Installation Guide to MEV and MVHR Systems

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Installation Guide to MEV and MVHR Systems

Introduction

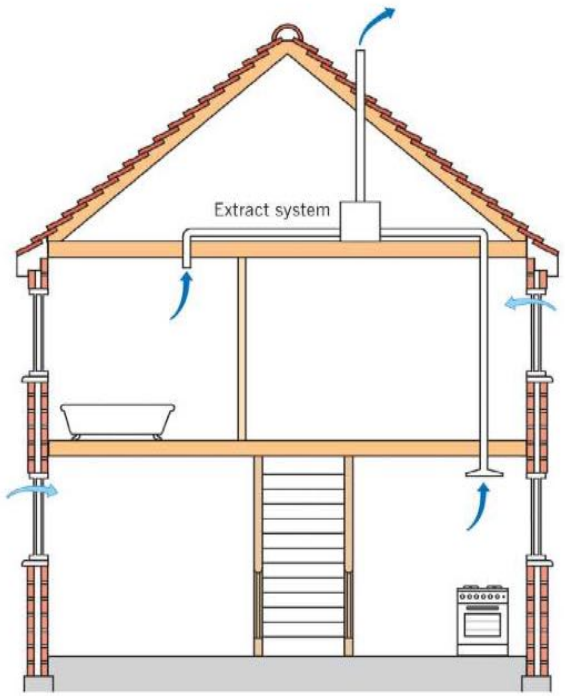
Building Regulations in the UK are becoming increasingly energy efficiency focussed and the Code for Sustainable Homes is steering house builders towards more energy efficient ventilation systems.

This document is designed to provide guidance for installers of Mechanical Extract Ventilation (MEV) and Mechanical Ventilation incorporating Heat Recovery (MVHR) to help to achieve a trouble free installation based on Vent-Axia's vast experience.

Design

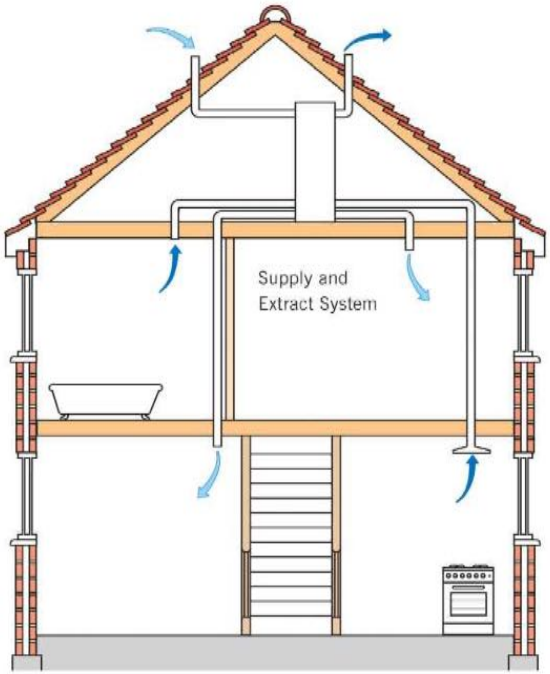
- It is important that the system is designed so that it complies with Building Regulations Part F
- Most system designs are done on CAD which will digitise drawings, show duct routes and provide airflow calculations
- If in any doubt about designing your ventilation system just contact Vent-Axia at info@vent-axia.com

Continuous Mechanical Extract (MEV)



- MEV extracts continuously at a low rate based on guidelines laid out in Building Regulations Part F and incorporates a boost facility to extract pollutants at a higher rate as required
- Can be controlled either;
  - Manually via single or multiple switches including light switches
  - Automatically, typically via humidity or other sensors
- The MEV ventilation unit is normally sited remotely in a loft space or cupboard and ducted via rigid duct to outside air using the most economical route
- If the air permeability rate of the dwelling is below $5m^3/h/m^2$, background ventilators, typically in the form of window vents providing $2500mm^2$ should be located in the head of window frames. These should be fitted in each room except wet rooms from which air is extracted. If the air permeability is greater than this rate, trickle vents are not required.
- If in doubt check the instructions in Part F

Mechanical Ventilation with Heat Recovery (MVHR)



•MVHR supplies & extracts air continuously at a low rate with boost facility to extract pollutants and supply fresh outdoor air at a higher rate as required

•Can be controlled either;

