

### CONTROLLING SILICA WHEN DISC CUTTING ROOF TILES

#### 1. INTRODUCTION

This guidance sheet gives information about the control of Respirable Crystalline Silica (RCS) issues associated with the disc cutting of concrete and clay roof tiles. However, the requirement to use water suppression applies to all roof tiles and related roof coverings such as artificial slates, concrete slates etc as well as all related fittings. This guidance note does not cover the practice of hand cutting, with the exception that this is recommended where possible to further reduce the risks.

Roof tiles often need to be cut in the verge, ridge, hip and valley area. Most roofers use a disc cutter saw for this. These saws produce large amounts of dust that contains silica that can easily be inhaled by the operator and others in the vicinity. Over time this dust can be very harmful to the lungs. Because of this it needs proper control in line with the Control of Substances Hazardous to Health Regulations (as amended) 2002 – commonly known as COSHH.

The Health and Safety Executive (HSE) has, for some time, seen the control of silica dust as a priority. NFRC has worked with them and others within the housing industry to provide a practical solution to this issue. This resulted in an interim agreement to use water suppression and respiratory protective equipment (RPE) for the cutting of all roof tiles except for valleys. Here, the established industry practice of only using RPE was allowed to continue. Wet cutting these tiles created a number of difficulties that some felt could not be effectively overcome at the time. There was also insufficient information on the level of risk created.



Subsequently, HSE has undertaken further work in this area. This has revealed that the levels of silica dust created when dry cutting valley tiles is much higher than published safety limits. Following a series of tests, effective methods of wet cutting valley tiles have also been devised. HSE therefore wants a high standard of control for cutting all roof tiles. This guidance note has been produced to assist members in complying with this requirement and COSHH. HSE will expect roofing contractors to follow it from 1<sup>st</sup> October 2012.

#### 2. THE RISK

Silica is a natural mineral found in large amounts in things like sand, sandstone and granite. It is also commonly found in many construction materials such as concrete and mortar. The silica is broken into very fine dust (also known as Respirable Crystalline Silica or RCS) during many common tasks such as cutting, drilling and grinding. It is often called silica dust.

Silica dust damages lungs and airways. It can cause lung cancer, silicosis and Chronic Obstructive Pulmonary Disease (COPD). While some of these lung diseases, like advanced silicosis, can come on quite quickly, most take a long time. Often this is over years. They happen because regularly breathing even small amounts of dust add up and damage the lungs and airways. Unfortunately, by the time the damage is noticed it is more difficult to treat. Because of this it is important to limit the amount of silica dust every time work is done so that the total amount someone may breathe in over the years does not build up.

Even though roof tiles can be cut quickly this does not mean that the work is low risk. HSE has found that dry cutting a single valley side can produce very high silica levels. COSHH sets a limit on the amount of silica dust that someone can breathe. This limit is not large. The image shows the maximum amount of silica you can breathe when averaged over a normal working day as compared to a penny. This limit is the legal maximum, the most you can breathe **after** the right controls have been used. For tasks that can create high levels of silica, like cutting roof tiles, these controls have to be very good as the risk from the silica is high.



### 3. CONTROLS FOR SPECIFIC ROOF TILES

Tiles need to be cut for different parts of the roof. The measures below outline reasonably practicable solutions for controlling silica exposure for these areas.

#### Verge Tiles

Where possible, avoid cutting by using  $\frac{1}{2}$  or  $1\frac{1}{2}$  size tiles. If cutting is needed, the consistent dimensions mean it is possible to mark the tiles and cut off the roof surface on the scaffolding using water suppression and respiratory protective equipment (RPE) as detailed in 'Controlled Cutting' below.

#### Openings and Abutments

If cutting is needed, mark the tiles and cut off the roof surface on the scaffolding using water suppression and RPE as detailed in 'Controlled Cutting' below.

#### Ridge Tiles

Where variable gauge tiles are used, the cutting may be limited to a small number of the covering ridge tiles. Where fixed gauge or restricted gauge tiles are involved, the top course may also need cutting to length. Mark the tiles and cut off the roof surface on the scaffolding using water suppression and RPE as detailed in 'Controlled Cutting' below.

