Construction Dusts:
Much more than a Nuisance!

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Health Risk Management Unit
“It’s only dust you know!”
What is Construction Dust?

- A general term used to describe what is found on a construction site.
- 3 main types
  - Silica
  - Wood
  - Lower toxicity
Respirable Crystalline Silica (RCS)

Crystalline silica concentrations in common materials

<table>
<thead>
<tr>
<th>Material</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>plastic composites</td>
<td>up to 90%</td>
</tr>
<tr>
<td>sandstone, gritstone, quartzite, flint</td>
<td>more than 70%</td>
</tr>
<tr>
<td>concrete, mortar</td>
<td>25% to 70%</td>
</tr>
<tr>
<td>shale</td>
<td>40% to 60%</td>
</tr>
<tr>
<td>china stone</td>
<td>up to 50%</td>
</tr>
<tr>
<td>tile</td>
<td>30 to 45%</td>
</tr>
<tr>
<td>slate</td>
<td>up to 40%</td>
</tr>
<tr>
<td>granite</td>
<td>up to 30%</td>
</tr>
<tr>
<td>brick</td>
<td>up to 30%</td>
</tr>
<tr>
<td>ironstone</td>
<td>up to 15%</td>
</tr>
<tr>
<td>basalt, dolerite</td>
<td>up to 5%</td>
</tr>
</tbody>
</table>
Wood Dust

- Hardwood
- Softwood
- MDF
‘Low Toxicity’ Dust

- Dust with very low silica content e.g:
  - Gypsum
  - Marble
  - Limestone
How can it harm me?

Construction dust can cause serious lung diseases:

• Lung Cancer
• *Chronic Obstructive Pulmonary Disease* (COPD)
• Pneumoconiosis (including silicosis)
• Asthma:
How can it harm me?

Asthma

NormalBronchiole Obstructed Bronchiole
How can it harm me?

COPD:

- Lungs and breathing tubes are damaged making it difficult to get air in and out. Common symptoms;
  - a persistent chesty cough and phlegm
  - wheeze
  - more frequent and troublesome chest infections
How can it harm me?

- Few develop quickly – acute silicosis
- Most take a long time – years
- Regularly breathing small amounts adds up over the years
- By the time you notice it may be too late to do anything about it

> Important to control every single exposure
How can it harm me?

Statistics are imprecise:

- 500+ silica related deaths in 2004 – over 10 a week
- Silica is the second most important cause of occupational lung cancer after asbestos
- Construction workers 2-3 times greater risk of COPD
- Other research backs up link between construction work and lung disease
- Reduced quality of life and shorter working life
How can it harm me?

It is worth remembering:

• 173 workers were killed at work in 2011/12
• In that year there are also estimated to be:
  – 8,000 occupational deaths from cancers
  – 4,000 occupational deaths due to COPD
• Over 40% of new cancer case are in construction workers
How much dust is a problem?

• Depends upon
  – Amount of dust
  – Size of the dust particles
  – Type of dust
How much dust is a problem?

- Dust comes in different sizes

- 150 microns - Human Hair

- 25 microns - Particles visible to the naked eye

- 10 microns (PM10) thoracic dust

- 5 microns (PM5) respirable dust
How much dust is a problem?

Small size of respirable dust means often invisible under normal conditions
How much dust is a problem?

- Measured in mg/m³
  - Bag of sugar = 1kg / 1,000 grams / 1 million mg
  - Teaspoon of sugar = 5 grams / 5,000 mg

<table>
<thead>
<tr>
<th>Dust</th>
<th>Inhalable</th>
<th>Respirable</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCS</td>
<td>________</td>
<td>0.1 mgm³</td>
</tr>
<tr>
<td>Wood</td>
<td>5 mgm³</td>
<td>As inhalable</td>
</tr>
<tr>
<td>Lower Toxicity</td>
<td>10 mgm³</td>
<td>4 mgm³</td>
</tr>
</tbody>
</table>

Based on an 8 hour average
How much dust is a problem?

