

# HOSPITAL ACQUIRED INFECTIONS COSTS AND CONSEQUENCES OF POOR INDOOR AIR QUALITY



# MAKE IT SAFER, KNOW IT'S SAFER, KEEP IT SAFER

There is an increasing need to understand more about healthy buildings and the wellness of staff, patients and visitors.

## INTRODUCTION

As we know, there has been an unprecedented demand on our healthcare system, and now, moving forward, we need to learn from the demands and issues created by recent events to make improvements for a better, healthier and safer healthcare environment for all, today; tomorrow and the future.

- 1.4m Full-Time Equivalent (FTE) Days are lost per month in the NHS due to sickness\*
- 2.3m FTE Days were lost per month at the height of the pandemic\*
- Much of the sickness is attributed to colds, coughs, flu, chest and respiratory problems
- Healthcare Acquired Infections cost the NHS £1billion a year

*\*Figures published by NHS Digital (as per The Guardian article 20 Aug. 2020)*

Building Management Systems (BMS) exist that can assist in making air quality better and reduce infections automatically, however more can be done to compliment your BMS strategy to provide greater assurance and knowledge that you are doing everything you can for the health of patients, staff and visitors.

The contents of this document are designed to highlight how you can make your buildings healthier and create a better wellness for all.

By improving air quality and wellness within a healthcare environment, areas of concern and cost can be alleviated. From reducing healthcare acquired infections which in turn reduces bed occupancy times through to improved lighting and cleaner air for a more balanced patient, staff and visitor well being, there are solutions that can effect all these needs.

To deliver these needs, you can employ a number of strategies (Dependent on your KPI's):-

- Measure air cleanliness
- Improve air quality
- Organize appropriate cleaning regimes, etc.
- Provide audit trails
- Demonstrate Improved Air Quality

To meet those needs, it is important that you are supported by a proven company and a suite of solutions which can complement existing systems and a network of experienced solutions providers and installers, so that we can take care of your well being, leaving you to take care of your patients and staff.

Topics to be covered include:-

- The Value of Clean Air
- HAI's – An example of Poor Air
- The Solutions – Basic Steps to Measuring and Managing Air Quality
- Summary – Taking the Next Step

# THE VALUE OF CLEAN AIR

Good indoor air quality, thermal comfort, daylight, good acoustics and amenities, all play a vital role in creating a positive atmosphere for occupants. A healthy and productive work environment is a key element of any green sustainable building.



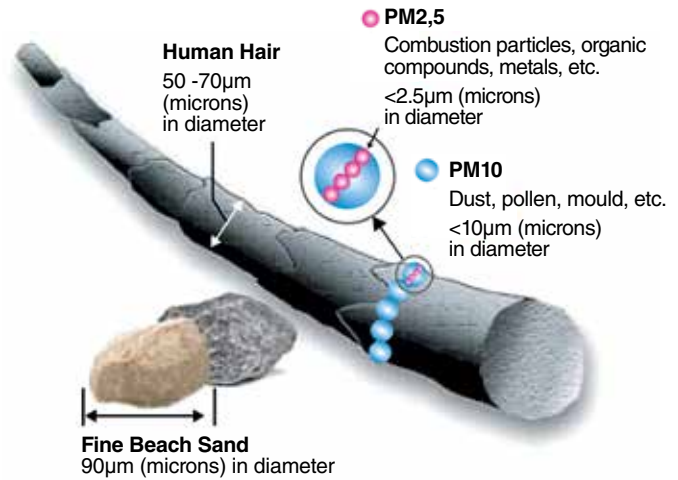
The long-term impact of clean air goes beyond enhancing occupant well-being, health and safety. Clean air keeps the air-conditioning system clean, prevents cooling coil fouling and maximises cooling coil heat transfer efficiency and energy savings.



# BASIC AIR POLLUTANT INFORMATION

Particle pollution, also called particulate matter or PM, is a mixture of solids and liquid droplets floating in the air. The smallest particles that can be seen with the naked eye are around 40–50 microns (1 micron is .001 millimeter).

Particles less than or equal to 10 microns in diameter are so small that they can get into the lungs, potentially causing serious health problems. The particles with the greatest capacity for reaching the deepest areas of our respiratory system are very small, approximately 0.01–1 micron in size.



