RVA
Residential Ventilation Association

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The trade association for energy infrastructure & systems

DOMESTIC VENTILATION INSTALLATION AND COMMISSIONING COMPLIANCE CODE OF PRACTICE

SUMMER 2026 EDITION

Contents

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1. Introduction

This industry guide provides detailed guidance for persons installing fixed ventilation systems in new and existing dwellings to help them ensure the system selected delivers the required outcomes of building regulations across all devolved nations.

The guide includes an installation and commissioning checklist that should be completed as part of the installation handover and signed and approved by a person 'competent' to do so as defined by the prevailing building regulations[1]. 'Qualified' in this context means having the appropriate qualifications, knowledge and suitable experience to carry out the installation, inspection and commissioning procedures in line with this document.

> It is important to note that the guide covers a range of frequently occurring situations but that alternative means of achieving compliance with the functional requirements in the Building Regulations may be possible.

This guide should be used alongside a ventilation design aimed to achieve effective ventilation rates as required by prevailing building regulations. It is also worth noting that this guide complements the *Future Homes Hub's 'Ventilation in new homes – Where to start for homebuilders'* May 2026 publication.

1 Competency' is not determined solely by training. Membership of a 'Competent Person Scheme' or equivalent is an evolving process of ensuring competency is sustained over time.

1.1 Key terms

Background Ventilator	A small ventilation opening designed to provide controllable whole building ventilation. A trickle ventilator for example.
Decentralised Continuous Mechanical Extract (dMEV)	Individual continuous mechanical extract fans located in wet rooms to provide whole house ventilation with air being supplied via background ventilators into the habitable rooms.
Centralised Continuous Mechanical Extract (MEV)	A ventilation system that comprises a central ducted continuously running extract fan with air being supplied via background ventilators into the habitable rooms.
Continuous Mechanical Ventilation with Heat Recovery (MVHR)	A balanced ventilation system that comprises central ducted supply and extract fans with air being supplied into the habitable rooms via a heat recovery unit. This system uses energy exchange to provide supplementary heat.
Design for Required Performance	A design protocol which is based on ensuring ventilation outcomes are delivered and compliance is achieved with the minimum requirements of building regulations (across all devolved nations).
Equivalent Area	A measure of the aerodynamic performance of a ventilator. It is the area of a sharp-edged orifice which air would pass at the same volume flow rate, under an identical applied pressure difference, as the opening under consideration.
Free Area	The geometric open area of a ventilator or terminal.
Intermittent Extract Fan	A mechanical ventilator that does not run all the time, usually only running when there is a particular need to remove pollutants or water vapour (e.g. during cooking or bathing). Intermittent operation may be under either manual control or automatic control.
Positive Input Ventilation[2]	A unit mechanically supplying filtered input air from a source which includes external or appropriately ventilated loft air.
Single Room Heat Recovery Ventilators (SRHRV)	Comprise local balanced supply and extract fans in a single room. This system uses energy exchange to provide supplementary heat.

2 Positive Input Ventilation can be a recognised means of compliance following the alternative approach method

1.2 General Performance

As a designated individual responsible for ventilation performance, it is your responsibility as a house builder, building contractor, sub-contractor or installer to ensure that your work complies with and meets all the relevant requirements of the prevailing building regulations for the location of the site. Ventilation is a controlled activity and traceable evidence of specific competency should be extant and validated through accurate completion of the system checklist (Section 4). It is necessary to follow the correct procedures and meet technical performance requirements to make sure that work is safe[3] and fit for purpose under inspection from a buildings inspector or building control officer.

In this guide, we focus on ventilation installation and commissioning processes with some design principles only and is to be used in conjunction with a more detailed 'system' design, where appropriate (e.g. ducted systems).

Ventilation in a dwelling is vital for the health and well-being of its occupants. If the performance or fitting of ventilation units or systems in a dwelling does not meet specific requirements and performance standards, levels of indoor air pollutants may rise above safe levels and may be breaching regulations. High levels of air pollutants can have a potentially serious impact on the health of those living in a dwelling, with indoor air pollution contributing to conditions including asthma, heart disease, dementia and even cancer. In order to ensure your ventilation installation meets general performance requirements, refer to the prevailing building regulations relevant to the location of the site.

> In all cases for ventilation installations, a preparatory design is required to determine the ventilation rates for the fans and background ventilation provision, regardless of utilising decentralised or centralised systems. An adequate power supply should also be ensured for all installations.

3 Fire and electrical safety are strict requirements for all fixed building services, including ventilation. Essential regulatory guidance can be found in Approved Documents B, M and P of the Building Regulations.

2 Decentralised Ventilation Systems

Decentralised systems are characterised as incorporating fans which tend to be installed directly through the building fabric (including windows) where the mechanical unit is generally connected to a short run of duct, typically no further than 2 metres from the outside terminal[4]. These fans may be intermittently operated or continuous running and, whilst utilising very limited lengths of duct work, they are referred to as ductless systems. Systems are accompanied by background ventilation, for example the presence of trickle ventilators or window openings.

Examples of Decentralised Ventilation Systems






4 A distance of 5m can be achieved but it is recommended to undertake a design risk assessment in these circumstances

Single Room Heat Recovery Ventilation can also be classed as a decentralised system and specific provisions are itemised below.

The information below lays out requirements for installation requirements, control and commissioning.

2.1 General Principles for Limited Duct Work in Decentralised Systems

Duct lengths, sizing and finishing

A. Ducts should be sized by diameter and length to minimise resistance, pressure loss and noise generation. This is achieved by sizing of the ducts to limit the air velocity and minimising bends required[5].

