



Guidance Document:

**De-centralised Mechanical Extract
Ventilation (dMEV) Systems**

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1. INTRODUCTION

The Property Care Association produces various pieces of peer reviewed technical literature on numerous subjects for use by its membership and any other interested parties. PCA literature is produced following consultation with a cross section of our membership with detailed knowledge and experience in the particular subject the literature covers. Members who contribute include manufacturers, surveyors, specialist contractors, consultants and academics. Like all PCA technical literature, it is regularly reviewed and updated and available to download for free from the PCA website. See www.property-care.org

This best practice document has been produced to provide independent generic guidance on the application, installation and commissioning of De-centralised Mechanical Extract Ventilation (dMEV) Fans to form a De-centralised Mechanical Extract Ventilation (dMEV) System in an existing home.

Different regions of the UK have different regulatory, compliance and guidance documents in relation to residential ventilation. It is impractical to cater for all parts of the UK in this guide. As the vast majority of the UK's existing housing stock is in England this guide is based around the various documents that apply in England in relation to the ventilation of buildings.

For residential ventilation work in Scotland, Wales and Northern Ireland this Code of Practice will provide a good source of advice and information. It should however be noted that in all cases the requirements of the individual countries Building Regulations and/or any local building bylaws must be observed, and where necessary the advice of the Local Authority Building Body should be taken.

It is important to note that this guide relates solely to the provision of dMEV Systems into existing homes. For the purposes of this document new build applications are omitted in their entirety.

This document should be read in conjunction with the PCA Code of Practice for Investigation and Provision of Ventilation in Existing Dwellings which sets out the general criteria for the assessment of condensation and ventilation within Existing buildings.

2. DEFINITIONS

For the purposes of this document, the definitions in The PCA Code of Practice for the Investigation and Provision of Ventilation in Existing Dwellings, BS 6100: Part 5 and Building Regulations Approved Document F apply with the following amendments/additions:

- **Background Ventilation**
Term often used as an alternative to “whole dwelling ventilation” and/or a term used to describe the continuous low duty setting of a dMEV, MEV, MVHR or PIV System.
- **Background Ventilation Rate**
The total extract rate calculated to provide the total Background Ventilation required in a property using a combination of individual continuously extracting dMEV Fans.
- **Background Rate**
The minimum continuous low duty setting extraction rate that an individual dMEV Fan must achieve to contribute towards the overall Background Ventilation Rate calculated for a property.

- **Boost Rate**
The minimum boost extraction rate that an individual dMEV Fan must achieve. This varies dependent on the fan location. It is worth noting that the Boost Rate of an individual dMEV Fan may be lower than the Background Rate it is set to. In this case, an additional boost facility, while desirable, is not essential.
- **Background Ventilator**
For the purpose of this document, this is a small, manually or automatically controlled ventilator e.g. a trickle vent in a window or a wall grille. For the avoidance of doubt it must be a ventilator that can open/close.
- **dMEV Fan**
A continuously operating “wet room” extract fan which operates at a low Background Rate with an occasional boost facility to Boost Rate when required. These fans generally operate at much lower airflow rates than Intermittent Extract Fans and the pressures they need to develop to overcome ductwork systems are therefore much less. Consequently, they are significantly quieter in operation, with many operating at imperceptible noise levels.
- **Ductwork System**
An assortment of components used to transfer air into and out of a building. These include rigid, semi-rigid, flexible, insulated and un-insulated lengths of ductwork, bends, t-pieces, connectors etc.
- **Intermittent Extract Fan**
An extract fan designed for occasional use to complement the Whole Dwelling Ventilation typically provided by Background Ventilators e.g. trickle ventilators.
- **MEV Unit**
A centrally mounted, continuous mechanical extract ventilation fan which is typically connected to a number of “wet rooms” via a system of ductwork and discharges air to atmosphere via a single external terminal.
- **Open-flued Combustion Appliance**
One which draws its combustion air from the room or space within which it is installed and which requires a flue to discharge its products of combustion to outside. Approved Document J gives examples and further information.
- **Solid Fuel Burning Appliance**
For the purposes of this document, it is an open-flued combustion appliance which burns a solid fuel derived from plants and trees. This can include wood logs, wood chips, wood pellets, compressed paper, coal, charcoal, peat and processed plant material.

