

## Air Sealing - GENERAL

### Existing Property After Air Tightness Test to Seal Air Leaks

Building or Refurbishing a new or old property with traditional cavity wall construction or with timber frame to achieve an air tight building can be daunting, but when you get your head around it, there are simple ways of achieving an air tight building. As long as you pay a little more attention to the small detailed amendments required and **THINK AIR TIGHTNESS** at each stage.

#### NEW BUILDINGS

For new builds think about every joint that is going to be created as the build process continues, then research what products there are available that will resolve your potential air leak. Google your question/s .....!

If in doubt seal every gap. BUT be sure that you have considered your ventilation solution or you & your new building will suffer from the effects of being too tightly sealed with condensation and poor air quality resulting.

#### EXISTING BUILDINGS

##### First Test the building to see How Leaky is currently is.

Before air sealing your building our advise would be to have an Air Tightness Test performed - after all you will not know how effective your sealing work has been unless you know the baseline figure?

See our link to "[14. All About Air Tightness - 04.09.2015](#)" for more information.

##### How do we achieve an air tight building?

This is achieved by starting at the design stage and thinking about what measures will be needed to get the building air tight and what materials we need to use to form an efficient Air Barrier.

Understanding the materials used for construction and how air may pass around or through the material.

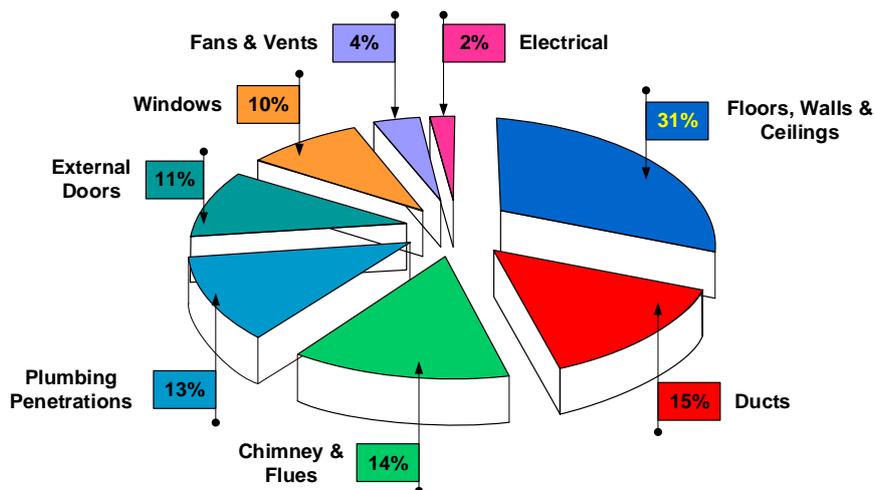
It can be surprising just what materials air will actually pass through!

Understanding what air is capable of and thinking about air tightness as each stage of the build by all trades concerned, and ensuring that **EVERY** hole made in the Envelope Area is re-sealed, will help the building achieve a good Air Tightness Result, first time!

In existing buildings follow the tips to reduce your homes energy consumption and lower your bills!

##### Where can we find air leaks?

The following pie chart indicates where DRAUGHT FINDER finds most common air leaks are to be found. These apply to existing buildings as well as new buildings.



Each cubic meter of air that enters or leaves the buildings conditioned space needs the energy previously used to heat it, to be replaced or the building will cool - leaving it uncomfortable & cold!

**The less air we loose from our buildings, the less our heating bill will be.**

## Ventilation is IMPORTANT

A word of caution is due at this point, while we are attempting to ensure we build an air tight property, we should realise that certain parts of the building NEED to have air circulation to remain in good condition for the life of the building!

### "Everything NEEDS to Breathe"

Air *MUST* be allowed to circulate around the following parts of the building;

1. The underside of any timber on the ground floor.
2. Through the cavity wall.
3. The unheated attic space.

If air is not allowed to circulate around these parts of the structure water will gather and overtime lead to conditions most suitable for rotting, which in turn will lead to major structural problems and a great deal of expense to rectify it!

## Ventilation of the Building

See our link for "[21. Ventilation Information - 05.08.2015](#)" for the low down on ventilation systems.

