Retrofit Under Pressure

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New PAS 2035: 2023

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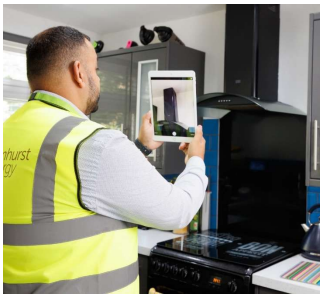
PAS 2035: 2023

- **Main changes: Retrofit Assessor**
  - Additional ventilation details required
  - Measuring background ventilation e.g. trickle vents
  - Recording flow rate of IEV
  - D1 Ventilation Checklist required (RA or RC)
  - Level 3 Older & Traditional Buildings
- Traditional construction is defined as: building with solid brick, stone or earth external walls, constructed with moisture-permeable materials and usually built prior to 1919, or pre-1919 timber-frame external walls with any infill



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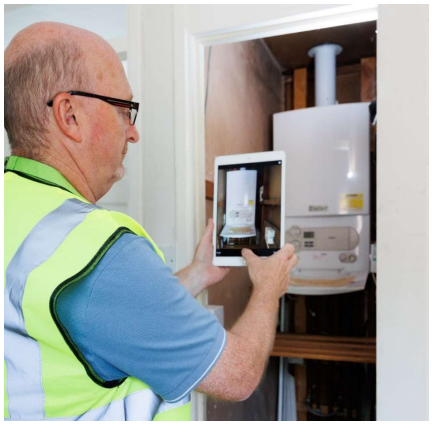
PAS 2035: 2023

- **Main changes: Retrofit Coordinator**
  - Removal of Risk Paths
  - IOE & Medium-Term Plan for all projects
  - D1 Ventilation Checklist including Ventilation category & strategy.
  - Design qualification changes
  - Site visits
  - Monitoring & Evaluation
  - Level 3 Older & Traditional building qualification



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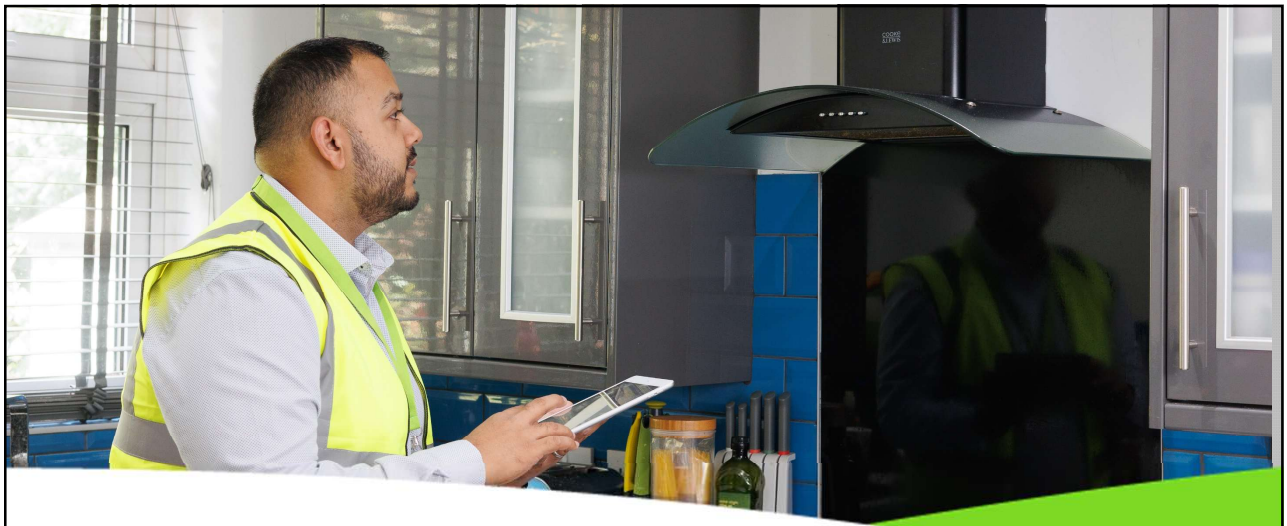

