

MVHR design

Brian Singleton, ADM System





Independent Heat Recovery
Ventilation Specialists

Building Airtight? Ventilate Right

The Importance of MVHR

Brian Singleton

ADM Systems

Relax!

ADM have all your heat recovery
ventilation needs covered!

Design | Supply | Installation | Service | Spares

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Who are ADM Systems?

- One of the pioneers in heat recovery ventilation - core competence since the early 1990s
- Completely independent not limited to any one manufacturers product range
- Select from a range of SAP Appendix Q products including *Passive House* approved
- Services include full CAD design, supply, installation, technical support commissioning and balancing and maintenance
- Network of UK based NIC/EIC accredited ventilation installers

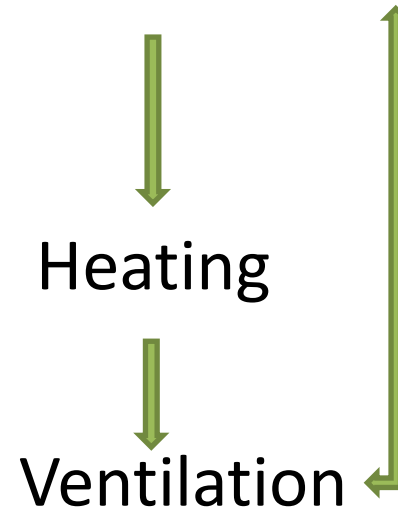


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Key components when considering the thermal strategy for your build

Fabric First, Insulation, Air Tightness 10 v 0.6



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Why is ventilation a key consideration in the thermal strategy of a house?

- In an airtight house up to **35% of total heat loss** can be contributed by ventilation
- It's a requirement of Part F and Part L of the Building Regulations for England & Wales, or Scottish Domestic Technical Handbook Section 3.14
- Indoor Air Quality and Condensation Control (we spend 90% of our time indoors)



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Non MVHR Extract Only Options 2022 Regulations



Opening windows
Does not satisfy
Building Regulations
(Summer Purge only)



**Intermittent
Extract fans and
trickle ventilators.**
**Only suitable for
less airtight
properties**



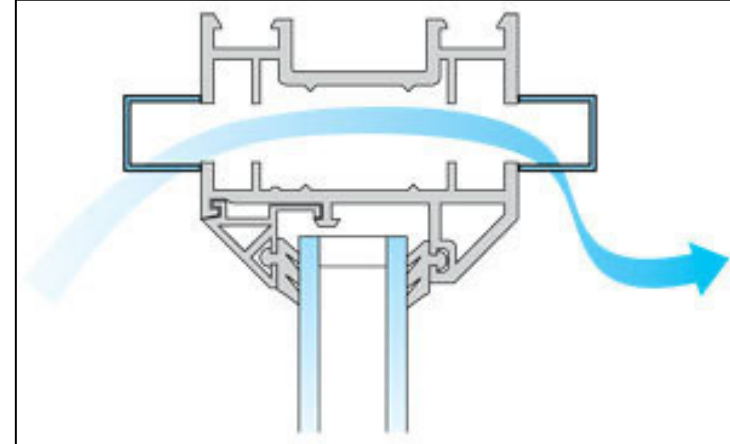
**Continuous Extract
(MEV or dMEV) and
trickle ventilators**

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Extract Only Options

- Extract fans Passive Stack and Central Extraction approaches all require **trickle vents in windows**
- Cold draughts make us feel less comfortable (wind chill)
- Tendency is to turn up heating to compensate



Trickle Ventilation Requirements for Ventilation Strategy using Extraction only

- Based on 200m² Property with 4 Beds Lounge Study and Dining,
- Section 3.14 Scottish Regulations 134,000 mm² overall
- Part F England and Wales 92,000mm² overall Intermittent Fans
- Part F England and Wales 32,000mm² overall Continuous Fans

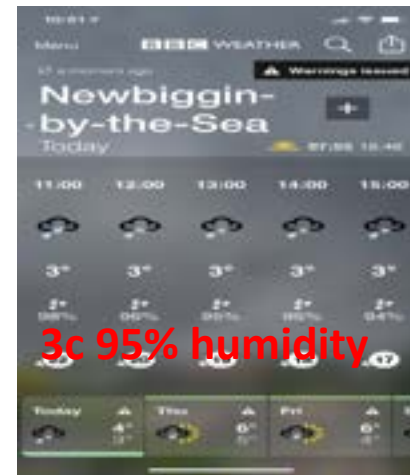
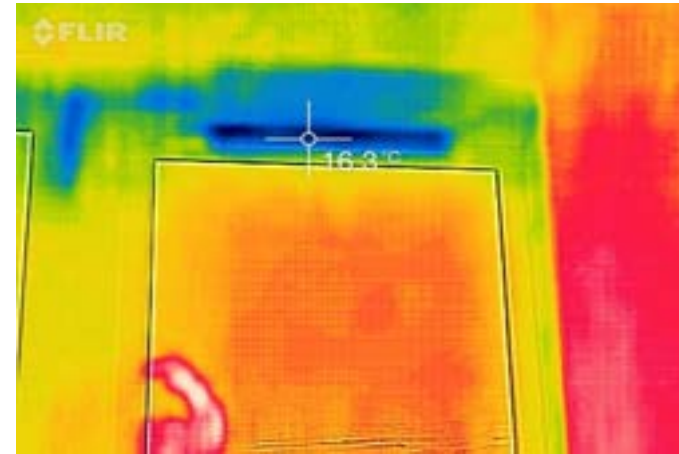