- Limit is the legal maximum, the most you can breathe after the right controls have been used.
- No short term limits **BUT** should not exceed x3 over a 15 min period
- Many construction tasks are short duration with very high exposure peaks
How much dust is a problem?
Managing Dust Risks:
Plan
Act
Check
Plan

Identify your **High Risk Tasks**:

Think about the:

- Material
- Task
- Work area
- Time
- Frequency
Plan: Silica Dust

Concrete, Granite etc:

• Some Tasks ALWAYS produce very high levels:
  — Cut-off saws
  — Grinders
  — Chasers
  — Grit Blasting
Plan: Silica Dust

• Some tasks can in right conditions
  — Pneumatic drilling / coring with poor ventilation
  — Internal structural demolition
  — Dry sweeping indoors
Plan: Wood and MDF

Wood and MDF:
Cutting and Sanding
Plan: Lower Toxicity Dust

Plasterboard sanding:

- Very dusty
- Tends to be done in smallish rooms with poor ventilations

Grinding / Cutting:

- Marble etc
COSH requires:

- Prevent exposure to employees where reasonably practicable:
  - Overriding duty
  - Do this by substitution
  - Eliminates or reduces risk

- Adequately control where not reasonably practicable:
  - Higher the risk the better the controls needed
  - Not exceed exposure levels
Appropriate work system, equipment, materials

Control at Source

PPE/RPE as well where above inadequate

- Safe handling/storage
- Maintenance
- Limit people, duration, quantity
- Ventilation
- Hygiene
- Management
- Training
Act

Likelihood of something going wrong

Prevent spread of contaminant

Control at Source
- Provision
- Training
- Use
- Maintenance

Eliminate / Reduce

RPE
- Selection
- Face fitting
- Provision
- Training
- Use
- Storage
- Maintenance
- Only protects wearer
Act: Elimination

- Design Out
- Alternative grit blasting media
- Work processes
Act: Control at Source

• Water Suppression
Act: Water Suppression

- Water Sources
Act: Water Suppression

Issues associated with water suppression use:

- Marking the cut line
- Slurry generation
- Wet clothing
Act: On-Tool Extraction
Act: On-Tool Extraction

On-tool Extraction is a system approach

Consumables       Capture Hood       Tubing
Act: On-Tool Extraction

Extraction Unit

Cyclonic

Compact
### Act: On-Tool Extraction

#### Different classifications:

<table>
<thead>
<tr>
<th>Dust Class</th>
<th>Suitable for dusts with WEL</th>
<th>Degree of penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>L (Light Hazard)</td>
<td>Greater than 1mg.m³</td>
<td>Less than 1%</td>
</tr>
<tr>
<td>M (Medium Hazard)</td>
<td>Greater / equal to 0.1mg.m³</td>
<td>Less than 0.1%</td>
</tr>
<tr>
<td>H (High Hazard)</td>
<td>Less than 0.1mg.m³ including carcinogenic dusts</td>
<td>Less than 0.005%</td>
</tr>
</tbody>
</table>

![Warning sign with symbols]

The vacuum cleaner is fitted with a H13 Hepa Filter Class H13. Separation 99.9955% EN 60335. Change the filters at least once a year. Not approved for use with anaesthetics.
Act: RPE

- Controls are not 100% effective
- RPE is still needed for high risk tasks

Disposable (FFP3)  Orinasal Half Mask

APF = 20
Act: RPE

Must fit correctly

Be worn correctly
Act: RPE

One day stubble

Wearer’s face

Short hairs act like stilts and hold the mask away from the face

Few days stubble

Wearer’s face

Longer hairs tend to lay flatter than short hair

Face mask
Act: Other Controls

• Also Consider:
  – Segregation
  – Ventilation – long duration power tool tasks, internal demolition
  – Limiting people / duration
  – Training
  – Involving workers
Check:

- Have work procedures
- Check controls working
- Maintenance
- Supervision
Putting it all together

Some examples:
Silica Tasks: Cutting

- Eliminate or minimise
Silica Tasks: Cutting

• Control:
  – Water (or on-tool extraction)
  – Mask APF 20
Silica Tasks: Roof Tile Cutting

• Eliminate or minimise:
  – Hand cutting natural / fibre cement slates
  – Use of ½ and 1 ½ tiles
  – Correct setting out / design
  – Hand cutting tiles where possible
  – Minimising valleys / use of dry valleys
Silica Tasks: Roof Tile Cutting

- Control
  - Water
  - Dedicated cutting area
  - Scaffold board protection
  - RPE with APF of 20
Silica Tasks: Wall Chasing

