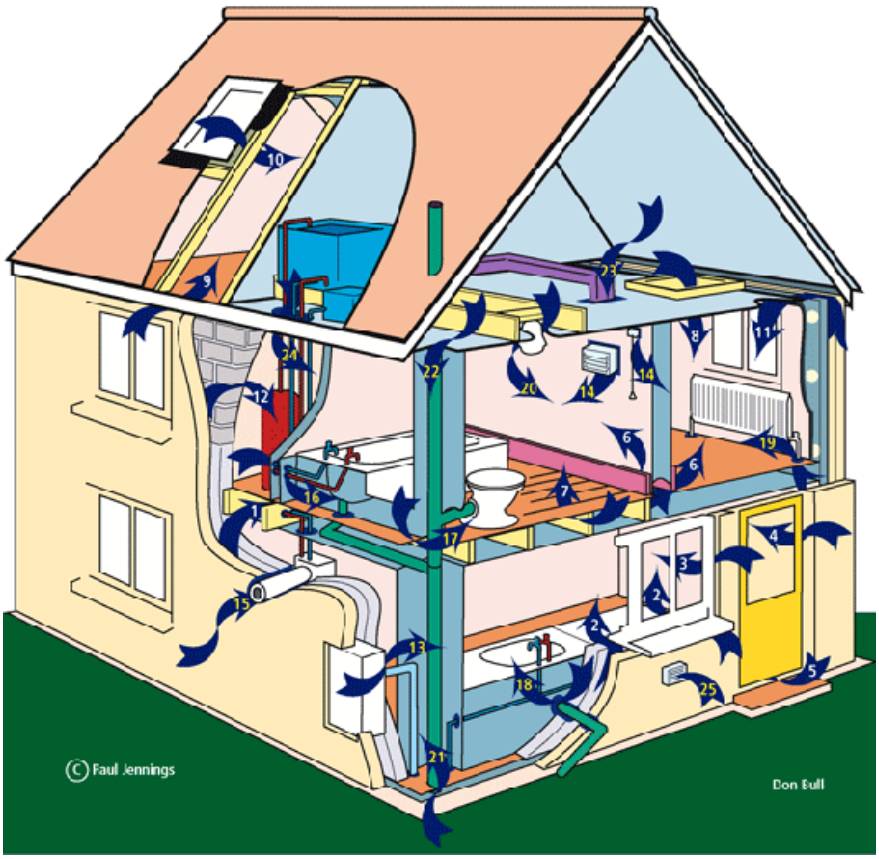
Title: **Residential Air Permeability Checklist**

Issue: **V4**

build energy | compliance testing consulting

	✓
Please tape all ventilation within the build; this will enable the engineer adequate time onsite to assist in any small remediation works within the timescale if required. Ventilation includes; intermittent extracts, mechanical extractors, air bricks, fire vents, chimney openings, trickle vents, roof window vents, inlet – outlet ductwork.	
We require two 110 / 240v Live Electric Sockets provided by site to operate	
If power to site is a problem we do have access to a small generator which can be hired at a cost of £50.00 +vat Electric	
Ensure the Building Envelope is complete. All Glazing, External doors and cladding to be complete	
Light fixtures to be fitted	
All sockets to be fitted	
Any Penetration made through the external envelope to be sealed	
Any loft/ storage doors, hatches, to be finished and in place with a draft excluder	
SVP and any waste pipes passing through the external walls and ceilings to be sealed	
If applicable all boxing in housing a soil pipe, to be sealed if exiting through the ceiling or external wall	
Plumbing installed and all traps to have water in	
Skirting boards to be in fixed and sealed top and bottom	
Integral garages with doors to the house to have draft excluder around the door	
Any Exposed beams require a caulk / mastic joint around the plastered finish around the beams	
If you have a chimney please make sure this has already been sealed prior to our visit	
We require a parking space for a transit van type vehicle within 20 metres of the test location on site. **If you are unable to provide a parking space, parking charges including any fines incurred will be chargeable**. Congestion charges and road / bridge tolls will be included in the price quoted	
We do require a door frame of standard size to fit our square adjustable frame. You may need to modify the opening to suit our template. Maximum size opening 2.4m X 1.1m	