Letterbox 250mm x 40mm

In order for your property to comply, you would be required to include the equivalent openings in your structure:-

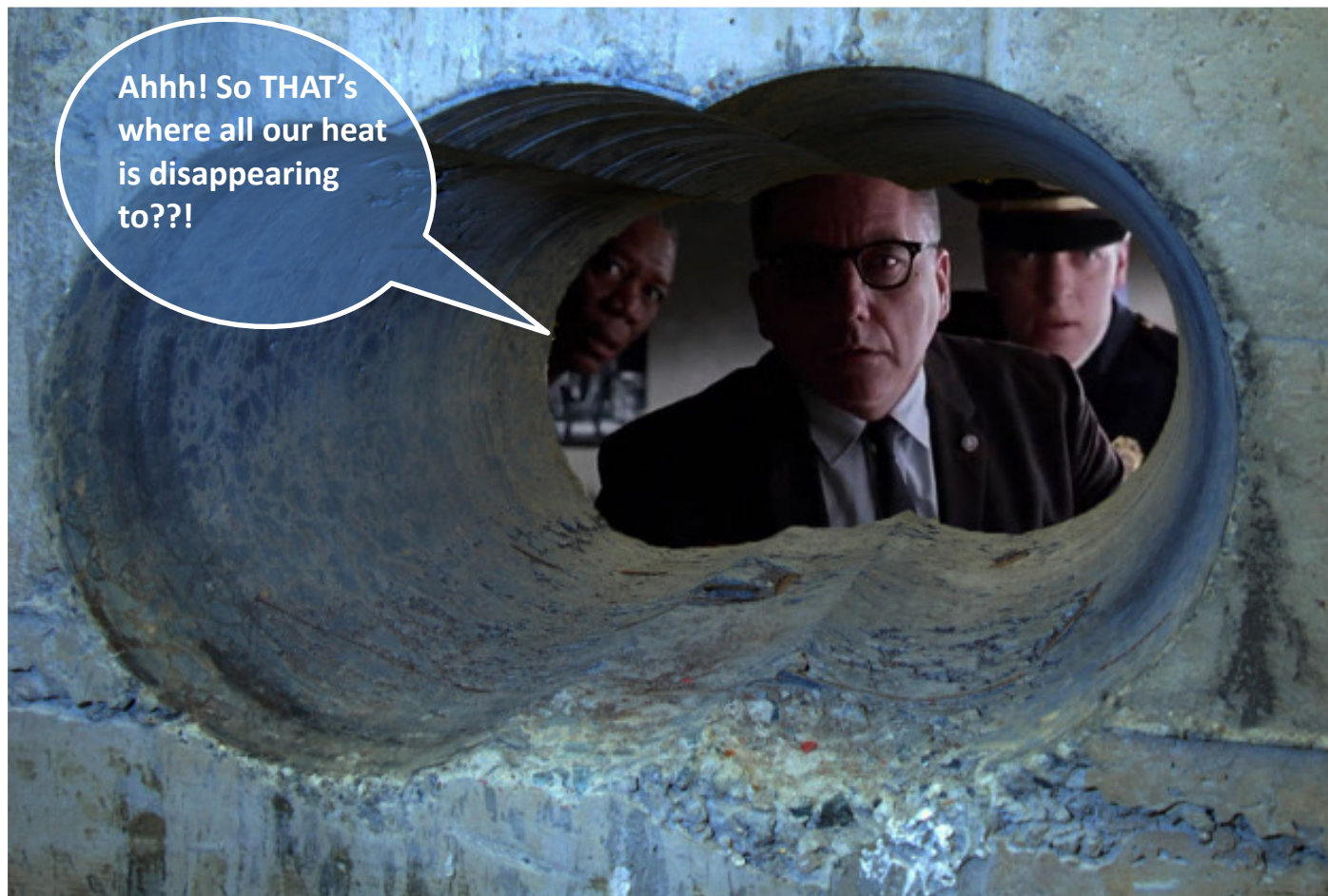
- Intermittant fans E&W Regs = Open **8/9 letterboxes** Scottish regulations = **13 x Open Letterboxes**
- MEV/dMEV All UK = **3/4 Open Letterboxes** Continuous fans
- **Plus penetrations for all extract only fans (Thermal Bridging)**

Impact and Flaws of Trickle Vents



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Mechanical Ventilation with Heat Recovery (MVHR)

How does it work and what are the benefits?



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What is MVHR?

