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Addressing the Risk of Silicosis Relating to Engineered Stone Worktops Working Group Review & Recommendation

Working Group Members.

Dagan Herculson	Chair - Berkeley Group - Head of Group Supply Chain
Adam Miles	Athena Surfaces - Managing Director
Adrian Hill	Bellway Homes - Procurement Director
Joel Kingsland	Wren Kitchens - Head of Manufacturing HSE
Jon Stanley	Caesarstone - VP Marketing & Customer Service
Jose Lopez Lopez	Consentino - Regional General Manager
Lee Greatorex	HSE - Senior Interventions Design Advisor
Nigel Fletcher	Worktop Fabricators Federation - Operations Officer

Review Remit & Material Definition

This review and its recommendations aims to address the risks of silicosis relating to the supply, fabrication and installation of Engineered Stone worktops within a new build construction environment. Finding practical solutions to mitigate the related health impacts in the short-term, and to significantly reduce them in the long-term.

There is no legal definition for Engineered Stone, so for the purposes of this review it covers all man-made solid surface products, including those referred to as quartz, artificial stone, resin bonded stone, composite stone and porcelain.

Background and Context

Silicosis is caused by inhalation of respirable crystalline silica (RCS), which are extremely fine particles of silica dust small enough to penetrate deep into the lungs. Prolonged exposure can lead to irreversible lung disease and premature death.

Engineered Stone worktops can contain 90–95% crystalline silica, with the HSE guide on the ‘control of exposure to silica dust’ confirming this risk by listing Artificial Stone (Engineered Stone) as the material with the highest crystalline silica content.

The greatest exposure risk to RCS occurs during the cutting, grinding, polishing and finishing of Engineered Stone slabs during fabrication, but while most fabrication is undertaken in workshops, on-site finishing and adjustments also generates RCS dust.

Silicosis cases linked to Engineered Stone fabrication have increased significantly in recent years internationally. Medical evidence has shown accelerated silicosis developing in relatively young workers involved in Engineered Stone fabrication, even where exposure periods were relatively short.

The rise in cases of silicosis in Engineered Stone fabrication in the UK is a result of the ease of availability of Engineered Stone, which is quicker and cheaper to process and therefore in increased demand over other forms of worktop.

HSE estimates that circa 600,000 workers in the UK are exposed to the risk of all forms of Silicosis, most of whom work in general construction. However, accelerated silicosis cases in the UK have been exclusively linked to high silica sandstone processing in the artisan stonework sector and, more recently, Engineered Stone fabrication. It is estimated that between 1,000 and 3,000 workers are currently exposed due to working specifically in the UK Engineered Stone industry.

Accelerated silicosis can develop within months of high levels of uncontrolled exposure to dry dust, is incurable and early death can only be forestalled temporarily by lung transplantation.

MP Liz Jarvis is currently leading a Silica Dust (Exposure) Bill, which is looking to address the increase in Silicosis largely as a result of dry cutting Engineered Stone without the proper controls being in place. The First Reading took place on the 17th March this year.

This Bill is to make provision about the prevention, monitoring and reporting of silicosis and other lung diseases caused by occupational exposure to silica dust; to make provision about a programme of screening for silicosis; to introduce certain requirements and prohibitions on working practices associated with exposure to silica dust, including a prohibition on the dry-cutting of high-silica Engineered Stone; to make provision about the role of the Health and Safety Executive in relation to occupational exposure to silica dust; and for connected purposes.

Whilst it remains under review, the UK Government are currently not considering a ban on Engineered Stone, as other materials also have an RCS risk. Their approach being based on ensuring the correct safeguards are in place and an intensive inspection regime of 1,000 workplaces. The inspections so far have resulted in four prohibition notices and several improvement notices.

Review Principles

As this review is based on activities relating to a new build construction, the outputs need to maximise the associated available benefits from operating pre-specified works within a controlled environment.

Experience tells us that getting people to comply within even simple rules and regulations can be tough, so we need to consider how to make it as easy as possible for people to do the right thing.

