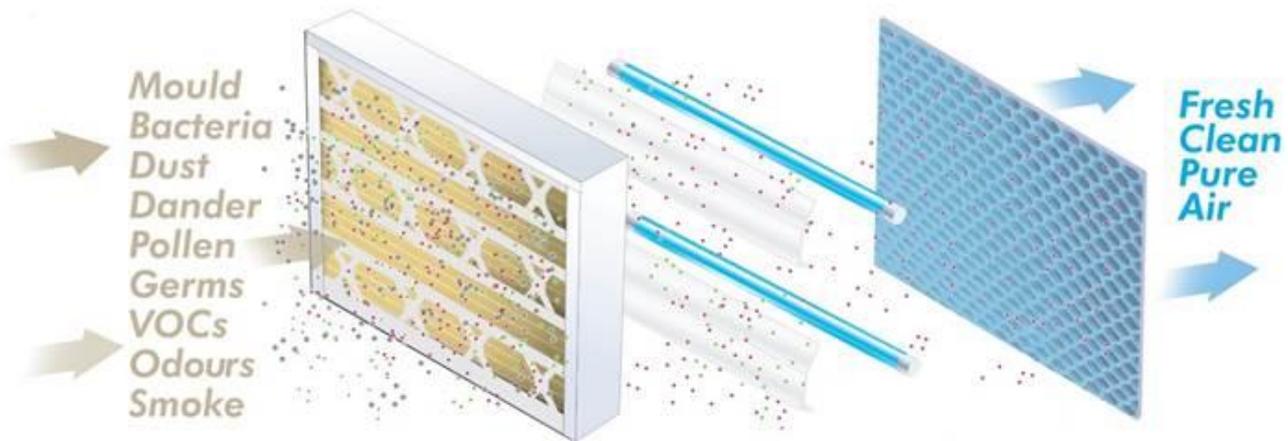


The Ingenious Air® Small Duct System

HEPS Air Purification Module



Significantly Improves Your Indoor Air Quality



Creates an Indoor Safe Haven



Protects from Airborne Toxic Pollutants



Protects from Airborne Illnesses & Allergens

Contact Us Today For Your Free Quotation

T: +44 1268 544 530 | E: info@ingenious-air.com | W: www.ingenious-air.com

Contents

Why is Indoor Air Quality Important?.....	1
What is the HEPS?.....	3
How It Works	5
Energy Efficiency.....	7
Maintenance	8
Research.....	9
References	11
Contact Details.....	12

“The air purification helps control the spread of infection and protect our patients when they visit our surgery. Each room is comfortable and there are no cold draughts when the air conditioning is on. Air outlets in the ceiling, wall and floor mean there are no radiators, which has given us more space in each room”.

Doctor, St John’s Villa Surgery

Why is Indoor Air Quality Important?

Indoor and outdoor air quality has featured heavily in national and global news over the past few years. Awareness surrounding the negative health effects of exposure to poor indoor air quality (IAQ) is growing.

Recent studies and articles have often shown that high levels of Volatile Organic Compounds (VOCs) and Carbon Dioxide (CO₂) can lead to minor ailments such as:

- Lack of concentration
- Fatigue
- Sickness

Increasingly though, there is disturbing evidence of the link between air pollution and serious health conditions, including:

- Cancer
- Asthma
- Stroke
- Heart disease
- Alzheimer's disease.



For Your Workplace:

Indoor air quality (IAQ) is one of the main environmental factors that impacts **employee health and well-being**. Monitoring and improving the IAQ in your workplace is therefore extremely important. It can considerably improve employees' health and:

- ✓ Reduce absentee rates
- ✓ Improve cognitive function and decision making
- ✓ Increase overall productivity
- ✓ Create an indoor safe haven in heavily polluted cities.

For Your Home:

A report by the Royal College of Physicians and The Royal College of Paediatrics and Child Health explains that air pollution causes over **40,000 UK deaths** each year (Ref 1). Those most susceptible to the risks of poor IAQ are young children, the elderly and the sick.