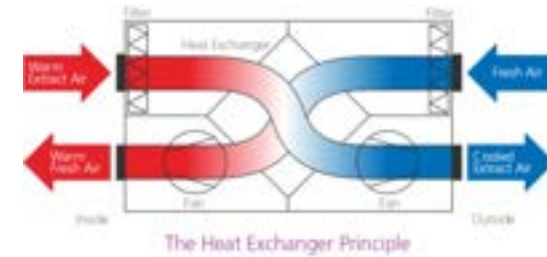
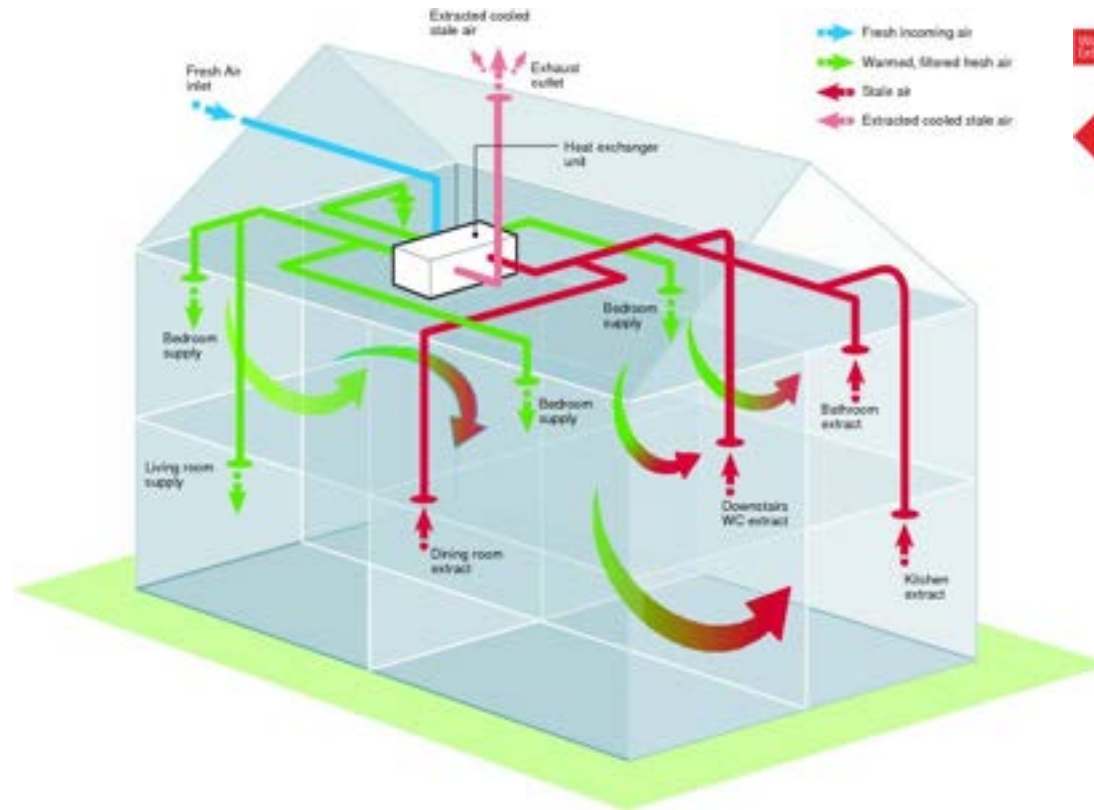
- NOT a heating system, but compliments heating system by considerably reducing heat losses.
- NOT an air conditioning system! Some cooling products are available to offer tempering of air.
- It is a balanced and controlled whole house forced air ventilation system
- Supplies a constant supply of filtered fresh air and extracts the stale air within your property
- Recovers most of the heat you generate within your home which lowers energy costs
- **No Requirement for Trickle Ventilators**

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How does MVHR Work?



Uses heat from “warm areas” of the building, and transfers this to other areas. Warm areas can be “wet rooms”, but also South facing rooms, double height areas, wood burning stove

In the summer months a bypass system allows fresh, filtered air to be introduced without being heated by the heat exchanger.

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MVHR – Comfort and Good Air Quality



Concerned condensation might take over your home?
Don't let the rot set in! Control moisture and condensation in your home and put a stop to damp and mould growth.



Everyday household products and furnishings can be detrimental to your health!
Our systems will filter and change the air within your home on average 11 times every day to help reduce the levels of Volatile Organic Compounds (VOC's) building up within your home.



Ventilating your home through noisy open windows?
Closing them will not only keep the noise down and allow you to breathe in fresh air but it will also increase security.



Can smells in your home linger for days?
Tackle strong odours in your property typically emanating from cooking and pets with a constant flow of fresh filtered air.



Suffer from allergies or asthma?
Heat recovery ventilation will help to alleviate your symptoms and provide you with a constant flow of fresh filtered air 24x7.



Looking to make energy savings?
Recover and re-use over 90% of your waste heat within the home with a heat recovery ventilation system.

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MVHR effect v Extract Only effect

MVHR House in Northumberland



10:52 Home zehnder

ME TASKS SCHEDULER FILTERS UNIT STATUS RESET

Unit	
Article Number	471502015
Temperature & Humidity	
Extract Air	21.5 °C / 31%
Exhaust Air	7.3 °C / 82%
Outdoor Air	3.1 °C / 75%
Supply Air	20.0 °C / 26%
Bypass	
State	0%
Frost Protection	
Reduction	0%
Pre-heater	
State	0 W
Postheater	

Non MVHR House Northumberland



10:51 Menu BBC WEATHER

Warnings Issued

Newbiggin-by-the-Sea

Today ☀️ 07:55 16:46

11:00	12:00	13:00	14:00	15:00
☁️	☁️	☁️	☁️	☁️
3°	3°	3°	3°	3°
98%	96%	95%	95%	94%
22	20	19	18	17

Today ▲ 4° / 3° Thu ▲ 6° / 5° Fri ▲ 6° / 4° Sa



Mechanical Ventilation with Heat Recovery (MVHR)