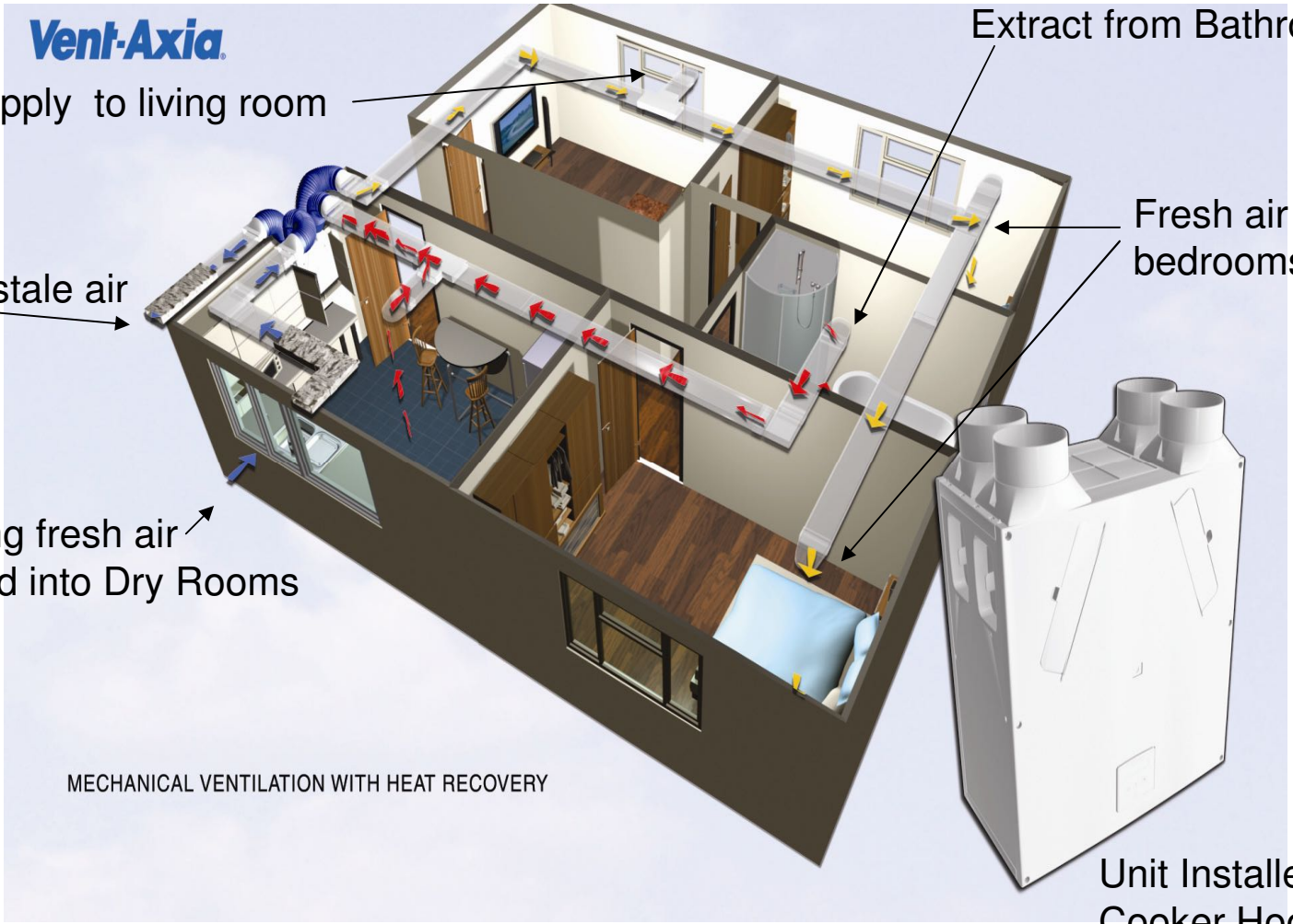
- Manually via single or multiple switches
- Automatically, typically via humidity or other sensors

These should be clearly marked and located in an accessible location in or near the wet rooms

-Normally the MVHR unit is sited remotely in a loft space or cupboard and ducted via rigid duct to outside air using the most economical route

•Replacement tempered air is introduced into bedrooms and living areas by the system, therefore background ventilators in windows are not required