Early exposure to high levels of air pollution can cause long term respiratory illnesses such as asthma.

Improving the air quality in your home can:

- ✓ Improve health and well being
- ✓ Reduce allergies
- ✓ Enable a better night's sleep
- ✓ Protect vulnerable people.

What is the HEPS?

The HEPS is a complete, optional high efficiency **air purification** module for The Ingenious Air® System. It significantly improves indoor air quality. It can be used on its own or combined with other modules to provide **heating, cooling** and/or **ventilation**.

If your Ingenious Air® System is already installed, the HEPS can be easily added retrospectively.

The HEPS reduces the spread of all three serious indoor air pollutants:

1. Airborne Disease-Causing Bacteria and Viruses

Removes bacteria (1 to 0.3 microns in size) and viruses (0.001 microns in size), which cause infectious illnesses. These include:

- Influenza
- Common cold
- Tuberculosis
- Chickenpox
- C.difficile

2. Airborne Allergy-Causing Particulates

Removes allergens (0.3 – 10 microns in size), which trigger allergies, hay fever, asthma, emphysema and chronic bronchitis. This improves allergy symptoms including fatigue, headaches, coughing, sneezing, runny, itchy eyes, stuffy nose, wheezing and shortness of breath. Allergens removed include:

- Pollen
- Fungal spores
- Dust mites
- Pet dander
- Tobacco smoke

3. Airborne Toxic Volatile Organic Compounds (VOCs)

Removes VOCs (0.001 micron and smaller), which can cause short and long-term ill-health. VOCs include:

- Nitrous oxide
- Carbon monoxide
- Fumes e.g. vehicle exhaust fumes
- Unpleasant odours e.g. paint solvents
- Pesticides
- Cleaning fluids
- Alcohol



Dust Mites, Spores, Dust, Influenza, Bacteria, Pet Dander, Viruses, Pollen, Colds, Vehicle Exhaust

Removing the primary cause of airborne illnesses and allergies alleviates the symptoms. This prevents ill health rather than treating the symptoms and can reduce the need for medication.

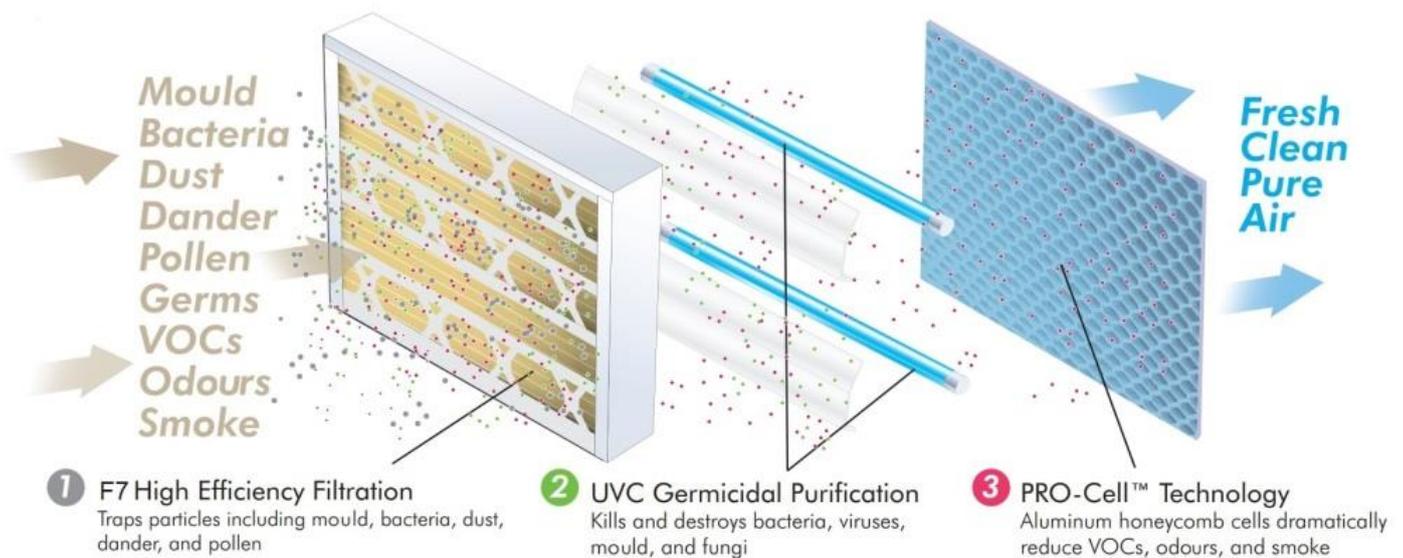
The system can enhance the overall performance of a commercial building as it helps eradicate **sick building syndrome**. This is a situation where occupants experience ill-health due to spending time in a building. Symptoms can vary from person-to-person AND from day-to-day, but the main tell-tale sign is that symptoms improve or disappear after leaving the building.

