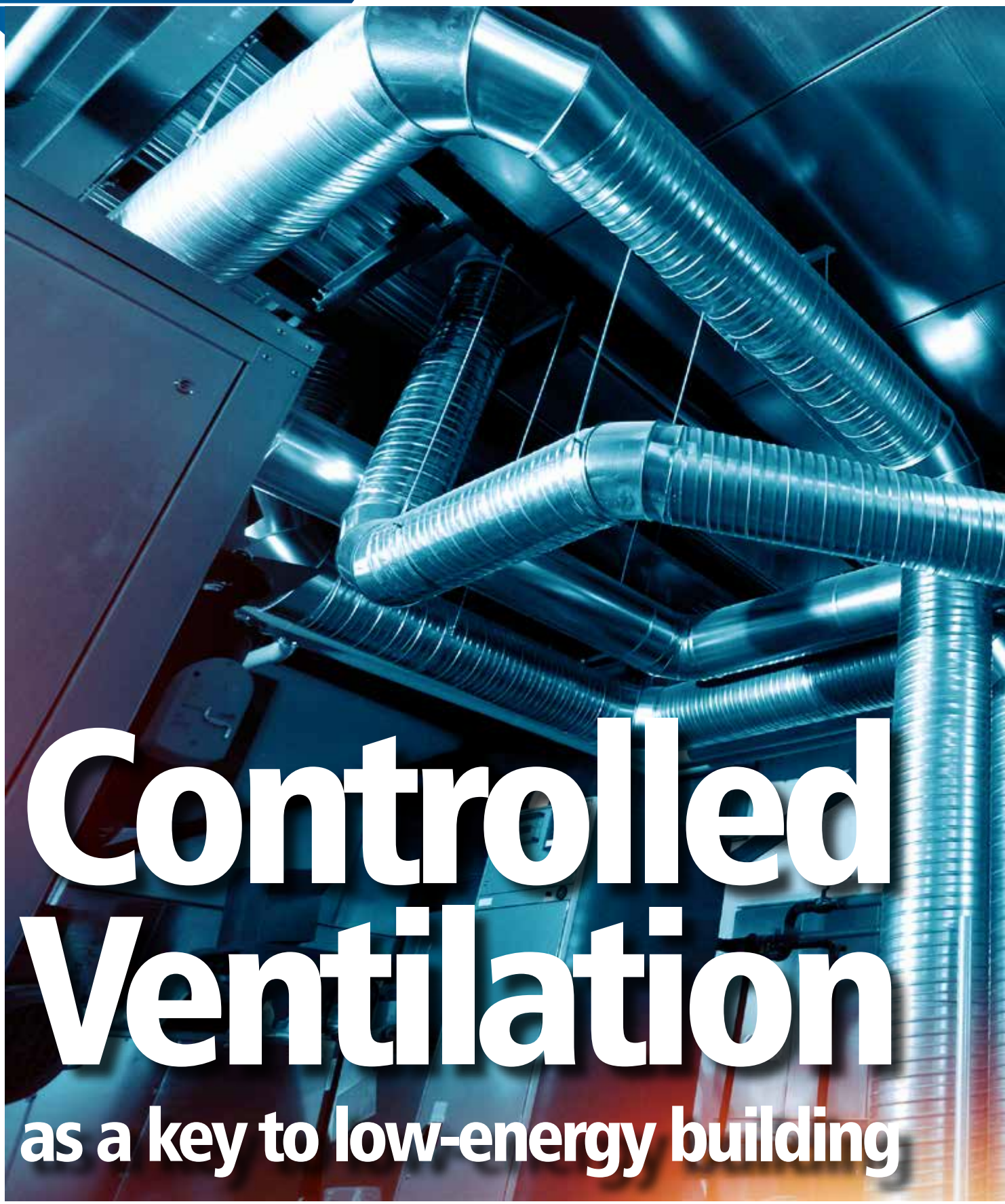


Controlled Ventilation

as a key to low-energy building

Mechanical ventilation heat recovery (MVHR) systems are getting more popular due to increasing interest in the better-built environment and healthy homes. The healthy building is the one that is airtight and adequately ventilated what improve its energy efficiency and prevents dampness. Mechanical ventilation heat recovery systems are currently the standard ventilation solution for new builds and are an essential part of Passivhaus and low energy building design.