MVHR



Fresh air supply to living room

Extract from Bathroom

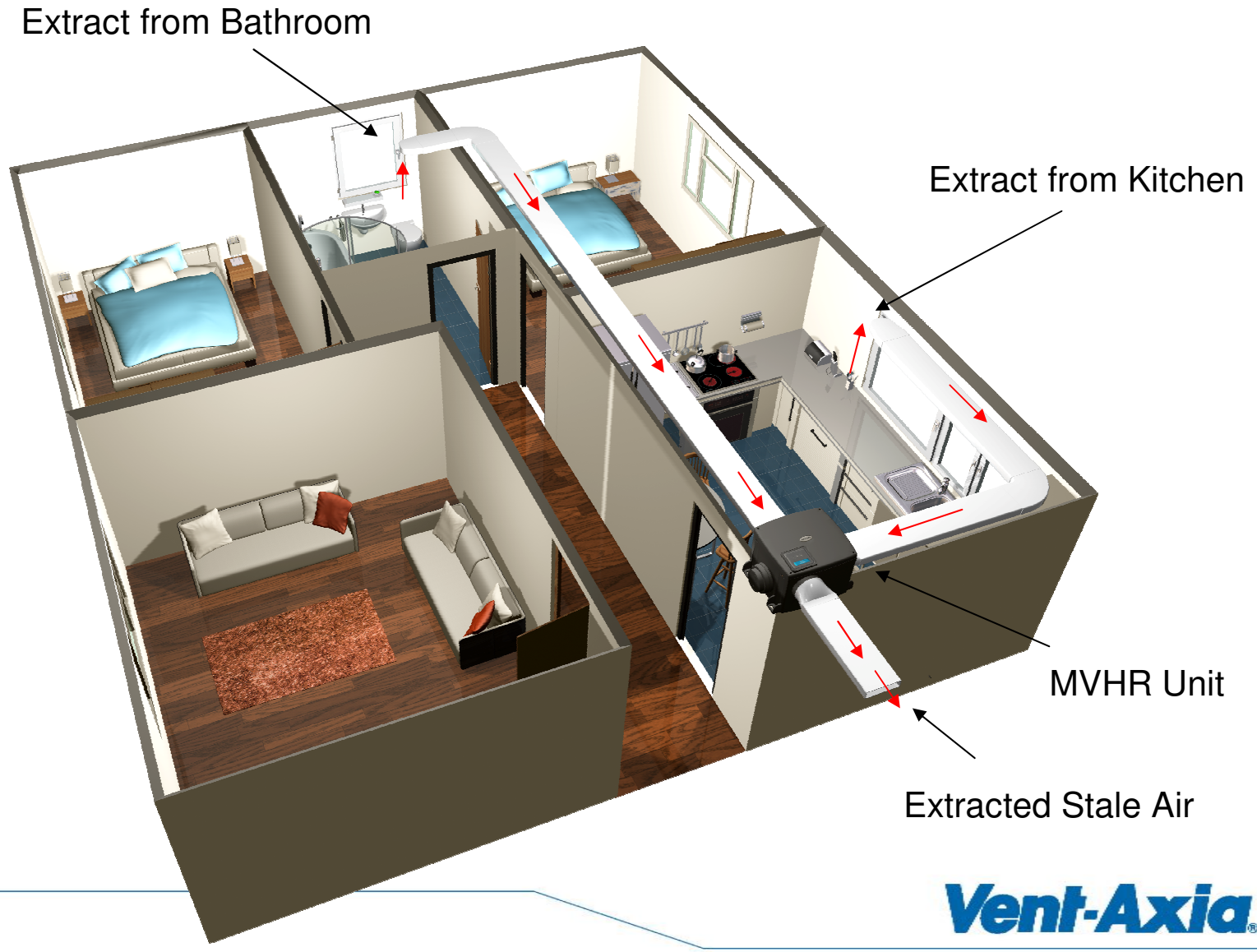
Fresh air supply into bedrooms

Extracted stale air

Incoming fresh air
Supplied into Dry Rooms

Unit Installed in Kitchen
Cooker Hood Version

MEV



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Planning the Installation

- You need to plan your work, and confirm if other contractors i.e. electricians are involved and who is doing what and when.
- It is unlikely you will be able to complete a job in one fit, and you will need to plan when you can carry out the stages of fixing required between other trades work
- Understand the design: Duct runs, terminals inside and out, position of the MEV or MVHR ventilation unit and controls, installation of condensate drainage.
- Check the design of the system against the actual site situation and what to do if it differs.
- Check what changes if any have to be made to the ventilation design, and is it possible or does the structure need changing.

Importance of Installation Practice to System Performance

- **It is vital that ventilation systems are installed correctly to ensure ventilation rates are met. You can help achieve this by;**
  - Using rigid ducts for the majority of the installation
  - Using minimal amounts of flexible duct to aid connections
  - Minimising bends and taking the most economical route
  - Providing airtight seals with good quality sealing tape
  - Providing mechanical fixes with cable ties or worm-drive clips

- This will ensure systems can be commissioned and balanced to deliver the designed airflow rates inline with Building Regulations document, Part F.

First Fix – Duct Runs

- Obviously, the ductwork should be installed before the ceilings and studwork are installed.
- Mark drawings where ducting has been temporarily been terminated as you need to know where to drill holes for terminations and connections

First Fix – Duct Runs

- Ducting should be aligned to minimise flow resistance (e.g. cutting the duct to the correct length, using the minimum number of bends, and minimising kinks, etc)
- The use of flexible duct must be minimised. Where used it must be pulled taut (flexible duct has higher resistance to airflow)
- Duct must be positioned where it cannot be damaged through occupier use in the space that it is installed e.g. high up in an airing cupboard or away from a loft hatch

First Fix – Duct Runs

- Use the specified size and type of duct and tape all joints
- Follow design drawing layouts, unless constraints in the building require another route to be taken.
- Take the most direct route possible out of the dwelling (in-line with proposed design layout)
- Do not introduce unnecessary bends into the system
- Avoid changes in duct size/shape as this will increase resistance

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First Fix – Duct Runs

- **Do**

✓ Ensure ducts take the path of least resistance to maintain system efficiency. Reducing amount of bends and flexible duct in the duct routes will help maintain performance

✓ Use flat ducts of an appropriate size for the system can be used instead of rigid round duct. Check with Vent-Axia if in doubt.