It also banishes unpleasant smells such as vehicle exhaust fumes, pesticides and cigarette smoke.

How It Works

The HEPS reduces costs by combining **three powerful technologies** in one system:

1. High Efficiency Filtration
2. UVC Germicidal Purification
3. PRO-Cell Technology.



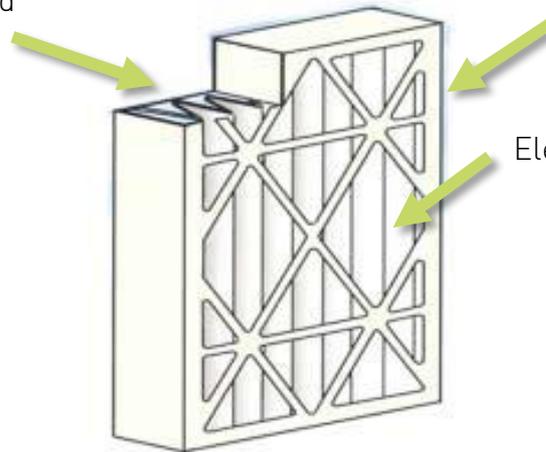
High Efficiency Filtration

The HEPS uses the “needled fibre electrostatic filtration media” developed by 3M Corporation. This Grade F7 to EN779 (MERV-13) filter gives high efficiency particle reduction, while maintaining high dirt loadings and low static backpressure.

The filter removes up to 96.3% of microscopic disease-causing particles and airborne allergens down to 0.3 microns in size. (A human hair is 80 microns and bacteria 1 micron in size).

ASHRAE rates the HEPS filter to ASHRAE Standard 52.2.

Galvanised steel
pleat support grid



Filter media frame

Electrostatically charged
needled media

Ultraviolet C Germicidal Purification

Germicidal ultraviolet light (UVC) destroys airborne bacteria, viruses and VOCs too small to be caught by HEPA filters. It kills disease germs on contact including tuberculosis, legionella, pneumonia, colds, influenza and C.difficile.



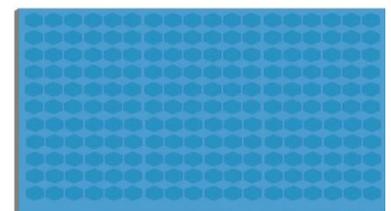
PRO-Cell™ Technology

The PRO-Cell uses powerful photo-catalytic oxidation (PCO) technology. This acts as an 'air sanitizer' to reduce VOCs, chemical fumes and odours by up to 90% or more.

PCO is a reaction that occurs when Titanium Dioxide (TiO_2) is exposed to ultraviolet (UVC) light rays.

The unique honeycomb aluminium cells of the PRO-Cell increases surface area and catalytic output exponentially while magnifying the effectiveness of the UVC light.

The PRO-Cell™ is maintenance-free and never needs replacing.



