Delivering good indoor air quality

through whole building climate control

The importance of good indoor air quality

According to the World Health Organisation (WHO) "Air pollution from both outdoor and indoor sources represents the single largest environmental risk to health globally," and causes seven million deaths a year, worldwide.

In the UK, Public Health England estimates air pollution is responsible for between 28,000 and 36,000 deaths a year, costing the NHS and the private healthcare sector £20bn annually.

With people spending an estimated 90% of their time indoors (and some, such as the elderly, spending even more), indoor air quality is now recognised as a key issue in building design, from homes and offices, to hospitals, schools and factories.

Aside from the long- and short-term physical effects, there is growing evidence that air pollution impacts mental health and may be a factor in conditions such as depression and bipolar disorder. It may also have a detrimental affect on children's learning ability, patient recovery and workforce productivity.

For building owners, poor indoor air quality (and poor indoor environments in general) can hit the bottom line: demands from leaseholders and tenants can result in having to carry out costly remedial works to both the building fabric and M&E systems (from lighting to climate control). This can lead to higher running costs and potentially affect market and rental values.

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The causes of poor indoor air quality

Indoor air quality is defined as the quality of the air in and around a building, particularly in relation to the health and comfort of occupants. It is affected by complex and interlinked factors, due to both outside and inside air pollution.

Sources of outdoor air pollution include road traffic, industrial processes, waste incineration and construction and demolition sites. Pollution includes particulate matter, NO_2, CO and pollen, all of which can be brought into a building through natural or mechanical ventilation and via infiltration through the building fabric.

But there are also pollution sources inside a building, including Volatile Organic Compounds (VOCs) given off by wall and floor coverings, furniture and appliances as they age and degrade; dust, damp and mould; emissions from office equipment and industrial machinery and, of course, occupants themselves, who breathe out CO_2 and can spread colds and viruses.

Whole building HVAC: striking a balance between good indoor air quality and energy efficiency

As energy efficiency standards in building design have risen in recent years, buildings have become more insulated and airtight. This can reduce fresh air circulation, leading to low oxygen levels and increased potential for allergies and odours, as well as the risk of condensation build-up.

The solution? Installing HVAC systems which control temperature, humidity and maintain air quality.

The main focus when designing and specifying HVAC is typically on energy use and efficiency, not least because they attract the highest weighting of all the factors in BREEAM assessments.

However, BREEAM also rewards the use of HVAC that maintains high air indoor quality, by balancing the indoor and outdoor temperature and humidity and preventing ingress of outdoor pollution, while ensuring a supply of fresh air to occupants. Clearly, a balance needs to be struck.

Sources of indoor pollution

From outdoor environment

- Traffic
- Industrial process
- Construction and demolition etc.

From indoor environment

- VOCs
- Dust, damp, mould
- Emissions
- Colds, viruses, CO_2

Ventilation

Fundamentally, ventilation aims to remove stale indoor air and replace it with 'fresh' outdoor air. HVAC systems are designed to extract water vapour, airborne pollutants and odours, controlling humidity and maintaining good indoor air quality, and to minimise the spread of these impurities to other areas of a building.

Systems must also provide 'purge ventilation' to help remove occasionally high concentrations of pollutants and water vapour caused, for example, by food cooking in a kitchen or an accidental water spill.

For larger buildings, ventilation can be supplied by air handling units linked to the indoor units, controlled centrally or by floor, room or zone. For smaller buildings, heat recovery ventilation units can be integrated with the overall climate control system, to supply tempered fresh air to the indoor units.

Energy efficiency

Whole building ventilation systems incorporating heat recovery deliver high levels of efficiency, using waste heat from cooling and refrigeration to heat different areas of a building.

Manufacturers typically claim Seasonal Energy Efficiency Rating (SEER) figures of 3 and 4 for heat recovery systems. However it is possible, under certain conditions, for a system's efficiency ratio to nearly double, when taking into consideration recovered energy. In practice, a SEER in excess of 6 should be possible to achieve on a fairly frequent basis.

Further energy savings can be achieved using features such as variable refrigerant temperature control. This varies the amount of refrigerant flowing through the system and alters the evaporating and condensing temperatures to match demand. Dramatically less power is needed as a result and efficiency rises accordingly.

Why not just open a window?

In the past, increasing fresh air supply was achieved by simply opening a window or a door. However, this can allow the ingress of outdoor pollution and simply may not be feasible in cold weather.