3. CONCEPT AND BACKGROUND OF A dMEV SYSTEM

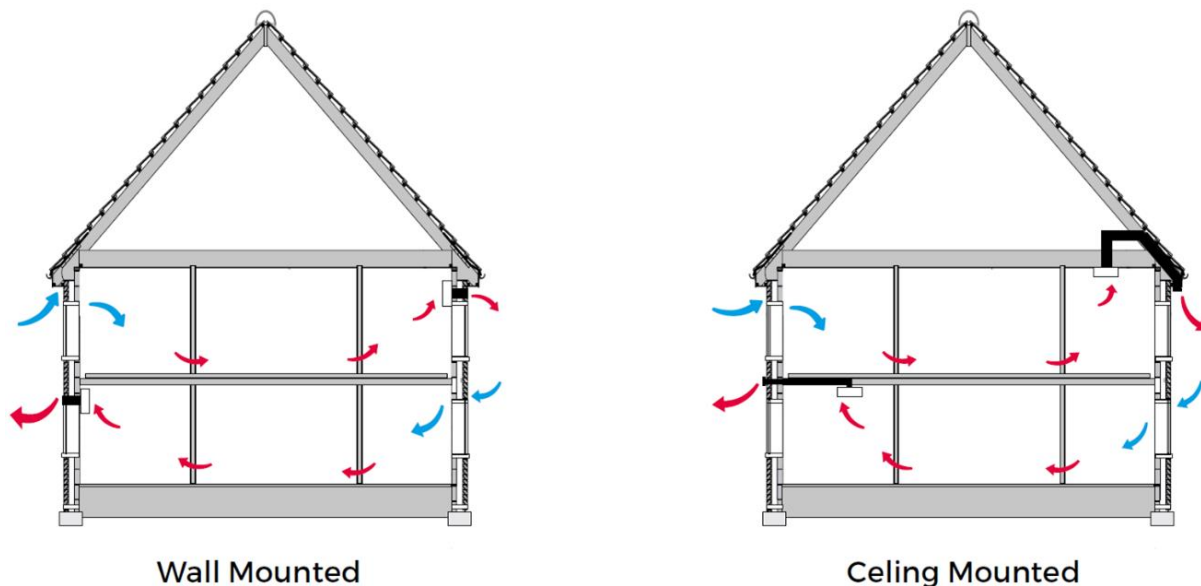
How a dMEV System Works

A number of individual dMEV Fans located in the “wet rooms” such as the Kitchen, Bathroom, Utility Room, etc., simultaneously and continuously extract air to provide the total Background Ventilation Rate required in a property. Calculating the Background Ventilation Rate for a property is covered in Section 7 – COMMISSIONING of this document.

In addition, individual dMEV Fans must also have a manual or automatic airflow boosting facility to provide minimum Boost Rates as follows:

- dMEV fan/s in a Kitchen - 13 l/s.
- dMEV fan/s in a Bathroom - 8 l/s.
- dMEV fan/s in an En-Suite - 8 l/s.
- dMEV fan/s in a Shower Room - 8 l/s.
- dMEV fan/s in a Utility Room - 8 l/s.
- dMEV fan/s in a WC - 6 l/s.

As mentioned earlier in this document, the minimum Boost Rate of an individual dMEV Fan may be lower than the Background Rate it is set to. In this case, an additional boost facility, while desirable, is not essential.



There is a huge range of dMEV Fans available on the market to choose from. The most common applications being wall mounted and ceiling mounted. Window mounting fans with appropriate window mounting kits are also available from a number of manufacturers.



dMEV Fans should be selected to provide the necessary airflow rates required once the resistance of the components they are connected to have been taken into account. These components include grilles and ducting. It is recommended that rigid ducting is used where possible with as little flexible ducting as possible due to its high resistance to airflow. Insulated ducting should be used whenever it passes through an unheated space. If the duct passes vertically to a roof mounted terminal a condensate drain may be required.