Energy Efficiency

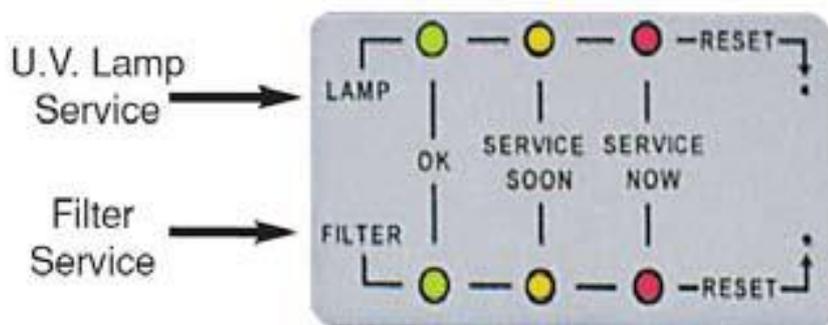
The HEPS forms part of The Ingenious Air® System – the **ONLY** small duct system to pass **Energy Star** testing.

It increases the energy efficiency of The Ingenious Air® System by eliminating the build-up of mould and dirt on evaporator cooling coils and heat exchanger surfaces.

The HEPS may also reduce the requirement to bring in outside air. This can lead to less energy being used to treat in-coming air.

The module is more energy efficient than other high specification air purification systems, such as HEPA filters. HEPA filters can significantly reduce air flow, which can triple electrical consumption.

The HEPS always operates at maximum efficiency: Built-in electronic service lights indicate when to change filters and ultraviolet lamps thirty days in advance.



Maintenance

The HEPS has relatively low maintenance requirements. Due to the self-cleaning action of the PRO-Cell, only the filter and UV lamps require replacing.

The recommended servicing period depends on the application and the installation location. In highly polluted areas, servicing may be required more regularly.

Generally it is recommended that the filter is replaced every six months and the ultraviolet lamps are replaced annually. The titanium oxide mesh does not need to be changed for the life of the system.

In addition to being cost effective, maintenance is also straight forward and can be carried out by your general maintenance team.

The HEPS is connected to the main air handling unit (AHU) of The Ingenious Air® System. The AHU is usually located in a cupboard or ceiling void away from the conditioned area. Only the temperature controller and air outlets will be in the occupied space.

This means that maintenance can be carried out with minimal disruption to occupants and work.



Research

The Southwest Research Institute (www.swri.com) in San Antonio, Texas, conducted tests on the destruction of typical VOCs by the HEPS Air Purification System (Ref 2). The results are shown in Fig. 1.

Further tests were requested by the government of Hong Kong and conducted at The Hong Kong Polytechnic University, Department Of Applied Biology and Chemical Technology. The result was a reduction in VOCs of 90% after 2:30 hours of operation (Ref 3).

Alpha Scientist in Reproductive Medicine tested the HEPS and portable HEPS for the reduction of VOCs in IVF laboratories (Ref 4), where even low levels of VOCs in the parts per billion can be extremely detrimental to the development of embryos.

The test data confirmed that the filter lowered the VOC levels by up to 82% down to an average level of (8ppb). The conclusion was that by installing the HEPS Air Purification System, there was no longer a need for a burn-in period of 30-40 days before the laboratory could be used.