This review is based on the following well-established, recognised and proven hierarchy of controls the construction industry uses for H&S:

1. Eliminate (remove the hazard)
2. Substitute (replace the hazard with a safer alternative)
3. Engineering controls (isolate people from the hazard)
4. Administrative controls (change how people work)
5. PPE (protect people)

Tighter controls must be put in place for fabrication activity both off-site and on-site, with as much fabrication being carried out off-site as possible, due to the higher standards of control available.

Material selection must follow the Construction (Design and Management) Regulations requiring the Principal Designer to work with any other designers on the project to eliminate foreseeable health

and safety risks to anyone affected by the work and, where that is not possible, take steps to reduce or control those risks.

This includes the health and safety of not only those contractors and workers carrying out the site-based construction work, but those who use, maintain, repair, clean, refurbish and eventually demolish a building.

Material specification needs to be clear and carry through from design to installation.

Recommendation Summary

Simple to follow guidance should be developed and issued to industry to provide a base understanding of the key things to consider with regard to worktop material description and selection.

The following actions should also be promoted.

1. **Eliminate**
 - Prevent unnecessary on-site fabrication through the use of good templating
 - Stop using Engineered Stone worktops with high crystalline silica content
2. **Substitute (replace the hazard with a safer alternative)**
 - Provide guidance to understand Engineered Stones crystalline silica content
 - Transition to only using Code for Construction Product Information verified products
 - Transition to only using materials with <1% crystalline silica over 2 years
 - Support a Construction Products Reform Designated Standard for Engineered Stone
3. **Engineering Controls (isolate people from the hazard)**
 - Use material templating
 - Transition to only using fabricators who have been awarded with a Quality Mark within 2 years
4. **Administrative Controls (change how people work)**
 - Align with British Occupational Hygiene Society to improve specific training
 - Recommend permittable on-site works
5. **PPE (protect people)**
 - Recommend RPE and PPE standards for low and high dust tasks

Full Recommendation

The following recommendation is designed to be implemented in the context of all aspects working together to mitigate the related health impacts in the short-term, and to significantly reduce them in the long-term.

All parties involved with the supply, fabrication and installation of Engineered Stone worktops must follow the relevant HSE guidance and advise listed below:

- ST - COSHH essentials for stonemasons: Silica
- ST0 - Advice for managers
- ST1 - Primary and secondary sawing
- ST2 - Rotary tools: Boring and polishing
- ST3 - Hand-held rotary tools: Cutting and polishing

- ST3A - Cutting and polishing Engineered Stone using powered hand-held rotary tools
- HSG53 Respiratory protective equipment at work guide
- INDG479 Respiratory protective equipment fit testing
- INDG463 Control of exposure to silica dust - A guide for employees
- G404 COSHH Essentials; General guidance - Health surveillance for those exposed to respirable crystalline silica (RCS)
- HSE advice for those installing stone worktops (1 page document)
- HSE website section on; Installing stone worktops: protect against harmful natural or artificial stone dust
- HSE website section on; Health surveillance

1. **Eliminate (remove the hazard)**

The risk of Silicosis relating to working with Engineered Stone containing crystalline silica cannot be eliminated entirely but the elimination of unnecessary on-site fabrication (by using accurate templating to moving works completely off-site) and the elimination of using Engineered Stone worktops with high crystalline silica content are both actions which should be taken, as detailed under sections 2 and 3 below.

2. **Substitute (replace the hazard with a safer alternative)**

There is RCS risk associated with a number of materials used in construction, such as natural stone, concrete, ceramics and bricks but unlike these it is possible to substitute Engineered Stone worktops containing a high level of crystalline silica with materials containing <1% crystalline silica and this change should be recommended to industry, as detailed below.

a. **Product Information**

Product information should be obtained and understood to ensure that informed product selections are made.

Great Britain continues to adopt the main duties to classify, label and package in accordance with European Regulation (EC) No 1272/2008 (referred to as CLP) and align with EU Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (referred to as REACH).

Compliance with the above should ensure that product information is available for all Engineered Stone worktops which disclosure the specific material composition (including crystalline silica / quartz content), hazard classification and safe-handling guidance.