As dMEV Fans are designed to run continuously they must be capable of doing so at noise levels acceptable to the occupants.

In the vast majority of existing homes there will be no need to have Background Ventilators (e.g. trickle vents) to allow replacement fresh air to enter the dwelling as the myriad of gaps in the building structure will suffice. If Background Ventilators are already installed in a property then it is recommended that any in any “wet room” are closed. Background Ventilators will only be required in extraordinarily airtight homes. If in doubt about this please seek specialist advice.

As with any ventilation system, appropriate Purge Ventilation measures as required with a dMEV system. Please refer to Approved Document F for further information.

Specific Fan Power Limitations

For regulatory compliance as per Approved Document L1B, only dMEV Fans with a Specific Fan Power at design airflow (i.e. taking into account any ducting connected to a dMEV fan, grille or tile vent) of less than 0.7 W/(l-s) should be installed.

4. INSPECTION CONSIDERATIONS

When inspecting a structure to determine whether there is a ventilation problem, it is essential to consider the possible presence of other sources of dampness. Even if the instructions given are limited to the detection of atmospheric dampness, other problems should be highlighted if they are present and reasonably obvious to a specialist surveyor.

The primary focus of the survey when investigating internal atmospheric moisture related problems should be to determine what is out of balance within the internal environment and resulted in the problem i.e. mould growth or condensation.

Further information on the practice of undertaking surveys can be found in the [‘Code of Practice for the Investigation and Provision of Ventilation in Existing Dwellings’](#) and [Best Practice Guidance Surveying of Ventilation in Existing Residential Dwellings](#).

Once it has determined that additional ventilation is required, the surveyor must consider which options are suitable for the property and occupants. This section details inspection considerations when specifying a dMEV System.

The property type

If the property is or is part of a building that has a storey 18 metres or above ground level, additional careful design consideration is required due to the complex nature and health and safety implications of such installations. If considering a dMEV fan/s installation in such a property, seek specialist advice.

If a dMEV fan is being considered to extract air from or via a protected escape route (defined here as a protected stairway or protected lobby that a front door of a property opens on to and does not part of the individual property itself) seek specialist advice for such applications as there may be a need for fire and smoke dampers as well as interlinks with a smoke detection system.

Existing Intermittent Extract Fans

dMEV Fans cannot be combined with Intermittent Extract Fans in a property if the intention is to provide a dMEV System capable of adequately ventilating a whole dwelling. Any existing Intermittent Extract Fans should be replaced with dMEV Fans. In the case of an existing cooker hood ducted to outside, the cooker hood should be modified to recirculation mode and a new dMEV Fan installed in the Kitchen.

dMEV Fan locations

For optimum performance, dMEV Fans should be located in the “wet rooms” of a property ideally diagonally opposite and as far away as possible from the door into the room, as high as practicable and preferably less than 400 mm below the ceiling. Ideal mounting positions may not always be possible, particularly when a dMEV Fan is being installed in the same location as an existing fan and compromises sometimes have to be made. Mounting a dMEV Fan close to the door into the room should however be avoided at all times.

Important additional checks

When carrying out your survey you must assess the feasibility of the particular installation location or route. It is important to find a location for dMEV Fans and their discharge grilles or cowls which would not be too close to lintels, pipes or heating appliance flues. The distance between a dMEV fan discharge grille or cowl and a heating appliance flue must be at least 500 mm. A separation distance from any windows or background ventilators (e.g. trickle vents) of at least 1,500 mm is desirable.

Ensure enough space is allocated when proposing the drilling of a core hole. If drilling a core hole next to a window there needs to be a gap of at least 150mm between the edge of the core hole and the window. This is to ensure the structure of the property remains sound.

Asbestos Containing Materials (ACMs)

Where the fabric of a building will be disturbed by the installation of any part of a ventilation system, including but not limited to the fan unit, ducting, tile vent, grille, wiring and controls, a risk assessment shall be carried out in accordance with the requirements of the Control of Asbestos Regulations 2012 and any actions recommended should be complied with.

