

# DUST KILLS



States of Guernsey  
Health and Safety Executive

# Tiny Particles, Big Impact

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26.03.2024



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**HSE**

# The Health and Safety Executive

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**HSE**



Cambridge University  
19th November 2014



# Contents

What is dust

Dust pathways

Health risks

Principles of protection

Hierarchy of controls

STOP Principle

Control of exposure



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# Dust exposure is one of the biggest threats the construction industry is facing due to the serious health impact it can have on workers

According to HSE statistics for Great Britain, there were

# 174

new cases of occupational asthma seen by chest physicians in 2019, with evidence of an increase in the rate of new cases over recent years.

Occupational lung diseases account for around

# 12,000

of the 13,000 total annual deaths estimated to be linked to past exposures at work. These figures are indicative of how important it is that we act on dust as an industry and protect construction workers.

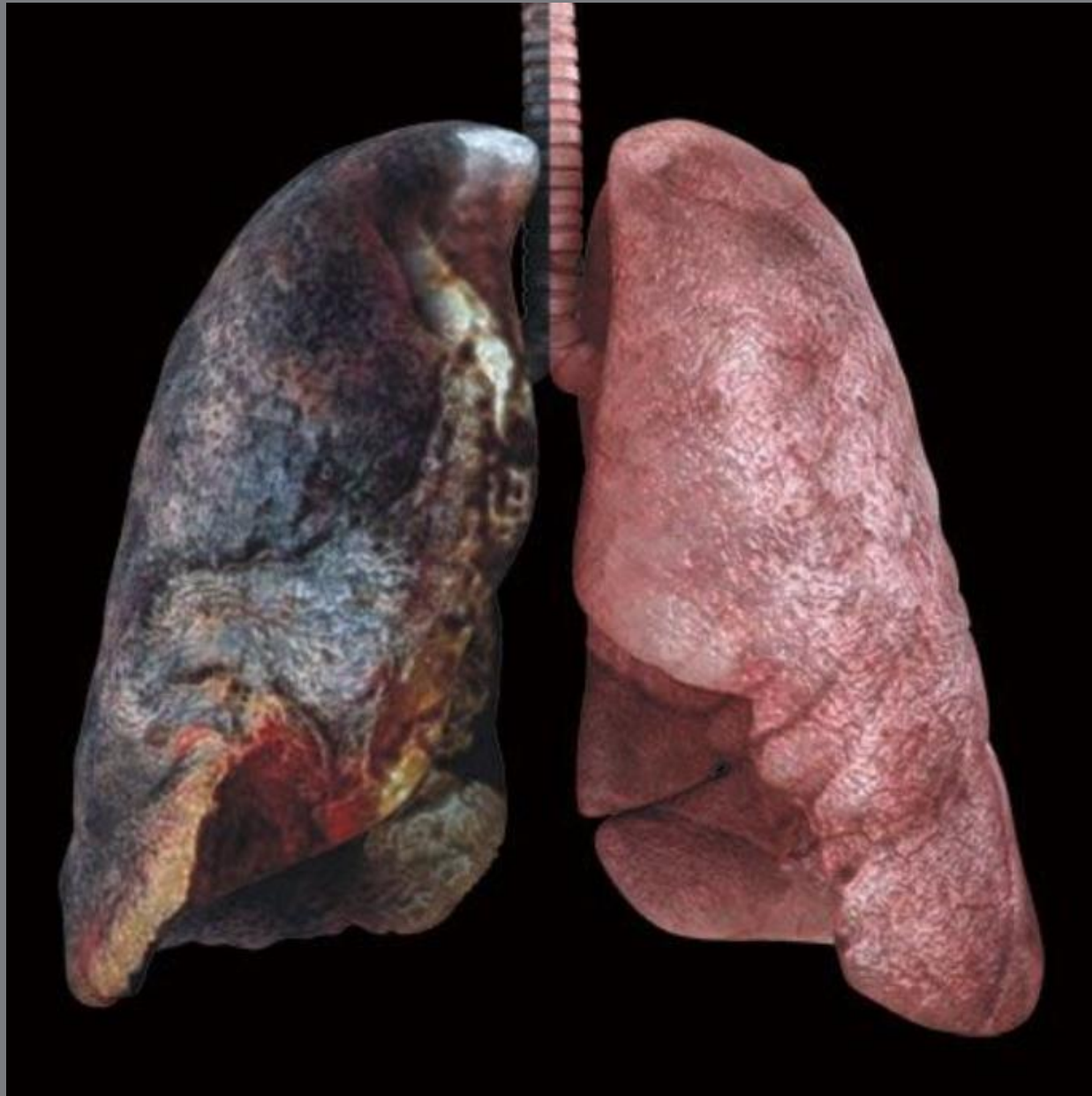
Findings by the Labour Force Survey found that over the last three years, there has been an estimated

# 17,000

new cases of breathing or lung problems caused or made worse by work each year on average.

<https://www.hse.gov.uk/statistics/overall/hssh1920.pdf> >





On the left, a lung with silicosis. On the right, a healthy lung.



# DUST



Dust consists of particles broken up from solid materials

Exposures to dusts are the 2<sup>nd</sup> biggest killer in the construction industry

In construction dusts are typically:

- Sand & concrete
- Wood – including MDF
- General dusts/Gypsum – Plasterboard



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Dust is best defined by its size, which also determines how your body can protect itself against it

Larger dust is called **inhalable** dust.