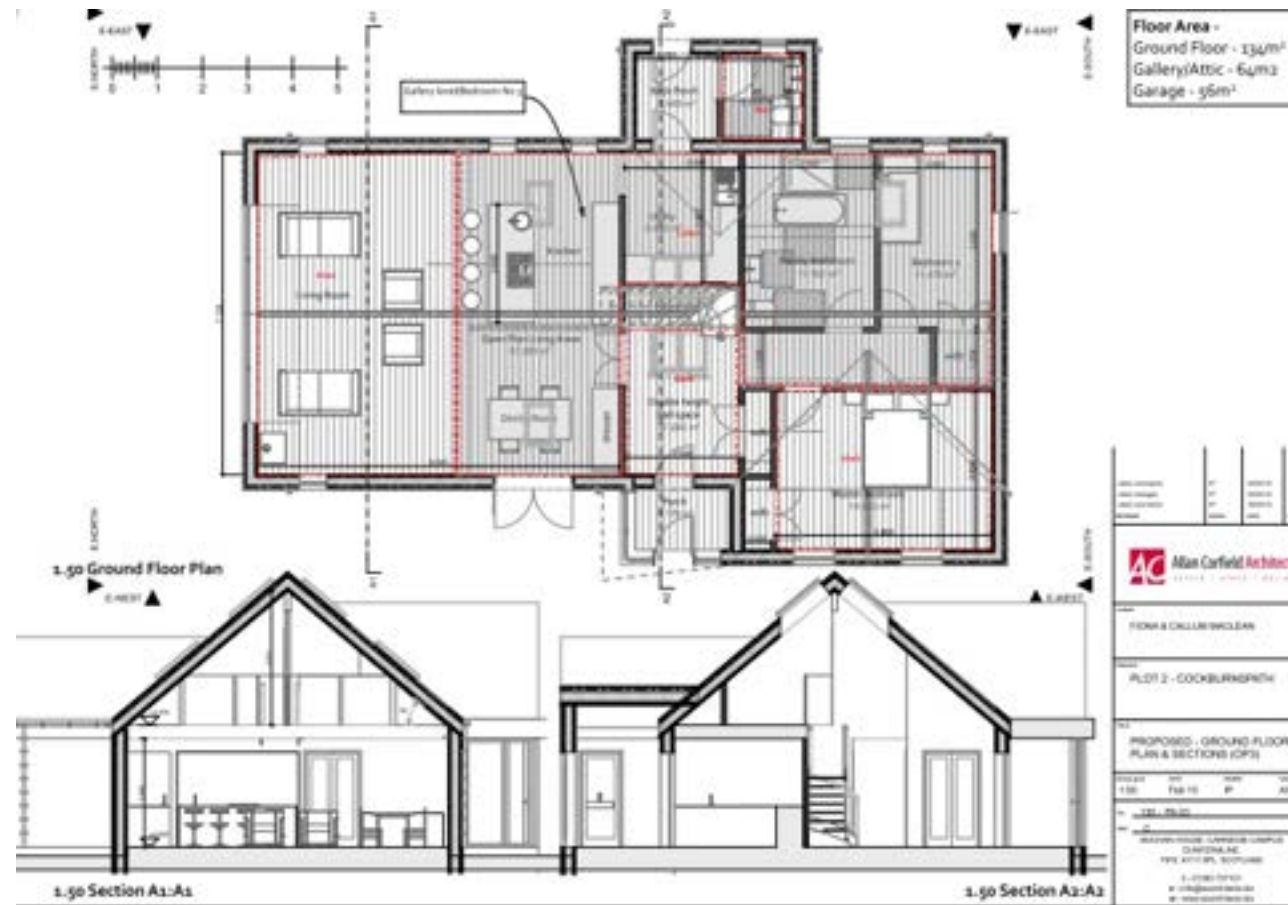
The Ventilation Design Process (What's involved)



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Review plans and determine required air flows



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Selecting the Components

Plant unit – Suitability, Airflow performance, cost, thermal efficiency, power consumption, control options, user friendly, durability, consumables



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Ducting Options - Semi-Rigid Radial

Smooth-bore improves air flows; anti-static lining; SAP Appendix Q compliant; ideal for Pozi Joists; Eco-Joists and engineered timber; perfect for limited void spaces and renovation projects; quicker to install than branch; reduces "cross-talk" between rooms; rubber seal on joints ensure 100% tightness; use in conjunction with a multiple port distribution manifold for central air distribution.



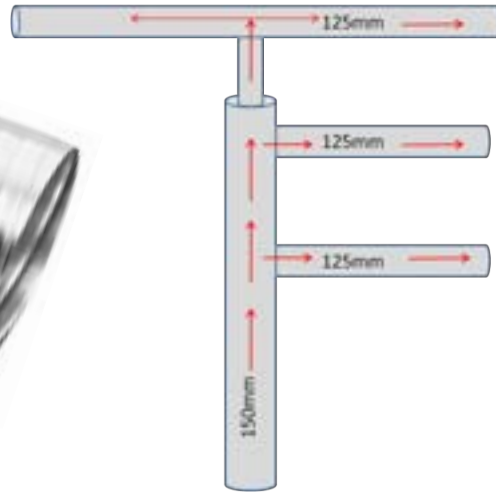
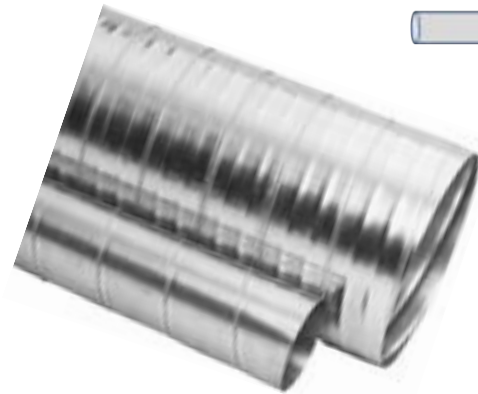
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Ducting Option – Rigid Ducting

Smooth-bore improves air flows; push-fit connections; SAP Appendix Q compliant; available on 180mm, 150mm, 125mm and 100mm diameter, also in 204cm x 60mm x 90mm for limited void spaces).