First Fix – Duct Runs

- **Don't**

Don’t allow ducts to be unsupported

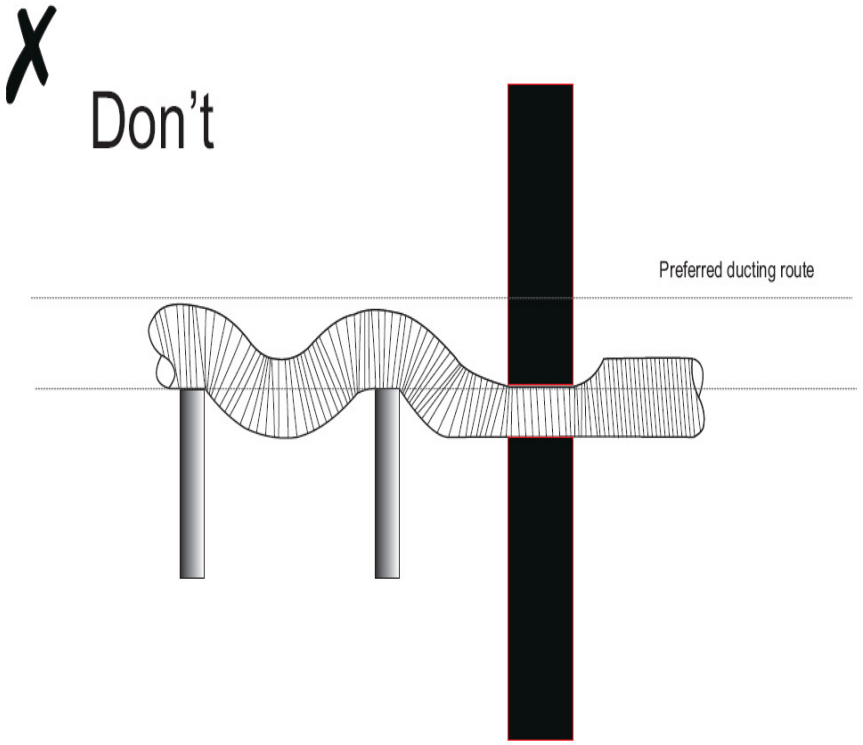
Don’t introduce more bends than necessary

Don’t use flexible ducting through walls as it can become crushed

- Here, the system is using too much flexible duct and has sharp bends in close proximity, which will greatly affect performance

First Fix – Duct Runs

- The circular profile of flexible ducting must be maintained throughout the full length of the duct run.
- An alternative profile of duct must be used if the duct route requires it passing through a restricted space.
- The free area must be maintained and not increase resistance to airflow
- Flexible ducting must be installed with the correct bracket support every 2m to avoid peaks, troughs, and distortion of the duct profile



First Fix – Duct Runs

- **Do**

✓ Use rigid duct for the majority of the duct route

✓ Plan the route carefully to avoid unnecessary bends over and above the design drawings

✓ Mechanically fix, silicon seal and tape joints to ensure an airtight seal

First Fix – Duct Runs

- **Don't**

x Use flexible duct for the entire installation

x This duct can easily be crushed in the roof space and system performance will be affected as this duct is not fixed for its working life and has potential to collapse

First Fix – Duct Runs

- **Do**
- ✓ Read installation instructions carefully and consider fully how the ducts will connect.
- ✓ In this example the ducts have been aligned so that a short straight taut flexible connection can be simply made

First Fix – Duct Runs

- **Don't**

  Don’t cram flexible duct into small areas where it can be crushed. This will reduce the amount of air able to pass through it, and will cause too much air resistance.

  Don’t ‘snake’ ducts unnecessarily - this duct can easily be crushed had the loft insulation been placed over it.

  It is recommended to use rigid ducts wherever possible to not only improve system efficiency, but ‘future proof’ the installation

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First Fix – Duct Runs

- **Do**

✓ Ensure ducts are fixed to surface securely and sealed. This will ensure that the system performs inline with the design drawings

First Fix – Duct Runs

- **Don't**

  Don’t attempt to fabricate components not suitable for the transfer of air. You can see that this branch connection is leaking air.

  The airflow requirements at the room grille will not be met as a result, causing delays in the commissioning process

  Don’t rush the connections.