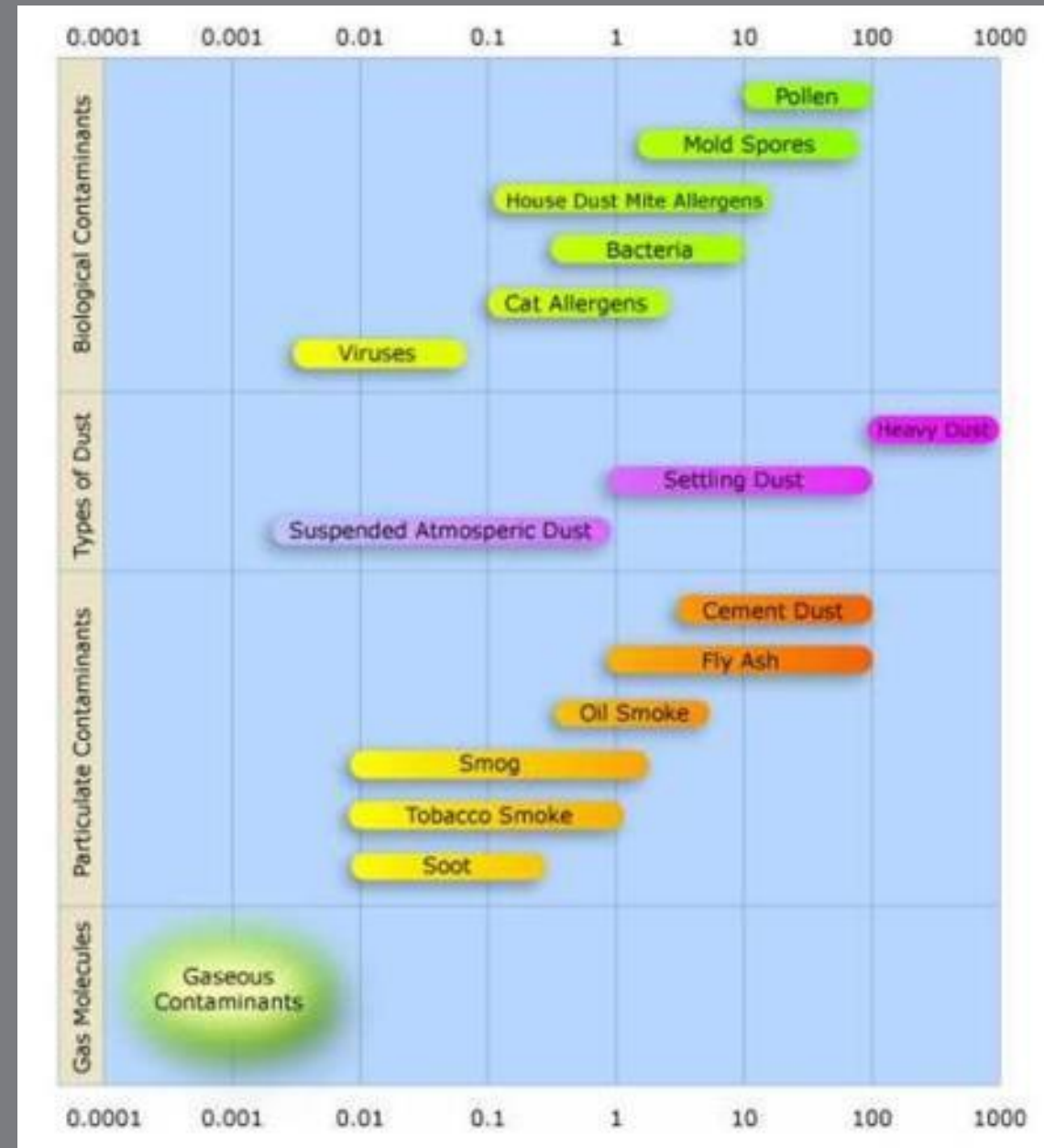
These can generally be **seen** by the naked eye.

Smaller dust is called **respirable** dust.

