

**The Delivery Hub health,
safety and environment**

Raising the bar 18
Control of dust

Contents

Objective

The purpose of this guidance is to set minimum and desirable requirements to help delivery partners and contractors prevent ill health and environmental nuisance from activities which produce dust.

Background

Some of the most common construction jobs create high dust levels. These jobs often involve the use of power tools like cut-off saws, grinders, breakers and sanders or large equipment, for example batching plants or crushers/screener. There is a legal duty for employer's to prevent or adequately control worker exposure to construction dust. For highway industry employees, and anyone in the vicinity of our works, conditions resulting from the production or exposure to dust can cause long term health issues or short term nuisance.

In addition it has been identified from the result of auditing that control of dust generating activities still need to be addressed in some areas of the Highways industry, and the HSE have also identified respiratory risks and adequacy of PPE use as one of their main focus areas when inspectors visit projects.

Many construction tasks create dust. A combination of the inputs noted below will influence the amount and the impact dust levels generated.

- Equipment.
- Work method
- Work area
- Time

Health issues

Repeated and long term exposure to irritants at work can lead to an array of lung diseases that may have lasting effects, even after exposure ceases. Certain occupations, because of the nature of their location, work, and environment, are more at risk for occupational lung diseases than others are.

There are many types of dust produced during construction activities, and can be classed as:

- **Silica dust** – silica is a natural mineral present 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. The Health and Safety Executive are particularly interested in the control of silica in construction activities due to the high health risk.

- **Non-silica dust** – the most common of this type used in highways works include cement, limestone and dolomite. This dust is also mixed with silica dust when cutting things like bricks

- **Wood dust** – wood is widely used in construction and is found in two main forms; softwood and hardwood

Breathing in these dusts can cause damage to the lungs and airways. The main dust related diseases affecting construction workers are:

- **Silicosis** an irreversible lung disease that can take years to develop caused by fine particles of respirable crystalline silica, the main symptoms include breathing difficulties and a chronic cough

- **Chronic obstructive pulmonary disorder (COPD)** is characterised by airflow obstruction that is not fully reversible. The condition is usually associated with inflammatory responses of the lungs to hazardous substances. Symptoms include chronic cough, sputum production, and shortness of breath

■ **Occupational asthma** is an allergic reaction that occurs in some people when they are exposed to substances in the workplace, (respiratory sensitisers or asthmagens) such as dust

Some tasks are so dusty that enough escapes into the air to still be a risk. For this reason some form of respiratory protective equipment (RPE), usually in the form of a mask, is also needed for high risk tasks.

Masks are available that provide different levels of protection. There are two main performance types you should ask your supplier/ employer for if working with construction dusts: FFP2 and FFP3. FFP3 is the most advisable type to use if you are doing work that does or could create high dust levels or involves silica or wood dust (the more hazardous substances).

Masks rely on a tight seal with the face to work. This is so that only air going through the filter is breathed. If the mask does not fit properly the dust can slip through any gap between the mask and the face and into the airways.

There are many designs of masks. Not all will fit you well enough to form a good seal with your face, for this reason it is a legal requirement for RPE to be fitted to the user.

Nuisance dust

Dust in the Highways construction industry can come from a range of sources on-site and legal action can be taken if activities create levels of dust that cause, or have the potential to cause, damage to property or disturbance to the surrounding community.

Dust is a statutory nuisance, if a local environmental health officer finds that a statutory nuisance exists, or is likely to occur or recur, they can serve an abatement notice. An abatement notice can require the operation to be stopped or impose restrictions to prevent any further occurrence. They can also instruct that works or other steps to restrict or remove the nuisance are taken. An abatement notice is a legal document and if not complied with it could lead to prosecution.

Dust blowing on watercourses have the potential to cause a negative impact on ecology. Plant growth is affected by some types of dust and excessive levels may result in pollution of the surface water.

The minimum requirement to achieve current best practice is to implement a process to systematically reduce the risks associated with dust. In the first instance you should avoid causing the release of dust.

You should ensure that dust does not become persistent and regular as this is more likely to result in legal action.