#### Hip and Associated Tiles

The roof tiles at the rake of the hip will all require cutting. In many cases this can be done on the roof, using hand tools, as long as this provides the accuracy needed. However, machine cutting will still be necessary in many cases for difficult cuts and where a neater, cleaner cut is required (e.g. some dry fix systems). Mark the tiles and cut off the roof surface on the scaffolding using water suppression and RPE as detailed in '**Controlled Cutting**' below. Where two people are working, this could be implemented by using one person to mark the tiles while another cuts. The process can also be alternated to reduce the amount of time a person is exposed and it eliminates any off-cuts being left to slide down a roof which could act as a slip/trip hazard.

#### Valley Tiles

As with those forming the hip, there is a need to size each tile to the internal angle formed. Tiles should be laid staggered, close to the valley but not into it. Next, measure the covering width of two tiles. Transfer this measurement horizontally from the cut line in the valley; onto the tiles of the top and bottom courses. Longer valleys may need a mid-point to avoid loss of accuracy when striking. The tiles should then be numbered by course with chalk or a pencil, with any nibs likely to kick the tiles removed, and cut off the roof surface on the scaffolding using water suppression and RPE as detailed in '**Controlled Cutting**' below. This should result in a straight valley which is dust and defect free.



Tiles laid 'staggered' to valley



Line struck - two tile widths from desired finishing point in valley line



Cut valley is straight

With this method, it is accepted that more time may initially be needed to complete the valley than when cutting in-situ. However there are many advantages too – see '**Benefits**' over the page.

### 4. CONTROLLED CUTTING

Always use appropriate water suppression when cutting a tile with a cut-off saw. A minimum flow rate of around 0.5 litres per minute is required for effective dust suppression unless a manufacturer advises otherwise. Low flow rates will not properly control the dust. For the type of cutting being done, the simplest way of supplying water is likely to be a portable polypropylene hand pump bottle. This contains around eight litres of water that is pressurised by hand. However, an effective flow is sustained only for a limited time (up to 4 minutes) before re-pressurisation is needed.



**Where water suppression is used the following guidelines should be followed:**

- Good arrangements are needed to ensure that enough water is available at all times. This could include measures for refilling hand pump bottles or the use of a more permanent water supply.
- Planning is required to prevent excessive handling of the tiles.
- Cutting work should be carried out on the surrounding scaffolding. A dedicated cutting area(s) should therefore be established before work starts at the planning stage. This area should be the most central/suitable for the work. If necessary it may be that more than one area can be used, e.g. some cutting is done in one area and then work moves to a second new area.
- Even with a dedicated cutting area, it is vital that the integrity of the scaffold boards is not compromised by the cutting operation. A suitable piece of sacrificial material should therefore be placed between the tile and scaffold board.
- Unless mechanical lifting aids are used, roofers are advised against cutting on the ground instead of the scaffolding. There is an increase in the risk of falls and manual handling associated with moving the tiles down and back to the roof area.



## **5. RESPIRATORY PROTECTIVE EQUIPMENT (RPE)**

RPE is an essential part of silica dust control. It should be used for all tile cutting activities even where water suppression is employed. Water suppression systems are not fully reliable and even when effective they do not eliminate all silica dust. The “residual” dust concentrations will be variable and unpredictable so additional control is necessary.

RPE will also be required for those workers in the close vicinity of tile cutting (e.g. workers assisting with a cutting task, or nearby on the roof or adjacent on the top lift of the scaffold). Workers in more remote areas of the roof (i.e. away from the dust cloud) do not require RPE. This practice of ‘segregation’ should be considered as the primary control measure for reducing incidental exposure

### **Disposable / Half Mask respirators**

Half masks (disposable or orinasal) are likely to be the most common type of RPE used in tile cutting. Masks with an assigned protection factor of at least 20 (i.e. a FFP3 filtering facepiece for disposable masks or an orinasal half mask respirator with a P3 filter) should be used. This high performance RPE should be worn for all tile cutting.

Disposable masks should be replaced every shift or when damaged. Orinasal filters should be renewed frequently dependant on use; probably at least weekly. A supply of suitable spares should always be available. Maintenance procedures will also need to be implemented for such masks (e.g. suitable storage arrangements and a monthly thorough examination and test by a competent person).