Additionally, windows in many modern buildings cannot be opened, to maintain energy efficiency (and in taller buildings, for safety reasons). Even if they can, opening windows or wedging open a door can have a detrimental effect on an HVAC system's ability to provide a comfortable indoor environment.

Designing ventilation

as part of whole building climate control

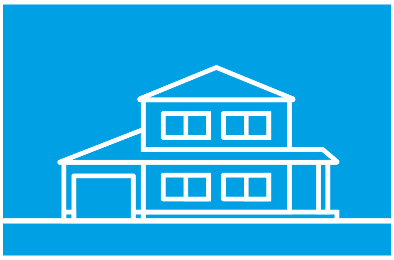
As with any element of HVAC, the design of ventilation, whether as a standalone system or as part of a whole building solution, must meet the requirements of the building's occupants.

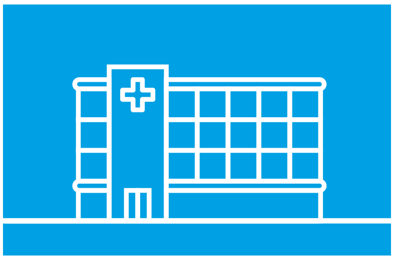
The key factor in designing ventilation is that it must provide sufficient fresh air supply and extraction to minimise moisture build-up (and therefore control mould) and deal with bio-effluents (body odour), as well as to keep exposure to NO_2, CO and VOCs to a minimum.

In the UK, ventilation design is controlled by the Building Regulations Approved Document Part F, which sets out criteria for both homes and 'non-domestic,' primarily offices.

Ventilation also has to comply with a number of British Standards covering energy performance, filters and maintenance. And, as part of HVAC systems, ventilation must comply with Part B (fire safety), Part C (site preparation and resistance to contaminants and moisture), Part E (resistance to the passage of sound), Part L (conservation of fuel and power), Part J (combustion appliances and fuel storage systems) and Part P (electrical safety).

There is a wide range of ventilation guidance available for designers, published by industry bodies including Building Research Establishment, the Chartered Institute of Building Services Engineers and REVHA (the Federation of European Heating, Ventilation and Air Conditioning Associations). Links to some of these documents are provided in the Standards and regulations and Guidance sections of this white paper. The key source of information on Ventilation is CIBSE Document B (Section 2.3) that builds on the advice given in Part F.





Homes

Required ventilation rates for homes are based on the number of bedrooms, from 13 l/s for a one bedroom home, to 29 l/s for a five bedroom property (assuming that two people occupy the main bedroom and one person occupies each of the others). The minimum ventilation rate must not be less than 0.3 l/m^2 of the internal floor area (all storeys).

Part F of the Building Regulations Approved Document also gives rates for intermittent or continuous extract ventilation required in kitchens, utility rooms, bathrooms and WCs. Purge ventilation is also required in every habitable room, which can normally be achieved by opening windows and doors.

Offices

The total air supply and extraction rates for office ventilation (assuming no significant pollutant sources) is 10 l/s/person, based on the assumption that the building has an air permeability of 3 m^3/(h.m^3). This is within the range achieved by most modern, well-designed buildings and is negligible infiltration, compared with the ventilation system capacity.

Intermittent extract ventilation is required for specific areas, including WCs and urinals, printing / photocopying rooms, showers and food and beverage preparation areas. Purge ventilation is also required in each office.

Hospitals and healthcare

Ventilation in healthcare environments must also be designed to Approved Document Part F. Health Technical Memorandum 03-01: **Specialised ventilation for healthcare premises**, published by the Department of Health, also gives general guidance and recommendations for HVAC systems in healthcare buildings.

Obviously, some healthcare environments, such as operating theatres, critical care areas and isolation units, have particular ventilation requirements to prevent the spread of infection and of odours and hazardous materials. For example, air recirculation systems are normally used in clean rooms and ultra-clean operating theatres, where the extracted air is significantly cleaner than the outside supply

Locating ventilation intakes and exhaust outlets

Ventilation intakes must be placed as far away as possible from the main sources of local air pollution. For HVAC systems, this typically means on the roof (unless there are higher-level sources). Alternatively, intakes can be placed on walls, in courtyards and in atria.

Regardless of position, it is important to avoid cross-contamination from boiler flues and exhaust stacks. In fact, exhaust outlets should be placed as far a way as possible, preferably on the roof or at a high level, and downwind of intakes where there is a prevailing wind direction. They should not discharge into courtyards or enclosed spaces and it is recommended that they discharge vertically, to avoid downwash.

