apt Sound Testing

Passivehaus Air Testing Checklist

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to speak with an adviser or visit
aptsoundtesting.co.uk

Most Common Areas of Air Leakage in Passivehaus Buildings

1. Seal all ducts and penetrations where the main services enter the building - we have encountered many tests where a water pipe duct has been left unsealed underneath kitchen units. After services have been installed in the duct, seal the rest of the duct.

2. Seal behind kitchen units at the wall/floor junction.

3. Seal all SVP and waste pipe penetrations passing through external walls and ceilings.

4. Make sure that the tops, sides & ends of all pipe/SVP boxing's are sealed to prevent air leaking into the boxing, and escaping through SVP/waste pipe penetrations. This is particularly important for SVP boxing's behind kitchen unit. Often the bottom of the SVP boxing is not sealed to the bottom of the floor so the air can escape straight out.

5. Bath and shower tray panels should be fitted and fully sealed.

6. All penetrations through floors & ceilings should be sealed.

7. The boiler flue must be sealed where it penetrates walls or ceilings.

8. Make sure all external door/window seals (if applicable) are installed.

9. In some houses, storage cupboards have been built into the roof space. The doors when closed should seal the room from the roof space. Fit draught excluder if necessary to top, bottom & sides of door/frame.

10. In houses constructed from Timber Frame or where DOT & DAB plasterboard has been fixed to the inside face of block work perimeter walls.

11. The gap in between the bottom of the plasterboard and floors needs to be sealed at every floor level. Alternatively the gap between the bottom of the skirting board and floor can be sealed with mastic. This prevents air leaking behind the wall board and passing above the ceiling board, into the roof space.

12. Seal the bottom of internal door frames at the floor junction.

13. Close all external doors.

14. Open all Internal doors.

15. Leave closet doors.

16. Close all hatch/trapdoor to unheated attic spaces but do not seal.

17 .Leave hatch/trap door open if attic is within airtight envelope.

18. Close basement door leading to unheated cellar/cellar corridor (within envelope).

19. Open fire place remove ashes; close inlet air.

20. Built in (tiled) or free standing solid fuel stove (or boiler) with independent external supply air* Decommission; remove ashes; close air inlet.

21. Room air dependent (gas) fire within heated building space - Decommission; no action

22. Solid fuel stove etc. which is dependent on room air - Decommission; no action.

23. Gas fired boilers (non- room air dependent) in heated building space (e.g. condensing boiler with balanced flue) turn off no action.

24. Hatches/doors/ access to unheated building spaces such as garages, storage rooms) close door.

25. Do not seal key hole.

26. Seal air release valve duct in unheated building space.

27. Kitchen hood - Decommission; no action.

29. Fixed vents in window/skylights (trickle vents) - Close; no action.

30. Additional vents or supply air openings - No action.

31. Seal all air inlet and exhaust valves (external air supply/exhaust ducts to MVHR).

32. Letter box door flap - Close; do not seal.

33. Cat door flap Close; do not seal.

34. Opening "inlet air or vents" in boiler room/oil storage room - no action.

35. Laundry dryer in heated building area with exhaust air to the outside - Close; no action.

36. Laundry chute to unheated building area - Close; no action.

37. Central vacuum cleaner facility - Close; no action.

38. Do not seal External roller shutter (shutter belt conduit) - No action.

39. Close top cover of (access) shafts with pumps/ installations in unheated building area – Close no action.

40. Close side access hatches to the attic eaves combine with loft hatch – same thing Close; no action (leave open only if attic eaves are within air tight envelope).

41. Missing window/door handle Seal; (add note in testing protocol log sheet).

42. Empty conduit (or ducting) to unheated building area (e.g. due to posterior installed solar panels) No action; do not seal (add note in testing protocol log sheet).

43. Air grilles/air bricks (existing openings for background ventilation of an existing chimney void) No action.

44. Suspended ceiling No action.

45. Close windows to unheated spaces

* If equipment is missing (not yet installed) then these items should be temporarily sealed and the sealing procedure should be noted in the air pressure testing report

** in non-res buildings with intermittent ventilation systems - sealing flaps must be closed during the pressure test but must not be sealed over

If you have any questions about the preparation or further information for the Passivehaus air test then please ring our office to discuss them. We are here to help you achieve a pass at the first attempt.

Items to be completed prior to our arrival on site

1. We will require the design air permeability rate for the building in air changes per hour. The air change rate must be less than or equal to 0.6 air changes per hour, under test conditions Passivehaus airtightness (n50) ≤ 0.6 h-1@ 50 Pa. If you do not advise of a figure we will assume that 0.6 air changes per hour is the maximum allowable figure.

2. For multiple tests we will require the latest revision floors plans for the building at least 1 week prior to the test date. For single tests we can have the drawings on the day of the test.

3. We require ONE 240v MAINS powered electrical sockets within 5 metres of EACH of our testing equipment set up. We cannot use temporary power or generators. Ensure that the completed building envelope is finished.

All doors, windows, and cladding must be installed, or if items, such as glazing are missing, they should be sealed up to prevent air leakage. Please note that the temporary sealing of items with tape should be limited to only those items detailed in item 16 below. All other items should be in their finished everyday use condition.

4. Seal with tape or cardboard any trickle vents, duct work and mechanical vents to the outside. Pay particular attention to the air conditioning system.

5. Ensure that all toilets and U bends in sinks have water in them.

6. Ensure all external doors and windows are closed fully and make sure all trickle vents are closed and sealed where required. Internal doors should be wedged open.