In order to reduce or eliminate the risk associated with the release of dust the following protocol should be adopted

Plan

- Plan the works to design out where possible the need to undertake operations which could create dust
- Look at ways of limiting the amount of dust created before work commences
- Use the right size of building materials so less cutting or preparation is needed
- Using a different method of work altogether
- Use dust extraction systems to remove the dust
- The number of material handling operations should be kept to a minimum, with drop heights of friable materials onto vehicles and conveyors reduced
- Procedures for the regular inspection of storage and handling facilities for fine, dry materials should be established, including procedures for the prompt clearance of any spillage
- Speed limits should be observed at all times to further reduce dust being generated

- General site traffic shall be restricted to watered or treated haul
- Completed earthworks should be vegetated or temporarily sealed as soon as reasonably practicable.
- All stockpiles that are undisturbed for more than 13 weeks must be vegetated or sealed

Organise

- Organise the work area to eliminate hazards that currently exist
- Bulk cement and bentonite should be delivered by tanker and stored in silos or other bulk storage devices. Appropriate measures should be taken when replenishing silos to avoid accidental spillage, including the use of audible and visual systems
- Fine, dry materials should be stored within buildings or with adequate protection from the wind
- Silos and stockpiles should be positioned as far as is reasonably practicable away from residential areas, places of public access or other sensitive receptors (such as watercourses)
- Equipment likely to generate quantities of dust can be enclosed or shielded
- Use a less powerful tool
- Handling areas should be maintained so far as reasonably practicable to reduce the risk of dust emissions
- Paved haul roads and associated vehicle waiting areas should be regularly inspected and kept cleaned of all mud and dusty materials
- Unpaved roads and verges should be compacted as appropriate
- Screens or enclosures can be used for activities that can easily be carried out in these enclosed conditions, however prior to enclosing or screening an activity or item of equipment, it is essential that suitable ventilation is provided for the operatives working within the area



- All concrete crushers and screeners must have water suppression
- Where possible haul roads should be covered with a hard surface to reduce dust generation
- All vehicles leaving site should go through a wheel wash to remove any mud or debris
- Workforce should receive appropriate training and awareness of the occupational health and environmental issues associated with dust exposure and emissions

Control

Where dust is still being produced the most important thing is to stop the dust getting into the air. This can be achieved by

- Water – water damps down dust clouds. However, it needs to be used correctly. This means enough water for the whole time that the work is being done. Just wetting an area of ground before cutting does not work
- Vacuum Extraction – Specially designed tools can be fitted with an industrial vacuum unit that sucks the dust away as it is being created and stores it until emptied
- Conveyor transfer points should be enclosed and dry conveyor loads shall be damped to prevent dust emissions
- Cutting and grinding operations on site should be conducted using equipment and techniques that suppress and reduce dust emissions
- Where appropriate, windbreaks, netting screens or semi-permeable fences should be used to reduce dust.
- Static sprinklers, bowsers and other watering methods should be employed to control dust generated during the works
- The surfaces of stockpiles of dry, friable materials should be damped by controlled application of water sprays, shrouded or screened as appropriate
- If necessary binding or surface crusting agents should be applied to long-term inactive stockpiles of such materials to prevent dust emissions
- Minimising tipping heights of material, especially when loading spoil into lorries
- Using road sweepers on hardstanding and haul roads throughout the site, and on public roads within the vicinity of the site. When using road sweepers, the Contractor must ensure that the arisings are placed through a suitable settlement system prior to being discharged

- All loads leaving site should be fully sheeted and should not remove the cover until fully within the site boundary
- Respiratory protective equipment (RPE)



Monitor and review

- Re-examine your approach in the light of experience. Look at incident investigation and inspection reports to show improvement
- Construction sites are ever-changing and dynamic so any plan put into place must be reviewed and monitored regularly to ensure it is still effective
- A daily inspection and point of work risk assessment along with hazard reporting submissions from the site team are essential to identify and correct site hazards, maintenance, housekeeping and exposures to employees, subcontractors and the public
- A programme of exposure monitoring should be in place and appropriate recorded action taken where issues identified
- A programme of health surveillance should be in place and actions recorded where issues identified

Case Studies:

Good examples of planning and organisation are provided below showing how exposure to dust can be eliminated when considered in design.