Controlling ventilation

Ventilation control is critical for maintaining indoor air quality. Typically, control of ventilation in a whole building HVAC system is integrated with heating and cooling.

Highlighting automated systems switch on and increase ventilation when CO_2 sensors detect specified concentration levels, typically linked to how many people are in the room. If CO_2 levels are perceived to be too high, air quality is maintained by VAV (variable air volume). Ventilation can also be controlled using the same infrared sensors used to adjust temperature in climate control systems that detect room occupancy.

Systems also need to be flexible enough to enable some ventilation units to be switched off (or reduce flow rates) – for example during rush hour – with the system relying on units remote from the pollution source or using recirculated air for a time.

Dealing with noise

Ventilation can be noisy and annoying for both occupants and for people outside a building, so noise should be minimised wherever possible. This can be achieved through design – i.e. by placing units carefully – or by choosing indoor and outdoor units with very low sound power levels and sound insulation – or introducing attenuation.

Filters

Filtration is another important element of ventilation. All HVAC units will be fitted with filters, primarily to keep them free of dust, to ensure good operation and to maintain energy efficiency.

Filters are also fitted to remove particulate matter (PM) from supply air and, in some cases to remove particles where there is a risk of pollution entering the outside atmosphere.

Filter selection is based on the widely-accepted thresholds for PM, published by the World Health Organisation in its **Air Quality Guidelines – Global update 2005**. The recommended annual limits are:

› Annual mean for PM2.5 < 10 μg/m^3

› Annual mean for PM10 < 20 μg/m^3

Until 2018, the standard for filters was BS EN 779: 2012 **Particulate air filters for general ventilation. Determination of the filtration performance.** EN 779 divided particulate air filters into five categories:

› General filters (G1 to G4)

› Medium filters (M5 and M6)

› Fine filters (F7 to F9)

› High-Efficiency Particulate Air (HEPA) filters (H10 to H14)

› Ultra-low particulate air filters (ULPA) (U15 to U17).

General filters capture larger, heavier particles, such as dust; fine filters remove smaller particles – typically the size of bacteria; while HEPA and ULPA filters are used in specialist environments, such as clean rooms and ultra-clean operating theatres.

However, while many guidance documents (for example, those published by CIBSE) still refer to EN 779, it has been superseded by ISO 16980 **Air filters for general ventilation**. The standard uses a filter efficiency classification system, based on the three main size ranges of PM, where ePMx describes the efficiency of an air cleaning device to particles within a range of 0.3 μm to xμm.

Efficiency	Size range (μm)
ePM10	0.3-10
ePM2.5	0.3-2.5
ePM1	0.3-1

Eurovent 4/23 **Selection of EN ISO 16890 Rated air filter classes for general ventilation applications** (2018) gives guidelines on selecting air filters based on the minimum filtration efficiency, depending on outdoor and supply air categories, for a range of buildings, including homes, offices, shopping centres and hospitals. It also gives comparisons between the filter grades in EN 779 and ISO 16890.

Installing, commissioning and servicing of ventilation to maintain good indoor air quality

Installation and commissioning

It is crucial that HVAC systems are installed according to manufacturers' recommendations and commissioned to the final design. Installers have been known to make changes on site – varying piping length, for example – which can have a significant impact on performance, energy efficiency and indoor air quality.

Using (and supervising) an installer approved to install a particular manufacturer's systems is key, as is choosing a company with experience of similar installations.

Maintenance and cleaning of ventilation

Regular maintenance of ventilation is obviously important and should form part of the overall servicing regime for a building's HVAC system. However, cleanliness is of particular importance when dealing with ventilation, as dust and dirt can affect their ability to maintain indoor air quality.

Maintenance should include checking the intake and exhausts for any signs of dirt build-up, pollution or contamination, damage from weather and animals, as well as inspections of ductwork and the indoor units.

BS EN 15780: 2011: **Ventilation for buildings. Ductwork. Cleanliness of ventilation systems** specifies acceptable cleanliness levels for supply, recirculation and extract air, grouped in three classes – Low, Medium and High – depending on building use. So, for example, rooms with intermittent occupancy are classed as Low, whereas a treatment room in a hospital is classed as High.

Dust should be removed from ductwork, particularly around filters, heating and cooling coils and any change of direction in the ducting. Filters should also be cleaned and replaced as necessary. Indoor units should also be cleaned and the dust boxes of those fitted with auto-cleaning systems emptied.