Textured Decorative Coatings (e.g. Artex) is one of the most common asbestos containing materials that may be disturbed during a ventilation system installation. The surveyor and installation team must have a level of training and competence in relation to ACM's appropriate to the type of work they do.

Open-flued Combustion Appliances

Extract fans can lower the pressure in a building which can cause the spillage of combustion products from open-flued combustion appliances. Under no circumstances should an extract fan be installed in any room containing a solid fuel burning appliance.

Extract fans installed in other rooms containing an open-flued combustion appliance should have a maximum extraction rate of 20 l/s. See note in Section 7 - COMMISSIONING regarding the testing necessary when installing extract fans in homes with open-flued combustion appliances.

5. OCCUPIER ENGAGEMENT

The way the system works should be explained to the occupier at the survey stage and should also be reinforced during the installation process. This is equally important for homeowners and tenants (social & private housing) alike.

Items that should be explained in detail are:

Maintenance

All dMEV Fans require cleaning and checking during their lifetime. The client should be made aware of the maintenance requirements at the report stage.

6. INSTALLATION

Manufacturer installation instructions must be followed in full. Failure to follow instructions properly can result in poor performance and may put the occupants and the structure at risk. It is also likely to invalidate the manufacturer's warranty and absolve them of any liability. The installation guidance notes which follow are in addition to those supplied by the manufacturer. Where there is conflict between these notes and manufacturer's instructions, then the manufacturers' instruction should take precedence.

Any dMEV System should only be installed by technically competent and qualified personnel in accordance with all regulatory requirements.

Any ceiling mounted dMEV fans should be ducted to the outside and not directly into the roof space or ceiling void.

Discharge grilles or cowls should be of a low resistance type and should not be fitted with fly mesh as they can substantially reduce airflow which in turn will decrease the performance of the dMEV Fan considerably. Gravity shutters should be avoided.

Where any dMEV Fan or component it is connected to passes through a fire resisting wall/floor or a fire compartment then appropriate measures must be incorporated by the installer to ensure the fire resistance of the structure is maintained in the event of fire. Such measures may include intumescent collars, inserts or fire dampers.

If a dMEV fan is being provided to extract air from or via a protected escape route (defined here as a protected stairway or protected lobby that a front door of a property opens on to and does not part of the individual property itself) the installer must comply in all respects with the specialist's instructions in relation to such works.

Internal door undercuts clearance for air transfer

For a dMEV System to be fully effective it is recommended that clearances under doors achieve a minimum free area of 7,600 mm² (i.e. a minimum of 10mm under a standard 760 mm wide door) to encourage good air flow in accordance with Approved Document F Means of Ventilation. This is similar to the air transfer requirements for all ventilation systems in Approved Document F. If such a door undercut is not possible then air transfer grille of a similar free area can be used. For fire doors without sufficient undercut please seek specialist advice.

7. ENHANCEMENT VENTILATION MEASURES

The installation of a De-centralised Mechanical Extract Ventilation (dMEV) System will help tackle a condensation dampness problem and improve indoor air quality in any home. Like any ventilation system it is not however a panacea and occasionally additional enhancement ventilation measures are necessary for optimum performance. Such enhancement measures may include Single Room Heat Recovery Ventilation (SRHRV) Units, Alternate Flow with Heat Retention (AFHR) Fans and passive ventilators. These may be necessary in properties of very unusual layout and/or in individual rooms which require enhanced ventilation. If in doubt as to whether or not any enhanced ventilation measures are required please seek specialist advice.

8. COMMISSIONING

As required under Approved Document F, if dMEV Fans can be tested and adjusted, they must be commissioned and a commissioning notice given to the local Building Control Body (BCB). It is not necessary to notify a BCB in advance if the work is completed by a person registered with a Competent Person Scheme that covers such work. Approved Document F gives much more detailed information on this notification process and reading and understanding of this process is highly recommended.

It is vital that a dMEV System is commissioned properly to prevent over or under ventilation of a home and to ensure that it is optimised to perform to the best of its capability.