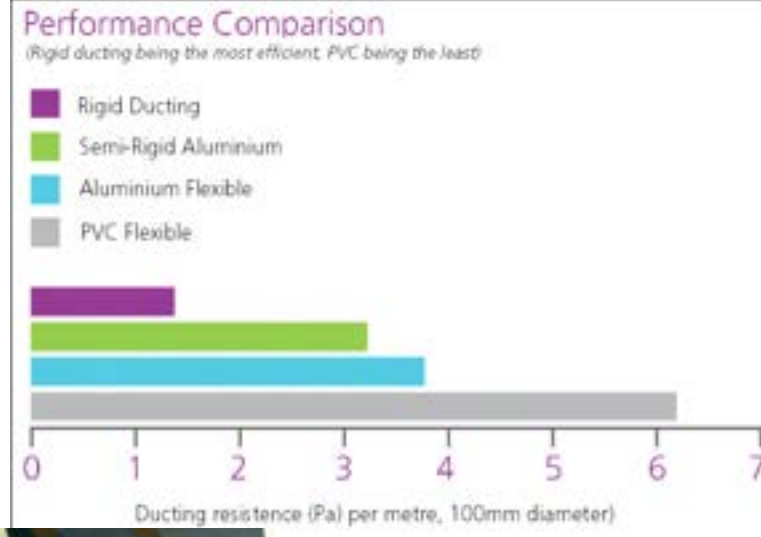


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MVHR: Ducting to be avoided!

We **strongly advise against** flexible ducting of ALL types because of its high air resistance (especially when kinked or restricted). Not only is it easily punctured or crushed but it will also lower the efficiency of any heat recovery unit. Very short sections may be unavoidable, guidance must always be followed. Flexible acoustic attenuation may be utilised where appropriate.



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Sound Attenuation



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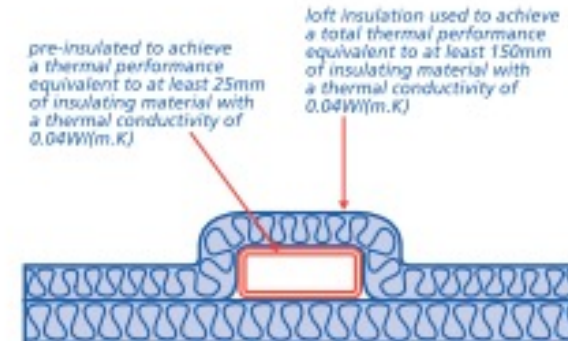
Thermal Duct Insulation



Any ductwork running in 'cold unheated areas' must be insulated.

Requirement for insurance for NHBC compliance.

Check U values to ensure correct level is suitable for both vapour barrier and insulation properties



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MVHR: Control Strategy

Integral humidistat, manual boost switching (auto revert to normal speed after set time), remote controller/programmer, PIR sensor, CO₂ sensor, app control, summer bypass settings, temperature profiles.



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MVHR: Pre/Post Heating

- Tempers the fresh air going into the MVHR machine in winter to prevent frost protection system shut down
- Also available as an integral preheater option
- Standard specification in Passive House projects
- Air entering MVHR system should not be below 0 °C to ensure condensate discharge and heat exchanger will not freeze up
- Minimum desirable domestic supply air temperature 16.5 °C