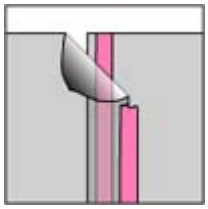
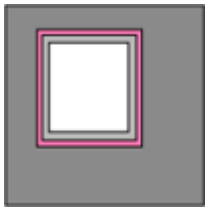
Where it all goes……

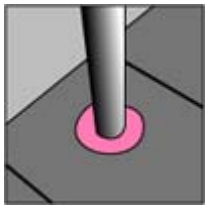
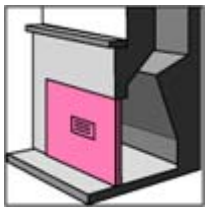
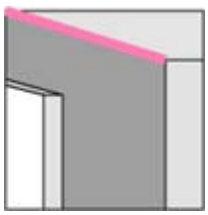


1	**Around the ends of floor joists or joist hangers**
2	**Beneath inner window sills and around window frames**
3	**Through windows and/or hollow window frames**
4	**Through and around doors – particularly double doors**
5	**Beneath doors and doorframes**
6	**Along the top and bottom edges of skirting boards**
7	**Between and around sections of suspended floors, usually timber floorboards**
8	**Around loft hatches**
9	**Through the eaves**
10	**Around rooflights**
11	**Through gaps behind plasterboard on dabs or hollow studwork walls**
12	**Cracks or holes through a masonry inner leaf**
13	**Around supplies from external meter boxes**
14	**Around wall mounted fan or radiant heaters; around and through fused spurs and pull switches**
15	**Gaps around boiler flues**
16	**Around water and heating pipes that penetrate into hollow floor voids and partition walls**
17	**Around waste pipes passing into floor voids or boxed in soil stacks**
18	**Around waste pipes passing through walls**
19	**Gaps around heating pipes**
20	**Around and through recessed spotlights**

21	**Around waste pipes, gas and water supplies, cables, which penetrate the lower floor**
22	**Around vent pipes passing through to loft void**
23	**Through MVHR or warm air heating systems; around terminals**
24	**Gaps around pipes to cold water and/or heating header tanks**
25	**Around and through wall-mounted extract fans, cooker hood vents, tumble dryer vents**
	Other routes
26	**Around and through ceiling roses**
27	**Through room thermostats and heating controllers**
28	**Behind polystyrene coving along wall to roof joints**
29	**Through key holes and where locks and bolts prevent effective draught proofing**
30	**Around internal timber joists that penetrate plaster walls**
31	**Through subfloor air supplies to solid fuel heaters**
32	**Through gaps in the casings of MVHR units**
33	**Up chimneys, particularly where flue dampers are not fitted**
34	**Through air bricks and partially closable hit-and-miss vents**
35	**Through window spinner vents**
36	**Around and through closed trickle vents**

Achieving Air Tightness

	Air barriers must be impermeable to air, continuous, durable and accessible. Internal air barriers need to be airtight; External air barriers need to be wind-tight Air barriers can be vapour open but require careful specification of adjoining construction and insulation materials. Having made the building airtight, mechanical ventilation is essential.	
	Laps in membranes should be rigorously sealed. Run a layer of double sided tape between the membranes at the overlap and run a tape over the leading edge of the outer sheet. Ensure that laps are positioned over a supporting area e.g. studs that can be battened for added security. Special wind and airtight membranes are available complete with adhesives, adhesive tapes and service penetration seals.	
	When installing / reinstalling a window/door frame, ensure that the gaps around the frame are sealed. Gunned in compatible sealant is suitable for small joints, not forgetting joint cleaning and priming to ensure a good bond, but where the openings are larger, use a pre-compressed flexible expanding foam strip. Ensure that the airtight membrane meets and overlaps the seal to maintain the airtight layer overall. Do not use foaming gap-filling adhesives, they shrink and break the seal after the tests are complete.	
	Use compatible gunned in sealant to seal joints between door / window frames and the surrounding wall externally. Internally, apply sealant to gaps between the wall reveals / window boards and the window / door units.	
	Draught strip existing windows and external doors. (Do not draught strip to kitchens and bathrooms unless extract ventilation is provided.) Use synthetic rubber or elastomeric tubular seals. Use brush seals with sash windows.	
	Draught strip the loft hatch. Ironmongery should be specified to ensure seals are compressed. NB Check that the hatch is thermally insulated as well as the rest of the ceiling.	