“ Particle pollution - especially fine particles - contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. ”

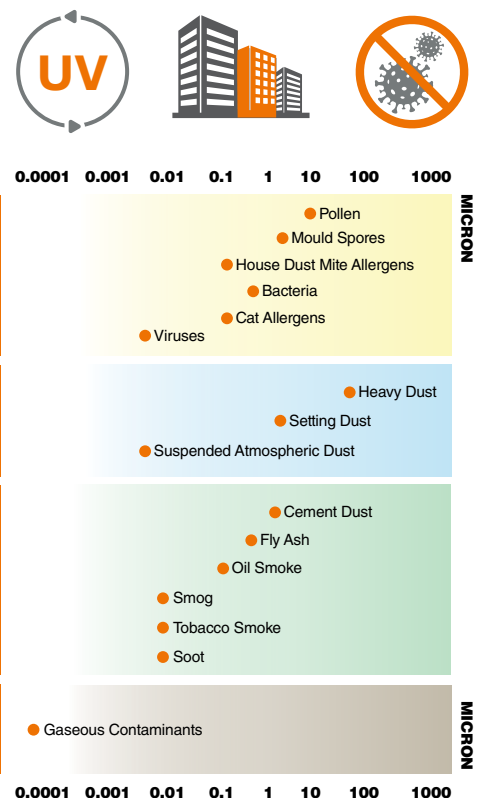
United States Environmental Protection Agency

# HEALTH IMPACT OF PARTICULATE POLLUTION

People with heart or lung diseases, older adults and children are most likely to be affected by particle pollution exposure. However, even healthy people may feel temporary symptoms if they are exposed to high levels of particle pollution. Numerous scientific studies connect particle pollution exposure to a variety of health issues,

including:

- Irritation of the eyes, nose and throat
- Coughing, chest tightness and shortness of breath
- Reduced lung function
- Irregular heartbeat
- Asthma attacks
- Heart attacks
- Premature death in people with heart or lung diseases



# HOSPITAL ACQUIRED INFECTIONS

**8.2%**

of patients develop a healthcare associated infection (HCAI)

**£1 billion**

Cost to NHS per year

**£56 million**

Estimated costs after discharge from hospital

**~30%**

are preventable

**infection acquired** during healthcare visit.  
Infection not present or incubating before.

**pain & suffering** caused which cannot be measured

Air quality at hospitals needs special precautions during design and maintenance stage to minimize transmission of infection. It is reported that over 8% of all patients who go to hospitals for treatment will develop an infection while they are there. The levels of hazardous pollutants in indoor air in some areas have been found to be up to 70 times greater than those found in outdoor air. Additionally, the complex hospital environment requires special

attention to ensure healthy indoor air quality to protect patients and healthcare workers against nosocomial infections and occupational diseases.

According to the World Health Organisation (WHO), bad indoor air quality is a real health hazard and can have significant impact on the shortening of life expectancy. Children and the elderly are especially affected by polluted indoor air.



## SYMPTOMS, CAUSES AND CONSEQUENCES OF POOR IAQ

### The following are some of the symptoms of poor IAQ in a building

- Limited fresh air
- Temperature and humidity outside comfort zone
- Eye, nose and throat irritation
- Dry facial skin
- Respiratory infections, asthma
- Fatigue, headaches
- Increased allergic reactions
- Sick building syndrome - SBS

### Potential causes of poor air quality

- Reduced ventilation
- Building materials and furnishings
- Deferred maintenance to save money
- Pesticides, housekeeping supplies, office supplies and chemicals in personal care products

### Consequences of poor IAQ

- Health problems
- Reduced productivity
- Higher costs to fix problems than to prevent
- Problems than to prevent
- Poor public relations
- Liability issues



# IAQ SENSORS FOR HEALTHY BUILDINGS

Honeywell Healthy Buildings help keep facilities safer for occupants, in part by cleaning the air automatically as people come and go. To do that, your building needs accurate data about the air quality – and that starts with our versatile range of sensors for indoor air quality (IAQ).

## INDOOR AIR QUALITY REINFORCES BUILDING HEALTH

Studies show that comfort levels inside your building can impact occupant health, satisfaction, and productivity.<sup>2</sup> This is influenced by factors such as CO<sub>2</sub>, temperature and humidity; as well as air that is free of irritants, allergens and unwelcome odours.

## REASSURE OCCUPANTS THAT YOUR BUILDING IS MEASURABLY SAFER

Proper air cleaning and exchange can help reduce disease transmission by removing or dispelling pathogens, as well as odours, chemicals, and CO<sub>2</sub>. A relative humidity of 40–60% can also decrease exposure to infectious particles and reduce virus transmission.



### CARBON DIOXIDE

CO<sub>2</sub> sensing is a proven way to gauge occupant density and automate demand-controlled ventilation (DCV), optimising both air quality and energy use.

- Factory-certified, self-calibrating sensors
- Wall-mounted room sensor

### TOTAL VOLATILE ORGANIC COMPOUNDS (TVOC)

Detect poor air quality due to a range of VOCs – such as odors, bioeffluents, and outdoor pollutants.

- VOC concentrations can be 10 times higher indoors
- Duct and wall-mounted sensors

### FINE PARTICULATE MATTER

Track levels of irritating fine particulate matter that contribute to asthma or other respiratory diseases.

- Choose from a range of detection levels (PM1.0, PM2.5, PM4.0, or PM10)
- Wall-mounted room sensor

### ALL-IN-ONE

Our multi-sensing devices report a full range of air quality factors to your building management system (BMS) for automated air cleaning and IAQ alerts.

- Temperature, humidity, CO<sub>2</sub>, PM 2.5, PM10 and TVOC
- Duct and wall-mounted sensors

# HONEYWELL ELECTRONIC AIR CLEANERS

The key to lower your Ecological Footprint

**An ecological footprint is a measure of human impact on Earth's ecosystems.**

Honeywell EAC's offer various benefits in commercial HVAC applications:

- Reduced pressure drop across the EAC's compared with conventional media-type air filters.
- No decrease in airflow due to increasing restriction as particulates are captured unlike media-type filters.
- Up to 5% reduction in fan power energy consumption and cost.

Unlike conventional media filters that are disposed of at the end of their service

life, Honeywell's electronic cells and pre-filters are washable and reusable. Typical life span of Honeywell EAC's is 15 years. Disposable media air filters clog up landfills or if they are incinerated in land scarce countries like Singapore, greenhouse gases are released into the environment, exacerbating global warming.

Honeywell EAC's have been independently tested and verified by LMS Technologies Inc, a reputable third-party testing laboratory in the United States.



# SCIENCE OF ELECTROSTATIC PRECIPITATION



An electrostatic precipitator, also called electrostatic air cleaner or electronic air cleaner (EAC) is a device that uses an electric charge to remove impurities, either solid particles or liquid droplets, from the air.

A Honeywell two-stage electronic air cleaner consists of two sections, a charging section and a collection section. A high voltage is applied to the ionizing wires to form a strong electric field between the wires.

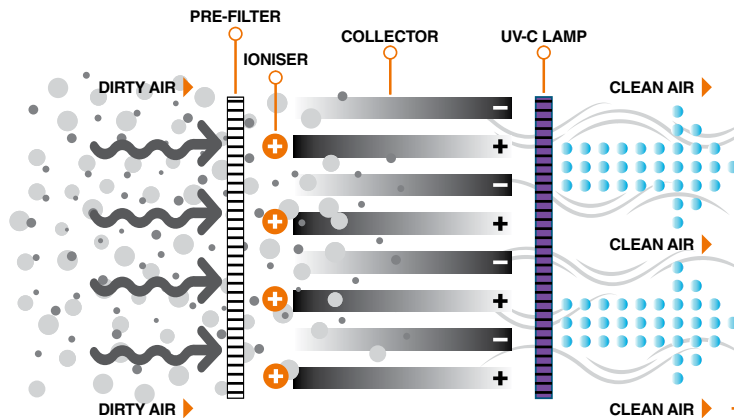
negative charged electric field to the positive charged electric field. Along the way they collide with the contaminants, releasing more electrons.

The ionized particles are moved by the moving air into the strong electric field at the collectors and are trapped at the charged collector plates.



Electrons present in contaminated air containing pollutants such as fine dust, smoke particles, pollens, mould spores and bacteria are pushed at high velocity (due to strong Coulomb Forces) from the

## HOW ELECTRONIC AIR CLEANSERS (EACS) WORK



“The electronic air cleaner functions by applying energy only to the particulate matter being collected, without significantly impeding the flow of air.”





# SUMMARY

The requirement and right to be able to breathe the best air we can should be a given.

However, we are aware that many external factors can have a negative impact on the air we breathe and as a result the effects that poor air quality can have on our health and well being. From viruses to exhaust fumes, there are many factors which can cause health issues and therefore, it is essential that from today, we examine all possible

solutions which can have a positive impact on our air quality.

The first steps are often the most important, which is why we are able to assist and support with information such as our Fit Building Report and Breathe Easy Checklist.



## NEXT STEPS



Our 'Fit Building' report remotely checks your site to highlight the BEMS adjustments needed to help your ventilation system comply with the guidelines issued by REHVA and CIBSE.

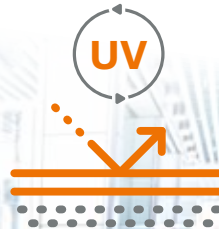


Our 'Breathe Easy' checklist provides a simple and effective way to understand the key factors that can have an impact on air quality.



To talk to one of our Healthy Buildings team and to discuss your specific requirements, please provide your details here and we will get in touch.

[\(link to contact form\)](#)





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