Report for airtest at 169 Pixmore Way, Letchworth

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Summary

Method A and B depressurisation and pressurisation tests were carried out at the above property. The aim was to roughly gauge the current level of air-tightness and determine where the main leakage areas are as part of a feasibility study for proposals to improve energy efficiency in the building. Also the test was used as a demonstrator for interested parties to learn and understand about the role of air-tightness in the thermal performance of buildings. The blower door was placed in the inner back door.

Below is an image of the simple internal thermal envelope for this building. The property has a surface area of **224m2**. The gross volume is 213m3 but using the Passivhaus methodology (excluding internal walls, floors etc) Vn50 is approximately **195m3**.

In preparation the following were treated for the method B test:

- Bathroom and kitchen fans sealed
- One vented chimney sealed
- Two open chimneys with closed iron top flaps taped up with a thick plastic sheeting
- One chimney sealed with tape and cardboard prior to arrival
- Two airbricks with hatches closed.

The method B test indicates an average air permeability (AP50) of around **5.9 m3/m2.h** @50Pa. Alternatively this could be expressed as an air change rate (n50) of **6.7ACH** when considering the volume by the Passivhaus methodology. An approximation of the total leakage area (total sum of all the "holes") would be a circular hole about 29cm in diameter (650cm2 total). A method B test is designed to test the fabric of the building so excludes all intentional penetrations that form part of the notional ventilation system.

A method A test was also run by unsealing all the openings listed above except the chimney that had been sealed before arrival and opening the airbrick hatches. The average AP50 for this test was **8.3m3/m2.h.** and an n50 of **9.5 ACH.** Approximate leakage area is a hole 34.3cm in diameter (920cm2). It was interesting and surprising to those present that there was not a greater impact of opening these vents.

Method A testing aims to test the building as it is used. So intentional openings are left open.



Investigations

Whilst the test was running the main leakage areas were identified. Thermal images are shown below.

Areas found as follows

- The suspended timber portion of the ground floor leaked at the perimeter and showed leakage through one room where a board had presumably been taken up and replaced.
- Many windows were poorly fitting both at opener and around frame
- The loft hatch leaks at the opening
- Ceiling penetrations particularly in the cylinder cupboard
- Leakage showing at 1st floor perimeter. We were able to see smoke coming out under window sills from this area. Presumably brickwork between floors not rendered and joist pockets also leaky.
- Interesting leak under picture rail in large front bedroom. Smoke comes out at soffit level. Possible change in construction or large hole in render/brickwork behind picture rail.
- Stairs into unheated pantry

Conclusion

In the UK we measure air tightness as a permeability (AP50). This figure relates to the flow of air required to maintain a pressure differential of 50Pa between inside and outside per m2 of external envelope. Compliance testing is done via Method B. Best practice for new builds is considered to be 5m3/m2/h. In passivhaus and other building standards much lower levels are required as it is recognised that air infiltration becomes a significant heat loss in well insulated buildings. Additional air movement through the construction can lead to moisture problems.

Overall the permeability of this property is significantly better than most existing buildings most of which fall between AP50 8-12 m3/m2.h.

In my there are good options for significantly improving the airtightness of this property. Were the ground floor to be sealed, new well fitted windows installed and ceiling penetrations including loft hatch addressed I believe this property could achieve an AP50 of **3m3/m2.h** or less. In order to get to better levels than this the more tricky area in the intermediate floor void will have to be treated. Its also worth noting that even at its current level a whole house continuous ventilation system should be implemented.

Thermal images

The temperature range and colours can be seen on the right hand side of each thermal image. Cold colours are black and purple and warms are white and red.



Uninsulated sloping ceiling



Leakage from behind picture rail.