  Failure to achieve a suitable connection onto this central extract system will cause large volumes of air to leak out causing limited airflow at the room grille

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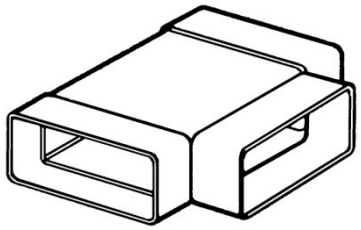
First Fix – Ducting Joints

- Air leakage testing of low and medium pressure ductwork is not mandatory under HVCA DW/143
  The integrity of the ductwork depends on the successful application of the correct jointing method :-

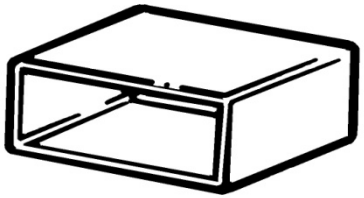
- **For rigid ducting**
- Joints should be mechanically fixed, taped and mastic sealed
- Most systems have socket and spigot joints, these can be mechanically fixed and sealed with low modular silicon and/or duct tape to seal joints.

First Fix – Ducting Joints

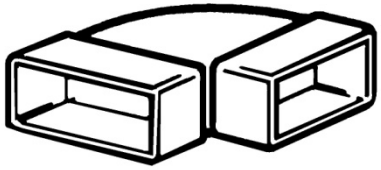
A small selection of jointing components for duct showing socket and spigot



Horizontal T-Piece

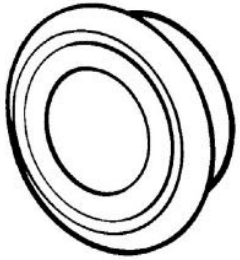


Flat Channel Connector

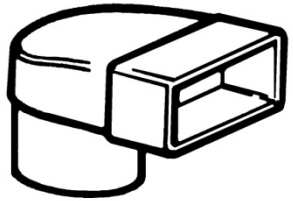


Horizontal 90° Bend

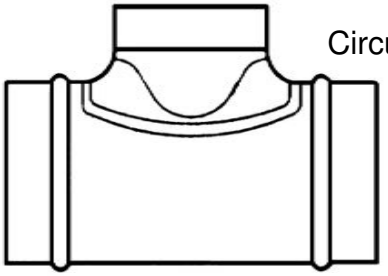
Round to Rectangular Adaptor



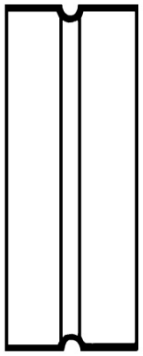
Circular Supply Diffusers



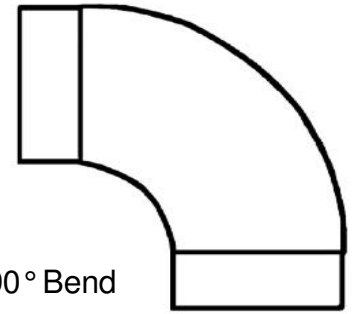
Elbow Bend with Spigot



Circular Equal Tee



Circular Female Coupler



Circular 90° Bend

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First Fix – Ducting Joints

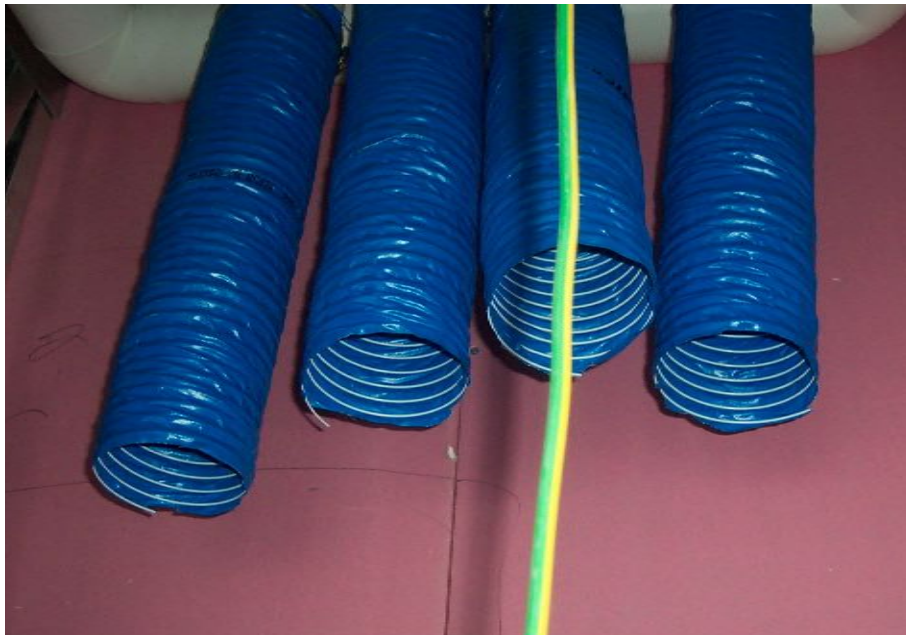
- Rigid duct should be mechanically fixed at the joints and to the structure close to joints. This is more important if the duct is in a roof space that is going to be used as storage and the ducting could get dislodged and leakage could occur at the joints.
- Diffusers should also be mechanically fixed to the ducting and sealed with tape.
- When using insulated flexible duct the inner sleeve should be attached to the spigot first with a foil or duct tape, the outer sleeve should be attached using a cable tie or worm-drive clip and taped.