Case Study 1:

On a major highways contract the designer worked with the Contractor to develop and gain approval for the use of square pre-cast concrete drainage chambers. One advantage of this product is that the holes in the chamber to accept the incoming and outgoing pipes are cored during the manufacturing process therefore eliminating the need to cut the chamber on site. The depth of the chamber is also pre-determined so the correct depth rings (or squares in this case) are supplied eliminating the need for the contractor to cut rings to suit.

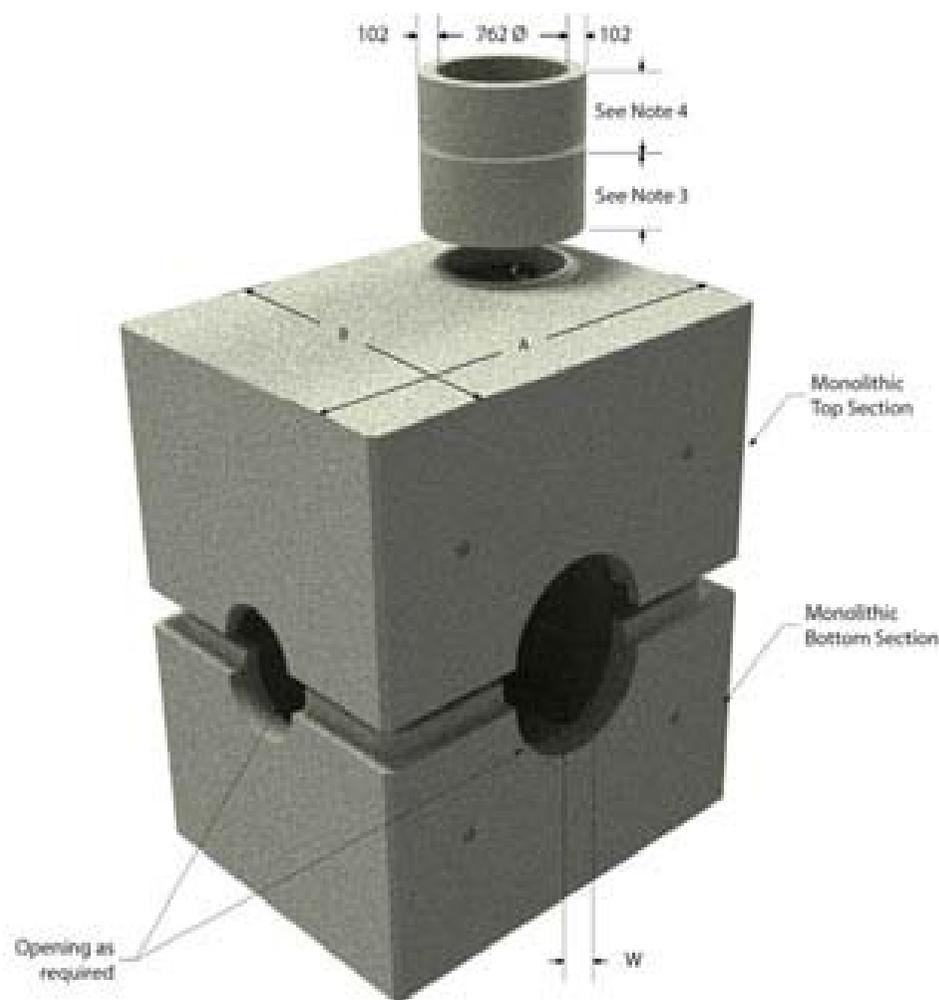
The designer had to work closely with the manufacturer of this product to develop it so it would be acceptable to Highways England. The use of pre-cast drainage chambers (round ones are available from other leading manufacturers) should be considered going forward as there are a number of other key benefits of using these products.

Case Study 2:

On a major highways contract the designer designed a series of maintenance turning heads situated within a grass verge. The turning heads were to be constructed using grasscrete blocks. The designer agreed with the Contractor which product would be used and sized and shaped the extent of the grasscrete using the product dimensions to avoid the need to undertake cuts.