COVID-19

As coronavirus (COVID-19) restrictions become part of our daily reality, concerns have been raised about the role of HVAC in the risk of spreading airborne viruses.

First and foremost, building owners and managers should follow government guidelines. But, as with any airborne contaminants, the risk of potential spread of viruses can be mitigated by ventilation and proper and effective filtration, along with regular cleaning and maintenance of systems.

It is essential that air conditioning systems in buildings where confirmed cases of coronavirus have been diagnosed are cleaned and sterilised according to best practice; it is equally important to do so in buildings with no confirmed cases, as a preventative measure, not only now but as part of ongoing maintenance.

REHVA, the Federation of European Heating, Ventilation and Air Conditioning Associations published guidance in April 2020: **How to operate and use building services in order to prevent the spread of coronavirus disease (COVID-19) virus (SARS-CoV-2) in workplaces.**

The guide gives a number of recommendations for buildings with mechanical heating and ventilation systems. Primarily, the advice for building owners and managers is to supply as much outdoor air as possible, as coronavirus particles can remain suspended in the air for a long time.

While in urban areas, where air pollution is likely to be higher, this may mean more pollution ingress to a building, the view is that mitigating the risk of coronavirus is more important during the pandemic.

This means extending ventilation operation times (and, where possible, keeping ventilation running 24/7), increasing ventilation rates when the building is occupied and only reducing them during 'off-peak times such as at night or at weekends.

In AHU units (as opposed to an AC unit being used in conjunction with a fresh air AHU), REHVA recommends switching air recirculation features off and says it is crucial to ensure systems are properly maintained and leaks are dealt with, to prevent virus particles in extracted air re-entering a building via the air supply, particularly in heat recovery systems.

However, it says there is no need to change filters more regularly; nor is additional cleaning thought to help reduce the risk of room-to-room transmission – normal maintenance procedures can be used, with adequate PPE for service engineers and appropriate safety procedures in place, including switching off systems during filter changes.

Visit https://www.rehva.eu/activities/covid-19-guidance for more information

CIBSE COVID-19 Ventilation Guidance document (V2)

Certification

BREEAM

BREEAM rewards the use of integrated ventilation systems maintaining high air quality. Assessment is split between how designers minimise sources of air pollution, through indoor air quality plans, ventilation and minimising VOC emissions from products (both during and post-construction); and potential to be adapted for natural ventilation.

https://www.breeam.com

Well Building Standard (WELL)

Indoor air quality is one of seven attributes of a building considered by the Well Building Standard (WELL), when measuring the impact on occupant health: air, water, nourishment, light, fitness, comfort and mind. Buildings are scored on a range of criteria, ranging from indoor air quality to how it is monitored and the level of filtration used.

https://www.wellcertified.com/certification/v2/

Allergy UK Seal of Approval

Allergy UK's Seal of Approval is awarded to products that have been independently tested and proven to restrict/reduce/remove allergens from the environment. Approved products include standalone air purifiers, typically for domestic use.

www.allergyuk.org

Standards and regulations

World Health Organisation Air quality guidelines (2005)

Widely accepted as the key air quality guidance for policy makers on reducing the effects on health of air pollution, this document includes guideline values for the four most common air pollutants: particulate matter, ozone, nitrogen dioxide and sulphur dioxide.

https://www.euro.who.int/__data/assets/pdf_file/0005/78638/E90038.pdf

WHO guidelines for indoor air quality – selected pollutants 2010

This document provides guideline values and exposure thresholds for the protection of public health from risks due to a number of chemicals commonly present in indoor air.

https://www.euro.who.int/__data/assets/pdf_file/0009/128169/e94535.pdf

UK Building Regulations – Approved Document F (2010)

Updated in 2013, Approved Document F covers the key requirements specific to building ventilation, including indoor air quality and preventing condensation in domestic and non-domestic buildings.

https://www.planningportal.co.uk/info/200135/approved_documents/68/part_f_-_ventilation

EN ISO 16980 Air filters for general ventilation (2016)

ISO 16980 is the guidance for designing filtration in ventilation systems. It superseded BS EN 779: 2012 Particulate air filters for general ventilation. Determination of the filtration performance in 2018.

https://www.iso.org/obp/ui/#iso:std:iso:16890:-1:ed-1:v1:en

EN 16798-1:2019 Energy performance of buildings – Ventilation for buildings – Part 1: Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics – Module M1-6.

This standard is part of a series, EN 16798, covering the main aspects of building ventilation, from the point of view of energy performance. This standard provides parameters that need to be considered in designing heating, cooling, ventilation and lighting systems to make the energy-efficient, but does not give a design method.