• Eliminate or minimise
  – Design out
  – Use another method
Silica Tasks: Wall Chasing

- Control
  - On-tool extraction (M or H class)
  - Mask APF 20
Silica Tasks: Wall Chasing

- Power Assisted RPE for mortar raking?
Silica Tasks: Rotary Drilling

• Eliminate or minimise:
  – Direct fastening
  – Limiting holes at design
Silica Tasks: Rotary Drilling

- One-off holes
  - No special controls
- Multiple holes ’15-30’ minutes trigger time
  - Dust collector
  - Cordless extraction
  - On-tool adaptor to M or H class unit
- Main activity
  - On-tool extraction with M or H class unit where possible
  - RPE with APF of 20
Silica Tasks: Sweeping

• Eliminate or minimise:
  – Control other tasks!

• Control
  – Remove larger bits
  – Rake
  – M or H extraction with vacuum attachments etc
  – APF 20 mask depending on what else happening
Wood Tasks: Cutting

- Eliminate or minimise:
  - Order pre-cut
  - Dedicated cutting areas to minimise spread
Wood Tasks: Cutting

• Control
  – On-tool extraction (M or H class unit)
  – Mask APF10/20 as well for longer cutting periods (15-30 minutes) /more enclosed space
Low Toxicity: Grinding/Cutting

• Eliminate or minimise:
  – Use other systems or finishes

• Control
  – On-tool extraction (L class unit+)
  – No mask needed
Dust in the workplace
General principles of protection
Guidance Note EH44 (Fourth edition)

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HSE Books
Guidance

Controlling construction dust with on-tool extraction

Introduction
The information sheet gives guidance on choosing, using and maintaining on-tool extraction for controlling construction dust. It is mainly for managers and supervisors but is also useful for operators, workers, representatives and employers.

The hazards posed by construction dust
Regularly breathing construction dust can cause diseases: the lungs, asthma, chronic obstructive pulmonary disease (COPD), which includes emphysema and other breathing difficulties and silicosis. Silicosis is the second biggest killer of construction workers after accidents.

Some of the most common construction jobs create high dust levels: those jobs that involve the use of power tools like saws, grinders, breakers and so on. There is a legal duty for employers to prevent or adequately control work-related exposure in construction dust. On-site extraction is an effective control for this dust and will reduce ill health.

How to choose an on-tool extraction
On-tool extraction is a form of local exhaust ventilation (LEV) system which is fixed directly onto the tool. It has the advantage of reducing the amount of dust created by the tool. It is also very easy to maintain and is effective if the system is used correctly. Extractor manufacturers provide systems for different tools and parts depending on use and extraction units for them can be used with other tools and parts.

It is important to choose parts that are compatible with the tool and work together. The tool may be poorly controlled if it does not. Make sure the system is right for the particular task and the method of work. Involve workers in the selection process. Use the following guidelines:

Tools and accessories
Find the amount of dust created by choosing appropriate tools and accessories. Agitating breakers or grinding discs with enough force to allow the dust to be extracted through them (see Figure 1).

Figure 1 Tools and accessories showing effective dust removal

Suction hood
The hood is the most important part of the LEV system. It is often manufactured as part of the power tool but can also be retro-fitted to existing equipment. See Figure 2 for examples.

Toxic woods

Introduction
This information sheet provides employers and operators with information on the types of toxic woods used in commercial quantities within the UK, as detailed in Table 2. This will help you take suitable precautions so that you can avoid or minimising ill-health effects.

Table 2: Toxic Woods

<table>
<thead>
<tr>
<th>Toxic Woods</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposed to</td>
<td>Wood</td>
</tr>
<tr>
<td>Wood dust</td>
<td></td>
</tr>
</tbody>
</table>

Toxicity
The hazardous forms of wood that are most likely to cause health risks are:

- Wood dust
- Sap, dust or litters associated with a wood.

Toxic activity
Toxic activity is often a result to a wood species, so knowing the wood species is important in distinguishing the potential toxic effects that may be present. It is important to identify any individual wood species (if) which are more than 50% of any particular part of the wood used. For example, the term "heartwood" may be used for up to 10 different species, and an individual species may have up to 10 different trade names.