The table below provides an example of the material composition information which should be supplied by manufacturers.

Component	CAS Number	Concentration % wt/wt
Recycled Glass, consisting primarily of Amorphous Silica	112945-52-5	80-90%
Quartz (SiO₂)	14808-60-7	<1%
Polyester Resin	Various	10-15%
Chemical Intermediate	Various	0.1-0.5%

Tetraethyl silicate	78-10-4	0.1-0.5%
Triethoxyphenylsilane	780-69-8	<0.1%
Pigment	Various	<0.5%
Titanium dioxide	13463-67-7	0-4

In relation to Silicosis risk the key component to consider is the percentage of Quartz the worktop contains.

Quartz (SiO₂) is a mineral with high crystalline silica content (typically 90-95%). Inhalation of the related respirable crystalline silica (RCS) dust is specifically associated with the significant long-term fibrotic lung disease silicosis due to its spiky/maple-leaf micro-shape, which can get stuck in the lungs. The respirable part of crystalline silica dust is subject to HSE workplace exposure limits (WEL) and therefore requires both the controls set out in this recommendation to be in place and exposures to be below the WEL.

Manufacturers can use materials such as **Amorphous Silica, Fluorite** and **Feldspars** in place of **Quartz (SiO₂)** to reduce the risk of Silicosis but these alternatives are not risk free. For example, the inhalation of amorphous silica dust can possibly cause temporary irritation of the nose, throat, and respiratory tract and it can also cause reversible lung inflammation. As such, amorphous silica dust is classified as a respirable dust under COSHH and so is subject to HSE workplace exposure limits.

Simple to follow guidance should be developed and issued to industry to provide a base understanding of the above and the key things to consider with regard to worktop material description and selection.

b. Verified Products

Manufacturers and their products should be successfully assessed against the Code for Construction Product Information (CCPI), to ensure that the required product data is in place and to provide third party assurance that the product information is accurate, clear, accessible, up to date and unambiguous.

This approach will also help address the issue that countries such as China continue to export Engineered Stone without product data sheets which can be relied upon to be accurate.

Whilst some Engineered Stone manufacturers have started the CCPI assessment process, it is recommended that there is a 2-year transition period to ensure sufficient time for all companies to achieve the required compliance.

The related material composition and product information will allow designers, procurement teams, specifiers and contractors to ensure that the correct and verified materials are used and installed.

c. Designated Standards

As part of Construction Products Reform, the CLC should work with MHCLG to develop a Designated Standard specific to Engineered Stone worktops to ensure that testing and labelling of all products are robust and trusted.

d. Transition Materials

The industry should transition to using <1% silica Engineered Stone over a 2-year period.

Engineered Stone can currently have a very wide range of crystalline silica content, varying from >90% down to <1% but there are three main bands as set out below:

- Level 1) <1% crystalline silica
- Level 2) ≥1% but <40% crystalline silica
- Level 3) ≥40% crystalline silica

Selecting low silica products can currently reduce the number of manufacturers which can use and the range of products and finishes available.

Some low crystalline silica products are currently only available with additional premium features and therefore are subject to increased cost but where the same manufacturer offers equivalent high and low silica products there is generally no cost difference.

Most reputable manufacturers and suppliers are already proactively working towards moving to low crystalline silica content products. Meaning it should be possible to transition to <1% silica product (offering a full range of products and finishes) without commercial impact (noting prevailing rates for all materials move over time) over a 2-year period.

Note some manufacturers may not offer products below 30-40% crystalline silica at that 2 year point and lower cost imported 'white label' products are likely to still contain higher levels of crystalline silica.

In all instances we should be promoting the specification of correctly sourced, traceable and CCPI assessed manufacturers and materials.

3. **Engineering Controls (isolate people from the hazard)**

We need to maximise the benefits of working in a controlled new build environment and ensure that the specified works are designed to move all fabrication and adjustment off-site. We should also only work with fabrication companies who operate proven effective health, safety and welfare process. Ad hoc on-site fabrication activity is not acceptable.

a. **Material Templating**

Material templating should be mandated as the single biggest lever for minimising (but not eliminating) on-site work.

b. **Fabricator Quality Mark**

The CLC should support and promote the newly launched Worktop Fabrication Federation (WFF) 'Quality Mark' with industry transitioning to only using fabricators who have been awarded this Quality Mark within the next 2-years.