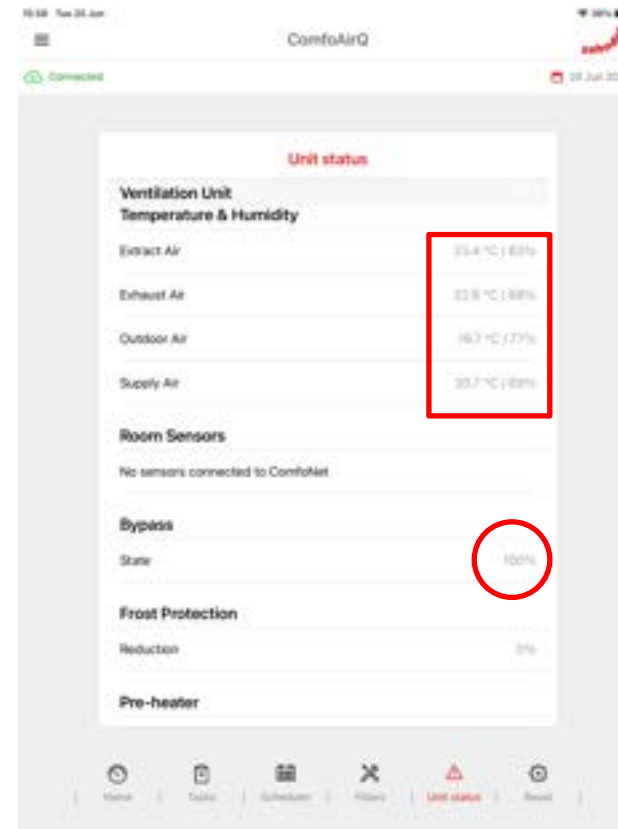
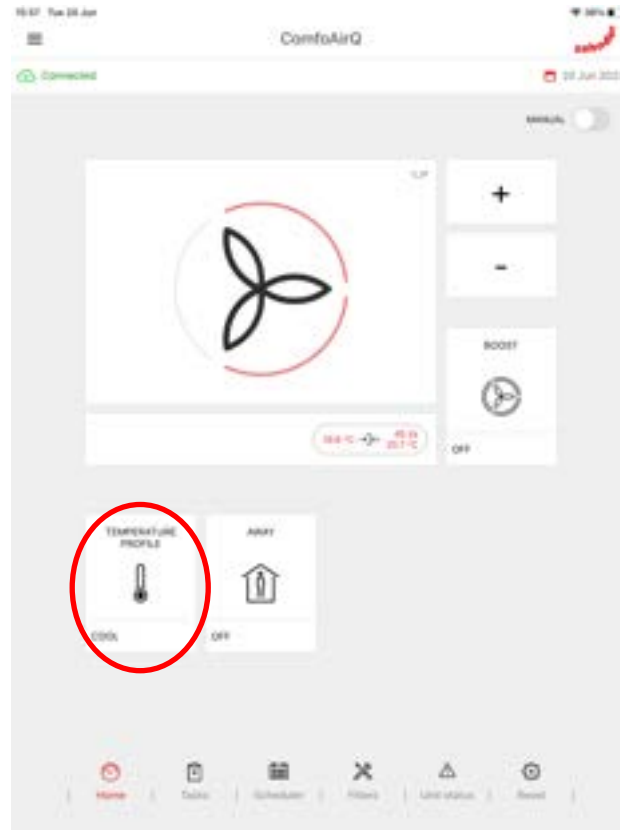


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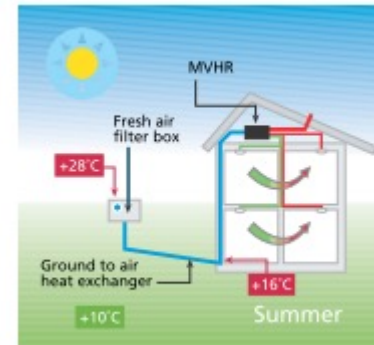
Using System settings to aid mitigation of over heating



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MVHR: Active Cooling/air tempering (not air conditioning)

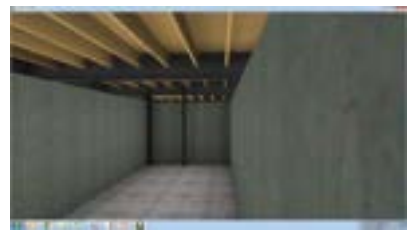
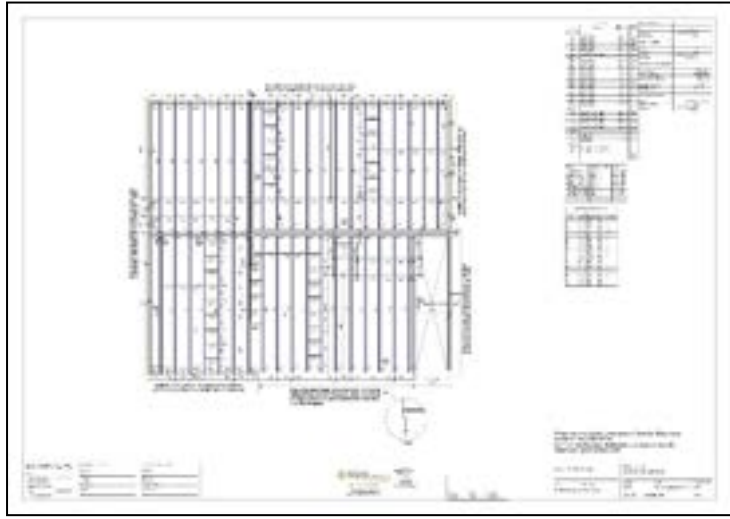


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Information required to produce the design layout. **Engage early, pre-kit construction and site start.**

- Construction fabric
- Sections and elevations
- Joist type
- Floor joist direction and centres
- Desired location of unit
- Location of external terminals
- Warm roof of cold roof construction
- Fire stopping requirements
- Building Code Level
- Air infiltration level
- 3D Modelling

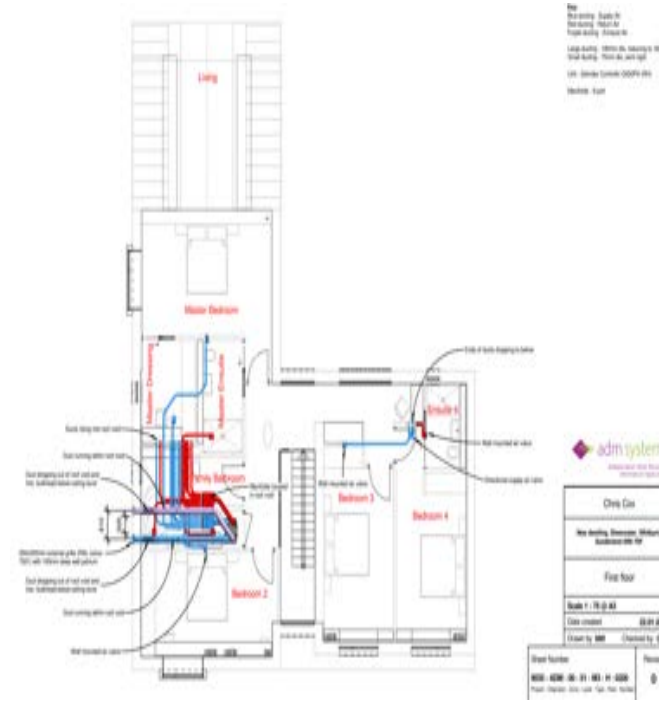
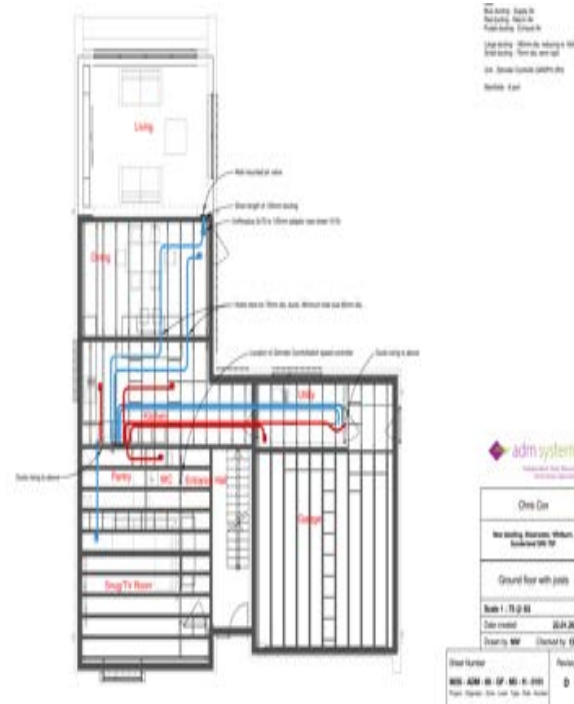


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Project Specific System Design

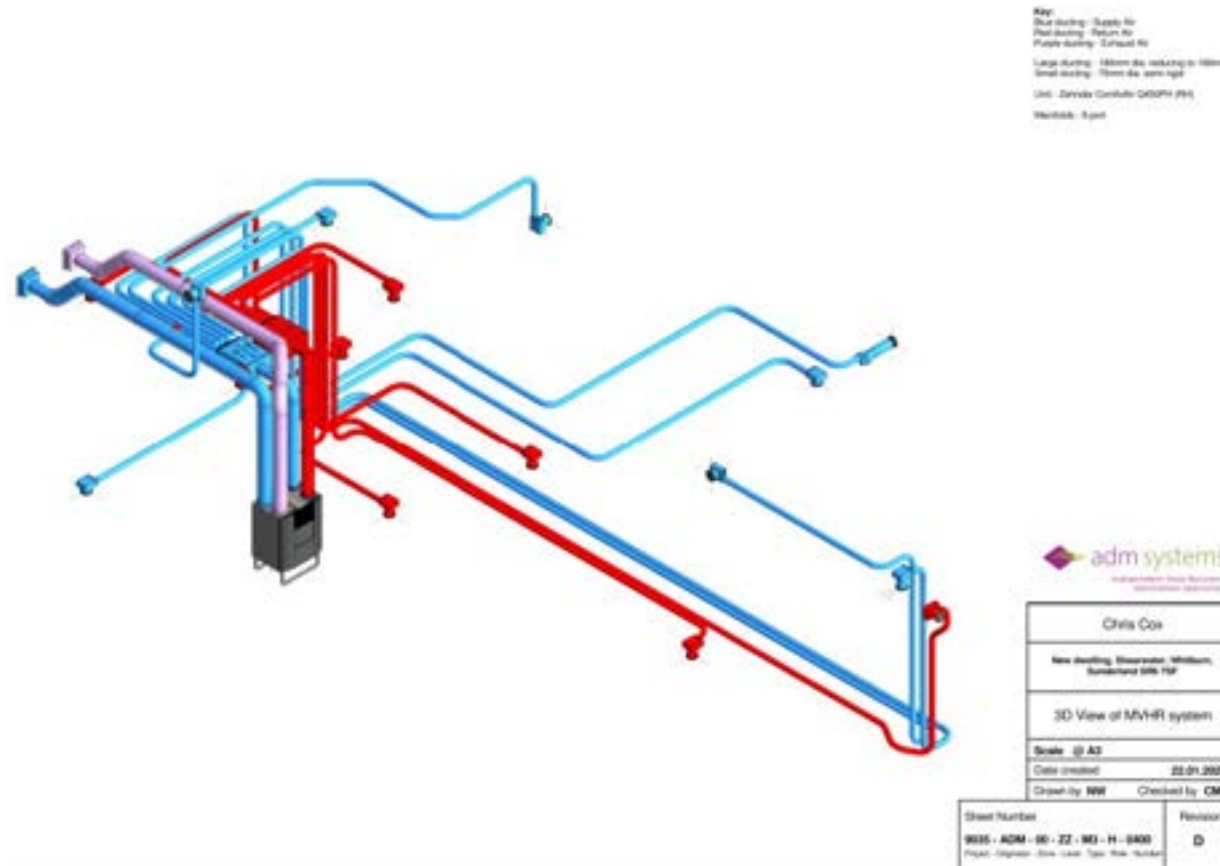


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Isometric 3D Design View



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Project Specific Air Change Schedule