First Fix – Ducting Joints

Ducting should be mechanically fixed, silicon sealed and taped

First Fix – Flexible Connections

- Flexible ducting will help connections to the unit on second fix
- On the supply side – you could consider using acoustic duct to help minimise ‘breakout’ noise from the unit



First Fix – Flexible Connections

- Flexible ducting on the connections will help with locating the diffuser after the ceiling is installed

First Fix – Duct Connections

- Failure to adequately connect and seal ductwork will result in poor performance levels with any ventilation system
- This ultimately leads to problems during the commissioning process as the ventilation system under performs and fails to comply with building regulations

Recommendations for Connections

- Use a good proprietary sealing tape as per manufacturers recommendations on all duct types
- Mechanically fix flexible connections after taping with a suitably sized cable tie or worm-drive clips
- Mechanically fix rigid ducts and seal with low modular silicon and duct tape to seal joints to aid an airtight connection.
- Adequately support ductwork to avoid movement and weakening of joints

First Fix - Fire Protection

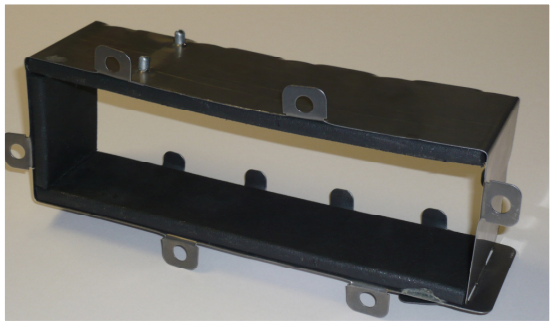
- It is important that fire regulations document Part B; 2006 for fire protection is adhered to.
- You must identify the fire strategy for the building, particularly on loft conversions and refurbishments
- Duct routes must be planned to avoid escape areas, such as hallways and stairways where possible

Fire Protection Products

- A wide range of fire protection products are available from Vent-Axia
- Fire products should be selected based on their suitability for the construction type - solid, hollow or plasterboard
- And for the level of protection required; 30mins, 1, 2 or 4hrs rated
- Typically these types of product are the most common

Fire Protection Valve

Intumescent Pipe Collars



Fire Wrap

Second Fix (complete installation)

- All terminals to be fixed.
  - Installation of ventilation unit to be completed including electrical connection via a fused spur
  - Ducting to be connected to the ventilation unit including to outer atmosphere duct and grilles Condensate drains are also to be installed
  - All necessary controls to be installed and fan speed settings to be established and set.

Second Fix – Diffuser Grilles

- Extract & Supply diffuser grilles- locations of grilles will be site specific and will vary from project to project, therefore installers will install to grill locations as indicated on drawings

Typical Supply and Extract Diffusers

Second Fix – Diffuser Grilles

- Ensure that the grille opening is adjustable to achieve room extract rates as detailed within Approved Document F

- **Extract Diffusers:**

Typical Supply and Extract Diffusers

- Installation best practice where possible would be to locate the diffusers as follows:
- Bathroom – above the bath taps or shower head
- Kitchen – above sink
- En-suite – above bath taps or shower
- Toilet & Utility – Normally small rooms and positioning not critical

Second Fix – Diffuser Grilles

- **Supply Diffusers**

- Ideally, these should be located about 1 metre in from the corner of the room diagonally opposite the entrance door
- In very large rooms good practice would be to have 2 supply points in the corners

Second Fix - Controls

- **The effective control of ventilation systems is important**
  Mechanical systems will fail to comply with building regulations if they cannot achieve a constant low speed and if required a boost facility during moisture generation

- **Recommendations for Controls**
- Refer to Vent-Axia's instructions to determine requirements for controlling the system and to ascertain which wiring arrangement is most appropriate for the installation

- **A competent person (Part P approved) must be responsible for the electrical installation**

Second Fix - Controls

- **Automatic Humidity Sensors**

- On certain products, these can be used to boost the system when moisture is generated
- Most sensors have an operating range from 30% to 90% which is adjustable
- To avoid nuisance tripping it is advisable to use a sensor with night time RH increment setback to suppress nuisance tripping when the humidity level gradually rises as the temperature falls.
- IEE Regulations 17th Edition states that mains voltage products should be installed in Zone 2 to avoid electric shock
- SELV Sensors can be installed in Zone 1
- **A competent person (Part P approved) must be responsible for the electrical installation**