This dust can be **invisible** to the naked eye

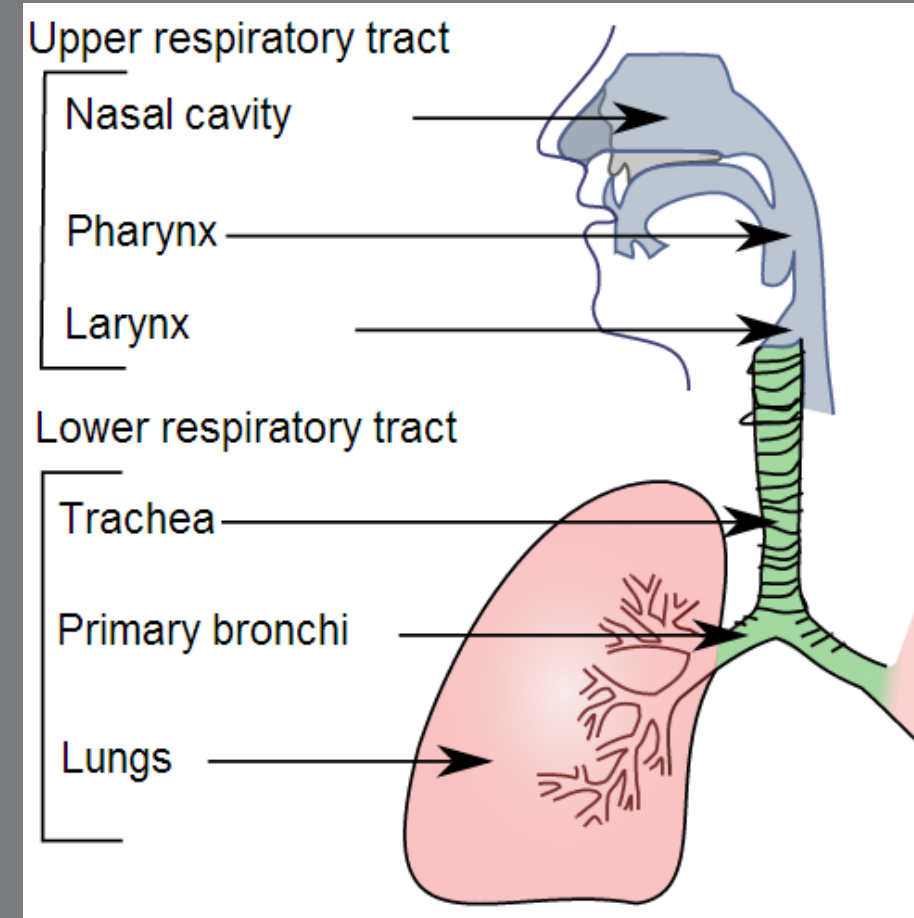
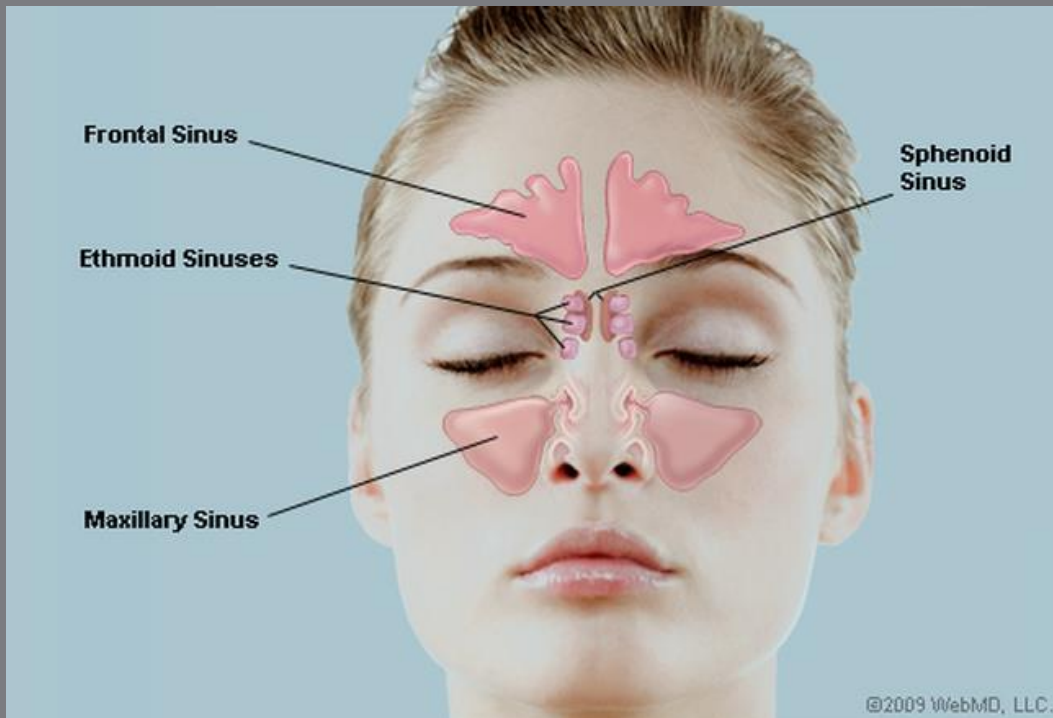


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# Dust Pathways

Dust enters your lungs via your nose or mouth, into the trachea (windpipe) and via bronchi (tubes) ultimately reaching alveoli (air sacks)



"Illustration of the conducting passages" by Lord Akryl - <http://cancer.gov>. Licensed under Public domain via Wikimedia Commons

# DUST Traps

## Nose:

Dust particles can get caught in your nasal cavity, leading to health problems such as nasal cancer from exposure to hardwood dusts.

## Mouth:

Dusts in your mouth typically give a taste to the air – however these particles do not often give health problems as they are swallowed in small quantities



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# DUST Pathways

## Upper Lung:

- Larger dust particles get caught in mucus lining the lungs
- Mucus is transported up to the mouth to be coughed out
- Snot and phlegm are often discoloured after exposure to dusts – it is a visual indication that your immune system is working



**Mucociliary escalator**



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# Lung Disease

Respirator, tr  
nflammator,  
Restrictive lun  
Pleural cavity  
pulmonary vas



# PNEUMOCONIOSIS

res  
cavity,  
nge from  
ning

# DUST Pathways

## Lower Lung:

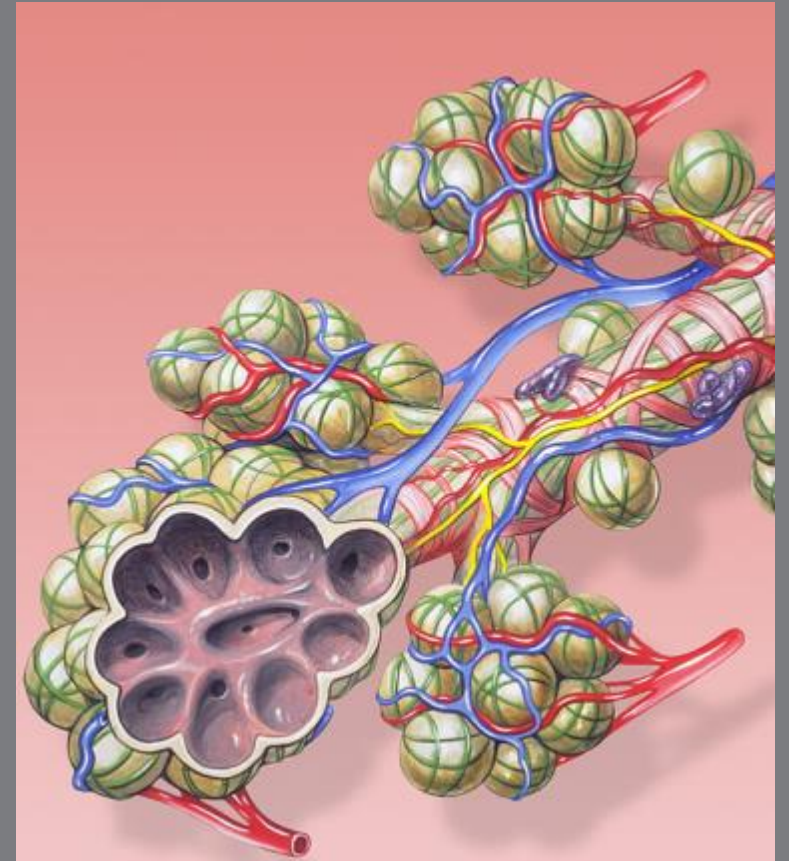
Only the finest dust particles get to the bottom of your lungs