When the dMEV System has been commissioned, the person commissioning it should spend time with the home occupants explaining how it works, what they should expect by way of performance and what maintenance will be required. They should also provide the occupants, and the home owner if different, with hard copies of operational and maintenance information on the equipment installed.

Calculating the total Background Ventilation Rate

The steps which follow are based around those in Approved Document F with increased or decreased airflows depending on each individual property.

Step 1 Estimate airflow rate in litres/ second (l/s) based on occupancy level (count a large dog as 1 occupant and a small dog and cat as ½ occupant each)

1-3	occupants	= 17 l/s
4	occupants	= 21 l/s
5	occupants	= 25 l/s
6	occupants	= 29 l/s
7	occupants	= 33 l/s
8	occupants	= 37 l/s
9	occupants	= 41 l/s
10	occupants	= 45 l/s

Step 2 Estimate airflow rate based on total internal floor area

Total internal floor area in m² x 0.3 = l/s.

Step 3 Take the higher rate of Step 1 or 2 = l/s.

Step 4 If necessary, add the following flow rates to the airflow rate in Step 3

Add 4 l/s for a poorly insulated property (e.g. single glazing, un-insulated walls and ceilings)

Add 4 l/s for higher than typical moisture production in property (e.g. excessive indoor clothes drying, high levels of cooking activity, bottled gas heater, fish tanks, etc.)

Final Estimated Airflow Rate = l/s.

Step 5 Check/compare Final Estimated Airflow Rate to occupancy level i.e.

Final Estimated Airflow Rate l/s ÷ occupancy level = l/s per occupant (Occupancy Ratio).

If Occupancy Ratio is greater than 20 l/s per occupant please contact a dMEV System specialist for advice on whether or not a lower Final Estimated Airflow Rate than that in Step 4 is recommended.

Step 6 Select an appropriate type and number of dMEV Fans and adjust them on site as required to provide the Final Estimated Airflow Rate (total Background Ventilation Rate) in Step 4 or other reduced rate as Step 5 above. To avoid excessive ventilation and consistency with Approved Document L1B, the actual total Background Ventilation Rate provided by all the dMEV Fans should not be more than 4 l/s higher than the total Background Ventilation Rate.

In selecting and adjusting dMEV Fans please remember the minimum Boost Rates they must be capable of achieving, the recommended maximum noise levels and the maximum Specific Fan Power limitations applicable to such fans covered earlier in this document.

If a particular fan manufacturer is preferred, and too many dMEV fans by the preferred manufacturer are required to meet the total Background Ventilation Rate, an alternative ventilation strategy may have to be considered e.g. Positive Input Ventilation (PIV).

Open-flued Combustion Appliances

Where dMEV Fans, or any other enhancement ventilation equipment which extracts air, are installed in a property containing an open-flued appliance or appliances, they should be temporarily electrically isolated following installation and commissioning by the ventilation installer. Tests by appropriately qualified persons to show that the combustion appliances can operate safely whether or not the fans are running should be carried out as soon as possible after the ventilation installation. These tests should be done with all the extract fans on at maximum extraction rates. This testing regime will require the persons carrying out the tests to temporarily switch the power supply to the extract fans back on. The extract fans should only be permanently re-energised once the tests have been completed satisfactorily.

9. AIRFLOW BOOST OPTIONS FOR dMEV FANS

dMEV Fans can have their airflow boosted manually or automatically from continuous Background Rate to Boost Rate by a number of means. These include:

- An integral pullcord
- A remote switch
- An integral humidistat
- An electrical link to a light switch
- A PIR sensor

10. LEGISLATION

The following legislation is referred to in this document:

- Building Regulations Approved Document F
- Building Regulations Approved Document L1B
- The Health and Safety at Work etc. Act 1974
- Control of Asbestos Regulations 2012

Employers and employees should satisfy themselves that they have knowledge of the duties placed on them by all relevant legislation.

11. ACKNOWLEDGEMENTS

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For further information, contact:

Property Care Association

11 Ramsay Court
Kingfisher Way
Hinchingsbrooke Business Park
Huntingdon
Cambs.
PE29 6FY
Tel: 01480 400000
Email: pca@property-care.org
Web: www.property-care.org

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