



Airtightness testing of low air permeability and Passivhaus buildings

Information for clients

Airtightness testing is a recognised method for measuring the extent to which air is lost through leaks in the building fabric. It is often referred to as an air leakage test, blower door test or air pressure test.

It is important to understand that air leakage is the uncontrolled flow of air through gaps and cracks in the fabric (often referred to as infiltration or draughts) and not ventilation, which is the controlled flow of air in and out of the building. Air leakage leads to unnecessary heat loss and discomfort for the occupants.

The gaps and cracks within the building fabric are often difficult to detect simply by visual inspection. One way of identifying these issues and quantifying infiltration is by a blower door test, which is specified in Part L for new build dwellings and involves either pressurising or depressurising the building. Air permeability is the UK measure of air leakage and relates an air flow (in m³/hr) to the building envelope. It is expressed in terms of m³/hm²@50Pa.

For Passivhaus buildings, the air leakage is calculated in a different way, using the volume of the occupied space only. This is termed the “n50” and is expressed as either ach@50Pa or h⁻¹@50Pa.

If Passivhaus certification is being pursued, in addition to confirming the n50 result a certificate will also be required to confirm the air permeability (UK methodology) and this will be used to produce the On-Construction SAP Assessment (EPC). This certification can only be produced by a member of a Competent Person Scheme.

Diane Hubbard of Green Footsteps is accredited for the testing and Part L certification of both homes and non-domestic buildings (up to a volume of 4000m³).

Diane is accredited under the iATS (Independent Airtightness Testing Scheme) Competent Person Scheme and is a Certified Passivhaus Consultant and Certified Passive House Tradesperson.



During the testing process, access to the building is severely limited and it should be assumed that it will not be possible for other trades to be working in the property.

On-completion test

Checklist— all the following are required in order to carry out an on-completion test on a property:

- All windows and external doors must be installed and closed. Loft hatches / doors into eaves should be fitted.
- Central heating boiler should be fitted. Any appliance which draws its air from within the property must be switched off e.g. oil-fired Aga, wood burning stove.
- Any ventilation systems (e.g. MVHR, passive ventilation, extract) should be installed, but must be switched off for the test
- All walls, floors and ceilings must be completed
- All skirting boards, electrical sockets, light fittings and switches, kitchen units and bathroom suites must be fitted
- **Unless thermal imaging has been requested, heating must be switched off in order to comply with ATTMA test requirements**
- Drainage Traps should be filled with water
- A mains power supply within the building is needed (240V or 110V) - a cable through a window should be avoided. **Portable generators are not suitable.**