Case Study 3:

On a major highways contract the designer encouraged the team to design radius values around curves that match manufacturers radius kerb. This means specific radius kerbs can be used which minimises the use and cutting of straight and radius kerbs. They were also able to round up the length of kerb runs to whole numbers, again minimising the number of cuts required.



Precast chamber eliminating the need to cut rings on site

Respiratory personal equipment (abbr. RPE)

Employers are responsible for implementing and managing RPE selection and use, or delegating that responsibility to another trained person. Support can be provided by internal or external health and safety professionals.

You should also ensure those wearing RPE follow the measures you put in place.

These are some of the key factors for users of RPE to remember:

- Users of tight-fitting facepieces should have passed a “fit test” for the particular RPE device they are using. (See next section).
- Hair, spectacles or other PPE can break the seal on tight-fitting facepieces, allowing the user to breathe in hazardous substances.
- Valves on reusable RPE need to be maintained and replaced.
- For RPE with tight-fitting facepieces, the user should carry out a ‘fit check’ of the seal when the device is first put on.
- For reusable masks in addition to the face fit test, a user check can be done by placing a hand over the filter or inlet valve(s) and breathing in. If there is a good seal, the user will experience the mask sucking in toward their face. The wearer should hold their breath for ten seconds and the facepiece should not loosen. If it does, the facepiece should be readjusted and the seal checked again. Do not use RPE if a good seal cannot be achieved.

When selecting RPE the most suitable mask for the task must be selected. Half masks can often be more durable and therefore offer better long term protection than disposable masks. Half masks can also be more cost effective in the long term as detailed in Table 1 (product names have been removed).

Item	Price	Item no.	Price per item	Price per person per month, based on one used per day
Type 1 FFP3 Dust Mask	£39.97	Box of 10	£3.99	£87.78
Type 2 FFP3 Valved Dust Mask	£27.20	Box of 10	£2.72	£59.84
Type A - Half Mask c/w P3 Cartridges	£10.97	Per item	£10.97	(Price based per person per month, based on one filter per week) £26.96
P3 Cartridges for Type A Mask	£5.33	Per item	£5.33	

Carrying out a fit test

If you are considering RPE with a tight-fitting facepiece, you should make sure that each wearer undergoes a fit test. Remember, people come in different shapes and sizes, so facial differences will mean that one kind of RPE is unlikely to fit all. The differences are even more significant between men, women, and people of different ethnicity. If the RPE does not fit, it will not protect the wearer.

Facepiece fit testing is a method of checking that a tight-fitting facepiece matches the wearer's facial features and seals adequately to their face. It will also help to identify unsuitable facepieces that should not be used.

The face fit test requires the user to wear the mask and have face fit solution (bitter or sweet options) sprayed into a hood worn over the mask whilst they conduct certain exercises (moving, speaking etc). If the wearer of the mask can taste the solution the mask is not fitting properly and requires adjustment or an alternative mask.



Remember that tight-fitting RPE will only provide effective protection if the wearer is clean shaven, so they should also be clean shaven when fit tested and when using the mask.

Some manufacturers may quote that the masks they provide still work with stubble. It should be noted that this is in contrary to HSE Operational Circular (OC 282/28) "Face fit testing or respiratory protective equipment facepieces" which requires people to be clean-shaven.

If personnel chose to be unshaven, for religious or other reasons they should use a loose fitting facepiece that does not require a seal to the face, for example an air fed hood.

You should carry out a fit test as part of the initial selection of the RPE (Appendix 4 contained in HSG53 refers). If RPE is used frequently it is good practice to ensure repeat fit testing is carried out on a regular basis.

Fit testing of RPE should be carried out by personnel trained and competent in use of Qualitative Face Fit Testing equipment. The RPE manufacturer's instructions will provide details of how to perform a fit check and they will provide training.