B. The duct sleeve connecting the fan outlet to the terminal/grille should be at least the same diameter as the fan outlet and rigid/semi-rigid (flexible duct NOT to be used).

C. The duct – and the cored hole – should have a slight downward angle towards the outside to prevent water ingress.

D. If rectangular ducting is used it should be built into the fabric of the building, also with a slight downward angle, ensuring no thermal bridging point.

E. The installed duct sleeve should be sealed to the external and internal wall to maintain air tightness. This is of particular importance for cavity walls.

F. Ensure that there are no obstructions – including debris or other items – in the duct prior to fitting the fan and the terminal.

G. For window installations, check suitability of window and obtain a suitable window mounting kit from the manufacturer of the proposed fan unit.

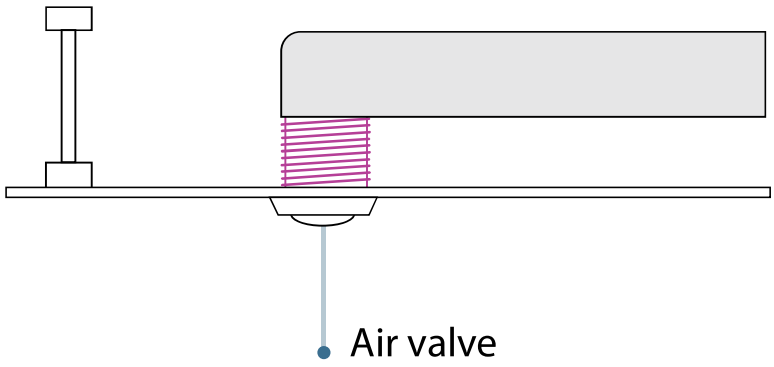


Figure 1: Air Valve and duct work

5 Flexible ducting should be avoided as this can increase resistance

Preventing condensation

A. Vertical ducting (for example, wet rooms to the roof line) may require a condensate trap in order to prevent backflow of any moisture into the product.

B. Perforated insulated flexi duct, used to minimise airborne acoustic transmission, should not be used between the fan unit and external discharge terminal to prevent condensation occurring within the insulation material.

Air Transfer

A. To ensure good transfer of air throughout the dwelling, there should be an undercut of minimum area 7600 mm2 in all internal doors above the floor finish. This is equivalent to an undercut of 10 mm for a standard 760 mm width door.

B. Ensure that the air transfer provision is unrestricted after floor finishes have been laid (e.g. carpets should not encroach). This should be achieved by making an undercut of 10 mm above the floor finish if the floor finish is fitted, or by a 20 mm undercut above the floorboards, or other surface, if the finish has not been fitted.

Installation – location

A. Ensure the final location of the selected fan and limited ducting will provide required ventilation rates (ensuring a clear path for air flow and limiting pressure drops i.e. no use of flexible ducting).

B. For through-wall units, if a hole is to be cored, it should be of a suitable dimension through the fabric of the building for the installation of the duct and ensure no thermal-bridging point.

C. The need for privacy (acoustic separation) between rooms should be considered when planning duct layout.

D. Terminals applied to external connections should equate to 90% of the duct free area[6].

Additional notes for Single Room Heat Recovery Ventilation

A. Do not install the SRVHR unit in the corner of a room as this may result in short circuiting of air flows.

B. Free air movement between rooms is not required as each room contains a single room heat recovery ventilator unit. These units have a balanced supply and extract air flow rate. It is however recommended that the provisions given in section 3 are maintained to minimise any imbalance flows within rooms.

C. These products provide balanced ventilation for one room only; the ventilation of all spaces should meet the requirements of the Building Regulations or Standard (calculation provision has been made in Approved Document F of the Building Regulations for mixed SRHVR and DMEV/MEV).

6 Note this is free area and not diameter

2.2 General Principles for Decentralised Systems Background Ventilation

A. Background ventilators should be provided to meet the minimum required equivalent area of ventilation specified by the relevant building regulation or standard[7].

B. For wall mounted background ventilators make an opening in wall in accordance with manufacturer's instructions for the size required. Ensure that there are no obstructions in the opening and install wall or window ventilator products in accordance with manufacturer instructions.

C. Install the wall or window ventilator product in accordance with manufacturer's instructions.

D. Ensure that wall or window ventilator products are sealed to their surrounds using a proprietary sealant as recommended by the manufacturer.

2.3 General Principles for Decentralised System Control

A. Installation of manual controls for the system must meet the requirements of prevailing building regulations.

B. Where sensors are not pre-installed within the fan unit, or additional optional sensors can be installed, only the sensors specified by the manufacturer of the fan unit should be installed and located following their guidance.

C. Where control of the fan speed is undertaken manually, switching should be provided locally to the spaces being served, i.e. bathrooms and kitchen. Provision of a single centrally located switch is insufficient and will result in fans being left in inappropriate modes of operation.

D. Ensure that a local manual override control is provided for any extract fan operated by automatic controls. *(Note: Humidity controls should not be used for sanitary accommodation where odour is the main pollutant).*

E. Continuous ventilation systems should not allow the occupier to turn off the fan other than at the local isolator. Provision of an on/off function will result in the fans being operated intermittently and the required continuous air flow ventilation rates not being achieved.

F. If control of the fan speed is undertaken manually, the operation of the fan in boost mode should be made obvious. This will minimise the likelihood of it being left in this mode unnecessarily *(Note: Installation of alternative sensors may result in control functions not performing correctly). A simple solution is a momentary switch with timer control.*

G. If sensors are duct mounted, their location should be noted and provisions for access for maintenance or replacement made.

