Silica advice sheet for managers – CN0*	

Mixing, cutting, drilling, demolition of silica containing materials has created the largest volumes of project dust.

3.0 HEALTH & SAFETY

Silica can be present as a hazard from the quarry through the construction phase and onto the demolition / alteration of completed structures. Inhalation is the primary route of exposure to crystalline silica dust. When any dust is inhaled, its point of deposition within the respiratory system is very much dependent upon the range of particle sizes present in the dust. The respirable fraction (smallest particle size) of crystalline silica dust can penetrate deep into the lungs.

Inhalation is the primary exposure route for RCS. The health risks from RCS are insignificant when exposure to dust is adequately controlled – it is essential to manage your team's health by planning for safety from design through to handover.

By breathing-in RCS, you could develop the following lung diseases:

- **Silicosis:** Silicosis makes breathing more difficult and increases the risk of lung infections. Silicosis usually follows exposure to RCS over many years, but extremely high exposures can lead rapidly to ill health.
- **Chronic obstructive pulmonary disease (COPD):** COPD is a group of lung diseases, including bronchitis and emphysema, resulting in severe breathlessness, prolonged coughing and chronic disability. It may be caused by breathing in any fine dusts, including RCS. It can be very disabling and is a leading cause of death. Cigarette smoking can make it worse.
- **Lung cancer:** Heavy and prolonged exposure to RCS can cause lung cancer. When someone already has silicosis, there is an increased risk of lung cancer.

What kind of tasks on RCS containing materials create hazards?

- Grinding, drilling, cutting, sanding, blasting;
- Mixing and handling, brushing and shoveling of dry materials;
- Rock breaking, drilling, crushing, screening.

Worker at risk of high RCS exposure. Arrow points to worker (Source – H.S.A)

4.0 CONTROL MEASURES FOR DEALING WITH RCS

The respirable fraction of the dust is invisibly fine. Elimination and substitution of RCS containing materials, dust extraction and/or dust suppression are the primary measures advised to control potential exposure.

4.1 How can we eliminate / mitigate these hazards?

- Commence with a risk assessment (knowledge of the % silica in a material is a distinct advantage);
- The risk assessment shall take account of the personnel / company completing the works plus other personnel who could be affected by the hazards created;
- **Eliminate** hazards where possible through early accurate design (formation of opes at concrete pouring stage);
- Use of remotely operated machinery in an open well-ventilated environment;
- Substitution of non-silica or lower level silica containing products at design stage;
- Offsite fabrication in controlled environments.

4.2 Mitigations:

- Make all employees aware of the hazards in advance;
- Plan via a RAMS which shall include task methodology, controls in place, training required, disposal of RCS containing dust, air monitoring as required (before and after depending on the ventilation / air exchange rate of the location);
- Use mechanical means to control the dust to be created, see the dust removal drilling example in the photograph below;

- Reduce exposure times for personnel;
- Forced extraction / ventilation for enclosed spaces;
- Air monitoring;
- Personal monitoring;

- Wet down all RCS containing materials during the cutting process – road saws, consaws, hole saws are good examples where water can be used to eliminate RCS hazards at the cutting stage (it is important that the wet dust is disposed of safely before it turns to dust and the wetting down procedure was wasted as the hazard remains on the project);
- Create a culture of completing all cutting externally to the project – in roofed open-ended cut shops;
- Never sweep up RCS containing dust – use an approved vacuum.

4.3 PPE:

- The risk assessment may deem the controls incomplete for your upcoming task where RCS hazards are present.
- Respirators may be required to increase your personal safety.
- All personnel who wear respirators must be trained by a competent person.
- You must be trained to use, check, and clean or know when to replace the respirator / filters.
- Disposable respirators / face masks require training to allow for the safe use of same. (You must be clean shaven to allow this type of respirator to work effectively).

Respirators (filtering devices) are available in a range of styles, either as tight-fitting face-pieces (masks) or loose-fitting face-pieces (hoods/helmets). Disposable and re-usable half-mask respirators (both tight-fitting devices) are generally used on construction sites (See Figure 5). Powered hoods/helmets and full-face respirators may also be worn occasionally. Air-line blasting helmets should be worn for abrasive grit blasting.

4.4 Key Points

Always assume that exposure is likely to occur and protect according to the level of risk identified from risk assessment.