Once here they either:

- Remain stuck in the lung
- Are broken down by the immune system
- Develop scar tissue causing pneumoconiosis diseases such as silicosis or asbestosis
- Cause an allergic response which damages the lung



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"Bronchial anatomy" by Patrick J. Lynch, medical illustrator - Patrick J. Lynch, medical illustrator. Licensed under Creative Commons Attribution 2.5 via Wikimedia Commons

Computer-aided  
The Chest-pneumonia



# Chronic Obstructive Pulmonary Disease

Lung damage and inflammation which restricts your airways

Clogging up of the lungs with dust and particulates



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## Work-related Chronic Obstructive Pulmonary Disease (COPD) statistics in Great Britain, 2023

Data up to March 2023  
Annual statistics  
Published 22 November 2023



Construction site

WESCO start - systems and product elements



only cure is PREVENTION



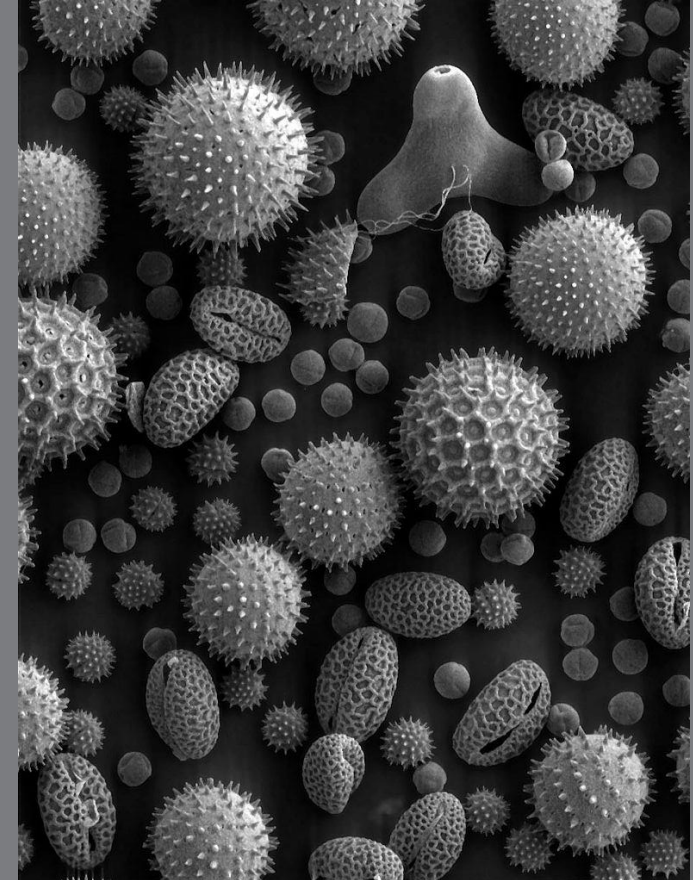
# Lung Sensitisation

An asthmatic reaction (breathlessness, wheezing, etc.) caused by an overreaction in the immune system following exposure to a sensitising dust.

Once sensitised, very low levels of exposure can lead to a life-threatening asthma attack, the condition is retained for life and the sensitised individual may become susceptible to other sensitising and none sensitising agents



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Construction that  
Expects to allow: Measurement of volume



# Pneumoconiosis

Scarring and inflammation of your lungs

Depending on the dust causing it the disease is given different names such as:

**Asbestosis** — asbestos fibres

**Silicosis** — silica dust

**Coalworkers pneumoconiosis** —  
coal and carbon



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# What can DUST do to me ?



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# Summary of Health Risks

Different dusts can have different effects

Sand and Concrete

Irreparable long term lung damage (pneumoconiosis)

Wood

Lung cancer and allergic reactions (sensitisation)

Gypsum & General Dusts

A clogging up of your lungs known as Chronic Obstructive Pulmonary Disease (COPD)



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Construction is an  
Activity that generates harmful waste





# Sand & concrete dust (RCS)

Crystalline Silica is a basic component of soil, sand, granite, and many other minerals. Quartz is the most common form of Crystalline Silica (Quartz means 'hard' in German)

Some tasks **ALWAYS** produce very high levels:

Cut-off saws, grinders, chasers, grit blasters



Type of Stone	Percentage of Silica
sandstone, gritstone, quartzite	more than 70%
concrete, mortar	25% to 70%
shale	40% to 60%
china stone	up to 50%
slate	up to 40%
brick	up to 30%
granite	up to 30%
ironstone	up to 15%
basalt, dolerite	up to 5%
limestone, chalk, marble	up to 2% (but these can contain silica layers)

# Sand & concrete dust (RCS)

Some tasks can in **uncontrolled** conditions produce very high levels:

Pneumatic drilling / coring with poor ventilation

Internal structural demolition

Dry sweeping indoors



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Primary



Dust that's generated

Secondary



Dust that recirculates

### Light drilling

1.5kg dust generated per hour



### Sawing

3 kg dust generated per hour



### Core drilling

4kg dust generated per hour



### Demolition

6kg dust generated per hour



### Diamond cutting

12kg dust generated per hour



### Slitting

17kg dust generated per hour



### Heavy drilling

9kg dust generated per hour



### Chiseling

2kg dust generated per hour



### Grinding

3kg dust generated per hour



# Wood and MDF

Cutting and sanding

Plan carefully where to cut

Move outdoors



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WITH

WITHOUT

# Is Drywall Dust Toxic?



# General dusts/Gypsum – Plasterboard

Modern plaster is most often based on gypsum, which is not in itself classified as a hazardous substance.