Second Fix - Installation of Unit (MEV)

•These units can be suspended by nylon cord / strapping in the loft to prevent noise transfer or could be structurally mounted and where need be have acoustic/anti-vibration mountings between the unit and the structure.
•The units must be installed in a position that will permit access for maintenance purposes

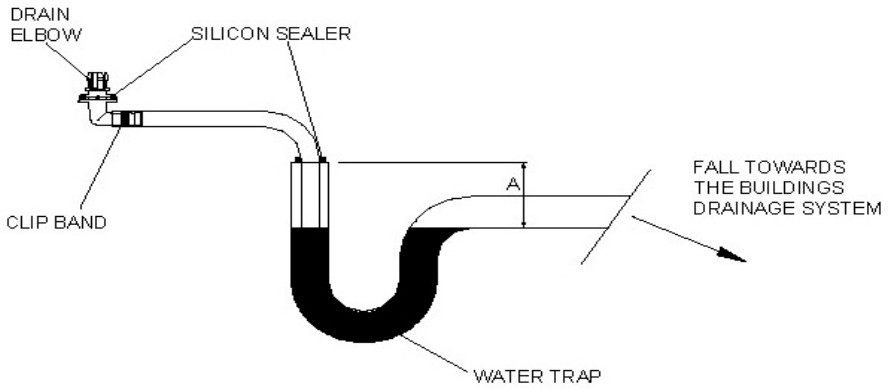
•A local isolator must be provided
•within 1 metre to enable the unit
•to be isolated
•A condense drain must be provided and run into the waste system

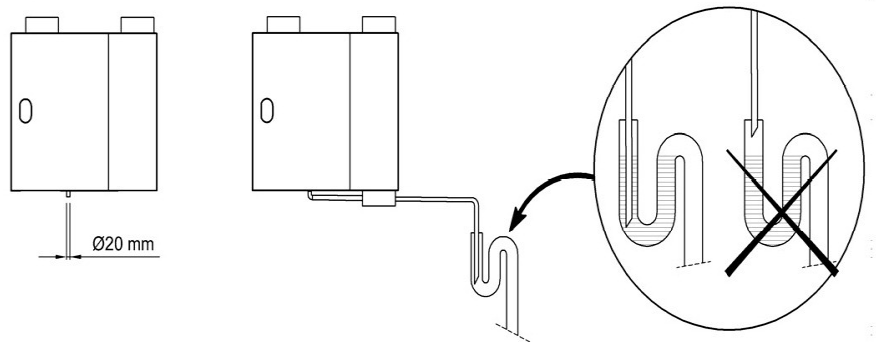
Second Fix - Installation of Unit (MVHR)

- MVHR units are usually heavier than MEV should not be fixed to structural walls especially plasterboard
- Therefore the client should provide a patrass to enable the unit to be fixed
- The unit may also require acoustic/ ant-vibration mountings
- A local isolator must be provided within 1 metre to enable the unit to be isolated

Second Fix - Condensate Traps

- **MEV and MVHR units extract moisture laden air and therefore must have a condense drain fitted**
- Condensate must be discharged into a trap which is then connected to the foul water system of the dwelling.
- The condensate discharge line is normally fed through the lower panel and the installer must screw it into the underside of the appliance.
- This diagram from typical MVHR F&W shows an example of a connection to a drain pipe
- Discharge pipe must enter the U trap far enough to enter the water within the trap as shown.





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Second Fix - External Terminals

- Supply and exhaust terminals should be kept a minimum of 1m apart and clear of flue exhausts (see BS 5440) and openable windows
- Where these terminals pass through the structure they should be positioned so any water penetrating through external grilles will run back to the outside of the dwelling
- It is important that the recommended grillage free area is maintained

Second Fix - Commissioning

- Ventilation systems should be installed and commissioned in a way that is not detrimental to the health of occupants
- Systems should be commissioned so that on completion the system and their controls are left in the intended working order for the provision of adequate ventilation for the people in the building
- All ventilation systems should be commissioned to demonstrate installed capabilities
- Manufacturers instructions take precedence unless additional criteria is specified on the design drawing

Second Fix - Commissioning

- Check for any additional specific requirements i.e. for protection against fire and the spread of smoke or for noise reduction
- Check that Vent-Axia's instructions are available
- Check installation matches design drawing including any background ventilators where required
- Check installation has the correct control devices fitted
- Check that any condensate pipes are fitted and terminated correctly
- Check airflow meter is suitable for system
- Note any alterations to the design and correct if necessary
- Note all system defects and correct them if necessary
- On ventilation systems with supply and extract grilles, typically MVHR systems, check that the airflow at each grille is flowing in the correct direction.

