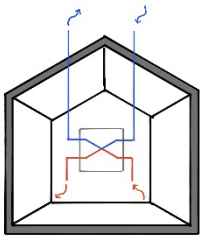
Powell Dobson
PassivHaus
Papers

Series 1_Paper 5_**Mechanical Ventilation Heat Recovery**

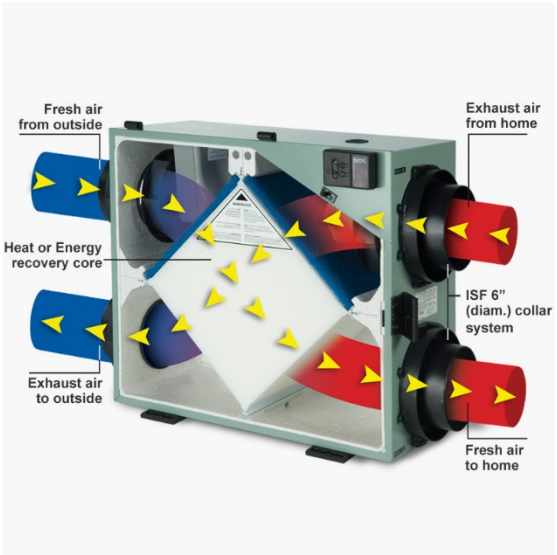


Time to talk about mechanical ventilation heat recovery. MVHR for short.

Why do we need it? There are two key reasons that an MVHR is vital for a PassivHaus. The first is that we go to a lot of trouble ensuring energy stays within the building fabric, therefore it doesn't make sense to allow the energy to simply escape through a standard extract grille in the bathroom. The second key reason is that due to the buildings airtightness performance, we need to ensure that a nice steady flow of fresh air is available to the building users, as the process of natural leakage and infiltration through the fabric will not be happening.

We need to ventilate to control humidity (remove water vapour – drying your socks!), remove pollutants such as CO^2 and VOC's and remove odours. As we ideally don't want to open windows (See Paper 4 on Triple Glazing) we need to keep things civilised inside, and occupants happy and healthy, so this type of system is vital for providing the internal conditions required.

The MVHR also incorporates a filtration system (F7 grade). These removable filters extract pollen and dust, meaning the internal conditions are far superior to the conventional home. I suffered from Asthma as a child, and hayfever in teenage years, but once my parents moved into their low energy home with an MVHR, my symptoms vanished. The filters need to be cleaned every 6 months or so as a rough guide, some just needing a quick hoover.



How does it work? Clean, fresh air is pulled into the building from outside, but before it is circulated around the house, this fresh air is passed over a heat exchanger. At the same time, warm stale air extracted from kitchens and bathrooms is also fed through the same heat exchanger. This allows the energy (In the form of heat) to be passed from the 'old' air to the 'new' air.

The system works continuously, on a steady low fan speed. Controls are kept simple, typically with a 3 fan speed controller, that allows the user to 'boost' the flow rates after someone takes a shower for example, or turns the system onto a trickle speed, if they were to go on holiday.

How big are they and where do they go? On our most recent certified project, we have opted for a 'Brink Flair 325' which is 750mm wide and 560mm deep. They are very capable of eating up a cupboard, especially when you allow for the 4 ducts which raise out of the top.

It is always a good idea to keep the MVHR unit within the thermal fabric. Ideally the unit will sit on an external wall, meaning the duct run lengths to outside are kept to a minimum, as although these ducts are highly

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insulated, they do allow some energy to escape. The shorter the length, the less surface area for energy to escape from. Working alongside this, it is also a wise idea to site the MVHR somewhere that allows for an efficient duct run. The shorter the duct runs, the lower the pressure drop and the more efficient the unit can run. The layout of the building is vital for helping achieve this, keeping bathrooms and kitchens close together is a good idea, as the extract duct can feed two rooms with very little travel.

The efficiency of some MVHR units is very impressive, achieving in the region of 90% in some configurations, as explained above. To be a PassivHaus, the minimum acceptable efficiency of the MVHR unit is 75%.

Duct runs and acoustics. To get the supply and extract air around the building, we have to design an efficient network of ducts and grilles. The ducts can be rigid or semi rigid. There isn't a right or wrong way to go with these, they have pros and cons to consider, such as flow rates, acoustics, flexibility of install and of course costs. Each project is assessed, and the most appropriate duct type is used to suit the project.

Cross talk attenuators are also included within these duct runs. These are vital for stopping noise travelling from one room to another.

Supply and extract terminals sit at the end of the duct runs and are visible to the building users. Below are some images of example products, which we used on our latest certified PassivHaus units at Mulberry Park, Bath. The terminals have an adjustable plate, which is manipulated to ensure the flow rates calculated using the PHPP software are achieved in each room. This is all completed during the commissioning at the end of the project. Care should be taken not to 'bump' these terminals, as this may upset the balance of the system slightly, and reduce efficiencies.

Valve for extract air
Lindab KIR

Designed for wall or ceiling mounting.

Bayonet holders connect to socket VRGU, VRGL, or VRGM.

Valve for supply air (Living Room)
Lindab KSU

Designed for ceiling mounting. Equipped with a removable blanking-off sector plate for preventing the air flow in a desired direction.

Bayonet holders connect to socket VRGU, VRGL or VRGM.

As with all these papers, it is hard to keep the information short and succinct but hopefully this has given you a nice insight into the world of MVHR.

Next week: Series 1_Paper 6_**Thermal bridging**

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We can't just consume our way to a more sustainable world.