Ventilation

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Ventilation Checklist

- Ventilation Checklist needed for all properties from Approved Document Part F Table D 1 (Building regulations)
- Complete checklist based on existing ventilation
- **Template available on Access Elmhurst - My Documents – Retrofit – SF70**

Table D1 Checklist for ventilation provision in existing dwellings

Natural ventilation[1]		
What is the total equivalent area of background ventilators currently in dwelling?		mm^2
Does each habitable room satisfy the minimum equivalent area standards in Table 1.7[2][7]?	Yes	No
Have all background ventilators been left in the open position?	Yes	No
Are fans and background ventilators in the same room at least 0.5m apart?	Yes	No
Are there working intermittent extract fans in all wet rooms?	Yes	No
Is there the correct number of intermittent extract fans to satisfy the standards in Table 1.1?	Yes	No
Does the location of fans satisfy the standards in paragraph 1.20?	Yes	No
Do all automatic controls have a manual override?	Yes	No
Does each room have a system for purge ventilation (e.g. windows)?	Yes	No
Do the openings in the rooms satisfy the minimum opening area standards in Table 1.4?	Yes	No
Do all internal doors have sufficient undercut to allow air transfer between rooms as detailed in paragraph 1.25 (i.e. 10mm above the floor finish or 20mm above the floor surface)?	Yes	No
Continuous mechanical extract ventilation[1]		
Does the system have a central extract fan, individual room extract fans, or both?	Yes	No
Does the total combined continuous rate of mechanical extract ventilation satisfy the standards in Table 1.3?	Yes	No
Does each minimum mechanical extract ventilation high rate satisfy the standards in Table 1.2?	Yes	No
Is it certain that there are *no* background ventilators in wet rooms?	Yes	No
Do all habitable rooms have a minimum equivalent area of 5000mm^2?	Yes	No
Does each room have a system for purge ventilation (e.g. windows)?	Yes	No
Do the openings in the rooms satisfy the minimum opening area standards in Table 1.4?	Yes	No
Do all internal doors have sufficient undercut to allow air transfer between rooms as detailed in paragraph 1.25 (i.e. 10mm above the floor finish or 20mm above the floor surface)?	Yes	No
Mechanical ventilation with heat recovery[1]		
Does each habitable room have mechanical supply ventilation?	Yes	No
Does the total continuous rate of mechanical ventilation with heat recovery satisfy the standards in Table 1.3?	Yes	No
Does each minimum mechanical extract ventilation high rate satisfy the standards in Table 1.2?	Yes	No
Have all background ventilators been removed or sealed shut?	Yes	No
Does each room have a system for purge ventilation (e.g. windows)?	Yes	No
Do the openings in the rooms satisfy the minimum opening area standards in Table 1.4?	Yes	No
Do all internal doors have sufficient undercut to allow air transfer between rooms as detailed in paragraph 1.25 (i.e. 10mm above the floor finish or 20mm above the floor surface)?	Yes	No

NOTES:
1. Make a visual check for mould or condensation. If either are present, install additional ventilation provisions or seek specialist advice.
2. All references to tables and paragraphs are to Approved Document F, Volume 1: Dwellings.

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Ventilation Checklist

- Enter summary of existing ventilation collected by assessor, trickle vent sizes, door undercut measurements, details of existing IEV's

SF70_Retrofit_Project_Ventilation_v2.1_March 2025

Ventilation Summary

To be completed for each property based on Condition Report findings and evidence. All habitable & wet rooms should be included.

Room	Purge ventilation	Trickle vents size	Door undercut size	Fan make & model	Fan flow rate

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Project category to identify ventilation requirements

Table 3.1 Energy efficiency measures

	Category of measure
Roof insulation	
a. Renewing loft insulation, including effective edge sealing at junctions and penetrations	Minor
b. Loft conversions or works that include changing a cold loft (insulation at ceiling level) to a warm loft (insulation at roof level)	Minor
Wall insulation	
c. Installing cavity wall insulation to any external wall	Minor
d. Installing external or internal wall insulation to less than or equal to 50% of the external wall area	Minor
e. Installing external or internal wall insulation to more than 50% of the external wall area	Major
Replacement of windows and doors[1]	
f. Replacing less than or equal to 30% of the total existing windows or door units	Minor
g. Replacing more than 30% of the total existing windows or door units	Major
Draught-proofing (other than openings)[2]	
h. Replacing a loft hatch with a sealed/insulated unit	Minor
i. Sealing around structural or service penetrations through walls, floors or ceiling/roof	Minor
j. Sealing and/or insulating a suspended ground floor	Major
k. Removing chimney or providing another means of sealing over chimney, internally or externally	Major