Second Fix - Commissioning

- Extract only ventilation systems: use a suitable airflow meter, ensuring it is positioned in the correct direction of flow, and measure the airflow at the point of entry. Compare results against design drawing and adjust airflow up or down as required

- Extract and Supply systems: use a suitable airflow meter, ensuring it is positioned in the correct direction of flow, and measure the airflow at the point of entry and supply. Compare results against design drawing and adjust airflow up or down as required

- If you have any doubts about commissioning process you should contact Vent-Axia for advice

Second Fix - Commissioning

- Commissioning should be carried out using anemometer hoods
- Supply and extract airflows should be balanced according to the design performance
- Adjustments to the diffusers and transformers should be carried out

Second Fix - Commissioning

Suitable Airflow Meters

Calibrated meter with direction of flow indicator

Commissioning Flow Rate Requirments

	Total Floor Area m2	MEV & MVHR Extract @ Boost l/s			Flats	Houses
		Kitchen	Bathroom EnSuite Utility	WC	MVHR Supply @ Trickle l/s	
					Living Areas / Bedrooms	
1 Bed Dwelling	20	13	8	6	10 Total	11 Total
	25	13	8	6	9 Total	11 Total
	30	13	8	6	9 Total	10 Total
	35	13	8	6	8 Total	10 Total
	40	13	8	6	7 Total	9 Total
	45	13	8	6	7 Total	9 Total
2 Bed Dwelling	50	13	8	6	10 Total	12 Total
	55	13	8	6	9 Total	12 Total
	60	13	8	6	9 Total	12 Total
	65	13	8	6	10 Total	13 Total
	70	13	8	6	11 Total	14 Total
	75	13	8	6	12 Total	15 Total
	80	13	8	6	12 Total	16 Total
3 Bed Dwelling	90	13	8	6	14 Total	18 Total
	100	13	8	6	16 Total	20 Total
	110	13	8	6	17 Total	22 Total
	120	13	8	6	19 Total	24 Total
	130	13	8	6	20 Total	27 Total
	140	13	8	6	22 Total	29 Total
	150	13	8	6	23 Total	31 Total
4 Bed Dwelling	160	13	8	6	25 Total	33 Total
	170	13	8	6	27 Total	35 Total
	180	13	8	6	28 Total	37 Total
	190	13	8	6	30 Total	39 Total
	200	13	8	6	31 Total	41 Total
	220	13	8	6	34 Total	45 Total
	240	13	8	6	37 Total	49 Total
5+ Bed Dwelling	260	13	8	6	41 Total	53 Total
	280	13	8	6	44 Total	57 Total
	300	13	8	6	47 Total	61 Total
	320	13	8	6	50 Total	65 Total
	340	13	8	6	53 Total	69 Total
	360	13	8	6	56 Total	73 Total
	380	13	8	6	59 Total	78 Total
	400	13	8	6	62 Total	82 Total

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Common Faults and Possible Causes

Fault: Ventilation Unit unacceptable noisy

Possible Cause:

- Transformer may not be fitted so no means of tailoring the system to provide trickle/boost. No means of automatic or manual control via sensor or trickle/boost switch
- Transformer set too high
- Ducting too small for the system or diffusers shut, (on constant pressure systems)
- Acoustic attenuation not provided either on the unit or supply ducts
- Unit installed above bedroom without attenuation

Common Faults and Possible Causes

Fault: Evidence of mould growth, condensation and smells

Possible cause:

- Unit not running
- Unit incorrectly sized and cannot provide the required air flow
- Diffusers closed and no air can circulate
- Ducting too small, crushed or not connected properly restricting airflow through the system
- External grilles blocked or too small
- Not enough free area on terminations

Common Faults and Possible Causes

Fault: Draughts entering the house through the diffusers

Possible Cause:

- System installed back front so supply air coming in to wet rooms
- Extract diffusers fitted on supply ducts causing air noise and difficulty in commissioning

Common Faults and Possible Causes

Fault: Water leaking from the unit and fuses keep blowing

Possible cause:

- Condense drain not fitted and unit is filling up with water

Fault: Unit does not provide boost facility

Possible cause:

- Incorrectly wired or no trickle/boost switch or humidity sensors

Fault: Poor Performance from system

Possible cause:

- Wrong size unit could be fitted initially
- If installed for some time - dirty/blocked filters or cube needs cleaning, (constant pressure fans will also be noisy)

Common Faults and Possible Causes

Fault: Cooking or other odours coming into the supply diffusers

Possible Cause:

- Intake and extract terminations too close together causing cross contamination

Fault: Damp patches on ceiling where ducting passes near terminations

Possible Cause:

- No insulated ducting used on terminations causing condense to form on outside of ridged ducting

Installation Guide to MEV and MVHR Systems

Vent-Axia hopes that this Guide has been helpful and your Installation is a success

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