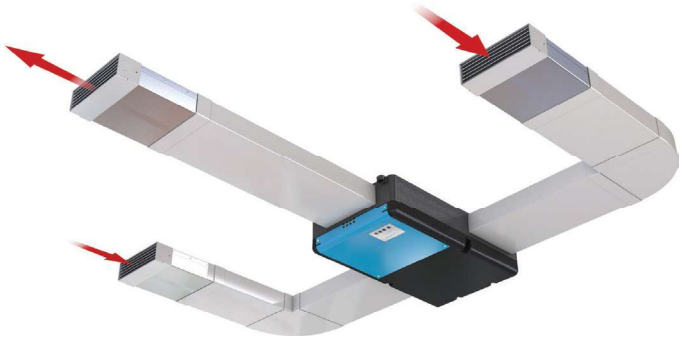
Examples of controls

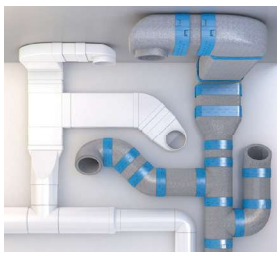
7 Cooker hoods should be installed so that access is easy for changing and cleaning of the filter/filters.

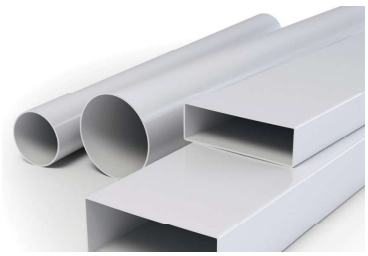
3. Centralised Ventilation Systems

Centralised systems are characterised as incorporating centralised mechanical ventilation units which are connected to a network of ducting for supply air (Mechanical Ventilation with Heat Recovery or Positive Input Ventilation) or extract air (Mechanical Ventilation with Heat Recovery or centralised Mechanical Extract Ventilation). These systems are continuous running. Central mechanical extract and PIV Systems are accompanied by additional background ventilation, for example the presence of trickle ventilators or window openings, whilst heat recovery is a balanced system with no additional background ventilation requirements.

Examples of Centralised Ventilation Systems







The information below lays out requirements for installation requirements, control and commissioning.

3.1 General Principles for Duct Work in Centralised Systems

Duct selection, sizing and finishing

A. Rigid or semi-rigid ducts, rectangular or circular, should be used[8]. It is good practice to only use flexi ducting up to a 200mm length for final connections.

B. The duct sleeve should be rigid and sealed to the external and internal wall to maintain air tightness. This is of particular importance for cavity walls.

C. It is important to check and consider the planning and installation of ductwork has been carried out/assessed in co-ordination with other trade activities and installations, such that routes are designed without compromise to the required ventilation air flow rates.

D. Where ductwork penetrates the fabric of the building (the building's air barrier), the fabric's continuity of barrier must be maintained. The nature of the barrier and ease of achieving an effective seal should be considered before holes are drilled. For new buildings, check with the principle building designer. For detailed retrofit, similarly check with the retrofit designer. Follow manufacturer's recommendations in these instances.

E. Horizontal ducting, including ducting in walls, should be arranged to slope slightly downwards away from the fan to prevent backflow of any moisture into the product.

F. For ceiling mounted fans/terminals, the holes should be cut to the minimum required size such that the fan/grille spigot fits snug into the hole.

G. Only proprietary terminals should be used. (discharge terminals and grills, roof or wall mounted). *Note: Ensure that the free area of the terminal/grille opening is designed to minimise pressure drop.*

H. Ensure that there are no obstructions, including debris or other items, in the duct prior to fitting the fan and the terminal.

I. Connection of components should not result in significant air flow resistance. Components should be proprietary and fit easily together without distortion.

J. Check duct runs have adequate space for the required thickness of ducting insulation as required by regulations and standards.

Duct connections and system support structures

A. Duct runs must be adequately supported with minimum separation distances set at 1m.

B. All duct connections require sealing. Where ducts are installed against a solid structure this can be difficult to achieve. In such locations preassembly of duct sections should be considered. This will require that connections are permanent to ensure the seal is maintained during installation.

C. Where access to ducts will not be possible after construction is complete, i.e. ductwork within floor and wall voids, consideration should be given to permanent connection and sealing with an appropriate non-hardening sealant, not using duct tape to achieve connection and sealing.

D. First fix ducts and for later connection of terminals etc should be checked and recorded for suitability before voids are closed off!

E. The fan unit should be adequately supported using the manufacturer's supplied or recommended fixing brackets.

8 If penetrating the building fabric with ducting, install in accordance with prevailing fire regulation. Example note: The requirements of Part B apply if ducts pass through any of the following (A fire resisting structure; A fire compartment; A protected stairway).

Preventing condensation

A. Vertical ducting (for example, wet rooms to the roof line) will require a condensate trap in order to prevent backflow of any moisture into the product.

B. Ducting should be insulated in accordance with prevailing regulations where it passes through unheated areas and voids (e.g. loft spaces). Current requirements require the equivalent of at least 25 mm of a material having a thermal conductivity of ≤0.04 W/m.K to reduce the possibility of condensation forming.

C. All intake and exhaust air ductwork, where it passes through conditioned areas (e.g. the heated part of a dwelling), should be insulated with the equivalent of at least 50mm of a material having a thermal conductivity of ≤0.04W(m·K). Insulation for intake and exhaust ducts should be fully vapour sealed to minimise the risk of condensation forming.

D. A condensate drain should be installed from the fan unit to an appropriate drain location. The condensate pipe should be installed to have a minimum 5º fall from the fan unit[9].

E. The condensate drain should be adequately secured and where passing through an unheated space must be adequately insulated to prevent freezing.