	Seal holes around services passing through the external wall including water, drainage, gas pipes, boiler flues and electrical cables. (Ensure that the sealant around boiler flues is heat resistant)	
	Seal holes around service pipes passing through suspended timber floors.	
	Seal holes around light fittings and pull cords in the ceiling. If the light fitting is not airtight then install an airtight box over the light fitting in the ceiling void. Choose airtight light fittings.	
	Block up redundant fireplaces and insert vent. Cap the chimney. Make sure the blocking up material is thermally insulating to reduce excessive heat losses.	
	Drylining is notoriously air leaky, consider parge coating the wall for airtightness before drylining. When drylining directly to an external wall, apply a continuous perimeter of adhesive. Ensure the joints between boards are sealed	
	Lay room-conditioned hardboard over existing square-edged floor boards. Seal the perimeter.	
	Seal the joint between the ceiling and the external wall Seal the joint between drylining and skirting board	

The 'Airtightness barrier'

• A continuous airtightness barrier system is the combination of interconnected materials, flexible sealed joints and components of the building envelope that provides the airtightness of the building enclosure and the separateness of heated and unheated spaces.

• The airtightness barrier needs to be designed into the building envelope during the initial concept design stage.

Developing an airtightness strategy

In the design office

• Define an airtightness performance target.

• Use a performance specification.

• Ensure all trade specifications include their requirements and interfaces with other trades.

• Ensure all ME&P service engineer's specifications include airtightness requirement and measures to achieve it.

• At an early stage of the design, define the line of the airtightness barrier.

• It can be useful to take plans and sections and draw a continuous red line that passes through all the elements that separate heated and unheated spaces thus:

Air barrier definition

• It is useful at an early stage to identify critical details that will have a bearing on the airtightness barrier.

• Details should be thoroughly worked out at design stage and not 'left-to-chance' later on site.

• Think in 3D and explore around every corner.

• Clearly identify the location of the air barrier on the drawings as an 'airtightness line'.

• Tightly manage the design implementation by appointing an 'Airtightness Champion' to coordinate between consultants and to coordinate with the contractor's 'Airtightness Champion' who will coordinate between trade sub-contractors.

• If the design team is inexperienced, it might also be prudent to appoint an independent adviser.

• Specify airtight components, membranes, seals and jointing methods.

• Check interfaces between components and between trades or work packages to ensure the continuity of the air barrier.

On site

• Tightly manage the implementation by appointing a contractor's site 'Airtightness Champion' to coordinate between trade subcontractors and to coordinate with the design team's 'Airtightness Champion' who will coordinate between consultants.

• Toolbox talks: Brief the construction team of the importance of airtightness and their collective role in achieving it.

• Clearly identify the location of the air barrier.

• Institute a regiment of inspection during construction, with particular regard to ensuring the air barrier is uncompromised by shoddy workmanship.

• Consider using airtightness testing kit during construction so all trades are aware of the effect of their work and encourage engagement in the quest for airtightness.

• Ensure that the air barrier is complete prior to covering up by other work and trades – failures found during testing can lead to expensive uncovering and remedial work.

• Ensure that air testing is scheduled in advance to achieve maximum benefit for purposes of remedial work.

Testing

• Air testing is a crucial tool in determining the effectiveness of an airtightness membrane.
• Air testing is carried out when the envelope is complete. If possible, it is wise to test twice - once before the covering-up of the membrane when remedial work can easily be carried out, and again at completion.
• Testing will identify the overall 'leakage' of the building.
• Smoke generating sticks can be used to find air leakage points or lines and help in understanding air leakage paths.

Notes: