

The Passivhaus Equivalent Standard

Ventilation and Overheating

Workshop 5 Notes



Built
Environment
—
Smarter
Transformation

5th December 2023

WORKSHOP BREAKOUT - VENTILATION AND OVERHEATING
WORKSHOP ACTIVITY

1. Discuss and compare the ventilation technical requirements as set by Passivhaus and those in the current Scottish Building Standards Technical Handbooks for domestic and non-domestic buildings.
2. Discuss and compare the overheating technical requirements as set by Passivhaus and those in the current Scottish Building Standards Technical Handbooks for domestic and non-domestic buildings.
3. To identify any unintended consequences of targeting a certain ventilation solution.
4. What does good and best practice currently look like in Scotland for the design, installation and commissioning of ventilation systems in buildings?
5. Discuss expanding the use of CO2 monitors to other rooms such as living rooms, where interaction may be more likely and would potentially increase occupant involvement with the ventilation system to help maintain good indoor air quality and environment.
6. Discuss what information is provided to occupants on the ventilation strategy for their dwelling, how it works and what maintenance will be required so it continues to function as intended.

Workshop Feedback

1. **Discuss and compare the ventilation technical requirements as set by Passivhaus and those in the current Scottish Building Standards Technical Handbooks for domestic and non-domestic buildings.**

Challenge is that Air Tightness is assessed differently between PHPP & SAP - difficult to understand like for like

Our current Air Test Results for the last 2 years is around 3.6 for standard 2 storey domestic housing. (Approx 2000 units)

Installation and commissioning are different between current & PH standards meaning lack of training and understanding between the 2

PH is in line with Cibse guidance which both reference BSEN13779 - best practice in terms of ventilation rates to mitigate health issues

In domestic PH the rules for design are quite straight forward i.e. once done right its quite easy to repeat/ scale up. Half measures is where the problems arise

Our average Air Tightness for current building reg homes over the past 2 years is around 4.5 (1000 homes)

We currently use a whole house ventilation strategy as per Part 'F' in England (undercuts to doors) based on dMEV & cMEV systems providing an alternative means of compliance. This has full Scottish Type Approval across 32 local authorities

We test houses when completely empty before people move in. Once they move in the actual airtightness could change, from the as designed

Technical standards Domestic-references BRE 398 for 'guidance' on mechanical ventilation systems which is 30 years old and quite basic

MVHR technology is advancing capable of resolving some of the technical concerns i.e. self-balancing/ volume control to compensate for filter contaminants (to a degree)

Our 2023 Building Regulation Homes will utilise DMEV

PH requires higher design, installation and commissioning requirements than the Technical Handbook

We are trained and work to PH and ADF. Optimising the MVHR system on a case-by-case basis. Using knowledge to enhance the whole dwelling system without enhancing the cost. A system that provides best value for money not simply ticking the box

Scottish Technical Standards are running far behind best practice from the professional associations (a legacy of not listening to them) and from overseas, so it's not surprising the industry is kicking back, but we must catch up or we condemn people to further poverty and ill health caused by poor buildings

Technical handbook requirements for MV relies on an outdated standard (BRE Digest 398: 1994)

Current regs accommodate MVHR and could be expanded to align with the PH requirements/ standards for PH. All need to be aligned with airtightness targets which will naturally need to go deeper if we are to align more closely with PH Standard

MVHR triggered under current regs by airtightness thresholds lower than $3\text{m}^3/\text{hr.m}^2@50\text{Pa}$. PH standard sets MVHR as mandatory requirement with 75% efficiency

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ventilation is key but we don't need to adopt passive house standards, we can set performance requirements

Passivhaus certifications restricts products

Passivhaus represents a good proven proportionate level of ventilation requirements

There is Scottish ventilation standards already in place and can be used

How would you meet Passivhaus levels of energy demand without heat recovery?

2. Gaps in understanding at design stage - where is the design guidance

3. Discuss and compare the overheating technical requirements as set by Passivhaus and those in the current Scottish Building Standards Technical Handbooks for domestic and non-domestic buildings.

We are looking at overheating risks as part of our new 2023 specified homes and currently don't have any homes that appear at risk across Scotland

Has there been any long-term monitoring of privately owned homes in Scotland? This would be very useful

The PH methodology enables the integration of avoiding overheating principle during the design process. It's not particularly onerous to satisfy (domestic at least) but ensures its integrated. The building standards has resulted in a huge number of lightweight buildings with overheating issues as it has not featured.

USE Cibse tm25 overheating standards no need for another standard

TM59 methodology is most current and should be used. We shouldn't deviate and have additional variations to this stipulated though standards/regulations

PH sets a risk profile based on model but defers to TM59 (domestic) or TM52 (non-res) model

PH homes have been demonstrated through POE to weather summer overheating well - insulated fabric acts as a battery for better controlled indoor environment

MVHR helps with bypass in PH homes during summer months

Measures and units used to define overheating will be key

TM59 beneficial for more insight into extent and configuration of shading.

4. To identify any unintended consequences of targeting a certain ventilation solution.

Natural ventilation leads to cold, damp and expensive to heat homes, leading to health issues and fabric problems

Natural ventilation and intermittent/ dMEV systems lead to fabric repairs costs

dMVE and natural ventilation rely heavily on the input of building users

The performance of dMEV and natural ventilation depend on multiple parameters, including floor-plan layouts, curtains, blinds, trickle vents, stack effects, etc. This means that they generally under-perform

Trade-offs with embodied energy for different high-performance solutions need to be considered (assuming that legislation is still moving forward)

Poor technical requirements for NV and MV set by BR lead to unintended consequences and expensive repairs

We run the risk of creating super tight homes that require the intervention/knowledge of users. If the system is ignored through subsequent home ownership, then it will cause issues

Focusing on MVHR risks denigrating naturally passive solutions - However, better as they are, that would mean even bigger changes to design practices, and the industry is kicking back on what are basic changes

Embodied carbon of MVHR increases significantly for little operational carbon saving in return

MVHR solutions are not mature yet for mainstream uses, MVHR has a limited benefit on reducing operational heat, as this is so small anyway

Poor quality installation results in performance gaps and under/over performance of the system / home

Costs to customer of replacing MVHR after 10years vs replacing extract only.

Issue is Supply chain capability, design and flexibility

Occupant behaviour is key to ventilation and opening windows is often a desirable thing

Lack of trades and competent installers

Commissioning and installation can be improved on all ventilation system, they don't just need passive house

Passivhaus MVHR provides a comfort standard that you won't get with other ventilation systems e.g. dMEV. Supply air at minimum 16.5 degrees, more consistent air temperatures

Risk Factor- How do we design buildings holistically. Layout to MVHR

5. What does good and best practice currently look like in Scotland for the design, installation and commissioning of ventilation systems in buildings?

Opening windows, purge and DMEV systems are in common use and performing in the main well

PH standard, LETI, AECB all recommend the use of MVHR

Really this comes down to competency of the installer. There is often a gap between best practice design, and what is installed to implement that design. Scotland's training systems need to improve to improve the quality of the workforce. PH quality standards and testing will also help to get best practice as built

Currently many natural ventilation and intermittent extract fan systems fitted with no issues. do we need to make the jump from this to full MVHR?

Good Practice is being designed, approved and installed/commissioned in accordance with the current standards

Issues with all systems - we need better designers, installers, etc for all ventilation systems.

6. Discuss expanding the use of CO2 monitors to other rooms such as living rooms, where interaction may be more likely and would potentially increase occupant involvement with the ventilation system to help maintain good indoor air quality and environment.

I would agree with additional monitors in all bedrooms and main habitable rooms to help identify poor air quality

Arming homeowners with data on their home is very important

monitors can be useful however it is better to design out the risk in the first place?

Homes of the future should have more sensors and smart data collection

Most people don't understand what their CO2 monitor does or how they should interact with it. Adding more of them won't change that, education is required

Monitoring and data collection of any kind is good. Just need to be careful the homes don't become overrun with technology and services.

Monitors and guidance on what to do at different CO2 levels important. MVHR would alleviate reliance on this due to constant supply & extract

MVHR makes controlling CO2 easier for residents – you can run boost on a timer

Do people understand what the CO2 monitor is doing, once people understand they might react to them better. Might be desirable to install in all bedrooms

There is no recognised product standard for CO2 monitoring

Demand controlled ventilation by means of CO2 sensors is already widely used in non-domestic settings particularly in Education sector, therefore don't see why this can't be introduced across the board if MVHR is mandated and makes sense in terms of maintaining good IAQ.

7. Discuss what information is provided to occupants on the ventilation strategy for their dwelling, how it works and what maintenance will be required so it continues to function as intended.

We host an information gathering meeting with our customers and explain/demonstrate the use of all systems in the dwelling.

We can provide handover information but how do we ensure this is done for future owners? Can handover packs be legislated?

We've seen a development in the dissemination into digital media with QR codes on systems in houses as everyone now defaults to their phone for info

We need to reframe Home Information Packs as Manuals (I gather BSD are considering this). It's amazing that people are used to getting a manual with a car but not when they buy a home. Similar to car industry - house logbook should be mandated

Systems need to be fit and forget and simple to use and maintain

Customers need all the relevant information on how to use their home. But systems shouldn't be overly complicated that consumer can't use them

A "cheat sheet" should be created that explains to the occupier on how to operate, understand and maintain their ventilation system; can be included in a homeowner handover pack

More info needed for tenants/ owners at handover and at change in tenancies, more info currently given for operation of a new washing machine than a new home

Development of online guidance, YouTube videos etc to make more accessible

Comfort and user variance/ how people use space is important to understand

The challenge is all types of buildings have different requirements

We need to embrace tech for key info RFID tags etc in every house

Ensure follow up in 6 months' time to make sure things are still working as they should. Can this be digitised

	<p>This is where non-domestic buildings will probably be significantly different in terms of the level of information provided and Building Logbooks. Small modular/portable buildings, however, may only come with simple brochure explaining the basics of operation and maintenance will be carried out as part of a service package</p>
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General Comments:

Over 10 years ago my team presented evidence that dwellings in the central belt were overheating (from monitoring properties) to Scottish Government, but we were told 'buildings don't overheat in Scotland'. Is it any surprise that we are so far behind?

We find the selection of ventilation system dictates the level of performance in airtightness as people look for the cheapest solution. This means we have a potential health issue with current domestic regs as high levels of airtightness may already be achieved in certain rooms and the leakage is induced intentionally in some areas so that the dMEV can be used

If electricity goes off all ventilations systems will stop working. In Affordable Housing Remote monitoring can mitigate this

If we don't start building in Air Tightness & MVHR on new build asap, it will always be difficult and expensive to retrofit

Technology why is there not the uptake in our homes as we do with every other part of our lives, such as hive

Concern that the new PH equivalent may outlaw any other system e.g. passive systems (any other options)

Regulations need to be based on outcomes not prescriptive in how you achieve those outcomes

Gap between industry and where we are – considerable

Quality assurance not required at present to commission ventilation in domestic buildings for Completion Certificate. Compliance Plan approach needs to be evidenced (set targets) to obtain Certificate.