Minimum and desirable requirements

The following table details the minimum and desirable requirements that should be implemented on our operations

Work activity	Minimum requirements	Desirable elements
Plan		
Design	Plan the works to design out where possible the need to undertake operations which could create dust. Use the right size of building materials so less cutting or preparation is needed	
Manufacturing		Where possible off site manufacturing of elements of the works should be used
Earthworks	Completed earthworks should be vegetated or temporarily sealed as soon as reasonably practicable.	All stockpiles that are undisturbed for more than 13 weeks must be vegetated or sealed.
Housekeeping	Procedures to be in place for the regular inspection of storage and handling facilities for fine, dry materials	
Site set up	Speed limits should be observed at all times to further reduce dust being generated	
Site set up	General site traffic shall be restricted to watered or treated haul	
Organise		
Material storage	Bulk cement and bentonite should be delivered by tanker and stored in silos or other bulk storage devices. Appropriate measures should be taken when replenishing silos to avoid accidental spillage, including the use of audible and visual systems Silos and stockpiles should be positioned as far as is reasonably practicable away from residential areas, places of public access or other sensitive receptors (such as watercourses).	Fine, dry materials should be stored within buildings or with adequate protection from the wind.
Equipment use	Equipment likely to generate quantities of dust to be enclosed or shielded	
Haul roads and access	Paved haul roads and associated vehicle waiting areas should be regularly inspected and kept cleaned of all mud and dusty materials.	Haul roads should be covered with a hard surface to reduce dust generation Unpaved roads and verges should be compacted
Crushing and screening	All concrete crushers and aggregate screeners to have water suppression	
Activity enclosures	Screens or enclosures used for activities to be provided with suitable ventilation for operatives working within the area.	
Vehicles	All delivery vehicles leaving site should go through a wheel wash to remove any mud or debris. All loads leaving site to be fully sheeted. Delivery vehicles not to remove covers to the materials until fully within the site boundary	Wheel wash facilities to be provided for all vehicles leaving the site.
Training and Awareness	Workforce should receive appropriate training and awareness of the occupational health and environmental issues associated with dust exposure and emissions.	

Work activity	Minimum requirements	Desirable elements
Control		
Tools and equipment	Water suppression to be used on all dust generating tools & equipment	Tools to be fitted with an vacuum extraction system
	Respiratory protective equipment (RPE) to be used in addition to water suppression systems. Minimum FFP3	
	Where RPE is used face fit testing process must be in place for the training and testing of all users to be carried out.	
	Conveyor transfer points to be enclosed and dry conveyor loads to be damped.	
Public protection	Windbreaks, netting screens or semi-permeable fences should be used to reduce dust.	
All works	Bowsers to be employed to control dust generated during the works	Static sprinklers systems to be employed to control dust generated during the works
Material storage	The surfaces of stockpiles of dry, friable materials to be damped by controlled application of water sprays, shrouded or screened as appropriate.	
Road cleaning	Road sweepers to be used on hardstanding and haul roads throughout the site, and on public roads within the vicinity of the site, the arisings to be placed through a suitable settlement system prior to being discharged	
Monitor		
Procedures	Procedures should be in place to systematically re-examine the approach to dust control in the light of experience.	
Review	A schedule of daily inspection and reporting to be in place to identify and correct hazards associated with dust generation	
Exposure monitoring	A programme of exposure monitoring should be in place and appropriate recorded action taken where issues identified.	
Health surveillance	A programme of health surveillance should be in place and actions recorded where issues identified.	

Legislation / additional information

Construction Dust HSE – <http://www.hse.gov.uk/construction/faq-dust.htm>

COSHH Regulations HSE – <http://www.hse.gov.uk/coshh>

Respiratory Protective Equipment at Work a Practical Guide HSE - <http://www.hse.gov.uk/pubns/books/hsg53.htm>

Using Cut Off Saws A Guide to Protecting Your Lungs HSE – <http://www.hse.gov.uk/pubns/indg461.htm>

Silica Dust HSE – http://www.hse.gov.uk/foi/internalops/sims/manuf/3_08_09.htm

Kerb Cutting Silica Risks HSE - <http://www.hse.gov.uk/construction/healthrisks/hazardous-substances/cutting-paving-blocks-kerbs-and-flags.htm>

HSE Operational Circular (OC 282/28) http://www.hse.gov.uk/foi/internalops/ocs/200-299/282_28.pdf

Breath Freely – <http://www.breathefreely.org.uk/>

IOSH no time to lose Campaign - <http://www.notimetolose.org.uk/>

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