

# UNDERSTANDING EXPOSURE HAZARDS

Workplace respiratory exposure hazards are encountered in four forms: solid particulates, liquid particulates, gases, and vapours. Regularly breathing harmful contaminants over an extended period of time can cause a variety of lifelong illnesses, including lung disease and cancer. Typically it takes several years for the effects of exposure to respiratory hazards in the workplace to develop and symptoms often do not arise until several years after exposure, by which time it may already be too late and result in permanent disability or early death.

## PARTICULATES

Dust particles can be classed as one of two types depending on their size:

**Inhalable dust:** larger sized particles that are visible to the naked eye - these particles reach the upper sections of the throat, airways and lung.

**Respirable dust:** Smaller sized dust particles that can be invisible to the naked eye or smaller - these particles become trapped in the lower sections of the lung.

Liquid particulates include water and oil-based aerosols and mists.



### SILICA DUST

The amount of silica dust that would result in personal exposure to the UK legal limit is indicated above the penny.

UK law requires companies to ensure exposure to silica dust is well below the amount illustrated here.

Substance	% Silica
Brick	Up to 30
Concrete, Cement, Mortar	25 - 70
Tile	30 - 45
Sandstone, Gritstone, Quartzite	70 +
Granite	Up to 30
Sand and gravel	70 +
Slate	Up to 40
Flint	80 +

## GAS / VAPOUR HAZARDS

Gas / vapour hazards encountered in the workplace include:

- Ammonia and acidic vapours
- Formaldehyde
- Chlorine
- Volatile Organic Compounds (VOCs)
- Isocyanates (require airfed RPE)

# IMPACTS ON EMPLOYEE HEALTH

When risks are not controlled effectively, it can have devastating effects on employee health. Breathing harmful levels of respiratory hazards found in the workplace can lead to lifelong and irreversible illnesses.

## CANCER

- Lung cancer and mesothelioma are the most common forms of cancer leading to death.
- Occupational exposure to asbestos is the leading cause of cancer death.
- Construction jobs pose the highest risk of occupational cancer, with the industry contributing 3500 deaths and 5500 diagnoses each year\*.
- Mesothelioma is mainly caused by inhalation of asbestos fibres. Awareness has improved but 2500+ deaths in the UK from mesothelioma still occur every year due to the slow development of the condition long after exposure (HSE, Mesothelioma statistics for Great Britain, 2019).

## COPD

- Chronic obstructive pulmonary disease (COPD) occurs in later life: it is estimated that over a million individuals currently have the disease in the UK, with over 25,000 deaths each year.
- The leading cause is smoking, but past exposure to fumes, chemicals and dusts at work have also contributed to many present cases. Research shows that about 15% of

COPD cases are likely to be work-related, indicating as many as 4000 occupational deaths each year in the UK\*\*.

- Hazardous substances in the workplace that are likely to lead to COPD later in life include: various dusts (including coal, grain, silica), as well as certain fumes and chemical vapours (including welding fume, isocyanates and polycyclic aromatics hydrocarbons).

## SILICOSIS

- Silicosis is an incurable lung disease caused by inhaling silica dust, usually over a period of many years.
- Silica dust can cause inflammation when particles enter the lung and, over time, lead to areas of hardened and scarred lung tissue (fibrosis).

## ASTHMA

- Occupational asthma is an allergic reaction that can occur in certain individuals when exposed to certain substances.
- These substances, referred to as 'respiratory sensitisers' or asthmagens, cause a change in the airways known as 'hypersensitive state'.
- Substances and materials that can cause occupational asthma include:
  - Chromium (VI) compounds: present in stainless steel welding fume, cement, and used in electroplating
  - Hardwood dusts: general term covering a variety of wood dusts, around 40 species of which can cause occupational asthma.
  - Softwood dusts: general term covering a variety of dusts mainly derived from coniferous trees. Occupational exposure to cedar dusts is particularly associated with the development of asthma.

## EXPOSURES FOUND IN THE WORKPLACE



**SOLVENTS**  
Breathing solvent vapours or fumes can cause headaches, dizziness and nausea.



**WOOD DUST**  
May cause allergic respiratory and mucosal symptoms, in addition to general respiratory irritation.



**ASBESTOS**  
Inhalation of asbestos fibres leads to mesothelioma - a rare type of lung cancer.



**WELDING FUMES**  
Prolonged exposure can lead to cancer, as well as damage to the nervous systems and kidneys.



**SILICA DUST**  
Breathing silica dust can result in respiratory illnesses such as silicosis.



**CLEANING UP**  
Sweeping can produce high levels of dust in the air, causing irritation and illness. Chemicals in cleaning sprays can cause respiratory problems and illness due to toxic ingredients.




**ENGINEERED WOOD DUST**  
Use of power tools with MDF, for example, releases formaldehyde which is highly toxic via inhalation, and can cause nasal and lung cancer.




**DIESEL EXHAUST FUMES**  
Irritation occurs within minutes; prolonged exposure over extended period is extremely harmful.


## EFFECTS ON THE BODY




**NERVOUS SYSTEM DISORDERS**  
Alzheimer's and Parkinson's disease have been linked to workplace air pollution.



**BLADDER CANCER**  
Fumes such as diesel exhaust can cause bladder cancer.



**HEART DISEASE**  
Angina, arrhythmia, hypertension and heart disease are linked to workplace pollution.



**DAMAGE TO REPRODUCTIVE SYSTEM**  
Workplace pollution, pre- and post- conception can affect parents, fetuses, and newborns.

\* HSE: Occupational Cancer statistics in Great Britain, 2019  
\*\* HSE: Work-related Chronic Obstructive Pulmonary Disease (COPD) statistics in Great Britain, 2019