MVHR system is the smart ventilation technology where a whole house ventilation system both supplies and extracts air throughout the property. Such solution offers a balanced low energy ventilation for new builds and re-uses up to 95% of the heat that could be lost. The heat from the extracted air is going through a heat exchanger located in the heat recovery unit and then reused and supplied to rooms as the filtered air. The Heat Recovery Unit runs continuously on trickle and can and is boosted when higher rates of ventilation are required, e.g. bathing, cooking. In warmer months a summer bypass function ensures that the dwelling is well ventilated and receive fresh filtered air. However, the heat recovery process is intermittently switched off.

The Building Regulations with regards to the MVHR system are set out in Approved Document F 2010. What's more, the Domestic Ventilation Compliance Guide is an associated document to Approved Document F 2010 and has been introduced to support the transition of ventilation to become a controlled building service.

MVHR systems allow for the sufficient ventila-

Table 5.1a **Extract ventilation rates**

Room	Intermittent extract	Continuous extract	
	Minimum rate	Minimum high rate	Minimum low rate
Kitchen	30 l/s adjacent to hob; or 60 l/s elsewhere	13 l/s	Total extract rate should be at least the ***whole dwelling ventilation*** rate given in Table 5.1b
Utility room	30 l/s	8 l/s	
Bathroom	15 l/s	8 l/s	
Sanitary accommodation	6 l/s	6 l/s	

Table 5.1b **Whole dwelling ventilation rates**

	Number of bedrooms in dwelling				
	1	2	3	4	5
Whole dwelling ventilation rate [a, b] (l/s)	13	17	21	25	29

Notes:

a. In addition, the minimum ventilation rate should be not less than 0.3 l/s per m^2 of internal floor area. (This includes all floors, e.g. for a two-storey building add the ground and first floor areas.)

b. This is based on two occupants in the main bedroom and a single occupant in all other bedrooms. This should be used as the default value. If a greater level of occupancy is expected add 4 l/s per occupant.

Table source: Approved Document F 2010

tion of the building and minimising the loss of indoor heat. It is achieved by use of heat exchanged driven by two low energy fans. The incoming air passes the outgoing air through the heat exchanger (without being mixed) so that energy is extracted from the outgoing air and is transferred into the incoming air.

MVHR systems are often designed, quoted and installed by the supplier. The prepared 3D drawings for the system and ductwork allow the installation to be prepared by the builder or the qualified engineer. Also, the 3D plan of MVHR system enables to check the performance of the system regarding noise, pressure, balance and airflows. MVHR systems ensure the excellent air quality.

To choose the proper system for your building needs the airflow rates will have to be calculated, so it is essential to give the number of bedrooms, floor area and a number of occupants.

The proper design of the system is vital to ensure its efficiency. It is recommended to plan it as soon as possible during the project works so it can correspond to the structural elements of the building or routs for services. Moreover, it has to work well with more compatible services like trickle vents, air bricks, letter boxes or cat flaps. Appliances such as log burners or flue-less gas products, extract fans in the bathrooms, kitchen cooker hoods or micro-exhaust air heat pumps. Often manufacturer or supplier provides detailed drawings during the quotation stage. The number of appliances or services that corresponds to the MVHR system makes it best for the new builds and most costly for retrofits.

Moreover, the correct design of the MVHR system is vital to avoid the condensation within the system which could cause damage to ductwork, the unit or the building fabric. Nowadays, the MVHR systems are designed with the silencers to lower the possible noise. Maintenance of the system is not expensive and consists of the

BENEFITS OF MVHR SYSTEMS:

- Constant removal of condensation and indoor pollutants
- Tool to meet requirements of the Dwelling Emission Rate required in SAP and reduction of the carbon footprint of the property
- Healthy benefits for allergy or asthma sufferers thanks to the constant supply of fresh filtered air
- Recovery of the heat that otherwise would have been lost.
- Low noise, non-intrusive ventilation system

inspection of the system, check for debris and the exchange and clean of filters.