F. Ducts within the building heated envelope carrying cold air between the external supply/discharge terminals and the fan unit should be insulated and wrapped additionally with a vapour barrier outside the insulation to prevent condensation occurring within the insulation material.

Figure 2
Ventilation control condensation – condensate trap

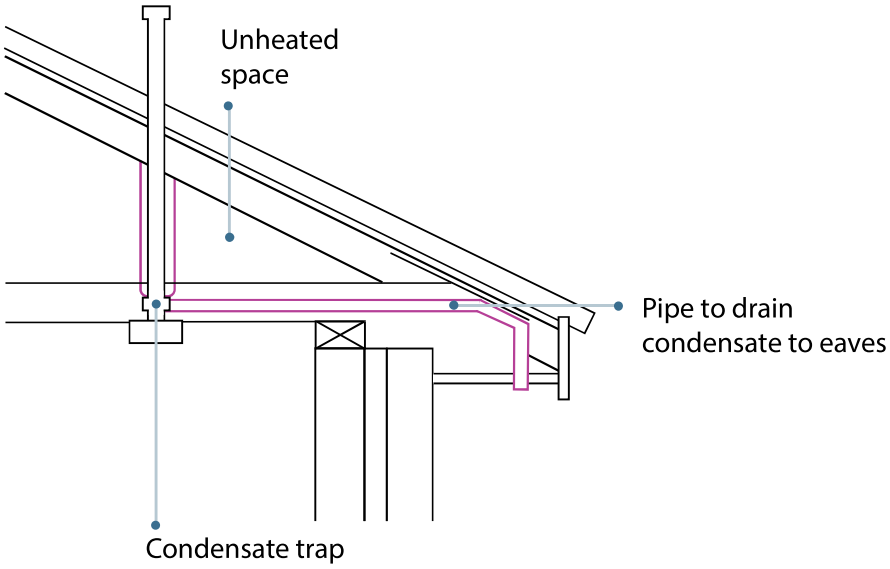
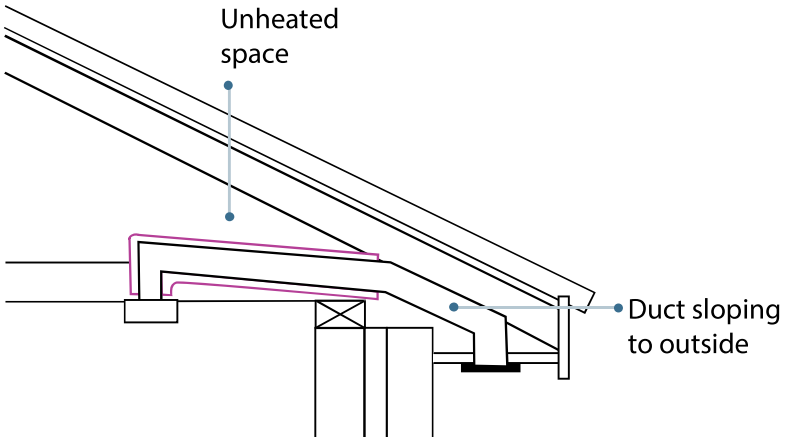


Figure 3:
Ventilation control condensation – insulation



9 Heat recovery systems should be provided with a condensate drain that drains to foul water via a non-return valve. This should be a mechanical seal type not a water trap

Air Transfer

A. To ensure good transfer of air throughout the dwelling, there should be an undercut of minimum area 7600 mm^2 in all internal doors above the floor finish. This is equivalent to an undercut of 10 mm for a standard 760 mm width door.

B. Ensure that the air transfer provision is unrestricted after floor finishes have been laid (e.g. carpets should not encroach). This should be achieved by making an undercut of 10 mm above the floor finish if the floor finish is fitted, or by a 20 mm undercut above the floorboards, or other surface, if the finish has not been fitted.

Grilles and Terminals

A. Only proprietary terminals tested in accordance with BS EN 13142:2021 should be used.

B. All room air extract terminals should be installed as detailed by the system designer. Room air extract terminals should be installed as close to ceiling level as practical, to ensure warm moist air is removed from each space.

C. Fixed terminals – grilles or louvers. If the room extract air terminals are fixed, ensure that effective balancing of the system can be achieved. If this is not provided within the fan unit then dampers should be installed within the duct system to allow balancing when the system is commissioned.

D. Adjustable terminals/grilles. Ensure each terminal/grille can be locked in its commissioned position once system balance has been achieved. It is vital for the correct operation of the system that the system remains balanced in its commissioned state.

Installation – location

A. Ensure the final location of the selected fan and ducting will provide required ventilation rates (ensuring a clear path for air flow and limiting pressure drops i.e. flexible ducting only up to 200mm in length to connections).

B. Ensure final location of equipment offers sufficient space to allow access for maintenance. For ceiling mounted terminals, the holes should be cut to the minimum required size such that the fan/grille spigot fits snug into the hole[10].

C. Fan units should be installed to allow sufficient space for replacement at end of its operational life – whole unit or key mechanical/electrical components. This should be achievable without need to remove fixed structures or remove significant lengths of connected ductwork. *Refer to the manufacturer's specification for appropriate environmental conditions. Unconditioned spaces, e.g. lofts, may become very hot in summer, which may have implications for both mechanical and electronic component life. The fan unit spigot arrangement may dictate the location and orientation of installation to ensure optimum performance refer to the manufacturer's instructions.*

D. The fan unit should be installed on a suitable sound structure, which is stable and level.

E. Ducts should not be installed where they can be easily damaged, for example; run across open loft areas where they may be stood on or have items placed on them, breaking seals and possibly crushing the duct.

F. The fan unit should be located as specified by the system designer. Ensure the final location of the unit and ducting meets regulatory guidance.

G. The fan unit should be mounted/installed as per manufacturers specifications. The location of the fan unit should minimise overall duct run length, both from the internal extract terminals/grilles to the fan unit and from the fan unit to the external discharge terminal.

10 Duct systems should be designed such that internal cleaning of the duct system is possible without dismantling the system. Access panels to permit inspection and service of any remote flow dampers, especially fire dampers, in line with regulatory requirements.

3.2 General Principles for Centralised Systems Background Ventilation (does not apply to balanced heat recovery systems)

A. Background ventilators should be provided to meet the minimum required equivalent area of ventilation specified by the relevant building regulation or standard.

B. Background ventilators should be at least 1700mm above floor level, to reduce cold draughts, but still be easy for the occupant to reach[11].

C. For wall mounted background ventilators make an opening in wall in accordance with manufacturer's instructions for the size required. Ensure that there are no obstructions in the opening.

D. Install the wall or window ventilator product in accordance with manufacturer's instructions.

E. Ensure that wall or window ventilator products are sealed to their surrounds using a proprietary sealant as recommended by the manufacturer.

F. Background ventilators should be provided to meet the minimum required equivalent area of ventilation specified by the relevant building regulation or standard.

Controls

3.3 General Principles for Centralised System Control

A. Where sensors are not pre-installed within the fan unit, or additional optional sensors can be installed, only the sensors specified by the manufacturer of the fan unit should be installed.

B. Ensure that a local manual override control is provided for any extract fan operated by automatic controls.

C. Continuous ventilation systems should not allow the occupier to turn off the fan other than at the local isolator. Provision of an on/off function will result in the fans being operated intermittently and the required continuous air flow ventilation rates not being achieved.

D. Humidity control should not be used in sanitary accommodation, as odour is the main pollutant.

E. If sensors are duct mounted, their location should be noted and provisions for access for maintenance or replacement made.

F. If control of the fan speed is undertaken manually, the operation of the fan in boost mode should be made obvious. This will minimise the likelihood of it being left in this mode unnecessarily. A simple solution is a momentary switch with a time for the fan.

Controls – Location and configuration

G. Installation of room sensors should follow the manufacturer's guidance on positioning.

H. Where control of the fan speed is undertaken manually, switching should be provided locally to the spaces being served, i.e. bathrooms and kitchen. Provision of a single centrally located switch is insufficient and will result in fans being left in inappropriate modes of operation.

I. Continuously running fans should be set up to operate without occupant intervention but may have manual or automatic controls for selecting the high rate of operation (manual turn off at the local isolator is allowed).

11 Cooker hoods should be installed so that access is easy for changing and cleaning of the filter/filters.

J. Any manual high-rate controls should be provided locally to the spaces being served, e.g. bathrooms and kitchens. Automatic controls might include sensors for humidity, occupancy/ usage and pollutant release.

K. Controls based on humidity sensors may be installed in moisture-generating rooms (e.g. kitchen or bathroom) but should not be used for sanitary accommodation, where odour is the main pollutant.

L. Other types of automatic controls might be suitable. Where present, automatic controls should operate according to the need for ventilation in the space. Background ventilators with automatic controls should also have manual override.

M. Where a combustion appliance is installed, any automatic controls must also ensure that the ventilation provided meets the requirements of Part J of the Building Regulations.

N. Installation of manual controls for the system must meet the requirements of prevailing Building Regulations e.g. *Approved Document M suggests that switches should be located between 450 mm and 1200 mm from finished floor level (Section 8.3 Page 69 ADM).*

Note: Installation of alternative sensors may result in control functions not performing correctly.

4. System Commissioning

4.1 Decentralised Commissioning

Visual Inspections (all decentralised systems)

A. System installation complies with the requirements laid out in this guide.

B. Number of extract points and terminals satisfy relevant building regulation or standard requirements.

C. All equipment is in good condition with no obvious defects that will be hazardous or affect the system performance.

D. Ensure adequate power supply.

E. Compliant with prevailing fire safety regulations.

Functional Checks (all decentralised systems unless noted)

A. Temporary protection and packaging should be removed from all products.

B. Check fan operates correctly when activated by manual control (e.g. light switch), or automatic control (e.g. PIR)[12].

C. Ensure fan switches off after controls are de-activated and, in the case of run-on timers, that these are set to a minimum of 15 minutes. (Intermittent fans only)

D. A noise reading must be taken.

E. Provision of electrical safety measures compliant with prevailing building regulations.

Airflow Measurements[13]

A. Ensure that all intended background ventilators or other air transfer devices are open.

B. Ensure all internal (with required undercuts at finished floor level i.e. including floor covering) and external doors and windows are closed, including room in which measurement is being carried out.

C. Airflow measurements should be performed using a calibrated airflow device with proprietary hood attachment and results recorded in litres per second (l/s).

D. Record the extract airflow for each extract fan onto commissioning sheet. The recording instrument should be calibrated annually and be capable of achieving an accuracy of ± 5%[14].

Background Ventilators

The following points should be observed and recorded:

A. Correct equivalent area and location of air inlets.

B. Remove any temporary protection and packaging from all background ventilators, and check functionality (i.e. do shutters open/close correctly).

C. Ensure that an adequate seal has been provided between ventilator product and wall/window frame.

12 *Unless timer control is graduated in minutes, run-on timers should be checked against a timed test and adjusted if run time is less than 15 minutes.*
13 Note that for Intermittent a vane anemometer may be used; for decentralised mechanical extract ventilation you may use a power hood. For Single Room Ventilation with Heat Recovery, follow manufacturer air flow measurement data
14 Check with boost off and normal boost

4.2 Centralised Systems Commissioning

Visual Inspections

A. System installation complies with the requirements laid out in this guide.

B. Number of extract points and terminals satisfy relevant building regulation or standard requirements.

C. All equipment is in good condition with no obvious defects that will be hazardous or affect the system performance.

D. Ensure adequate power supply.

E. Compliant with prevailing fire safety regulations (e.g. Installation of fire dampers and relevant compliant access for service and inspection should be made).

Initial start-up

A. Check that air flow direction is correct at each room terminal.

B. Check for any abnormal noises on start-up or when the system is running in normal background ventilation mode.

Air flow balancing and measurement

A. The system should be balanced to ensure that design air flow rates are achieved at each room terminal/grille. There are several combinations of room terminal/grille (hereon referred as terminal) and fan control that may be used in domestic systems, the fan manufacturer's instructions should be followed to achieve balancing. If specific details are not included the following steps should be:

1. **Adjustable terminals and controllable speed fan.**

   The fan speed should be set approximately to achieve the desired continuous flow rate. The index terminal flow rate is set with the terminal fully open and all other terminals are adjusted to achieve the required flows at each terminal.

   If the index terminal has to be closed to achieve only the required air flow rate, then reduce the fan speed and rebalance the terminals.

2. **Fixed terminals with flow adjustment by duct damper or similar device at the fan unit.**

3. **Adjustable terminals and fixed volume flow fan.**

   The fan speed should be set to achieve the desired continuous flow rate.
   The index terminal flow rate is set with the terminal full open and all other terminals are adjusted to achieve the required flows at each terminal. Adjustment of the terminals achieves balancing only; total flow rate is governed by the fan control setting. Great care should be taken not to close the terminals too far as the fan unit will always maintain a constant volumetric flow rate; closing the terminals will only require the fan to work harder to achieve a given air flow rate.

4. **Fixed terminals with automatic flow adjustment at the fan unit.**

   The fan speed should be set to achieve the desired continuous flow rate.
   The flows are balanced by automatic devices located within the fan unit, no adjustment can be made.

Example of Air flow testing equipment

B. Ensure that background ventilators or other air transfer devices are open.

C. Ensure all internal and external doors and windows are closed, including rooms in which measurements are being carried out.

D. Air flow measurements should be performed using a calibrated airflow device with proprietary hood attachment and results recorded in litres per second (l/s). Reference should be made to design airflow rates.

E. Record the airflow rate at each room terminal onto the commissioning sheet in Section 5, along with the design air flow rate for each terminal. Measurements should be taken at both maximum rate and minimum rate fan speeds.

F. It is recommended that a vane anemometer or similar device is used to balance and measure the air flow rates at each room terminal. The instrument will require a hood to be attached to allow it to cover the terminal. The instrument should be calibrated annually and be capable of achieving an accuracy of ± 5%.

Controls

A. Ensure all local controls have been installed following the manufacturer's instructions.

B. Ensure all local controls are adequately labelled, indicating their function clearly.

C. If sensors have been installed separately from the fan unit ensure installation follows the manufacturer's instructions.

D. Where control of the fan is automated, the controls should be configured to minimise the occurrence of hunting (the continual increase and decrease of the fan speed).

E. If manual control of, for example, heat exchanger by-pass is provided, clear and detailed instructions must be made available to the occupier.

F. As far as practical the correct operation of each control function should be tested.

4.3 Balanced Systems Commissioning

Visual inspections

The following points should be observed and recorded:

A. System installation complies with the requirements laid out in this guide.

B. System installation complies with the installation clauses in section 1.5.

C. System is installed in accordance with design criteria.

D. All ductwork and terminals are in good condition with no obvious defects that will be hazardous or affect the system performance.

E. Ensure adequate power supply.

Initial start-up

A. Check that air flow direction is correct at each room terminal.

B. Check for any abnormal noises on start-up or when the system is running in normal background ventilation mode.

Air flow balancing and measurement

A. The system should be balanced to ensure that design air flow rates are achieved at each room terminal/grille. There are several combinations of room terminal/grille (referred to as a terminal from now on) and fan control that may be used in domestic systems; the fan manufacturer's instructions should be followed to achieve balancing. Both supply and exhaust should be balanced within 10% of each other (at normal ventilation rate). If specific details are not included in instructions the following steps should be:

1. **Adjustable terminals and a fixed (stepped) speed fan.**

   The fan speed should be set approximately to achieve the desired continuous flow rate. The index terminal flow rate is set with the terminal fully open and all other terminals are adjusted to achieve the required flows at each terminal.

   If the index terminal has to be closed to achieve only the required air flow rate, then reduce the fan speed and rebalance the terminals.

2. **Adjustable terminals and controllable speed fan.**

   The fan speed should be set approximately to achieve the desired continuous flow rate. The index terminal flow rate is set with the terminal fully open and all other terminals are adjusted to achieve the required flows at each terminal. If the index terminal has to be closed to achieve only the required air flow rate, then reduce the fan speed and rebalance the terminals.

3. **Fixed terminals with flow adjustment by duct damper or similar device at the fan unit.**

   As 1. or 2. above depending on the type of fan speed control.

4. **Adjustable terminals and fixed volume flow fan.**

   The fan speed should be set to achieve the desired continuous flow rate. The index terminal flow rate is set with the terminal full open and all other terminals are adjusted to achieve the required flows at each terminal. Adjustment of the terminals achieves balancing only; total flow rate is governed by the fan control setting. Great care should be taken not to close the terminals too far as the fan unit will always maintain a constant volumetric flow rate; closing the terminals will only require the fan to work harder to achieve a given air flow rate.