7. Have a competent member of your staff available on the test day to modify and/or seal any further areas that we identify as requiring extra work. A good supply of mastic/decorators caulk and board material etc. would be useful in case areas need to be sealed.

8. If the door chosen for the test has a larger opening than 1.100m x 2.200m high, you will need to modify the opening to suit our template. (Please call us for advice should this be required.)

9. Ideally all the units to be tested should be in a completely finished condition

10. Whilst we would prefer to have the building empty during the test duration, people can stay in the building whilst the test is in progress. They may not however enter or leave during the test period. (Approx. 1/2 hour)

11. We require a parking space for a transit van within 10 metres of the test location on site.

12. If we arrive on site and are delayed due to the site not being prepared adequately, or the items in this checklist not being completed prior to our arrival, we reserve the right to cancel the test. The full test fee will be payable.

If you have any questions about the preparation or the actual test, then please ring our office to discuss them. We are here to help you achieve a pass at the first attempt.

Sequencing of Passivehaus Air Pressure Tests

It is recommended that at least three air tightness tests are carried out during the construction phase. All tests should be comparable in terms of results i.e. the (Vn50) volume used should be the same for all tests and is effectively the final volume of the finished building.

1. The first test should ideally be undertaken as soon as the air barrier is complete, but before any services and/or appliances have been fitted. This allows the robustness of the air barrier to be assessed. Any defects (air leakage paths) can be easily identified and remedied at this point. This test can be carried out before all of the windows are installed by temporarily shuttering (and taping) any openings.

2. The second air tightness test should be carried out after services have been installed, but before fixtures and fittings (baths, shower trays, kitchen units etc.) have been installed. It is crucial to achieve an airtight seal around all services penetrations before they are hidden from view by follow on trades, and a test at this stage will ensure this has been achieved.

3. The third air tightness test must be carried out at practical completion for certification purposes. By checking the performance of the building through prior testing and remediation the result of this test should be confirmation of a well-sealed project. The final test result is the test result recorded for Passivhaus certification purposes. Air pressure tests should always be accompanied by a thorough air leakage audit; so that any air leakage paths can be identified and remedied whilst the tester is on-site.

This procedure may take some time and requires good diagnostic skills of the tester as well as trained operatives on hand - where for example poorly adjusted window gearing is a culprit. This time audit and remediation time must be factored into the programme from the outset as it is an essential requisite of achieving the

It is worth noting that the additional expense to the project from a few extra air pressure tests is negligible in comparison to the potential extra costs that may be incurred by not achieving the air tightness standard on completion - resulting in extensive remedial sealing work. Testing different building to the Passivhaus Standard

Detached buildings

These are tested as a whole unit. Every part of the internal volume that is surrounded by the air barrier and within the thermal envelope will be subject to the test, therefore it is essential to make sure internal doors are wedged open to ensure the free flow of air around the building. Loft hatches should be closed (but not sealed) if the insulation and VCL are located at joist level (cold roof), but left open if the insulation and VCL are located at the rafters (warm roof). Note, if there is no loft hatch the volume of the air in the loft is not included in the Vn50 even if it is a warm roof construction.

Large Buildings

For large buildings it will be necessary to make sure that fan equipment used to pressurise and depressurise the internal volume is adequately sized to achieve the pressure differentials

required for the test (i.e. > 50 Pa). Conversely for small units (dwellings) it is important to make sure that fans are not oversized as over pressurisation (> 100 Pa) may cause damage to the building's fabric. Competent air pressure testers will have experience in calculating the fan capacity requirements for different sizes of buildings.

Terraced / semi-detached houses

Partitioning walls between individual terraced and semi-detached houses need to be airtight, and therefore terraced and semi-detached houses must be tested separately. The windows in the adjoining houses should be open during the airtightness test to make sure the air pressure in these adjacent dwellings equalises with the outside. If this is not possible (e.g. if the adjoining dwellings are occupied) then the tester should note this in the test report. For a terrace of five houses they would be tested individually.

Blocks of Flats

If the communal and circulation areas (foyer, corridors and staircases) in a block of flats are all within the thermal envelope (built to Passivhaus standard) then the block will be tested as a whole building (all doors to individual flats and all internal doors must be wedged open); the fan testing equipment will be installed into the main entrance door and must be appropriately sized to ensure pressure differentials are maintained equally throughout the whole building. For UK Building Regulations compliance it will then be necessary to carry out further air pressure tests on a sample of individual flats (in this case the flats to be individually tested will be determined by the Building Control Body).

When communal circulation areas (foyers, staircases and corridors) are outside the thermal envelope and therefore not heated, it will be necessary to test each flat individually; however it is important to note that Passivhaus Certification requires the tester to balance the pressures (i.e. co-pressurise) between the flat being tested and adjacent dwellings (i.e. flats that adjoin the flat being tested - including flats that are directly below, to each side and directly above). This method of testing is often complex and can be costly.

An alternative to this approach may be to test an entire group of flats at the same time by ducting air flow into each flat, but again this method of testing is complex and should only be attempted by a competent air pressure tester.

Please note - co pressurisation:: If one overall thermal element is split into separate units which are not linked via a passivhaus standard common area then co pressurisation tests should be carried out to each unit with each unit separately achieving the required standard. Mixed Use (multi residential units with commercial units)

If the commercial unit is separated from the domestic units by a thermal break and an air barrier then it will be necessary to air pressure test these areas separately. Where there is no thermal separation, such as in a single livework unit, then the block would be tested and certified as one unit.

If you have any questions in regards to your Passivehaus air test, then please ring our office to discuss them. We are here to help you achieve a pass at the first attempt.