MVHR system is a whole house ventilation system that both supplies and extracts air throughout the property. It offers a balanced low energy ventilation solution for new dwellings and re-uses up to 95% of the heat that would have otherwise have been lost.

MVHR system consists of ducting, units and air valves.

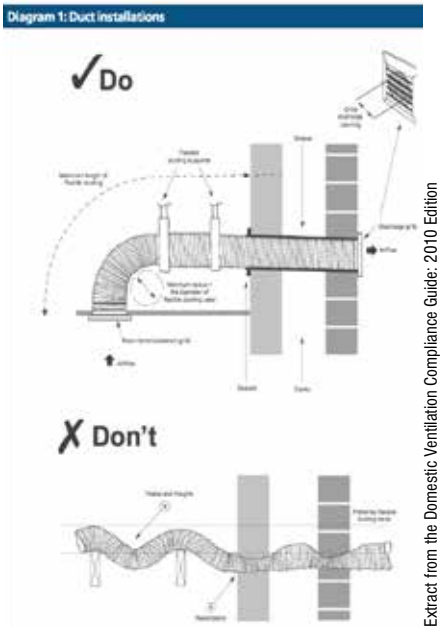
The well-designed high-quality ducting system is critical to the efficiency of an MVHR system. There are two types of the duct layouts like branch types and radial types. These models have rigid large bore ducts connecting the heat exchange unit with the outside of the property. To minimise the risk of condensation, ducts should be short and insulated. Insulation of ducts can be in the form of foiled back mineral wool or cell foam wrap.

Branch duct layout- it is the layout with the main central duct and branches going to different rooms. Ducts diameter varies between 100mm and 200mm. One branch layout will distribute fresh air to rooms while the second branch network will draw air from the humid areas like kitchen or bathroom. Both systems have to be balanced with the similar number of terminals on each network. The so-called cross talk silencers are fitted where two rooms are connected to the same network to minimise the noise levels. Each room also has terminals to balance the right amount of air to each room.

Radial duct layout- it is the layout where narrower ducts 75mm and 92mm all coming from a central manifold. Radial ducts are in longer lengths of up to 40m or 50m. The system is balanced at the manifold to deliver the right amount of air to each room. It is different to branch duct system as it does not have the adjustable terminal in each room. Moreover, radial duct systems do not require silencers fitted as the noise levels are much lower.

The installation of the ductwork should be faultless to ensure its proper working, increasing the energy efficiency of the MVHR unit, reducing energy losses from the system itself, providing good air quality and long-term performance with low noise levels.

Diagram 1: Duct installations



Extract from the Domestic Ventilation Compliance Guide: 2010 Edition

DUCTWORK INSTALLATION TIPS

- Install fan unit with the fixings provided by the manufacturer.
- The hole for the fan unit should be cut to the minimum required size.
- The performance of the MVHR depends on the efficient air distribution.
- Only ducts in sizes designed by the specialist should be used.
- Ducting should be insulated where it pass through unheated areas
- Ducts should be supported in intervals not exceeding 600mm
- All ducts connection should be sealed

Heat exchange unit is the most significant part of the MVHR system. Its size varies from the small shoebox size to the size of a fridge. The MVHR system design has to take into account the additional free space required next to the unit to allow for the installation of ducts and insulation and a unit maintenance. Due to its large size, it is common to place the heat exchange unit in the loft, an airing cupboard or a utility room.

How much does it cost to install mechanical ventilation?

The cost associated with the installation of the MVHR in the new builds or retrofitting ventilation in the existing building includes the cost of the system design for the particular building, cost of materials and installation.

The approximate costs for the average-sized UK home with the high quality MVHR unit and ducting-designed, installed and commissioned:

- £1000 +VAT - design
- £3,200 +VAT - MVHR unit
- £3,600 +VAT - ducting
- £3,000 +VAT - installation
- £800 +VAT - commissioning

The approximate total cost of £11,600 +VAT is for the modern high-class system providing healthy, fresh and filtered air in the house. The cost of running the MVHR is approximately £90 per annum in electricity, while the savings in heating reach up to £1000, with the payback on the investment into MVHR system within 15 years or less.