5. **Fixed terminals with automatic flow adjustment at the fan unit.**

   The fan speed should be set to achieve the desired continuous flow rate. The flows are balanced by automatic devices located within the fan unit, no adjustment can be made.

B. Ensure all internal and external doors and windows are closed, including rooms in which measurements are being carried out.

C. Air flow measurements should be performed using a calibrated airflow device with proprietary hood attachment and results recorded in litres per second (l/s). Reference should be made to design airflow rates.

D. Record the airflow rate at each room terminal onto the commissioning sheet in Section 5, along with the design air flow rate for each terminal. Measurements should be taken at both maximum rate and minimum rate fan speeds.

E. It is recommended that a vane anemometer or similar device is used to balance and measure the air flow rates at each room terminal. The instrument will require a hood to be attached to allow it to cover the terminal. The instrument should be calibrated annually and be capable of achieving an accuracy of $\pm$ 5%.

5. System completion and handover

This section outlines the minimum information to be handed over to the end user immediately after the ventilation system has been installed and commissioned.

5.1 Documentation to be handed over to the end user

Operation and maintenance manual

The operation and maintenance manual should contain specific instructions for the end user on how and when to use the ventilation system, including information on the intended use of available fan settings. Information should also be provided to suggest when the system components should be cleaned and maintained.

The following information should be provided where relevant:

- manufacturer's contact details;
- use of air inlets for background ventilation;
- location of and setting automatic controls (e.g. humidity and timer controls);
- location and use of on/off and boost settings for mechanical ventilation system;
- instructions on how cleaning and maintenance should be carried out, including replacement filters;
- location of filters if not installed within the fan unit. (If no filters installed on extract terminals – how are ducts accessed for cleaning and recommendations for how cleaning is undertaken and interval);
- recalibration or checking of sensors and their location.

The operation and maintenance manual should also contain relevant manufacturers' literature which was supplied with the system or with individual components of the system. This might include components specifications, installation guidance, operating instructions, maintenance schedules, guarantees, registration card, spare part lists, means of obtaining spare parts, etc.

Completion checklist and commissioning sheet

The three-part sheet detailed in Section 5 should be signed and completed and included in the Operation and Maintenance manual.

6. Completion checklist and commissioning sheet

This installation completion checklist and commissioning sheet is divided into three distinct parts:

- **Part 1** contains the particulars of the system, installation address and installer's details.
- **Part 2a** should be completed for all systems, and functions as an installation checklist.
- **Part 2b** is a visual inspection, or pre-commissioning checklist, and should be completed for all systems.
- **Part 3** should be completed for all systems that employ fan units, including intermittent extract fans, and requires air flow measurements to be recorded.

The three parts should be completed in full, and a copy should form part of the operation and maintenance manual.

Checking design against measured air flow rates

For Systems 1, 3 and 4, the measured air flow rates should be recorded on Part 3: Commissioning details, as part of the commissioning procedures given in Tables 2, 6 and 8. The measured values will need to be compared with their respective design values. Compliance with the design will be met if the measured rates for each are equal to, or greater than the design value (typically 10% tolerance). If any measured value is less than the design value, adjustment should be made to correct the system and all air flows re-measured until they meet the design values.

Instrument calibration

Measurement of air flows should be performed using equipment that has been calibrated at a UKAS accredited calibration centre. Calibration should be performed annually for each air flow measurement device used to record final air flow rates in Part 3. The Building Control Body (BCB) reserve the right to request copies of calibration certificates, which should be produced within seven working days of such request.

Demonstrating compliance

All three parts should be completed, with the relevant Parts 2 and 3 signed by a person who is competent and responsible for the installation and for the commissioning of the system that has been installed.

The three-part form needs to be completed for each installation address, and a copy should be submitted to the BCB as evidence the installation has been correctly installed, inspected and commissioned.

SAP 2009 – In-use factors[15]

In-use factors are applied in SAP to the energy performance of continuous mechanical ventilation systems. These factors allow for several issues including the quality of the installation and commissioning (see draft SAP 2009 for more details). It may be appropriate to reduce these in-use factors for suitably qualified people adopting this installation and commissioning compliance guide. Evidence will first be required of the improved energy performance of this approach.

15 In use factors were introduced under SAP 2009 but the model is now superceded by SAP 10.3 and in the future, the Home Energy Model (subject to rules on publication)

Part 1. System details and declarations

1.1	Installation Address Details
Dwelling name/number	
Street	
Locality	
Town	
County	
Post Code	

1.2	Installation Details
System classification*	System .....
Enter System 1 to 4 as defined by Approved Document F 2010	
Manufacturer	
Model numbers	
Serial number (where available)	
Location of fan units	1.
	2.
	3.
	4.
	5.

1.3	Installation Engineer's Details
Engineer's Name	
Company	
Address Line 1	
Address Line 2	
Telephone Number	
Post Code	

1.4	Commissioning Engineer's Details (if different to 1.3)
Engineer's Name	
Company	
Address Line 1	
Address Line 2	
Telephone Number	
Post Code	

**Note. If a system has been installed that is not defined by Systems 1 to 4 in Approved Document F further installation checks and commissioning procedures may be required. Seek particular guidance from the manufacturer for these systems.*

Part 2a. Installation details

2.1	*Installation Checklist – General (all Systems)*	*Tick as appropriate*	
Has the system been installed in accordance with manufacturer's requirements?		**Yes**	**No**
Have relevant system installation clauses been followed as detailed in Tables 1, 3, 5, and 7 as applicable?		**Yes**	**No**
If any deviation from Tables 1, 3. 5 and 7, these should be detailed here.			
Description of installed controls (e.g. timer, central control, humidistat, PIR, etc)			
Location of manual / override controls			

2.2	*Installation Engineer's Declaration*
Engineer's Signature	
Registration Number (if applicable)	
Date of Inspection	

Part 2b – Inspection of installation

This section should be completed by the commissioning engineer prior to completing Part 3.

