

Mechanical extract ventilation systems (MEV)

Bathroom and kitchen extract fans providing decentralised extract ventilation (dMEV) or central mechanical extract ventilation (cMEV) and may be continuous or intermittent, depending on design and location.

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Figure 1: dMEV layout

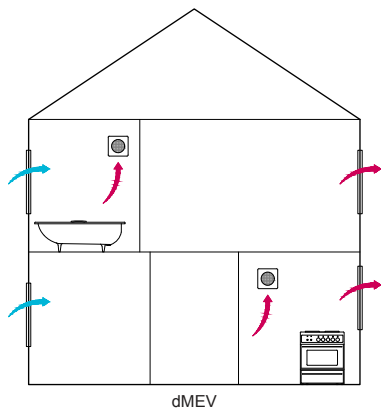
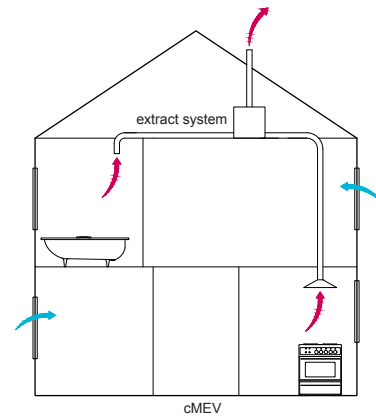


Figure 2: cMEV layout



Definitions for MEV

Air valve (extract)	Wall or ceiling mounted fittings used to balance the flow rate of air between rooms; may be referred to as grilles.
cMEV	Central mechanical extract ventilation system providing simultaneous ventilation to reduce excess moisture using multiple extraction points.
dMEV	Decentralised mechanical extract ventilation system providing ventilation to reduce excess moisture using single extraction point.
Exhaust ductwork	Carries air from the fan unit and exhausts it to the external atmosphere.
MEV	A generic term relating to both cMEV and dMEV.
Service ductwork extract	Carries air between the air valves and the MVHR fan unit.
Terminal fittings	Located on the outside of the building to finish the intake and exhaust ductwork.

8.4.2.1 Compliance

Also see: Chapter 2.1

MEV design, materials and sitework shall comply with the Technical Requirements. Issues to be taken into account include:

- 1) relevant standards
- 2) product certification
- 3) operative competency.

8.4.2.1.1 Relevant standards

Relevant standards include:

BS 476	Fire tests on building materials and structures
BS EN 1365-2	Fire resistance tests for loadbearing elements. Floors and roofs
BS EN 1366-3	Fire resistance tests for service installations. Penetration seals
BS EN ISO 12001	Noise emitted by machinery and equipment
Approved Document F England	Ventilation
Technical handbook Scotland	Section 3 Ventilation
Technical Booklet NI	Part K Ventillation

8.4.2.1.2 Product certification

MEV appliances should hold a current assessment by an appropriate independent technical approvals authority accepted by NHBC confirming compliance with UKCA, UKNI or CE marking. A Declaration of Conformity detailing the standards the product complies with and documents should be available on request.

8.4.2.1.3 Operative competency

MEV systems should be installed by competent operatives who are:

- familiar with the system being installed, or
- certified to a standard acceptable to NHBC.

8.4.2.2 Provision of information

Designs and specifications shall be produced in a clearly understandable format, include all relevant information and be distributed to the appropriate personnel.

Provision of information is important as it allows for energy-efficient use of the building and common methods adopted to prevent overheating.

Clear and fully detailed drawings should be available on site to enable work to be carried out in accordance with the design. Design and specification information should be issued to site supervisors, relevant specialist subcontractors and suppliers, and include the following information:

- fixing schedule
- a full set of current drawings
- indication of which manufacturer and/or installer is responsible for each system and interface
- commissioning schedule
- manufacturers' specifications
- interface details
- on-site testing requirements
- type and spacing of clips and fixings
- type and location of ancillary components, including those used for fire safety and acoustic purposes
- commissioning certificates
- location of all ductwork runs, the fan unit and controls
- type, size and position of ducts and terminals
- direction of fall for horizontal ductwork
- designed airflow-balancing figures for the system
- thermal modelling.

8.4.2.3 System design

MEV systems shall be designed to minimise disturbance caused by noise. Issues to be taken into account include:

- 1) location
- 2) system
- 3) compatibility
- 4) performance
- 5) control of condensation
- 6) terminals.

8.4.2.3.1 Location

MEV systems should be correctly located, including ancillary components, in accordance with the manufacturer's recommendations.

The route of ductwork should take account of other building elements. Ductwork passing through structural elements should not adversely affect the structural or fire performance of the building. Where alterations to structural elements, such as I-joists, are required, this should only be carried out in accordance with the manufacturer's recommendations or be designed by an engineer in accordance with Technical Requirement R5.

The fire requirements of the building should be in accordance with relevant Building Regulations and standards. Issues that should be taken into account include:

- suitable detailing of components passing through other elements of the building
- the location and type of dampers and firestops to be used
- the integrity of protected stairs and halls
- the integrity of walls and floors.