- Required for each property
- The improvements under consideration and any existing measures installed since construction are to be considered

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Major fabric measures

- Installing external or internal wall insulation to at least 50% of the heat loss walls.
- Replacing more than 30% of total existing windows or doors
- Sealing and or insulation a suspended ground floor
- Removing a chimney or providing another means of sealing a chimney, internally or externally

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Ventilation Adequacy

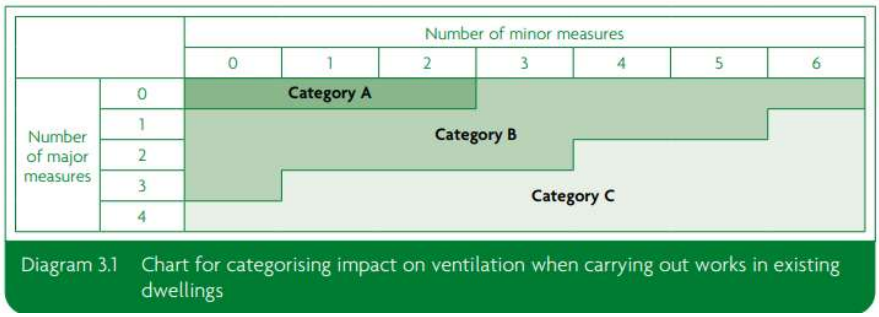

Diagram 3.1 Chart for categorising impact on ventilation when carrying out works in existing dwellings

To be reviewed and upgraded if:

- The improvements and existing measures are under Category B or C of Diagram 3.1 - Approved Document F or
- If any condensation or mould is present.

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Acceptable Ventilation

- Passive Stack ventilation and positive input ventilation systems are no longer considered acceptable.
- Pre & post air leakage test should be done for any major insulation projects

- **Acceptable ventilation for measure category B**
  - Same as for C or IEV with correctly sized extractors in wet rooms and background ventilators in all rooms
- **Acceptable ventilation for measure category C**
  - Continuous MEV in wet rooms and correctly sized background ventilators in all living spaces, or
  - Supply & extract MVHR system
  - Other if shown to meet an equal level of performance & effectiveness, but expert advice should be sought.

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Airtightness strategy

For any projects including improvement of the building fabric, airtightness strategy must be developed, which should:

- Consider impact of EEMs on the airtightness
- Explain the benefits of air leakage testing and the risk of not doing so
- If the airtightness targets are set for the dwellings – the air tightness test is required for each dwelling.

- **We would strongly support both pre & post air testing for all projects that fall into Category B or C**

- Remember RdSAP 10 now allows you to record those results

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Airtightness & BVT Testing

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Airtightness and BVT Testing

- When the insulation and Airtightness of the building fabric are improved, adequate ventilation must be maintained. (This is a new build and retrofit issue)
- Airtightness is not the same as ventilation, ventilation is the **controlled** flow of air in and out of the building (Mechanical or Passive).
- They are, however, closely related and therefore it's important to recognise the ventilation requirements under PAS 2035.

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Airtightness and BVT Testing

- **Airtightness testing** (can also referred to as Air Permeability Testing - **APT** / Pressure Testing)
- Testers here are referred to as **Level 1 Testers**.
- This has been within the new build sector for at least the last 20 years and has been used within full SAP to help demonstrate new build compliance.
- Results are based over the buildings **envelope** and will be cited at 50 or 4 Pascals (pa).

