#6753

In the air tonight

technical file

If you want to know how good the air is in your office, you need to be able to monitor it. Here we describe a system that tells you if you are being gassed by the photocopier, infected by bacteria or suffocated by the ventilation system.

What might be described as the first air quality sensing device has recently been launched by environmental specialists Winton Environmental Services.

Aimed at the building user, Winton's Monitair 393 is designed to identify the levels of those contaminants commonly associated with sickness in offices.

According to its designer Alec Logan, Winton's technical director, the Monitair 393 addresses the problems of monitoring created by new health and safety regulations requiring employers to assess risks in the workplace.

"The Monitair 393 will indicate that a building is either going to have a problem, has conditions that suggest it already has one or that everything is OK."

Operation

The device is a continuous time-weighted air sampler that records the presence, over any programmed time, of airborne particulates, gases and micro-organisms.

A small percentage of room air – 2 litres/min – is pumped past a range of devices which sample the air for specific pollutants.

The first devices the air hits are impingement plates, designed to trap non-respirable bacteria and fungal micro-organisms. The respirable fraction is picked up by a filter.

The air passes through three 100 ml bubble tubes which can be filled with a range of chemicals to look for particular substances.

The Monitair is limited to three bubble tubes. The three most common office pollutants – CO_2 (an indicator of ventilation effectiveness), ozone and formaldehyde – will be the usual measured substances.

Winton claims that formaldehyde and ozone need only be measured until such time that these chemicals are not posing a problem, freeing up the bubble tubes so that other sensitisers can then be monitored.

A gas chromatography absorber can also be installed to trap any gases and vapours, for example solvents from paint fumes.

Winton says that only one Monitair per floor is required, sited strategically at a point where the greatest levels of pollution are likely or have already been found to occur during a pre-installation survey.

After a given period of operation, Winton will remove the sampling devices for analysis and present the user with a report including data result sheets examining the indoor air quality.

Reporting the results

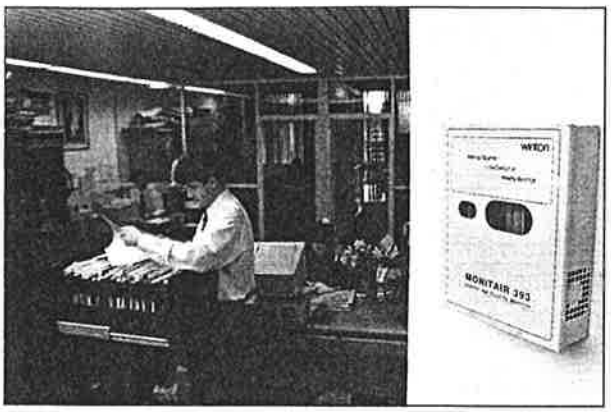
The concentration of dust particles, gases, bacteria and fungi are indexed against known occupational exposure limits. The total sample is then broken down into the percentages in which each substance has appeared.

For fungi and bacteria, the results are given in terms of colony forming units per cubic metre, with each species being individually identified.

A high incidence of building related sickness may mean daily samples being taken for analysis, whereas buildings with no obvious problems may only require monthly or quarterly reports.

It largely depends on the client and the type of building. A museum, for example, would be more concerned about possible damage to artefacts, so gases like sulphur dioxide and hydrogen sulphide would be monitored in preference to other gases.

In all cases Winton supplies an executive summary which states whether the levels of pollution are 'satisfactory', whether action is recommended or whether the detection level is above legal limits.



Winton's air quality monitor, the Monitair 393.

Deciding whether or not a given pollutant or microbiological level is 'satisfactory' is subjective, although the results are indexed against outside ambient air conditions determined during the pre-installation survey. Winton sets its action levels below the limits contained in World Health Organisation and HSE guidelines.

"We know from experience that an occupation exposure of 1250 ppm of CO_2 will produce complaints of headaches," says Alec Logan, "so we like to see values of 800 ppm, certainly no more than 1000 ppm.

"Where no legal standards exist, we base our action levels on experience of using Rodac contact plates to sample over 5000 air supply systems."

Practical value

So what value does the Monitair 393 have in mitigating the effects of building related sickness? As a device for letting building occupiers know that the management is taking the issue seriously, the device could be quite useful, as trial installations are purported to have proved. But the Monitair is not designed to be a method for solving problems, as Alec Logan readily admits.

"It is useful for confirming that conditions are OK, and for detecting early trends that something is going wrong," says Logan. "Detecting an allergen in a building before anyone becomes sensitised to it is very valuable to building managers who want to stay ahead of the game."

The Monitair forms one part of a continuous monitoring and analytical service provided by Winton – you buy the service and get the air quality sensor.

The service is inclusive of a pre-installation survey of the building, and all the laboratory monitoring and subsequent reports. Typical costs of operation for a four-storey office block using four Monitair units would be around £2000/y, with savings for long term monitoring contracts.

The drawback of the Monitair is that it is a stand-alone unit, not connected to the operation or management of the building services. The time weighted analysis means that poor building services operation over short periods cannot be easily detected, nor can the staff quiz the system when uncomfortable.

In a building which is healthy, it could be argued that a combination of CO_2 sensors and dumb building management terminals, perhaps equipped with touch screens, would be more useful for informing staff as to how well the building is performing.