8.4.2.3.2 System

MEV systems should be in accordance with relevant Building Regulations and installed to ensure that effective ventilation is provided without affecting health or creating unnecessary noise.

8.4.2.3.3 Compatibility

MEV systems should ensure compatibility with other building elements and not adversely affect the performance of the building.

MEV systems should be designed as a complete package, taking into account the performance of all components and materials, to ensure compatibility, and in accordance with the performance requirements of the system.

Particular consideration should be given where components from different manufacturers are specified on the same system.

8.4.2.3.4 Performance

The MEV system should be designed to provide satisfactory performance and be installed according to the design and manufacturer's recommendations. Variations from the design should maintain the satisfactory performance of the system and be approved by the designer.

Issues that should be taken into account include:

- ventilation rates as set out in appropriate relevant Building Regulations and standards
- fan capacity, accounting for airflow resistance of the system
- ensuring the even distribution of air flow, regulations, standards and airflow resistance, including from bends and fittings.

Airflow resistance should be calculated using figures for air valves and terminals determined in accordance with BS EN 13141-2 and data supplied by the duct manufacturer. Ductwork should be as direct as possible to reduce the number of bends.

Allowance should be made for air transfer within the home. Where gaps between the underside of internal doors and the floor finish are used for air transfer, the guidance in Chapter 9.1 A consistent approach to finishes should be considered.

8.4.2.3.5 Control of condensation

Where extract ductwork passes through unheated spaces, it should be continuously insulated to achieve a thermal resistance equivalent to a minimum of 25mm of insulating material with a thermal conductivity of 0.04W/mK. This can be achieved by using:

- suitable pre-insulated ductwork, or
- a proprietary insulation system (see Figure 3).

Alternatively, the ductwork can be fitted with a condensate trap that discharges to the outside or the duct can be installed to slope to the outside (see Figure 4).

Figure 3: Ventilation control condensation — insulation

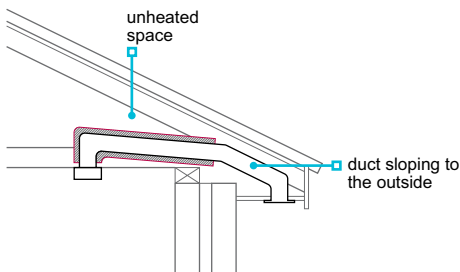
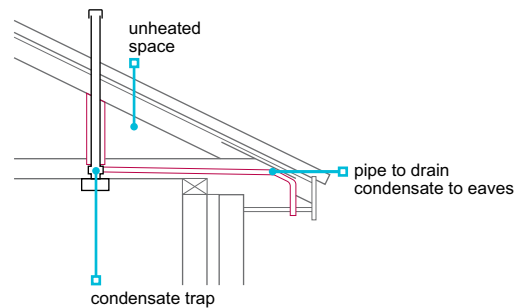


Figure 4: Ventilation control condensation — condensate trap

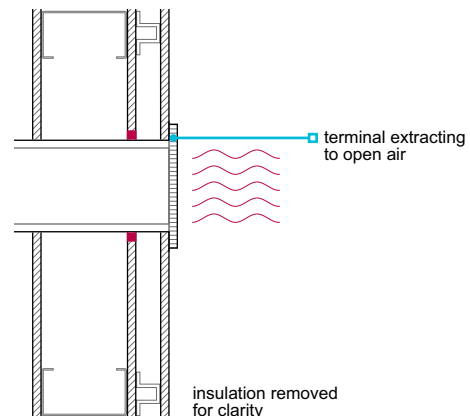


8.4.2.3.6 Terminals

Ventilation systems should terminate freely to open air.

The airflow resistance of terminals should not adversely affect the performance of the ventilation system. Airflow resistance of terminals can be obtained through testing in accordance with BS EN 13141-2 (see Figure 5).

Figure 5: Termination to ventilation systems



8.4.2.4 Acoustics

MEV systems shall be designed to minimise disturbance caused by noise.

MEV fan units should be sized to run at their optimum speed and to provide suitable performance whilst taking the resulting noise and vibration into account. Specifying MEV fan units that can provide the required airflow rates when running at less than full speed can reduce unnecessary noise.

Ductwork should be sized to allow air to pass freely without causing excessive noise disturbance. To reduce noise transfer along ductwork, a short length of flexible duct can be installed adjacent to air valves and fan units. Other issues to be taken into account include:

- noise between habitable rooms
- external noise
- location of the MEV fan unit
- the type of mountings used to secure the MEV fan unit.

8.4.2.5 Building integration

Also see: Chapters 7.1, 7.2 and 8.6

MEV design, materials and sitework shall comply with the Technical Requirements. Issues to be taken into account include:

- 1) weathertightness
- 2) fixing of fan units
- 3) fire-stopping.

8.4.2.5.1 Weathertightness

Proprietary roof terminals should be used to ensure the weathertightness of the roof covering.

8.4.2.5.2 Fixing of fan units

MEV fan units should only be fixed to parts of the building capable of taking the load. Where MEV fan units are supported by framed structures, additional components such as noggings may be required to provide a secure fixing point.