It is true every building needs ventilation, but ventilation air needs to be "controlled" any air entering from gaps & cracks in the building is uncontrolled & wastes energy as Draughts!

Older builders will dismiss sealing these natural ventilation gaps by saying "You will only increase dampness unless you leave a few gaps"

Ventilation controls moisture, which in turn can eliminate the problems of condensation and consequential mould growth and the health issues that can result. So in one way they are correct, but when do you get most natural ventilation from these "natural gaps" - in winter when it's blowing a gale outside & you are trying to keep warm! Then when you want a airflow through the building in summer, there's no wind!

A ventilation system should control the flow of air in both winter & summer

However the biggest factor in condensation control remains as "Occupational Usage".

If after sealing your building, you notice condensation where before there previously was none then you have probably "over sealed" the building! having an Air Tightness Test before sealing will provide a guide to how much sealing you need to perform.

If you start suffering from condensation problems the only cure is to introduce ventilation into the affected room, or consider other ventilation options for the house.

## Common Air Leakage Locations and Solutions

The information following pages shown various known **Uncontrolled Air Leaks** in buildings. In a new house most of these should have been resolved by the designer before building took place. If we have conducted a survey for you we will have provided a report indicating where we found air leaks, and a password for the link to "**16. Client Air Leaks**".

Unfortunately not all air leaks can be resolved after completion without some very costly disassembly work taking place (in terms of additional time and material expense). It is better to build it tight first time than to revisit a problem missed at an early stage!

## Do it once but do it right!

We will not be able to cover every air leak, but will try to provide suggestions for sealing most leaks. However, if you have a leak that is not covered or if you have a solution that may be cheaper or more effective then please LET US KNOW.

We will be delighted to include your solution in the next revision & include your name as credit for the solution as well, if you wish!

### Air Leakage Trouble Spots

31%	Structure - Floors, Walls & Ceilings	Structure - Floors, Walls & Ceilings	15%	Ducts	4%	Fans & Vents
1	Services Meter Entrances, Gas & Electricity	16	'Accidental' Holes in the Vapour or Air Barrier	28		Warm Air Registers
2	Unfilled Holes in Structure	17	Unsealed Air Lock & Porch Roof	29		Vents from Bathroom/Kitchen Extract Hood
3	Joints Between Walls & Ceilings & Floor Joist Junctions	18	Attic Access Hatch	30		Whole House Fan System Ducts
4	Dot & Dab Fixed Plasterboard	19	Attic Air Sealing	31		Ducts, Passing Outside Envelope Area Walls & Unsealed Ducting
5	Roof Light Windows	20	Dropped Ceiling/Soffit			
6	Unsealed Cavity Wall - Inside Conditioned Space	21	Boxing Shaft for Piping or Ducts	13%		Plumbing Penetrations
7	Boxed in Steel Support Girders & Pipes			32		Water Pipes through Air or Vapour Barrier
8	Structural Cracks in Building	11%	External Doors & 10% Windows	33		Plumbing Waste Pipes
9	Poorly Sealed Insulation Within Cavity Wall	22	All Joints in Dormer, Walls, Floors, Doors, Windows & Ceilings			
10	No or Poor Air Vapour Barrier Installed	23	Windows, Doors & Frames to Structure	2%		Electrical
11	Garage to Living Space Walls & Ceilings - Unsealed	24	Gasket Sealing to Window & Doors	34		Service cables for TV/Phone/Fuel etc.
12	Cantilevered Floor			35		Outside Lights
13	Rim Joist, Sill Plate, Foundation, Floor & Ceiling Wall Plate	14%	Chimney & Flues	36		Electrical Cables Penetrating Air or Vapour Barrier
14	Joints at Internal Wall Partitions Top & Bottom	25	Flue or Chimney Shaft	37		Electrical Outlets & Switches
15	Common Walls Between Attached Dwellings	26	Fireplace Wall	38		Recessed Light Fittings
		27	Boiler & Solid Fuel Flues			

## The 5 P's

### Proper Preparation Prevents Poor Performance

To achieve a good seal, proper preparation is essential, or you will be redoing this work in sooner! The surfaces must be clean to obtain good adhesion at the surfaces of the gap or crack you are going to seal. Any dust or dirt will prevent good adhesion & result in a leak again at some point in the future.