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Airtightness and BVT Testing

- **Background Ventilation testing (BVT)** is the method of demonstrating that a building or room has too much or too little 'air changes'
- Testers here are referred to as **BVT Testers**.
- Used within the retrofit industry, to help show if a building or room requires additional background ventilation. This can be in the form of trickle vents and door undercuts.
- Results are based over the buildings **volume** and shown as Air Changes at 50 or 4 Pascals (pa)

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What is the Difference

- **Air Permeability** is used in SAP and RdSAP, to override the default that is used if we don't test.
- For new builds the building must be under 8.00@50pa or under 1.57@4pa .
- We prepare the building differently (to BVT) here and this demonstrates the uncontrolled air leakage, mainly through poor fabric.
- The level of Air Permeability also then indicates the type of ventilation (mechanical) that is appropriate.

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What is the Difference

- **Background Ventilation** testing is used within PAS and Retrofit.
- The result here then helps us determine the need for additional trickle vents and door undercuts (if required).
- For a house, then over **1.0 ach@4pa** is deemed as enough air exchanges.
- For a room test, then over **1.5 ach@4pa** is deemed as enough air exchanges.
- The building or room is prepared differently to an air permeability test.

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The Importance of Airtightness

- Whichever type of test that we are using, then the ability to generate a known figure helps us make a more accurate decision about the building.
- For years, the new build sector took the figure achieved and entered into SAP to create a pass/failure.
- The realisation that we have built heavily insulated but sealed up boxes has shown us that we need to **'build tight but ventilate right'**
- This now is replicated in the existing/retrofit market.
- As we improve our building stock thermally, we also need to add in the appropriate ventilation, both passively and mechanically.

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Airtightness Strategy

- Within PAS and Retrofit, we are now required to have in place an airtightness strategy.
- The more robust / rigorous that strategy is, the more confidence there is that the buildings requirements for appropriate ventilation have been met.
- Without a schedule of testing then we are leaving the building with an unknown level of performance.
- Testing pre and post works, and at house or room level gives us the ability to schedule appropriate works and then also see (post works) the final effect of the upgrade.
- Its is increasingly important that we evidence the buildings final ventilation set up. Photos and site notes plus flow reads can then show that we have left the building in positive condition. (This helps us in the future if the building is altered negatively)

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RdSAP 10 Impact

- With the introduction of APT now into RdSAP, we are now able to improve the accuracy of the assessment.
- If we don't test, then a default of 15.0@50pa is used.
- Over-riding this can then improve the score.
- By how much will be case by case specific.
- In the below the building was a 1900 end terrace with solar/battery already installed, up to date boiler and a good level of roof insulation.
- Using default = C/69 with a potential of C/78
- Adding in a test of 8.00@50pa, altered to C/71 and a potential of C/79
- Adding in a test of 5.00@50pa, altered to C/72 and a potential of C/80
- Adding in a test of 1.00@4pa, altered to C/72 and a potential of C/80

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Heat Pumps

- Use of EPC in MCS Standards
  - Performance Estimation
    - Under MCS Standard MIS 3005-D, a performance estimation is required.
    - The standard recommends using an Energy Performance Certificate (EPC) for this purpose.
    - If the EPC uses a default airtightness value, the energy performance estimate will be less accurate.
- Heat Loss Calculation
  - MCS requires heat loss calculations to correctly size heat pumps.
  - Currently, this uses a notional air change rate (ACH) from CIBSE tables.
  - Replacing the notional ACH with results from an actual airtightness test improves accuracy.
- Benefits of Accurate Sizing
  - Lower upfront costs: A more precise calculation may allow for a smaller, less expensive system.
  - Improved efficiency: A correctly sized system operates more efficiently.
  - Reduced running costs: Lower energy usage and reduced maintenance over time.

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Who tests and Certification of tests

- For BVT tests
  - Testers will need to have sat the IAA or Elmhurst course.
  - They will also need to be accredited with both if applying for Trustmark funded work.
  - Any test (pre or post / house or room), should then be certified.
- For Level 1Air Permeability Tests (APT)
  - Tests should be undertaken by a Level 1 Tester and certified.
  - These certified tests can then be used in Retrofit application and within an RdSAP10.

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Ventilation

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Ventilation Testing

- For installation of new fans, or verifying that the existing extraction is sufficient, then flow rate testing should be undertaken.
- This requires the use of anemometers to verify the extraction rates.
- This is recommended to be undertaken by a competent and trained tester.
- Courses are available and we also run a CPS scheme here to certificate those tests.
- Courses are 2 days in length and cover Part F and the Domestic Service Compliance guide.
- Looking at Level 1 fans through to balancing MVHR systems.