Fan units should be located, orientated and fixed in accordance with the design, using the clips, brackets and fixings recommended by the manufacturer.

The type, size, number, position and fitting tolerance of fixings should be in accordance with the manufacturer's recommendations.

8.4.2.5.3 Fire-stopping

The MEV system should not adversely affect the fire performance of the building. Issues to be taken into account include:

- ensuring that the fire requirements of the building are in accordance with relevant Building Regulations
- suitable detailing of components passing through other elements of the building
- location and type of firestops to be used
- integrity of protected stairs and halls
- integrity of walls and floors.

Proprietary fire components should be suitably tested and specified to take account of the test conditions.

8.4.2.6 Ductwork

Also see: Clause 8.4.1.6

Ductwork to intermittent and continuously running MEV systems shall ensure satisfactory performance and durability. Issues to be taken into account include:

- 1) resistance to airflow
- 2) installation of ductwork.

8.4.2.6.1 Resistance to airflow

Ductwork systems should be designed to minimise the resistance to airflow and be formed from compatible components.

Rigid duct is preferable to flexible, but where flexible duct is used, it should be restricted in length to ensure that the airflow resistance does not prevent the designed ventilation rate from being achieved. Flexible duct should be installed:

- straight
- in accordance with the manufacturer's recommendations.

Bends should generally be formed with proprietary rigid components. Where flexible duct is used to form bends on an intermittent extract system, they should be restricted to a maximum of:

- two for systems up to 30 L/s
- one for extract rates higher than 30 L/s.

8.4.2.6.2 Installation of ductwork

Ductwork should be installed in a neat and workmanlike manner, be securely fixed and have:

- adequate support throughout its length
- sealed mechanically fixed joints and connections.

Where ductwork passes through an external wall, it should be positioned to slope slightly outwards to prevent water entering the building. Clips and supports for ductwork should be spaced at equal distances and in accordance with the ductwork manufacturer's recommendations. For rigid ductwork, they should not generally be more than 750mm apart.

Ductwork should not be in direct contact with other surfaces, such as plasterboard ceilings, that may transfer noise to the home.

It is not necessary to provide non-return shutters on extract fans or cooker hoods or their ducting unless specifically required by the manufacturer's installation instructions.

8.4.2.7 Fixing and jointing of ductwork

MEV ductwork and insulation shall be installed to a satisfactory standard. Issues to be taken into account include:

- 1) fixing
- 2) jointing of ductwork.

Ductwork should be installed in a neat and workmanlike manner.

8.4.2.7.1 Fixing

To prevent condensate collecting, horizontal ductwork should be to a suitable outfall in accordance with the design and installed to a true line to avoid localised dips. Where parallel ductwork is run, it should be positioned to maintain an even gap.

Where ductwork passes through an external wall, it should be positioned to slope slightly downwards to prevent water entering the building.

Ductwork should be securely held in position by evenly spaced clips no more than 750mm apart, or in accordance with the ductwork manufacturer's recommendations.

Ductwork should not be in direct contact with other surfaces, such as plasterboard ceilings, that may transfer noise to the home.

8.4.2.7.2 Jointing of ductwork

The method and materials used for jointing ductwork should be specified by the duct manufacturer, and be:

- durable and airtight
- sealed with purpose-designed connections in accordance with the manufacturer's recommendations.
- securely fixed

Where tapes and sealants are used, they should be suitable for the intended purpose and be recommended by the ductwork manufacturer. Issues to be taken into account in relation to the durability of the jointing method include:

- thermal movement
- temperature
- moisture
- compatibility with the duct material.

Tape should be installed in a neat and workmanlike manner, and surfaces should be dry and free from grease and dust before applying. Excess sealant should not extrude to the inside of the duct.

8.4.2.8 Access

Appropriate arrangements shall be provided for the purposes of maintenance and removal of permanent equipment.

Access should be provided for MEV systems in accordance with the manufacturer's recommendations.

Where permanent equipment is to be installed in a loft or roof void, guidance is provided in Clause 7.2.12.

8.4.2.9 Electrical installation requirements

Also see: Clause: 8.1.6

The electrical installation shall be in accordance with relevant regulations.

Electrical installations should comply with *BS 7671 Requirements for Electrical Installations*.

The electrical installation should be capable of being isolated from all other electrical sources when required, for maintenance or testing.

8.4.2.10 Handling and storage

Materials, products and systems shall be handled, stored and protected in a satisfactory manner to prevent damage, distortion, weathering and degradation.

MEV systems should be:

- transported, lifted, handled and stored in accordance with the manufacturer's recommendations
- delivered in sequence to avoid storage
- protected to avoid the risk of damage.

8.4.2.11 Commissioning and balancing

MEV design, materials and sitework shall be tested and commissioned in accordance with the commissioning schedule.

Upon completion of the installation, MEV systems should be protected from dust during the construction of the home. Where possible, the system should be switched off and dust covers applied to air valves.

8.4.2.12 Sequence of work

MEV systems shall be installed in accordance with a suitable schedule.

To ensure performance, MEV systems and ancillary components should be installed in a logical and timely sequence in accordance with the manufacturer's recommendations.

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