The Workplace (Health, Safety and Welfare) Regulations 1992

Regulation 6 of the Workplace (Health, Safety and Welfare) Regulations states: Effective and suitable provision shall be made to ensure that every enclosed workplace is ventilated by a sufficient quantity of fresh or purified air.

http://www.legislation.gov.uk/uksi/1992/3004/regulation/6/made

BS EN 15780:2011 Ventilation for buildings. Ductwork. Cleanliness of ventilation systems

This European Standard applies to both new and existing ventilation and air conditioning systems and specifies the assessment criteria of cleanliness and cleaning procedures. It applies to systems for human occupancy and not for industrial processes.

https://shop.bsigroup.com/ProductDetail/?pid=000000000030239699

Ecodesign Directive 1253/2014 – Air Handling Units

The Ecodesign directive outlines minimum requirements for heat recovery efficiency, fan efficiency and SFP internal values.

The directive applies to occupied spaces ventilated with outdoor fresh air, process ventilation e.g. heat removal is not covered by the directive.

Non-Residential (NRVU) units are classified under the directive with airflows from 280 l/s onwards.

Bidirectional (BVU) units are those producing an airflow between indoor and outdoor via supply and extract fans.

All BVU products must incorporate heat recovery in the form of Thermal Wheel, Counterflow, Plate or Run Around Coil.

Air recirculation (Mixing) is only permissible if the fresh air content is 10% or less of the total ventilation rate without a separate heat recovery device.

The Specific Fan Power (SFP) is a ratio of power consumed to the amount of air moved by a ventilation system i.e. W/l/s or kW/m^3/s. SFP is greatly influenced by system resistance and reducing by design is an effective method of achieving the requirements of Part L2A.

The requirements are defined by application and differentiate between a new build and an existing building.

Central System – A supply and extract system serving the whole or major parts of a building.

Zonal System – A system which serves a group of rooms forming part of a building (i.e. a zone where ducting is required).

Local Unit – An unducted ventilation unit serving a single area.

Guidance

BRE: Ensuring good indoor air quality in buildings

Published in March 2019, the BRE guide gives an overview of the issues of indoor air quality, standards and guidelines, as well as strategies for improving indoor air quality in buildings, including those with HVAC systems.

https://www.bregroup.com/bretrust/wp-content/uploads/sites/12/2019/03/Ensuring-Good-IAQ-in-Buildings-Trust-report_compressed-2.pdf

CIBSE Guide B2: Ventilation and ductwork (2016)

This is one of a suite of guides covering all aspects of the design of HVAC systems. This volume focuses specifically on ventilation but should be used in conjunction with the other guidance documents. Specific guidance is given for ventilation in buildings with specific uses, such as shops, museums and hotels. Note the guide refers to BS EN 779 and has not been updated to meet ISO 16980.

https://www.cibse.org/knowledge/knowledge-items/detail?id=a0q20000008JuB7AAK

CIBSE TM21 Minimising pollution at air intakes

This technical memorandum sets out guidance on the nature and characteristics of pollutants in the outdoor air and how these may impact on indoor air quality. In particular, it provides designers with the information that will help in locating ventilation inlets to minimise cross contamination from a range of polluting sources.

https://www.cibse.org/knowledge/knowledge-items/detail?id=a0q20000008I7eVAAS

CIBSE TM26 Hygienic maintenance of office ventilation ductwork

The publication provides practical guidance to building managers on the proper procedures for maintaining ductwork systems in a safe and effective state.

https://www.cibse.org/knowledge/knowledge-items/detail?id=a0q20000008I7efAAC

Eurovent 4/23 Selection of EN ISO 16890 Rated air filter classes for general ventilation applications (2018)

This document provides guidelines on selecting air filters, outlining the differences between EN779 and EN ISO 16980 filter classifications. It gives recommendations for selecting the minimum filtration efficiency based on outdoor air and supply air in a range of buildings, including homes, offices, shopping centres and hospitals.

https://eurovent.eu/sites/default/files/field/file/Eurovent%20REC%204-23%20-%20Selection%20of%20EN%20ISO%2016890%20rated%20air%20filter%20classes%20-%202017.pdf

Health Technical Memorandum 03-01: Specialised ventilation for healthcare premises (2007)

Published by the Department of Health, this memorandum is in two parts: A: Design and validation and B: Operational management and performance verification. It gives general guidance and recommendations for HVAC systems in healthcare buildings, including specialised ventilation.

https://www.gov.uk/government/publications/guidance-on-specialised-ventilation-for-healthcare-premises-parts-a-and-b

Non-Domestic Building Building Servies Compliance Guide – (2013 For Use In England), (2015 For Use In Scotland).