Nevertheless, dust of any type can damage health.

Plasterboard contains silica composites.



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# Financial Impacts

## Direct Costs

(e.g., Health Care Expenses, Equipment Repair)

## Indirect Costs

(e.g., Loss of Revenue, Decreased Employee Morale)



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# What to do about it

General principles of prevention

Hierarchy of control

STOP Principle



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## Dust in the workplace General principles of protection

Guidance Note EH44 (Fourth edition)

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# Principles of prevention

The general principles are set out in full in the Guernsey CDM ACOP but in summary:

- (a) Avoiding risks where possible
- (b) Assessing risks that cannot be avoided (risk assessment)
- (c) Putting in place proportionate measures to control those risks at source (method statement)



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## Guernsey Construction (Design and Management) 2020

Approved Code of Practice 2020

The Health and Safety at Work (General) (Guernsey) Ordinance, 1987



# Hierarchy of control



# Differences:

The principles of prevention are a **series of rules**, in order, that form a best practice approach to risk management.

Hierarchy of control prioritises **control measures** based on their effectiveness, starting from elimination down to personal protective equipment.



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# MANAGING DUST ON YOUR JOBSITE



# Substitution



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# Substitution

Eliminate the risk using alternatives



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# Substitution

**Eliminate the risk** through using safer alternatives to avoid hazards where possible.

**Designing out dust** generating work



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# Technical measures

Using machinery, tools or technologies



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# Technical measures

Using machinery, tools or technologies to reduce dust in the air, to minimise the dangerous effects of dust



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# Organisational measures

Alternative methods of working



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# Organisational measures

Implementing alternative methods of working

Scheduling

Rules



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# PPE

The final line of defence.

Combine with other measures.



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# PPE

Dust masks, for example, should be the final line of defence.

Use if risks remain present after the other steps have been followed and combine with other measures.



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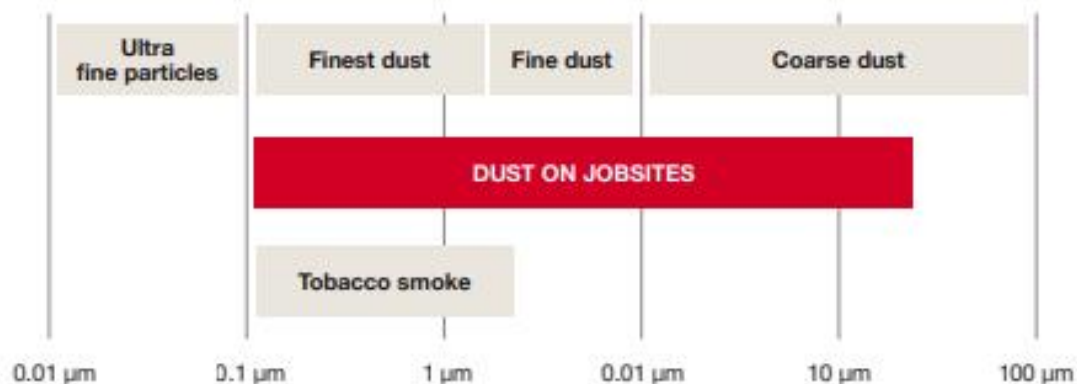
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# MATERIALS CONTAINING SILICA

Engineered stone	Fibre cement board	Concrete	Sandstone	Brick	Plasterboard	Natural Wood
						
> 93% crystalline silica	20 - 60% crystalline silica	5 - 40% crystalline silica	61 - 68% crystalline silica	50 - 60% crystalline silica	< 5% crystalline silica	<0.5% crystalline silica



# SIZE RANGE OF DUST



Particle size	Time to ground from 1 m height
50 µm	10 seconds
10 µm	5 minutes
1 µm (1/1000 mm)	7 hours
0.1 µm	12 days +



- From very small to very very very small...and then invisible!
- By way of comparison, a human hair measures between 7 and 180 µm.

The table indicates the time it takes for a particle to sink to the ground from a height of 1 metre in still air





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# Control at source

On-tool extraction  
(upfront cost higher but less issues)

Requires more maintenance

Compatibility issues

Training

Housekeeping with leads and hoses and cables

[Controlling construction dust with on-tool extraction CIS69 \(hse.gov.uk\)](https://www.hse.gov.uk/cis69/)



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**MODE 162 Professional**  
Technical and universal  
dust extraction system for power cutters





### L Class (low risk)

L Class dust includes house dust, soft woods, and solid surface material.

The maximum allowable concentration of L class dust is  $> 1 \text{ mg/m}^3$ , this means the vacuum cleaner has to extract 99% of the dust.



### M Class (medium risk)

Dust from hard woods, cement, concrete and tile cement as well as paints belong to the M class.

The maximum allowable concentration of M class dust is  $\geq 0.1 \text{ mg/m}^3$ , this means 99.9% of the dust has to be extracted.



### H Class (high risk)

Typical H Class dust can be found in asbestos, mineral fibres, bitumen and artificial fibres such as glass wool.

The maximum allowable concentration of H class dust is  $< 0.1 \text{ mg/m}^3$ , this means 99.995% of the dust has to be extracted.