These forms of RPE (i.e. disposable and orinasal equipment) can only provide protection against fine dust such as RCS if the mask actually fits the wearer. Fine dust will readily seep through gaps and holes in ill-fitting equipment. Therefore a successful face fit-test is crucial to ensure that the user can be protected. In the absence of a satisfactory face fit test, the worker may receive no or little protection despite “wearing” the RPE. A qualitative or a quantitative fit test is acceptable for half masks. Fit test providers should be competent (e.g. those accredited under the Fit2Fit scheme)

Other factors are also important to obtain protection from a respirator. Wearers should be properly instructed, trained and supervised on the correct use of the equipment. Wearers must be clean shaven and the mask must be fitted and worn correctly for the full duration of the tile cutting activity. Where these factors are not implemented, protection will be lost.

### **Powered Respirators**

A “loose-fitting” type of respirator (e.g. powered hood, helmet or visor) should be worn by workers who have beards or are unable to obtain an adequate fit for the disposable or orinasal half masks. Models incorporating head and eye protection can also be selected. These should be to a protection factor (PF) of 20 and a TH2 classification.

Again the users will require adequate information, instruction and training in the correct use of the chosen equipment. Storage and maintenance arrangements will also be required including a monthly thorough examination and test by a competent person.



## 6. TRAINING, INFORMATION AND WORKER INVOLVEMENT

In order for these measures to be effective it is important that appropriate training and information is given to those undertaking tile cutting activities. This should include awareness about the risks involved, the different precautions required, the effective use of water suppression and the appropriate use and, where appropriate, maintenance of RPE. Steps should be taken to ensure appropriate worker engagement and consultation as part of this process.

## 7. BENEFITS

The main change from recent practices in this guidance is the need to wet cut valley tiles. With the method described above, it is accepted that initially more time may be needed to complete the valley than when dry cutting in-situ. However, there are many advantages too:

- Using water significantly increases the life of blades and prolongs the lifespan of the cut-off saw motor.
- There is no need to rough cut first,
- There is less risk of cut tiles breaking during cutting (and having to be re-cut)
- The off-cuts can be saved and re-used on any hips on the roof (or forthcoming roofs) thus saving waste and money.
- The Concrete Tile Manufacturers Association (CTMA) does not recommend cutting valley tiles in situ because it can make slits in the liner. There can also be problems with dust or slurry getting into the mortar, loss of bond from the vibration, and problems with long term durability of the mortar. NHBC has undertaken a study into pitch roof claims. They found that over half of these claims were due to mortar defects.
- Subsequently, repairing damaged valley mortar can be expensive as scaffolding or other edge protection is often needed.

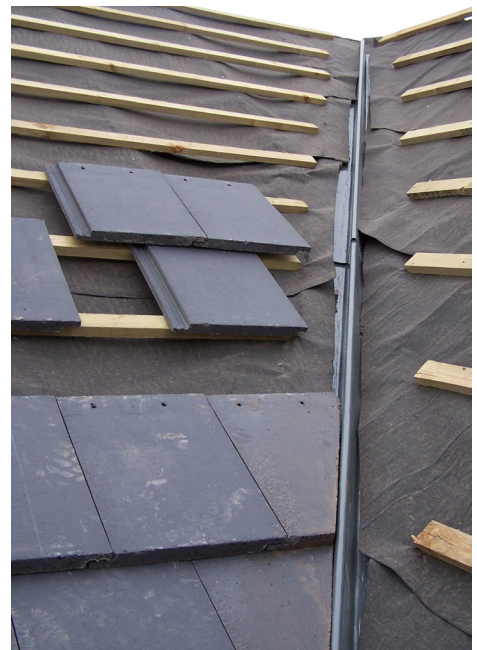


Off-cuts to be re-used on hips

### Dry Valleys

Recent evidence would suggest that there is trend towards using dry valleys. Where possible, NFRC would encourage that these (rather than wet valleys) are specified. The main benefit being that this eradicates the problem of mortar potentially failing in the valleys. However, there are also other benefits as well:

- Dry valleys cannot be cut in-situ. It therefore makes the transition to wet cutting off the roof less difficult.
- Although neat accurate cutting is still important, the cuts do not have to be quite as precise as with an open valley.
- The valleys are maintenance free. This can act as a valuable selling point to customers/homeowners.
- Unlike mortar, this system can be installed in cold weather, allowing work on potentially more days during the winter. There is also no setting mortar to be washed out by wet weather.



## 8. FURTHER INFORMATION

This guidance is not intended to be exhaustive but to contain the main criteria that should be followed to ensure the health safety and welfare of operatives and others involved in the cutting roofing tiles. Further information can be found on the HSE website at [www.hse.gov.uk](http://www.hse.gov.uk).

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