- Prepare written risk assessments (required by law) highlighting the key hazards, risks and controls in place.
- Use safe systems of work to reduce exposure based on the risk assessment.
- Use dust suppression techniques during work.
- Use of engineering controls such as local exhaust ventilation to control exposure can be very effective.
- Use and store personal protective equipment according to instructions to reduce exposure.

4.5 Health Surveillance:

For example, a health surveillance programme for workers should be established:
when there is still a risk to health from RCS exposure, even after the implementation of all reasonable precautions;

where there is reliance on RPE/PPE as a control measure;

in situations where workers are carrying out most of the tasks referred to in this guidance, as RPE is also required as a control measure, in most cases.

It must be remembered that Health Surveillance cannot replace the controls put in place to prevent exposure to RCS but is additional and complementary to it and provides a means of monitoring their adequacy.

4.6 Practical solutions to minimizing dust creation on construction projects:

Elimination or substitution	Has the employer considered elimination or substitution e.g. process, use of pre-cut materials, or substituting with materials with no crystalline silica content, changing to low quartz materials?
Task	What work is creating the dust and how much energy is involved? The higher the energy the greater the risk. Can the task be done in another way that reduces the risk?
Location	Where is the work taking place? The more enclosed a space the higher the exposures will be **unless a suitable means of extraction is used;** this has an impact on the controls required e.g. RPE
Duration	How long is the task taking? Generally, the longer the task the higher the exposure.
Frequency	How frequently is the task done? Are people likely to be regularly exposed doing other similar tasks?
People	Who is being exposed? Is it just the worker doing the task or are others being exposed?
Controls	Are effective controls in place and in line with the **hierarchy of controls?**
Monitoring of Controls	Is there a system in place to monitor controls e.g. supervision, personal air sampling?
Other OSH issues	Does application of appropriate controls introduce other OSH issues e.g. ladder work with on-tool extraction may increase the risk of falls?

2 X Photographs of water suppression techniques: Source HSE – UK.

Grinder with on tool extraction – UK HSE

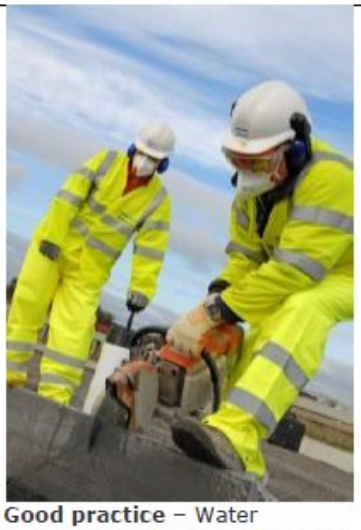
The **extraction unit** is like an industrial vacuum. It is a portable unit and also an important part of the LEV system. The extraction unit removes the dust from the captor hood, filters it and then stores it for safe disposal. It is important that the extraction unit is to the correct specification for silica i.e. M (Medium) or H (High) class unit. The extraction units are marked with a special label (see Figure 4 below).

Figure 4 Label on M and H class extraction units (Source HSE, GB)

Source – UK HSE

2.1 Cutting concrete kerbs, blocks and paving with a cut-off masonry saw

Poor practice – no dust suppression or RPE (HSE, GB)



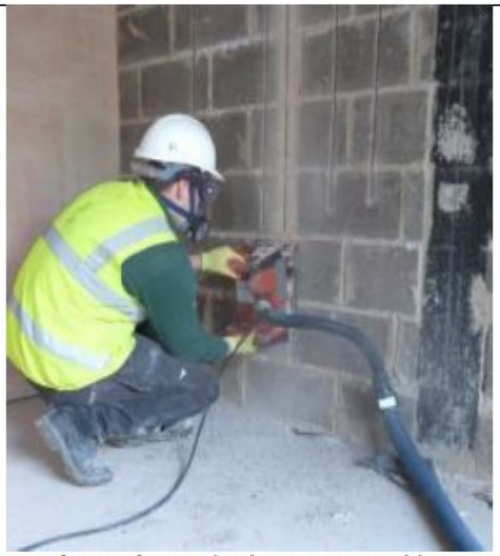
Good practice – Water suppression and RPE (HSE, GB)

Good practice – Using a low energy solution such as a block splitter (HSA, IE)

Source – EU SLIC

2.2 Chasing concrete and raking mortar

Poor Practice – Chasing concrete with no on-tool extraction or RPE (Safer Sites Website, GB)



Good practice – Chasing concrete with on-tool extraction (HSE, GB)