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# Organisational measures

Changes in the way people work

Examples:

Control the length of time to perform dusty tasks to reduce exposure

Multi-skill and share tasks to reduce exposures

Reduce the number of people being exposed

Apply good housekeeping practices

Work instructions based on risk assessments to reduce exposures

**Worker education and awareness training**

**Less reliable than elimination or substitution  
because the hazard is still present**



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# BAN THE BROOM



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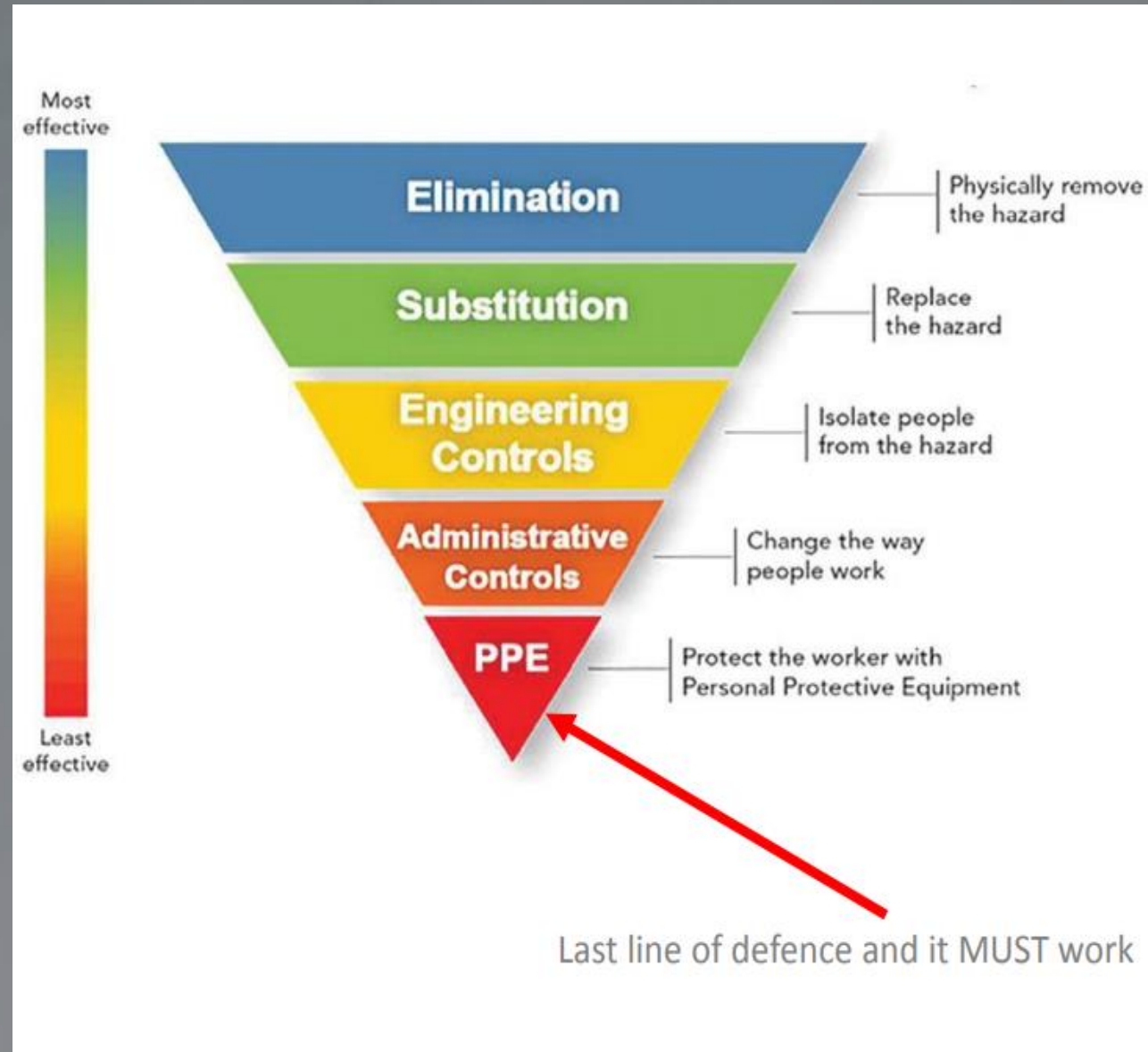
# Personal Protective Equipment (PPE)

Should only be used when other controls are either

- (1) Not feasible,
- (2) Do not reduce exposures enough or
- (3) While other controls are being investigated



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# Respiratory protective equipment at work

A practical guide



This is a web-friendly version of HSG53 published 05/13

**HSG53 (Fourth edition, published 2013).**

You can buy the book at [www.hsebooks.co.uk](http://www.hsebooks.co.uk) and most bookshops.

**ISBN 978 0 7176 6454 2**

This book provides guidance on the selection and use of adequate and suitable respiratory protective equipment (RPE) in the workplace, in order to comply with the law.

It tells you when you can use RPE, using a simple step-by-step approach. It helps you to decide the adequate level of protection for a given hazardous substance and how to select RPE that is suitable for the particular wearer, task and work environment. It also contains advice on how to make sure that the selected RPE keeps working effectively.

# HSE Considerations

Action to address non-compliance should be proportionately targeted at the dutyholder(s) most directly responsible for the failings identified.