Remove all trace of dust prior to applying any caulk. Check the instructions on all materials for damp surfaces, some caulk needs to be dry while others will achieve a better adhesion if the surface/s are slightly damp before applying.

No grease or oil should be present.

All loose material around the area being sealed should be removed. If this is old plaster you may need to 'prime' the surface by applying a PVA solution & allow to dry first, before continuing with sealing.

Dry timber under skirting board may present a problem with adhesion. Apply PVA solution & allow to dry after cleaning by using a vacuum cleaner to remove loose debris from the gap.

## IMPORTANT SAFETY NOTE

### Read Instructions

As with all Do It Yourself projects, **when all else fails, read the instructions** & *understand* them!

This is really important as we cannot foresee all & every circumstance where an air leak will need sealing, you are 'on site' you know the materials you are working with, you need to understand the limitations of the sealing material you are about to use, & where it will be used!

### YOU need to read & understand what the caulk, or foam is capable of.

Read the instructions on the packaging or ask (*download from the manufacturers website*) for the technical information sheet, make sure that you do not put yourself in any DANGER while performing any sealing work.

Some steps to consider;

1. Tell someone where & how long you are working for; *i.e. in the loft, under the floor etc.*
2. Avoid using any HAZARDOUS material in a confined space, some give off volatile vapours as they cure, ventilate the area as required.
3. Always ensure you have enough light, using a safe cool lamp or power source (battery power if working with electrical circuits off).
4. Use good steps or ladders when working at height, ensuring a firm footing before using.
5. If you are sealing around electrical equipment, turn off the power &/or remove the fuse.
6. Not confident around electrical outlets or lights? Get an electrician in to help, they can make it safe, remove the fittings while you follow sealing & they can re-fit the items afterwards.
7. If working in the attic loft space, without flooring ALWAYS use a board of sufficient size & strength that will span at least 3 rafters & is wide enough to kneel or lay on comfortably.
8. If you don't feel safe or confident when doing some of the sealing, **DON'T DO IT!** ask for help, or arrange for someone to do it for you.
9. CONSIDER what you are about to attempt, assess the risk of you having an accident first BEFORE proceeding, any doubt? Don't proceed, ask for help.

### Caulk & Foam: Tips

- a. Always wear protective gloves & old clothes as the foam sticks like Sh\*t to a blanket, being very difficult to remove from clothes, furniture & skin!
- b. Cover flooring with old covers, or plastic dust sheeting to catch dropped foam. Leave covers until cured, it still pushes out after the trigger is released!
- c. Use the nozzle on the foam can to gauge the gap size you are about to fill.
- d. Use foam to fill gaps larger than the nozzle on the foam.
- e. Do ALL foaming in one go - it will stop nozzle from blocking if in use.
- f. Pack gaps with a cheap draught excluder foam before sealing with decorators caulk, this saves caulk & will save returning after when the thick layer of caulk has shrunk while drying!
- g. When foaming a long gap, consider applying 50 mm Masking tape or Brown packing tape on either side of gap which should make trimming excess off easier, & possibly preventing foam sticking to an unwanted surface!
- h. After trimming excess foam, & if painting afterwards cover with decorators caulk before painting.

- i. Filling a large hole? Use a 4 or 9 mm plywood board cut oversized to cover the hole. If you need access afterwards use a good quality draught strip before fixing in place with screws. Paint with a gloss paint to prevent water vapour from travelling through.
- j. If no access is required, run a thick bead of decorators caulk around the perimeter of holes & fix board in place with screws, before painting
- k. Filling a large hole & can't cover with a board? Use a plastic bin bag (of sufficient size) fill with fibre glass insulation & seal bag. Push the bag into the hole & fill small holes at corners with foam, this will hold bag in place as well as sealing. Finally if you can feel small draughts fill these with decorators caulk.

## Materials & Equipment

**Caulk** - In general use a caulk that is labelled as a "flexible filler". You need to seal the gap but allow for movement of the gap, or the sealing medium may be pulled apart & your work has been in vain.

There is a wide choice of caulking available & you should choose a caulk that will adhere to the structure material on each side of a gap or the surrounding hole.

For internal sealing generally a decorators caulk is sufficient. However if the gap is wide & you know that it is subject to movement between summer & winter then choose a caulk which has Butyl in it's ingredient mix. This will remain flexible & not part company with the gap sides.

Caulking containing Silicone has been known to part company with PVC over a period of time & generally is not recommended for air sealing.

However if you wish to obtain a permanent seal those caulks having 'Nail & Seal' or will adhere 'Even Under Water' seem to have amazing adherence qualities while remaining flexible. These I would use both internally & externally as long as you don't want to remove them again!

**Foam** - Small, medium & large sizes are available in all DIY stores. Check the technical details, as some foams can produce quite a strong pressure as they cure, you need a 'Soft' foam that fills the cavity quickly, but will not carry on expanding too long after, & cure quickly.

Decide roughly how much foam you may need. If doing all foam sealing in 'one go' buy a large can. If spreading the sealing over a few hours, buy smaller cans as the nozzle will inevitably block up after using once or twice!

**Spray Foam Kits** - are available online, use these only for covering large areas. They are ideal as a final layer on top of fibreglass to stop air reducing the insulation performance by blowing through the fibreglass fibres & removing energy.

But be careful not to trap water vapour from kitchens or bathrooms below. Water vapour will not pass through the foam, but build up & ruin the glass fibre insulation.

In general all air sealing is performed from the inside, however you may come across a leak where you can only get access from outside. Use an external caulk for these leaks.

For very large holes, where access is difficult, use a 'heavy duty' plastic bag fill with fibreglass & stuff into the hole. Foam around to close small holes.

For large holes with easy access, use polystyrene board or foil back urethane board, cut to 10-15 mm narrower than the hole all around & foam in place. Ideal for filling the void between joists, floor & ceilings under dormer attic rooms

If you have a water leak - rain getting into the property you MUST seal the water leak first, failure to resolve this problem first will result in rotting where you cannot see it!

## Equipment

The following list is the equipment you may need, it is not exhaustive as different problems require a different solution, but should cover the majority of sealing work.

1. Caulking Gun - buy a good gun, nothing more infuriating than a cheap gun breaking on you.
2. Foam Dispenser Gun - some high end foams require the use of a trigger mechanism. Generally easier to control, but not a necessity.
3. Trimming Knife - with safety blade.
4. Selection of screwdrivers
5. Ladder - access to loft
6. Step ladder - access to light fittings

7. Bucket - For cleanup operation
8. Clothes - For cleanup operation
9. Small spray gun - for spraying dilute PVA glue in difficult areas (dilute 3 parts water to 1 part PVA)
10. Small panel saw for cutting insulation board
11. Tape measure - for measuring where board requires cutting to fit!

## Client Air Leak Sealing Tips

After reading the above information as a client you will have been provided with a password for further Hints & Tips on air sealing. Visit our website [www.draught-finder.co.uk](http://www.draught-finder.co.uk) Page 4 "16. Client Air Sealing Tips"

In this document we try to cover the common areas where we have found air leaks in new & existing properties. Some solutions will be duplicated, we have tried to group these together.

Some of the leakage trouble spots should have been sealed during the building construction stage, as such these have been omitted as the sealing afterwards can be difficult to explain briefly in this document & in practice.

This part of the document is an 'on going' Work In Progress - if you come across a leak that is **NOT** shown, **please let us know**. We will suggest a solution & include the problem & solution into the next revision of the document.

### [Let us know if you have a better solution for these air leaks.](#)

We have tried to provide options for you to consider prior to starting sealing;

- |                    |                           |                                       |
|--------------------|---------------------------|---------------------------------------|
| 1. The Best method | - <b>E</b> xpensive       | - done once                           |
| 2. A Good method   | - <b>M</b> edium to cost  | - done once                           |
| 3. An Easy method  | - <b>R</b> easonable cost | - may need repeating in 5 to 10 years |
| 4. Quick Fix       | - <b>C</b> heap cost      | - done once                           |

**E M R & C** will be indicated on the following leaks as a guide cost.

We will use sketch diagrams to show clearly the fault & solution suggestions on some but not all leaks.