EXTRACT													
Room Name	Volume m ³	A.C.R. No./h	Volumetric Normal Flow Rate (l/s)				Z m	Volume m ³ /min	Normal Rate		Boost Rate		
			Unit 1	n/a	n/a	n/a			m ³ /s	m ³ /h	m ³ /s	l/s	m ³ /h
Ensuite 4	13.5m ³	2.0	7.5				(1) (1)	26.5	0.0075	43.0m ³	8.1	0.0090	
Family Bathroom	27.2m ³	3.0	14.4				(1) 2	51.8	0.0144	84.0m ³	16.8	0.0190	
Kitchen	91.6m ³	4.0	18.0				(1) 1	58.0	0.0161	70.0m ³	19.1	0.0200	
Master Ensuite	16.1m ³	2.7	12.9				(1) (1)	43.1	0.0123	55.0m ³	15.0	0.0160	
Wc	16.5m ³	3.0	7.2				(1) (1)	29.3	0.0075	30.0m ³	8.1	0.0090	
WC	6.4m ³	3.0	6.7				(1) (1)	24.3	0.0067	30.0m ³	8.1	0.0090	
			63.9				**						
Total volumetric flow rate (extract) l/s								63.9	230.1	0.0639	287.7	79.9	0.0799
								230.1	Target rates		287.7		

SUPPLY														
Room Name	Volume m ³	A.C.R. No./h	Volumetric Normal Flow Rate (l/s)				Z m	Volume m ³ /min	Normal Rate		Boost Rate			
			Unit 1	n/a	n/a	n/a			m ³ /s	m ³ /h	m ³ /s	l/s	m ³ /h	
Bedroom 2	64.5m ³	0.5	8.1				(1) (1)	29.0	0.0080	36.0m ³	10.1	0.0100		
Bedroom 3	68.4m ³	0.5	7.6				(1) (1)	27.2	0.0076	34.0m ³	9.4	0.0090		
Bedroom 4	62.5m ³	0.5	7.8				(1) (1)	28.1	0.0078	35.0m ³	9.8	0.0090		
Dining	43.2m ³	0.6	6.9				(1) (1)	25.8	0.0069	29.0m ³	8.1	0.0090		
Living	99.3m ³	0.6	14.8				(1) (1)	52.8	0.0144	60.0m ³	16.0	0.0190		
Master Bedroom	72.2m ³	0.5	9.0				(1) (1)	32.5	0.0090	40.0m ³	11.0	0.0110		
Master Dressing	17.3m ³	0.6	3.0				(1) (1)	10.4	0.0029	10.0m ³	3.0	0.0030		
Living/TV Room	43.2m ³	0.6	7.2				(1) (1)	26.4	0.0072	32.0m ³	8.0	0.0090		
			63.9											
Total volumetric flow rate (supply) l/s								63.9	230.1	0.0639	287.7	79.9	0.0799	
Ratio Supply/Extract:								100%	230.1	Target rates		287.7		

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Air change schedule

Project number	9036
Date	22.01.2021
DWG No	1000

W6: Unit 3, Unit 4, Row Reading House, Boston, Cambs, Peterborough, PE17 1AR
Telephone: 01753 751243 Email: adm@admsystems.co.uk

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Mechanical Ventilation with Heat Recovery (MVHR)

The Installation Process



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MVHR Installation Process Timescales

- First Fix : wind and watertight
- First Fix Preferable before other services
- Second fix : walls floors boarded and/or plastered
- Commissioning and Balancing : As close as possible to client move in
- Client to be available at Commissioning and Balancing for system instruction/handover



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Consider potential conflicts



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Consider the location of units



Passive House
project unit
in store room



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Consider location of units



Wall mounted unit and radial duct manifolds

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Consider location of unit

Plant Room/Utility



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Consider location of unit



Tight Space?

Branch ducting in
eaves/comb void

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MVHR Unit Location : allow access for maintenance



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Air valve positions First and Second Fix Assembly



Air Valves & Locations



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External Wall Grilles.



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External Roof Vents **(avoid Supply Air through roof)**

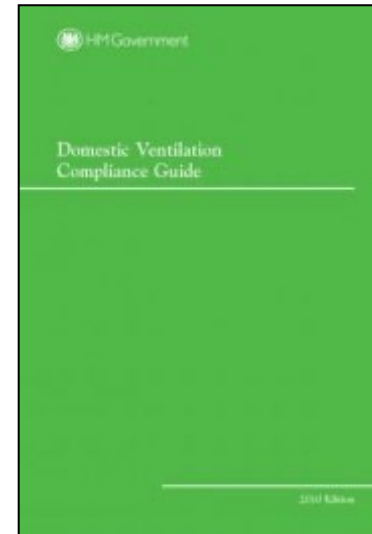


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Commissioning & Balancing



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Thank you for listening

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ADM Systems * 1st Floor East Suite * The
Waterfront * Salt Mills Road *
Shipley * BD17 7TD

Call: 01756 701051

General enquiries

info@admsystems.co.uk

Proposals

plans@admsystems.co.uk

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