Action will be in accordance with the Enforcement Management Model and Enforcement Policy Statement available for download from [www.gov.gg/hse](http://www.gov.gg/hse)



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# Dust Management Benefits

You can significantly increase productivity and lower maintenance costs with appropriate measures against dust by:



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# Dust Management Benefits

You can significantly increase productivity and lower maintenance costs with appropriate measures against dust by:

- Reducing preparation time
- Not affecting other work
- Reducing cleaning time
- Reducing damage of fixtures and fittings
- Increasing lifetime of tools
- Environmental protection
- Community relations
- Quality control
- Not delaying handovers



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# Information

## The Health in Construction Leadership Group (HCLG)

The mission of the HCLG is to unite the construction industry in order to eradicate the ill health and disease caused by exposures to health hazards on building sites. The home page contains a powerful video “committing construction to a healthier future.”

## Institution of Occupational Safety and Health (IOSH) ‘No Time to Lose’ initiative


IOSH have launched the silica phase of their campaign – the website contains free resources, guidance, trade fact sheets and case studies.

## British Safety Industry Federation (BSIF) ‘Clean Air? Take Care!’ campaign

This BSIF campaign (with HSE) centres on raising awareness among respiratory protective equipment (RPE) users, employers, fit testers and advisors on the correct selection, deployment, use, maintenance and storage of RPE.



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## Construction dust

**HSE information sheet** Construction Information Sheet No 30 (Revision 2)

Construction dust is not just a nuisance; it can seriously damage your health and some types can eventually even kill. Regularly breathing these dusts over a long time can therefore cause life-changing lung diseases.

This sheet tells employers what they need to know to prevent or adequately control construction dust risks. It is also provided advice for safety representatives and workers.

**Construction dust**

This is a general term used to describe different dusts that you may find on a construction site. There are three main types:

- silica dust – created when working on silica-containing materials like concrete, masonry and ceramics (also known as respirable crystalline silica or RCS);
- wood dust – created when working on softwood, hardwood and wood-based products like MDF and plywood;
- lower toxicity dusts – created when working on materials containing very little or no silica. The most common include gypsum (eg in plasterboard), limecrete, marble and asbestos.

**Health risks**

Anyone who breathes in these dusts should know the damage they can do to the lungs and airways. The main dust-related diseases affecting construction workers are:

- lung cancer;
- silicosis;
- chronic obstructive pulmonary disease (COPD);
- asthma.

Some lung disease, like advanced silicosis or asbestosis, can come on quite quickly.




Figure 1 Common tasks like cutting can create very high dust levels.

However, most of these diseases take a long time to develop. Dust can build up in the lungs and harm them gradually over time. The effects are often not immediately obvious. Unfortunately, by the time it is noticed the total damage done may already be serious and life-changing. It may mean permanent disability and early death.

Construction workers have a high risk of developing these diseases because many common construction tasks can create high dust levels. Over 500 construction workers are believed to die from exposure to silica dust every year. The amounts needed to cause this damage are not large. The largest amount of silica someone should be breathing in a day after using the right controls is shown below next to the penny.

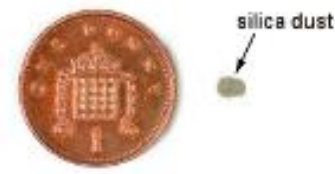


Figure 2 Your maximum daily silica exposure is tiny when compared to a penny.

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# References

- COSHH essentials for RCS related construction tasks
- Construction Dust FAQs
- CIS 36: Construction dust
- WIS 23: Wood dust controlling the risks
- CIS 69: Controlling construction dust with on-tool extraction
- Thorough Examination and Test requirements for on-tool extraction
- HSG 53: Respiratory protective equipment at work
- INDG 479: Guidance on respiratory protective equipment fit testing
- EMM Application to health risks
- OC 273/20 COSHH general enforcement guidance and advice
- Operational Guidance on respiratory protective equipment (RPE)




**HSE** Health and Safety Executive

## Construction dust

**HSE information sheet** Construction Information Sheet No 39 (Revision 2)

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- wood dust – created when working on softwood, hardwood and wood-based products like MDF and plywood;
- low-toxicity dusts – created when working on materials containing very little or no silica. The most common include gypsum (g) in plasterboard, limecrete, marble and asbestos.

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**silica dust**

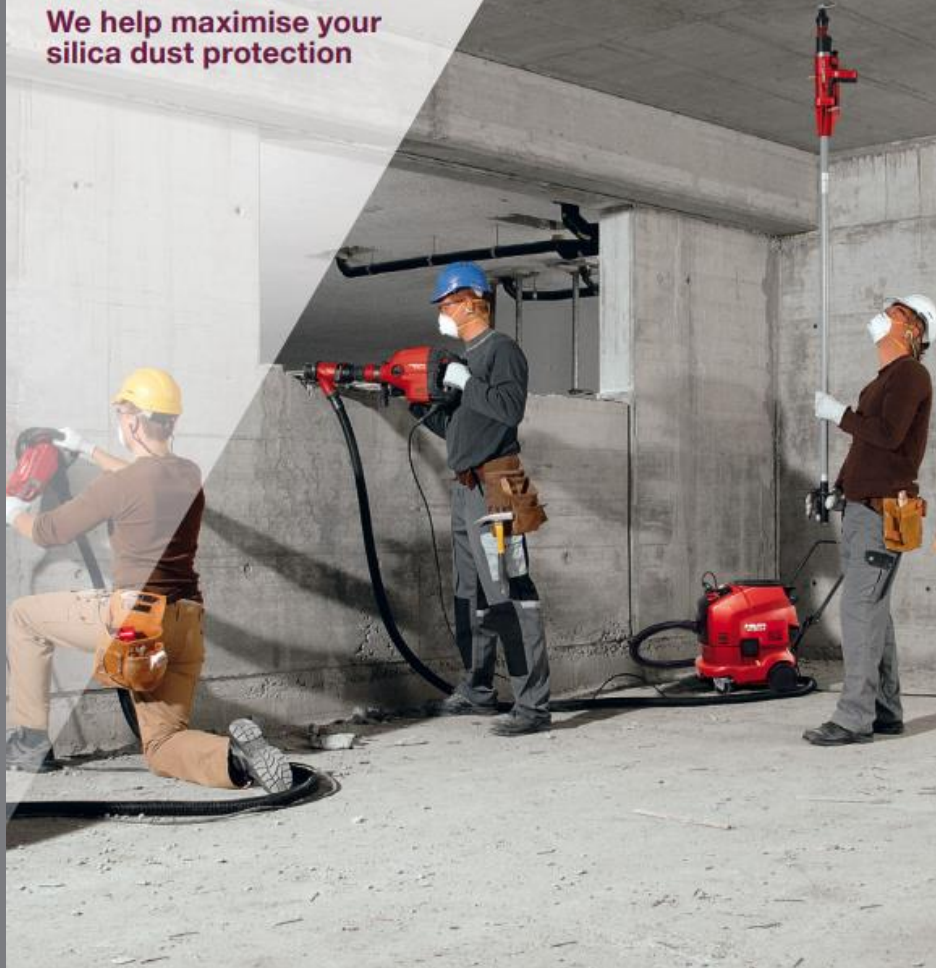
Figure 2 Your maximum daily silica exposure is tiny when compared to a penny.