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Ventilation Testing

- It makes sense that if we advise to pressure test the building at various stages of the retrofit process, that we also verify the fans we are leaving in the building are also validated. (Part of our strategy?)

- The best solution here is to test those flow rates.
- Either;
  - The existing fans are checked.
  - Any newly installed systems are then also checked to ensure they are extracting appropriately.

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Ventilation Testing

- Within the new build testing environment, these ventilation tests are carried out by the pressure or BVT tester.
- This is an opportunity to add this service to the Pre and Post test visit.
- Part F, does state that newly installed systems should be verified.

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Ventilation Competency Scheme

- Must have completed and passed the NICEIC or BPEC 2 Day Domestic Ventilation Course
- Application for Ventilation membership- £265 + VAT
- Lodgements – £2.50 + VAT
- Annual renewal fee – £265 + VAT

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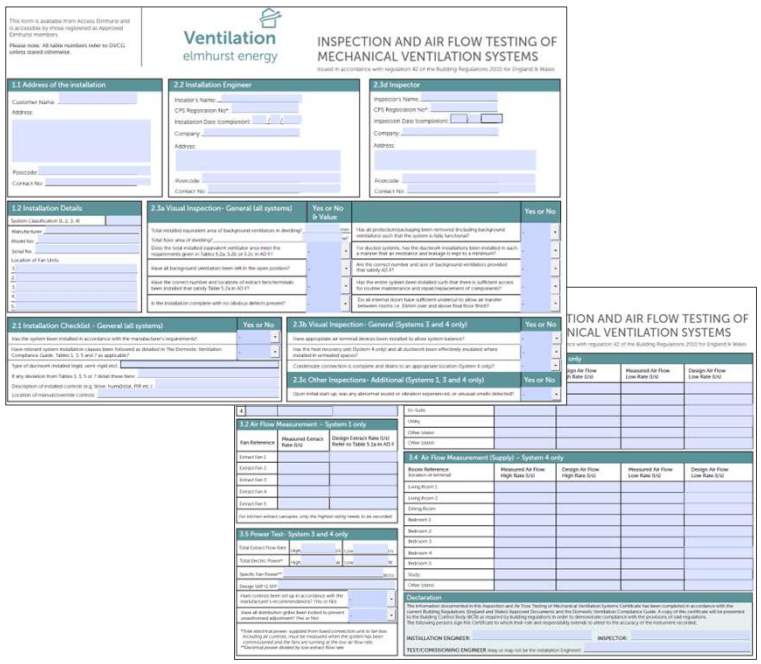

Ventilation
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INSPECTION AND AIR FLOW TESTING OF MECHANICAL VENTILATION SYSTEMS

Issued in accordance with regulation 42 of the Building Regulations 2010 for England & Wales

1.1 Address of the installation

2.2 Installation Engineer

2.3d Inspector

1.2 Installation Details

2.3a Visual Inspection- General (all systems)

2.1 Installation Checklist - General (all systems)

2.3b Visual Inspection- General (Systems 3 and 4 only)

2.3c Other Inspections- Additional (Systems 1, 3 and 4 only)

3.2 Air Flow Measurement – System 1 only

3.4 Air Flow Measurement (Supply) – System 4 only

3.5 Power Test- System 3 and 4 only

Declaration

Ventilation
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Certificate

Certificate No. (VCN): 9303-4110-4683
Inspection Date: 23/06/2025
Submission Date: 30/06/2025

Ventilation Inspection Certificate

for

LE17 4HB

This certificate has been produced in accordance with the Elmhurst Ventilation Scheme. This competency scheme ensures that the Ventilation Inspection Report has been produced by an approved Ventilation Inspector.

If you have any queries with this certificate in the first instance please contact the Ventilation Inspector that produced it, details as below.

Ventilation Inspector:	Accredited RdSAP
Inspector Number:	EES/090001
Telephone:	01455 1357911
Email:	testteam.surveyor@elmhurstenergy.co.uk

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