The Worktop Fabrication Federation (WFF), working with the British Occupational Hygiene Society (BOHS) has just launched a 'Quality Mark' standard for all fabricators, which ensures that fabrication-related health exposures and/or risks are effectively controlled.

The related industry facing Quality Mark processes were being finalised in a parallel timeframe with this review and so have been challenged by this CLC Working Group to ensure that they are both suitable and robust enough to align with the needs of the new build construction industry.

The resultant CLC Briefing note on the Process for BOHS validation of WFF Members claiming to meet quality mark scheme (written by BOHS and WFF) is contained in Appendix A and the related website is:

<https://worktopfabricators.org/quality-mark/>

4. **Administrative Controls (change how people work)**

The following sets out the key actions relating to on-site works.

a. **Dust Suppression & Control**

At-source control is required for all dust generating tasks, undertaken outdoors where appropriate with a RAMS ventilation assessment deciding if supplementary room filtration, to EN 1822 H13 as a minimum, is also needed for indoor activity.

On tool water dust suppression should always be the first consideration.

Where water suppression is not reasonably practicable on-tool dust extraction to a minimum Class M (BS EN 60335-2-69) should be used.

c. **Permittable On-Site Works**

Noting the above controls will be in place, the practical need to undertake some finishing and adjustment work on-site and the need to be able to effectively manage and monitor the related processes, where absolutely necessary the following works can be undertaken on site:

Finishing Activities (lower dust tasks):

- Drill and fill chip repair
- Feathering Joints
- Polishing stop ends
- Mitred waterfall end installation

Adjustment Activities (higher dust tasks)

- Adjusting notches into the surface or cladding
- Adjusting Hob/sink cutout
- Radius adjustment
- Adjusting Socket/ light switch in cladding
- Tap hole cutting
- Trimming an upstand/ cill
- Worksurface/cladding/leg trim 950mm in length or less

Works NOT permitted on site:

- Roughing adjoining edges for bonding
- Drainer grooves
- Smooth underside
- Cutting notches into the surface or cladding
- Cutting in Socket/ light switch in cladding
- Cutting or adjusting a pop-up socket
- Cut out for a hob/sink

To add industry rigor we recommend that based on the related tool energy required and the amount of material removed for all higher dust Adjustment Activities listed above, enhanced levels of RPE and PPE are used for these tasks, as detailed in section 5 below.

5. **PPE (protect people)**

Note: Only standard site PPE is required if no Finishing or Adjustment activities are undertaken when installing Engineered Stone worktops.

Minium requirements for on-site Finishing Activities:

- Respiratory Protective Equipment to FFP3 (APF 20). Tight-fitting needs annual face-fit testing and a clean-shaven seal but loose-fitting powered hoods avoid both, which suits a mobile workforce. Documented filter-change schedule, pre-use checks and clean/dry storage are all required. This hood / visor could replace the need for separate eye protection if it complies with EN ISO 16321-1:2022
- Eye protection to EN ISO 16321-1:2022 with consideration for using sealed goggles
- Gloves should provide at least cut and abrasion Level B protection in accordance with BS EN 388:2016. For wet working, a cut-resistant gauntlet is recommended to provide both cut protection and additional coverage to help reduce the risk of dermatitis
- Clean up by M-class vac or wet wipe, never dry brushing or compressed air

Additional enhanced requirements for on-site high dust Adjustment Activities:

- Respiratory Protective Equipment to be powered air-fed (TH2P/TH3P, APF 20–40)
- Hearing protection to EN 352
- Coveralls to EN ISO 13982-1 (Type 5) for protection against hazardous dry particulates and EN 13034 (Type 6) for limited protection against liquid splashes.

Appendix

Appendix A - CLC Briefing note on the Process for BOHS validation of WFF Members claiming to meet quality mark scheme