2.3a	*Visual Inspections – General (all Systems)*		
Total installed equivalent area of background ventilators in dwelling?			**mm**
Total floor area of dwelling?			**m^2**
Does the total installed equivalent ventilator area meet the requirements given in Tables 5.2a, 5.2b, or 5.2c in ADF?		**Yes**	**No**
Have all background ventilators been left in the open position?		**Yes**	**No**
Have the correct number and location of extract fans/terminals been installed that satisfy Table 5.2a in ADF?		**Yes**	**No**
Is the installation complete with no obvious defects present?		**Yes**	**No**
Do all internal doors have sufficient undercut to allow air transfer between rooms (i.e. 10 mm over and above final floor finish)?		**Yes**	**No**
Has all protection/packaging been removed (including background ventilators) such that system is fully functional?		**Yes**	**No**
For ducted systems, has the ductwork installation been installed in such manner that air resistance and leakage is kept to a minimum?		**Yes**	**No**
Are the correct number and size of background ventilators provided that satisfy ADF?		**Yes**	**No**
Has the entire system been installed such that there is sufficient access for routine maintenance and repair/replacement of components?		**Yes**	**No**
2.3b	***Visual Inspections – General (Systems 3 and 4 only)***		
Have appropriate air terminal devices been installed to allow system balance?		**Yes**	**No**
Has the heat recovery unit (System 4 only) and all ductwork been effectively insulated where installed in unheated spaces?		**Yes**	**No**
Condensate connection is complete and drains to an appropriate location (System 4 only)?		**Yes**	**No**
2.3c	***Other Inspections – General (Systems 1, 3 and 4 only)***		
Upon initial start up, was any abnormal sound or vibration experienced, or unusual smells detected?		**Yes**	**No**

Part 3. Commissioning details

3.1 Commissioning Equipment		
Schedule of air flow measurement equipment used, (model and serial)		Date of last UKAS calibration
1.		
2.		
3.		

3.2 Air Flow Measurements – System 1 Only		
Fan reference (as 1.2)	Measured Extract Rate (l/s)	Design Extract Rate (l/s) Refer to Table 5.1a in ADF
Extract Fan 1.		
Extract Fan 2.		
Extract Fan 3.		
Extract Fan 4.		
Extract Fan 5.		

For kitchen extract canopies, only the highest setting needs to be recorded.

3.3 Air Flow Measurements (Extract) – Systems 3 and 4 only				
Room reference (location of terminals)	Measured Air Flow High Rate (l/s)	Design Air Flow High Rate (l/s) Refer to Table 5.1a in ADF	Measured Air Flow Low Rate (l/s)	Design Air Flow Low Rate (l/s) Refer to Table 5.1b in ADF
Kitchen.				
Bathroom				
En Suite				
Utility				
Other...				
Other...				
Other...				

3.4 Air Flow Measurements (Supply) – System 4 only				
Room reference (location of terminals)	Measured Air Flow High Rate (l/s)	Design Air Flow High Rate (l/s) Refer to Table 5.1a in ADF	Measured Air Flow Low Rate (l/s)	Design Air Flow Low Rate (l/s) Refer to Table 5.1a in ADF
Living Room 1				
Living Room 2 (if present)				
Dining Room				
Bedroom 1				
Bedroom 2				
Bedroom 3				
Bedroom 4				
Bedroom 5				
Study				
Other...				

3.5 Commissioning Engineer's Declaration	
Engineer's Signature	
Registration Number (if applicable)	
Date of Commissioning	

7. Annex – Positive Input Ventilation

Positive Input Ventilation (PIV) is a generic term commonly applied to **Continuous Mechanical Supply ventilation systems.** There are two types – 1) Ducted; 2) Loft or Roof-space mounted.

Examples of Positive Input Ventilation

PIV systems may be used in conjunction with other measures to provide compliant[16] ventilation for a wide range of dwellings.

PIV as a Ducted Ventilation System

Many of the principles in this document that are applicable to other ducted ventilation systems also apply to PIV systems but there are specific factors unique to PIV that must be addressed.

Applicable Clauses:

Ducted PIV – *(Note – in all cases, the Manufacturer's Installation Guidance takes precedence).*

3.1. General Principles – All Relevant Clauses but note that manufacturers may specify/provide **mandatory** ancillary items and installation configurations.

3.2. General Principles – Background ventilation – All Relevant Clauses but note that in existing properties natural infiltration / exfiltration paths may eliminate the need for trickle ventilators.

3.3. General Principles – Controls – All Relevant Clauses but note that a PIV system typically operates on the entire dwelling from a central supply point. Ducted PIV systems may also include a heating component for air tempering purposes. Such devices must be controlled in conjunction with the ventilation unit.

4. System Commissioning – Relevant Clauses in 4.1, 4.2

5. System Completion and Handover – All Relevant Clauses

6. Completion checklist and commissioning sheet – All Relevant Clauses

*Note – PIV system performance is tested by the manufacturer as a complete system and **verified during the third-party approval process** (for Ducted PIV this would include a representative duct system), including intake and supply terminals. As the additional static*

16 In use factors were introduced under SAP 2009 but the model is now superceded by SAP 10.3 and in the future, the Home Energy Model (subject to rules on publication)

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