Source – EU SLIC

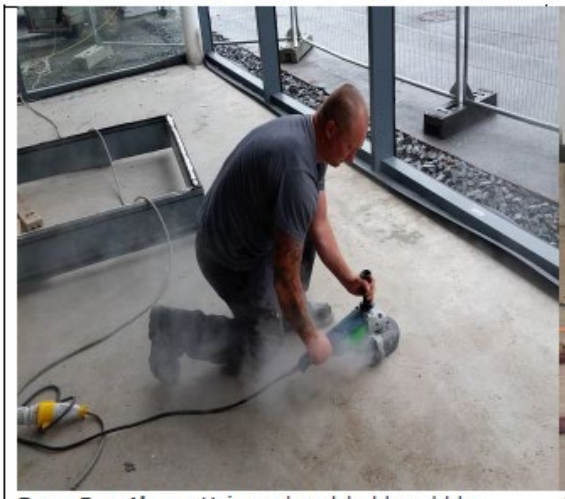
2.3 Cutting roof tiles with cut-off saw

Poor Practice – Cutting roof tiles without control measures (National Federation of Roofing Contractors Ltd, GB)

Good practice – Cutting roofing tiles with a tile cutter (National Federation of Roofing Contractors Ltd, GB)

Source – EU SLIC

2.4 Scabbling or grinding concrete floors with hand-held tools



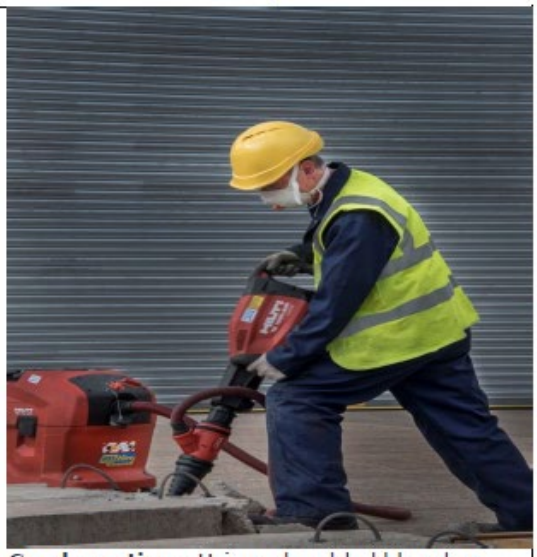
Poor Practice – Using a hand-held scabbler without on tool extraction (David Flynn Ltd, IE)

Good practice – Using a hand-held grinder with on-tool extraction (HSE, GB)

Source – EU SLIC

2.5 Hand-held breaker in enclosed space (without ventilation)

Poor Practice – Using a hand-held breaker without on-tool extraction (DLI, CY)



Good practice – Using a hand-held breaker with on-tool extraction (HSE, GB)

Source – EU SLIC

2.6 Drilling small diameter holes in concrete floors, walls and ceiling

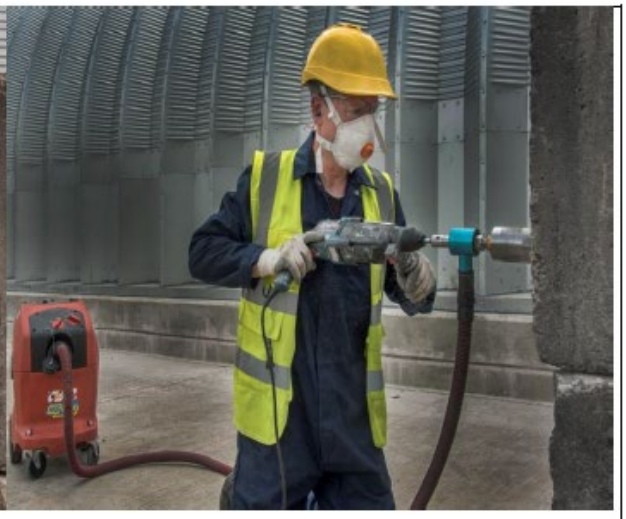
Poor practice – Using Hand-held drill with no on-tool extraction (David Flynn Ltd, IE)

Good practice – Using a hand-held drill with integrated cassette (HSE, GB)

Source – EU SLIC

2.7 Dry coring

Poor Practice – Using hand-held corer with no extraction or RPE (HSE, GB)

