

Fact Sheet No. 11

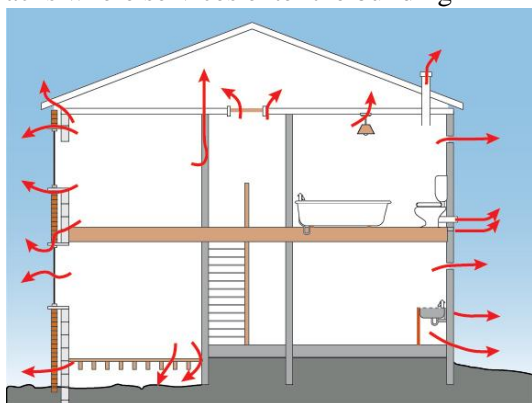
Building Air Tightness: Air leakage, Ventilation and Air Pressure Testing

What is Building Air Leakage?

Air Leakage (or infiltration) occurs when outside air enters a house uncontrollable through cracks and openings. It is not planned by the designers and is due to imperfections in the building 'envelope' (or outer skin). Air leakage has harmful effects on the buildings thermal performance, comfort levels and energy efficiency.

Air leakage will typically take place through:

- Joints, gaps and cracks in the construction;
- Gaps created where the structure penetrates the outer skin of the building;
- Cracks where services enter the building



Possible Paths of Draughts

Air leakage can account for 30% or more of a home's heating and cooling costs and contributes to problems with moisture noise, dust, and the entry of pollutants, insects and rodents.

Ways to Reduce Draughts in your Home

- The main problems occur where there are older timber doors and windows. These do not have any seals and will usually allow draughts in. To minimise draughts, compression seals from hardware shops should be fitted to door frames and window openings. The seals are applied to the door/window frame where the door/window opening closes the gaps between the opening and the frame and minimise draughts.
- Where draughts are coming in by the edge of the door/window frame; these can be sealed with a clear silicone gel that will be inconspicuous. It closes the gaps through which the draughts are coming in.
- Check pet flaps and places where pipe and cables etc. Pass through walls – the heat could be lost there too.
- When carrying out draught proofing, remember that is too important to maintain a reasonable

level of ventilation. Without it the whole house could become stale, stuffy or even damp. Ventilation is also essential for certain types of heating equipment, and for gas fires etc., so never block off ventilation unless it is needed.

- In the case of windows, the provision for controllable 'trickle' ventilation can be included when ordering the frames.

Heat Loss in the Attic Living Space

In dormer houses and attic conversions, draughts may be coming through into the living space, from the unused attic spaces. This is necessary to allow the wood in attic to breathe and prevent any risk of rot in the timber.

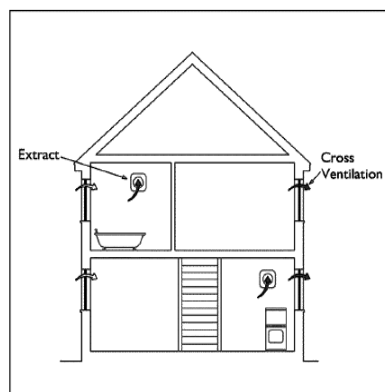
In many cases, there are unnoticed gaps in the walls separating the living space from the attic space through the gaps around any access doors/hatches into the attic space. This results in a draught that may be felt through the rest of the house. In order to prevent this, checks should be carried out at joints in wall panels and around access doors/hatches and seal any gaps accordingly. It is also important to insulate the walls of the living space, particularly those separating the living space from the attic space, in order to reduce heat loss through these walls as many people have problems with dormer rooms/converted attics being colder than the rest of the house.

Ventilation

Ventilation is fresh air that enters a house in a controlled manner. The primary function of ventilation is to provide an adequate level of fresh air to meet occupancy needs and to displace stale air, which effects air quality and can cause mould growth.

There is typically two ways to ventilate a house:

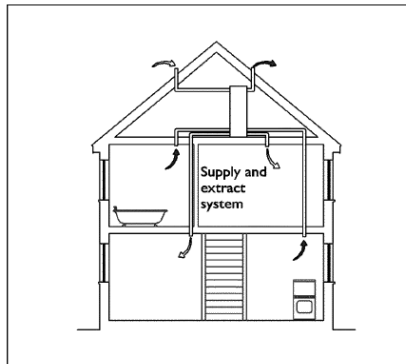
1. **Natural ventilation:** uses the forces of wind to help move air naturally through a building.
2. **Mechanical Ventilation:** is an extractor fan or ventilation with a heat recovery system.



Mechanical extractor fans can/should be used in wet rooms e.g. kitchens, utility rooms, bathrooms and sanitary facilities containing

provision for showering or bathing.

Mechanical ventilation with a heat recovery system should be capable of providing adequate general ventilation at all times. The minimum capacity of a heat recovery system should be based on the calculated general ventilation rate, adjusted to allow for air infiltration due to permeability of the building.



Ventilation Regulations

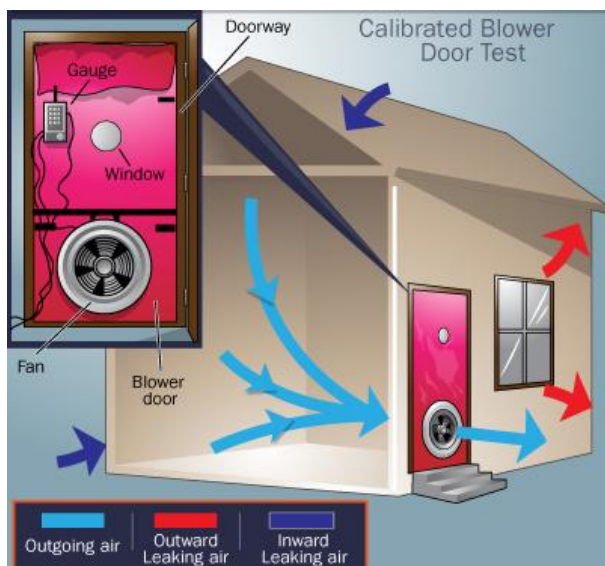
Part J of the building Regulations is to allow for the installation of heat producing appliances whilst giving adequate protection to the occupants.

In the case of a solid fuel being burned in an open space (e.g. open fire), a permanent ventilation opening (s) with a total free area of at least 50% of the appliance open area is required. At least 6,500mm² of the opening should be permanent ventilation.

Air Pressure Testing

Air pressure testing is mandatory under the building regulations for new homes since July 2008. The procedure for testing is specified in I.S. EN 13829: 2000 "Thermal Performance of Buildings: determination of air permeability of buildings: fan pressurisation"

Additional guidance on testing is given in the BSRIA Guide "Air tightness testing for new dwellings" and CIBSE Technical Manual 23 "Testing Buildings for Air leakage".



Air Tightness Testing:

The procedure is as follows:

- Install a fan into the doorway of the main entrance of the house (No fixing in the process).
- Seal all vents, flues and fans.
- The air flow rate required to maintain an excess pressure of 50 Pascal's (Pa) above outdoor is achieved.

Air permeability is calculated by dividing the air leakage rate in m³/hr by the envelope area in m². The performance is assessed at 50 Pascal's pressure difference.

All testing should be carried out by a person certified by an independent third party to carry out this work, e.g. National Standards Authority of Ireland certified or equivalent.

Results: If a building fails to meet the required air tightness standard, inspections should be undertaken using a tracer smoke to identify areas of excessive air leakage. Remedial measures should be carried out on the dwelling and a new test carried out.

Typical Payback Time: Air-tightness depends on construction method, site practice and the quality of the build. Payback periods tend to be medium term for larger commercial buildings as some of the structural remediation work can be expensive. Draught stripping the external skin of the building is the most economically cost effective option.

Savings: Heating costs for a well sealed building can be 40% less than equivalent cost effective option.

Waterford Energy Bureau is a sub-section of the Waterford City and County Council Environment Department



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