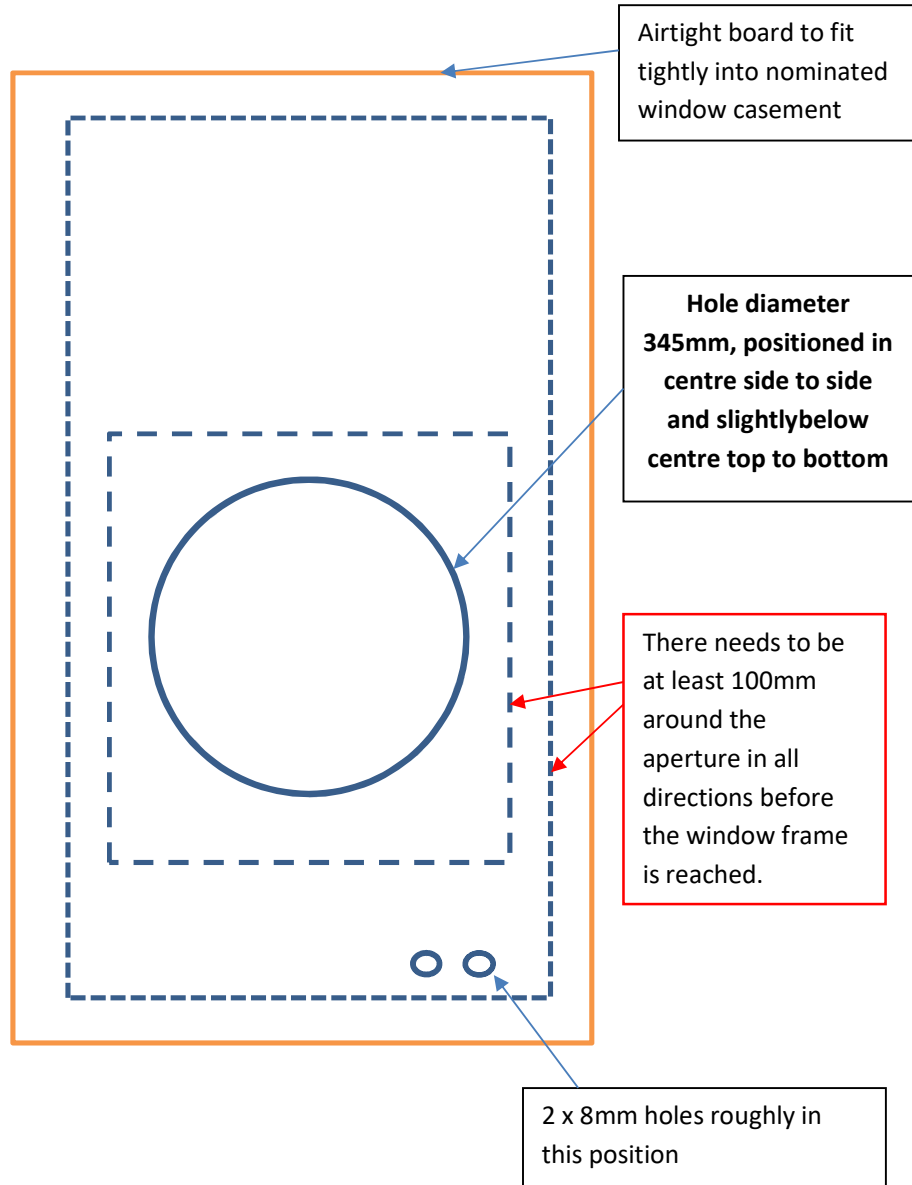
If all the above are not in place when the tester arrives, it may not be possible to carry out the test but the time will still be charged - so raise any potential issues in advance of the test day.

Details of any combustion appliances (e.g. a wood burning stove) within the property need to be forwarded before a test can be confirmed.

Please ensure that accurate floor plans (PDF) are supplied in advance of the test so the results can be discussed with you following the test. If accurate PDF floor plans are not available, there will be an additional charge for measuring the property (charge dependant on property size).

For relatively airtight buildings, the fan is normally mounted in a window casement as doors are often more problematic than windows and so this method allows them all to be tested. A board for mounting the fan needs to be provided by the client / builder. This needs to comply to spec outlined in the drawing below and must be made from airtight material. It must also fit into the window casement, though it will be taped into place.

For some buildings, the location of the window may be important, so this would normally be nominated at the time of confirming the test.



Intermediate test(s)

For relatively airtight buildings, it is prudent to consider an additional test or tests at earlier stages of construction when it is easier and cheaper to rectify faults in the airtightness barrier. This will lower the risk of the building failing the on-completion test and reduce the level of stress for both client and builder during the project.

For timber frame, the ideal stages for additional tests to take place are when the airtightness membrane is installed and still exposed (or after first fix where membranes are not used) and, less commonly, after second fix.

For masonry construction, a test is often carried out when all the airtightness tapes are in place, but the building has not yet been plastered. A test at this time will **not** give a quantified result, but will confirm that no taping has been missed and it has properly adhered to surfaces. A further test is then carried out after first fix.

The most appropriate time for an intermediate testing will be discussed on an individual basis.

During an intermediate test, the key infiltration points will be identified – this may be using thermal imaging or smoke (depending on the weather conditions). Thermal imaging provides the best record as infrared and daylight images are taken to record each of the issues identified and these can be used to carry out remedial action following the test. But this technique can only be used if the interior of the building is at least 10°C warmer than outside. This means the building would have to be heated (using temporary heaters if necessary) and thermal imaging is limited to the cooler months of the year.

If thermal imaging is to be carried out in conjunction with the air tightness test, the property needs to be heated to at least 18°C uniformly for the 24-hour period ahead of the test with the heating being switched off at the start of the test.

Where thermal imaging has been used, you will receive copies of all relevant thermal images for your future reference. If a formal report on the outcomes of the survey is required, this will be at an additional cost.