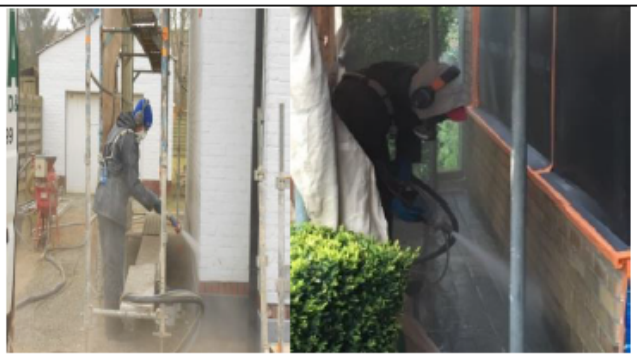


Good practice – Dust extraction on the core drill and RPE (HSE, GB)

Source – EU SLIC

2.9 Abrasive pressure blasting

Poor Practice – Dry abrasive blasting without water suppression or on-tool extraction (HSE, GB)



Good practice – Wet abrasive blasting i.e. Water suppression with RPE (Note this hearing protection is incorrect! A hard hat and plugs or integrated helmet with hearing protection should be worn which is compatible with the RPE) (GDWW, B)

Source – EU SLIC

2.10 Removing small rubble, dust and debris

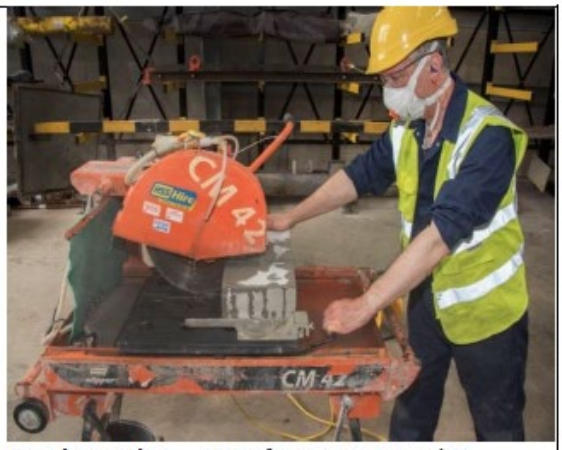
Poor Practice – Removal of rubble using dry sweeping (HSE, GB)

Good practice – Removal of dust using high-efficiency filter vacuum (HSE, GB)

Source – EU SLIC

2.11 Bench-top masonry saw

Poor Practice – No/insufficient water suppression and lack of RPE (HSE, GB)



Good practice – Use of water suppression (shown) and RPE worn by the operator (HSE, GB)

Source – EU SLIC

2.12 Wall sanding

Poor Practice – Use of a pole sander without extraction (HSE, GB)

Good practice – Use of pole sander with extraction (HSE, GB)

Source – EU SLIC

2.13 Sanding concrete floors

Poor Practice – sanding concrete floors without on-tool extraction (GDWW, B)

Good practice – sanding concrete floors with on-tool extraction (HSE, GB)

Source – EU SLIC

2.14 Utility vehicle demolition

Good Practice – Utility vehicle cabin fitted with in-cab ventilation and material wetted before loading and transportation (MTS group Ltd, GB and JCB, GB)

Good practice – Use of remote controlled utility vehicle (SWEA, S)

Source – EU SLIC

5.0 CONCLUSIONS:

Get everyone home safely to their families every day

How do we achieve this? By the following means:

- Increase RCS awareness within your company (including the potential hazards caused by other trades);
- Risk assess your tasks;
- Eliminate / mitigate the RCS hazards as far as is reasonably practicable;
- Train your personnel / provide adequate resources;
- Monitor your workforce's health;
- Plan for a safe workplace;
- Stick to the Plan.

6.0 FURTHER INFORMATION

Other useful references for information on RCS are as follows:

- Guidance provided by the European Commission for National Labour Inspectors on addressing risks from worker exposure to respirable crystalline silica (RCS) on construction sites. Located at: https://osha.europa.eu/en/guidance-national-labour-inspectors-on-addressing-risks-from-worker-exposure-to-respirable-crystalline-silica
- European Social Dialogue Agreement (NEPSI) on Workers' Health Protection through the Good Handling and Use of Crystalline Silica and Products containing it. Located at: http://www.nepsi.eu/agreement
- IOSH. No Time to Lose – Respirable Crystalline Silica. Located at: https://www.notimetolose.org.uk/wp-content/uploads/2018/03/Factsheet_Respirable_crystalline_silica_the_facts_MKT2730.pdf
- BOHS. Breathe Freely. Located at: http://www.breathefreely.org.uk/breathefreelyconstruction.html