

## What is important to know about indoor air quality: airborne particles - PM2.5/PM10?

Independent workplace compliance

### What are airborne particles?

Airborne particles are tiny solid or liquid particles suspended in the air that come in many shapes and sizes. They are also known as particulate matter, or PM for short. Fine particulates are those with a diameter of 10 micrometres (microns) or less (PM10). As one micrometre is a 1000<sup>th</sup> of a millimetre, PM10s are invisible to the naked eye. PM10s are further split into two groups - the fine fraction and the coarse fraction. The fine fraction contains particulates with a diameter of 2.5 micrometres or less. The coarse fraction contains those particles between 2.5 and 10 micrometres in diameter.

### What are the sources of particulates?

Primary particulates are released directly into the air. Secondary particulates are predominantly PM2.5s, derived from reactions, mainly involving gases, which have been emitted into the air. They are produced by:

- Natural sources such as fungal spores, plant fragments and pollen; and
- Man-made sources such as emissions from road traffic, trains, planes and ships, combustion processes (fuel, waste etc.) and industrial processes (mining, smelting etc.).

### What is their significance?

Larger particulates pose less of a threat because of their weight. Even if we do inhale them they generally collect in our nose and throat and do not travel any further into the respiratory system.

Coarse fraction PM10s generally settle to the ground between a few hours and a few days after emission. These particulates, once inhaled, are mostly deposited in the upper respiratory tract and do not travel very far into the lungs. Fine fraction PM2.5s may be suspended in the air for weeks. They can penetrate the microscopic air sacs (alveoli) in the lungs once inhaled. This is where the exchange of oxygen and carbon dioxide in the bloodstream occurs. Consequently, they can cause breathing difficulties and lead to conditions such as bronchitis, asthma and emphysema. PM2.5s can also give a "free ride" to harmful substances, some of which can be carcinogenic.

### What is the legislation in this area?

The HSE have set exposure standards to comply with the requirements of The Control of Substances Hazardous to Health (COSHH) Regulations. These are described in the HSE document EH40, which is updated annually. Currently, these are:

- 10 mg/m<sup>3</sup> (8 hour time weighted average) for total inhalable dust.
- 4 mg/m<sup>3</sup> (8 hour time weighted average) for respirable dust.

Total inhalable dust is defined as the fraction of airborne dust which enters the nose and mouth during breathing and is therefore available for deposition in the respiratory tract. Respirable dust approximates to the proportion which penetrates to the alveoli within the lung.

European emissions standards have highlighted a yearly average of 40 µg/m<sup>3</sup> and 25 µg/m<sup>3</sup> for PM10 and PM2.5 respectively. The 'WHO' standards outline a guideline of 20 µg/m<sup>3</sup> and 10 µg/m<sup>3</sup> for PM10 and PM2.5 respectively.

### How can you monitor fine particulates?

As part of an indoor air quality (IAQ) audit we can monitor levels of airborne particulates of various sizes in the circulating air. It is important that the company carrying out an IAQ audit has no links to any other product, service or company. This will ensure that the results are not misinterpreted to justify remedial services, such as ductwork cleaning and disinfection.

**This guide is of a general nature; specific advice can be obtained from Assurity Consulting.**

**Assurity Consulting is the UK's leading independent compliance consultancy specialising in workplace health, safety and environmental solutions. We have over 30 years' experience of helping customers of all sizes, from across all sectors, manage their compliance responsibilities, making sure that their organisation is compliant, their employees are safe, their processes are cost effective and their management team is in control.**



### Assurity Consulting Limited

26 Redkirk Way Horsham West Sussex RH13 5QH  
t +44 (0)1403 269375 e info@assurityconsulting.co.uk  
w [assurityconsulting.co.uk](http://assurityconsulting.co.uk)

Registered in England and Wales Reg. No. 2227268  
Corporate Member of IWFM