1 of 6 pages



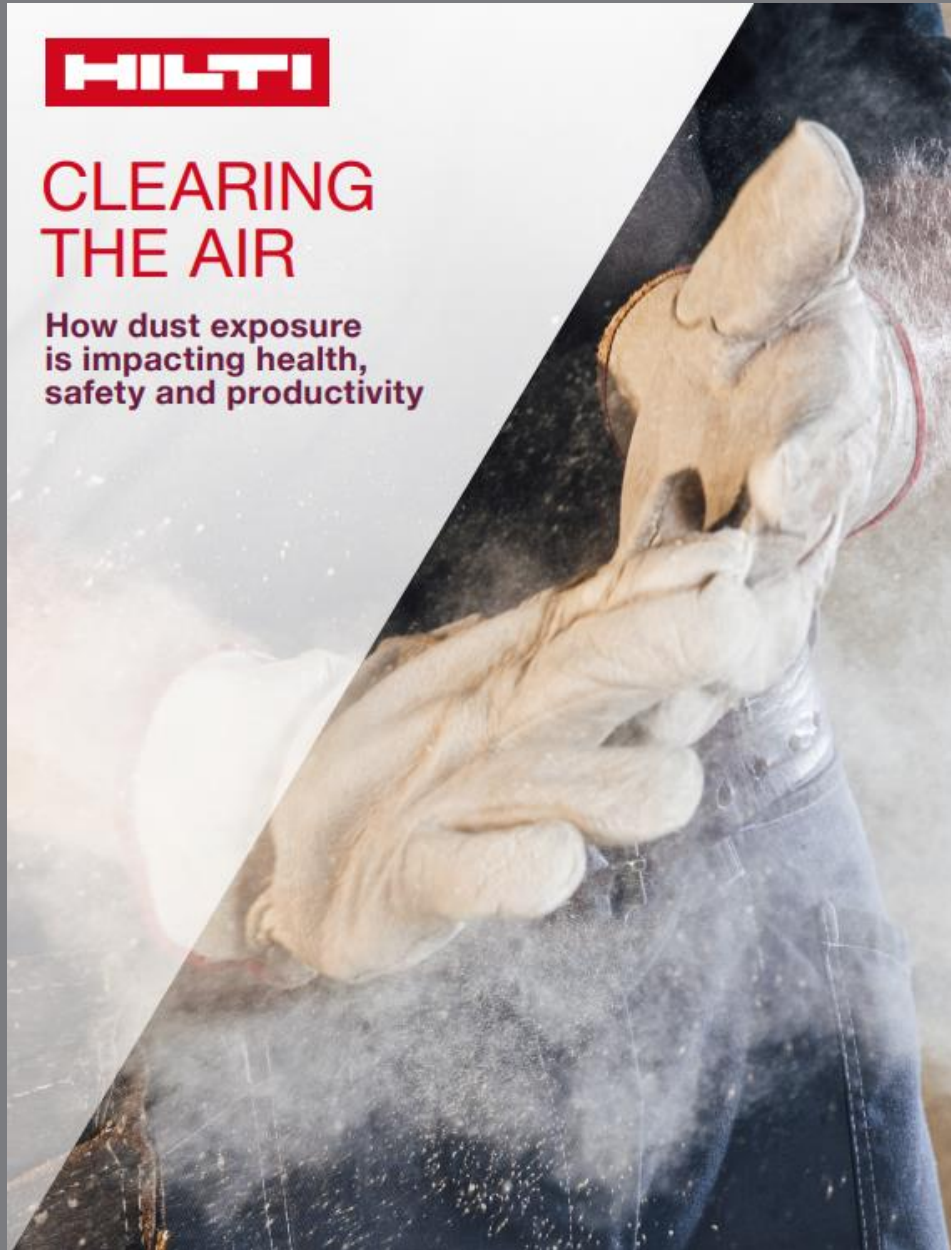
## DUST CONTROL SOLUTIONS

We help maximise your silica dust protection



## CLEARING THE AIR

How dust exposure is impacting health, safety and productivity



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# In summary

Dusts cause serious long term ill health

2<sup>nd</sup> biggest killer in the construction industry

Most diseases cannot be treated

Use STOP principle an effective and memorable guide to control dust

Lead by example

Resource your teams

Health and financial benefits



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## Construction dust

### HSE information sheet

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Construction Information Sheet No. 38 (Revision 2)



Figure 1 Common tasks like cutting can create very high dust levels.

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Figure 2 Your maximum daily silica exposure is tiny when compared to a penny.

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