An additional difficulty is that trees vary within a species. One specimen may contain low levels of its toxic agent and the next contain much higher levels.

Workplace exposure limits
Under the Control of Substances Hazardous to Health Regulations 2002 (COSHH) both hardwood dust and softwood dust have been assigned workplace exposure limits (WELs) of 5 mg/m³. In use time-weighted average (TWAW) exposure levels are kept below the WELs. Both hardwood dust and softwood dust are respiratory irritants and hardwood dust is reported to cause sensitisation. Therefore, masks must be worn in areas where the wood dust is present, and they must not be used in areas where the wood dust is present.
Guidance

• FAQ: [http://www.hse.gov.uk/construction/faq-dust.htm](http://www.hse.gov.uk/construction/faq-dust.htm)

• Other parts of HSE website:
  – Woodworking
  – LEV

• Forthcoming revisions
  – Website
  – COSHH task sheets

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**Dust**

- What is Construction Dust?
- How can construction dust harm me?
- Construction dust is not just a nuisance; it is a real risk to your lungs
- Which tasks create the most dust?
- How much dust can harm me?
- How do I control construction dust?
- Do I need to use a mask as well?
- Why can’t I just use a mask to protect me?
- I’ve been told I need a face-fit test for my mask. What is this?
- The dusty work I do is over very quickly. Does this mean I am OK?
- Am I OK if I am working outside?
- How far do I need to be away from someone else creating dust to be safe?
- Are members of the public at risk from breathing in this dust?
RPE Guidance

- New website
- HSG 53 revision
- DVD Bundle
RPE Guidance

Fit2Fit

Important statement from the HSE

In preparing the Fit2Fit RPE Fit Testers Accreditation Scheme, BSIF and other industry stakeholders have worked closely with the experts in Health and Safety Executive (HSE). Following this scheme is not compulsory and employers are free to take action to comply with the law. But if you follow this scheme, you will be doing enough to demonstrate good practice.

fit2fit accreditation

Are you sure that the RPE you provide to your employees fits them properly? Are you sure the face fit test was carried out competently? You ought to be, because the health of your employees could be at serious risk.

Recent research indicates that up to 50% of all RPE used does not offer the wearer the level of protection assumed and one of the major reasons is that it simply does not fit! Yet, under the regulations RPE must be correctly selected and this includes, for many types of RPE, a face piece Fit Test conducted by a competent person. So how can you be sure the person conducting the fit test is competent?

In view of these major concerns the British Safety Industry Federation, along with the HSE and other industry stakeholders have developed a competency scheme for Fit Test Providers. The Fit2Fit RPE Fit Test Providers Accreditation Scheme is designed to confirm the competency of any person performing face piece fit testing. Follow the useful links and downloads below to find out more.

useful links

HSE 282/28
British Safety Industry Federation (BSIF)
Institute of Occupational Medicine (IOM)
Asbestos Removal Contractors Association (ARCA)
ROHS
TSI
ACAD - Asbestos Control & Abatement Division

downloads

Click here to see a list of Accredited Providers
Click here to view our Fit2Fit presentation

Fit2Fit Scheme Brochure
Candidates Handbook
RPE Fit Test Provider Syllabus
Candidates Application for Accreditation
Guidance

Scottish Healthy Working lives

RPE Selector

Selecting the right Respiratory Protective Equipment (RPE) for the job

This is the RPE Selector Tool. By answering a few questions about the job, substance, and the wearer, this Tool will help you find the right RPE to protect you and your employees.

PPE used at work must be CE marked to conform. It has been designed to meet at least the minimum requirements laid out in law. However, employers are responsible for selecting the right RPE for their tasks, provided a safe environment is the wearer. By answering a few questions about your work area, the substances involved, and the user for which it is intended, this tool will help you find the right RPE for you.

The tool is jointly developed by the Health and Safety Executive (HSE), Health Scotland, and Healthy Working Lives (HWL) based on HSE guidance HSG253.

To move from one step to another click the arrows button at the bottom of the page.

Types of Respiratory Protective Equipment

1. Disposable half mask respirator
2. Reusable half mask respirator
3. Full face mask respirator
4. Fan-powered respirator with reusable hood
5. Fan-powered respirator with reusable hood, helmet or visor
Not asking for anything new!
Questions?