These guide provides detailed guidance for the installation of fixed building services in new and existing non-domestic buildings to help with the energy efficiency requirements of the Building Regulations.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/453973/non_domestic_building_services_compliance_guide.pdf

https://www.gov.scot/publications/building-standards-list-of-guidance/pages/key-supporting-technical-guidance/

Daikin

Delivering indoor air quality with energy-efficiency and comfort

From small heat recovery systems to large air handling units, Daikin provides a variety of ventilation solutions to deliver a fresh, healthy and comfortable environment for residential, commercial and industrial spaces. Heat recovery is standard, with units recovering up to 81% of outgoing heat.

Daikin offers a wide range of solutions to cover almost any application, starting from as low as 0.04 m^3/s to 7.2 m^3/s.

Case studies

Smith & Wollensky, London

Indoor air quality was a key element of creating a welcoming and comfortable environment for diners at this central London restaurant. Seven Daikin VAM heat reclaim ventilation units, capable of supplying up to 13,000 m^3 of tempered fresh air into the dining area every hour, were part of the VRV heat recovery system installed to meet a range of needs from the kitchen to cold storage.

The VAM units' heat reclaim facility helps to minimise indoor/outdoor temperature differentials, avoiding excessive loads on the VRV units. CO_2 sensors continuously monitor the airflow to ensure the VAM units operate as economically as possible, delivering only the volumes of fresh air required to maintain indoor air quality.

The Jungle, Warrington

A conditioned ventilation system providing plenty of fresh air was more appropriate than a conventional air conditioning system for the Jungle: a popular children's soft play centre in Warrington. A Daikin D-AHU Modular R air handling unit (AHU) delivers a supply and extract air volume of 2.16 m^3/s. Its rotary wheel heat recovery device exchanges heat between exhaust and fresh streams – tempering the incoming fresh air to ensure the most efficient use of two air cooled condensing units. Air is ducted to outlet grilles on both levels of the 11,000 sq.ft building, with a return flow via extraction points on the ground floor.

Montcalm Hotel, London

Comfort and indoor air quality, as well as energy efficiency, were important considerations for the owners of the new five star Montcalm Hotel in central London. Public areas are ventilated by 15 Daikin VKM heat reclaim ventilation units. With a combined capacity of 13,350 m^3 of fresh air per hour, these units optimise the balance between indoor and outdoor temperatures and humidity levels. Guest rooms are ventilated by a central air handling unit feeding ducted fan coil units, with return flow via bathroom vents.

Products

Auto-cleaning duct

Daikin's auto-cleaning duct can be fitted to VRV and Split air conditioning units to collect debris in a dust box that can be simply emptied using a standard vacuum cleaner.

Designed specifically for hotels, offices, restaurants, retail and residential applications, the automated cleaning accessory prevents dust formation within indoor ducted units by keeping the filter consistently clean thanks to an automated filter cleaning system. The auto-cleaning duct is easy to install and offers lower maintenance and running costs, while providing a 20% energy saving.

Models with a dehumidifier (VKM) or without (VAM)

Daikin Heat Reclaim Ventilation (HRV) units recover heat energy lost through ventilation and controls room temperature changes caused by ventilation, maintaining comfort and air quality. They can also reduce the load on the climate control system, conserving energy. HRV units can be integrated into a VRV or Sky Air system, allowing central control of all aspects of the indoor climate. The current line-up includes models with (VKM), or without, a dehumidifier (VAM).

Heat Recovery Ventilation Air Handling Units (AHUs)

Daikin offers a wide range of air handling units for medium-sized to large-scale applications. The standard range of different sized units can be customised to fit available space, or systems can be tailored to meet a building's needs. Air handling units can be integrated into a whole building solution by connecting them to any Daikin VRV or ERQ inverter condensing unit.

Air purifiers

Daikin's standalone streamer technology air purifiers supply fresh air and minimise asthma and allergy symptoms by removing dust particles and pollen from the air, as well as reducing odours and filtering out airborne bacteria and viruses. Awarded Allergy UK's Seal of Approval, air is cleaned as it passes through a prefilter, plasma ionizer, electrostatic dust collection filter, a titanium apatite filter and a deodorising catalyst filter.

CERTIFIED
ISO 9001:2015

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