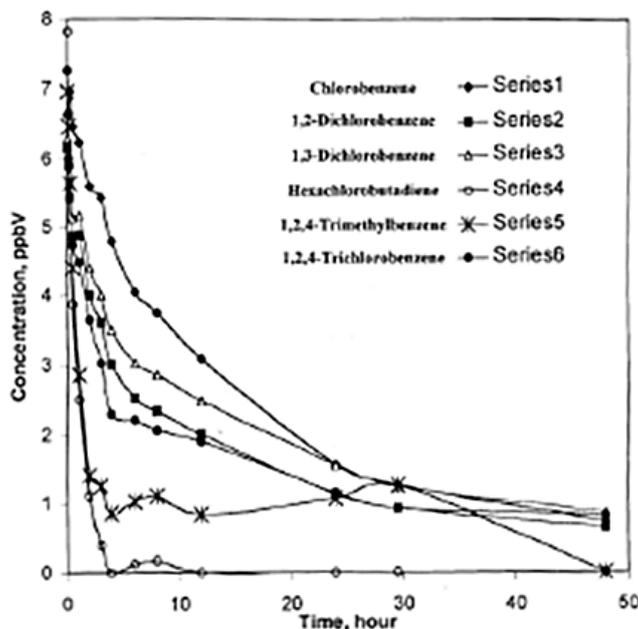


Figure 1
Decomposition
Process of Some
VOCs

Case Study

For Your Perfect Indoor Climate



Key Benefits

- ✓ Air purification removes all three types of serious indoor air pollutant, which can lead to short and long-term ill-health.
- ✓ Banishes unpleasant smells.
- ✓ Flexible, smaller ducting fits into restricted spaces that standard ducting cannot reach.
- ✓ Discreet air outlets blend beautifully into the interior design.

Air Purification Only Option for Luxury London Apartment

The Problem: The owner of this large three bedroom apartment in London's prestigious Park Lane was concerned about the city's poor air quality. She understood how indoor air quality is affected by both indoor and outdoor air pollution. She also understood the potential negative impact poor indoor air quality has on health. As the apartment already had heating and air conditioning, she needed a system to provide air purification only to clean the air. The system also needed to solve the issue of restricted space for ducting.

The Solution: One HE-71 Ingenious Air® Small Duct System with high specification air purification, but no heating or cooling, was installed. Ducting was routed through the floor joists to solve the issue of restricted space. The air handling unit (core of the system) was positioned upside down to supply purified air vertically downwards into the floor ducting. The floor ducting terminates in slotted air outlets installed in the skirting boards. These deliver purified air to every room. In the bathrooms purified air is also delivered via air outlets positioned at high level in the walls.

Follow Up: The Ingenious Air® System gently re-circulates and purifies the indoor air. It removes all three types of serious indoor air pollutant, which can lead to short and long-term ill-health:

1. Airborne toxic volatile organic compounds (VOCs) including nitrous oxide, carbon monoxide, fumes and unpleasant odours from vehicle exhausts.
2. Airborne bacteria and viruses (0.001 microns) that cause infectious illness including influenza, colds, tuberculosis, chickenpox and c.difficile.
3. Airborne allergens including pollen, dust mites, tobacco smoke.

The fan speed control allows for switching between a high speed setting when the apartment is unoccupied and a low speed setting during occupation. At the lower fan speed the full volume of air of the apartment is drawn through the purification unit every four hours or so – i.e. there are approximately six full air changes per day. This increases to approximately one air change per hour during unoccupied times when smells normally build up.

The owner enjoys clean and healthy air. The Ingenious Air Company provides routine planned maintenance twice a year to ensure the air purification maintains optimum effectiveness.

References

Ref 1: The Royal College of Physicians and The Royal College of Paediatrics and Child Health (2016) “Every breath we take: the lifelong impact of air pollution.” Available at: <https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution> [Accessed on: 31/03/2016].

Ref 2: Tan, Dr. CK (2000) “Summary report for air purifier project (model HEPS)” Chemical Engineers Division, Dept. of Analytical and Environmental Chemistry, San Antonio, Texas.

Ref 3: Lawrence, C et al (August 2007) “VOC Levels in a new IVF laboratory with both central and in-laboratory photo-catalytic air purification filters”, Alpha (Scientists in Reproductive Medicine) No. 36.

Ref 4: Chan, Dr. GYS (2004) “Test Report on HEPS Photo-catalytic oxidation air purification system” The Hong Kong Polytechnic University.

Contact Details

Call **+44 1268 544530**

or email **info@ingenious-air.com**

To discuss how the system will benefit your project or for
your **FREE** Quotation



The HEPS also comes in
a portable version. Ask
us for more information.

The Ingenious Air Company is a trading name of Hi-Velocity UK Ltd

The Ingenious Air Company, The Laindon Barn, Dunton Road, Laindon, Essex, SS15 4DB, UK.