



A guide to achieving the required level of  
Airtightness  
In  
Domestic and Small Commercial Buildings





## Introduction

With increasing concern over Global Warming and the worldwide need to reduce carbon emissions, the spotlight has fallen on new buildings and measures that can be taken to make them more energy efficient.

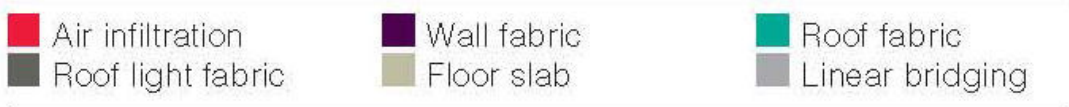
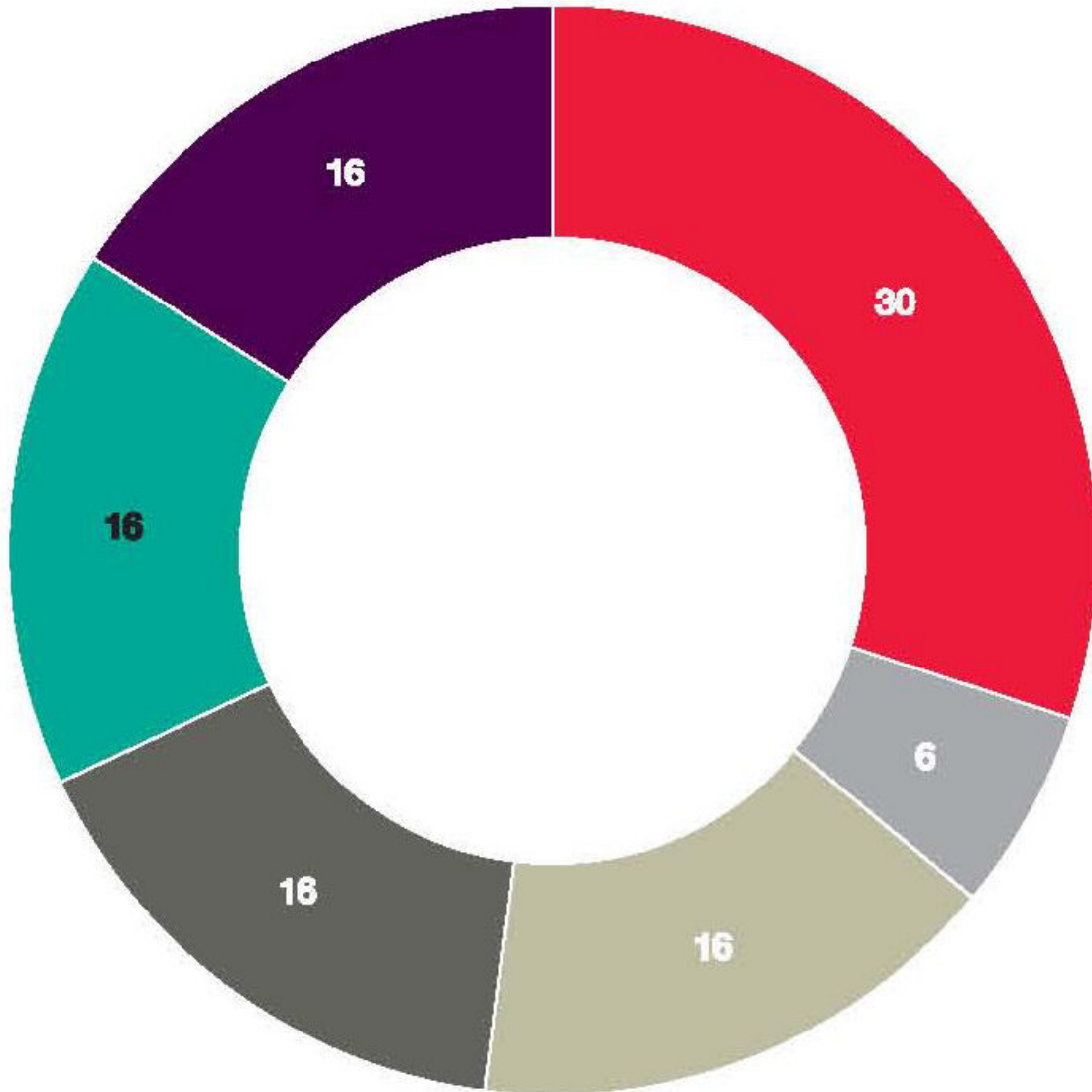
As over 30% of energy losses from a building are through uncontrolled air infiltration it has become increasingly important that air leakage from new buildings is reduced as much as possible.

Legislation has been introduced to establish maximum air leakage criteria and we can be confident that future revisions of such regulations are going to demand greater levels of airtightness.

Permagreen Insulation have a long and established track record in reducing air leakage from all types of buildings and this guide outlines measures that can be taken to increase the airtightness of domestic and small commercial buildings with the minimum of expense to the Client and Contractor.

*It is our aim to reduce the air leakage to the lowest possible level rather than merely meet any targets laid down in current legislation.*

**Building envelope energy losses.**



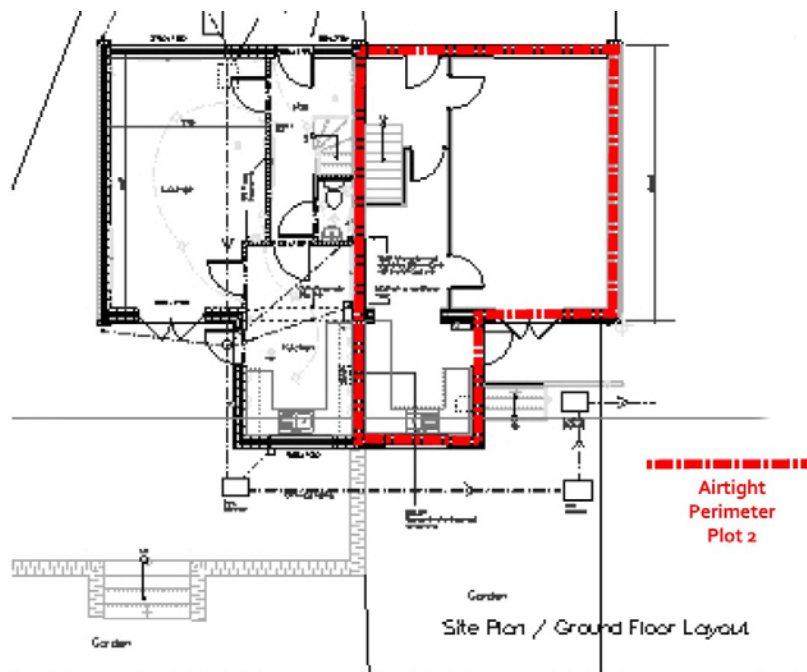
## Establishing the Airtight Perimeter

Before we can begin to formulate an action plan for increasing the airtightness of our proposed building we must decide on the actual area to be tested.

In the majority of domestic and small commercial buildings the boundaries of the airtight 'box' will be as follows:

- Base of tested perimeter – Top of Ground Floor Concrete Slab
- Top of tested perimeter – Underside of Top Floor Ceiling
- Sides of tested perimeter – Inside face of external perimeter/party walls.

As the intention is to reduce fuel consumption, any unheated spaces will be excluded from the airtight perimeter. This includes integral garages, bin stores, plant rooms with louvered doors and service shafts.



In the case of blocks of flats each individual flat will form its own airtight compartment.



## First Principles

It is important that any routes for air loss are addressed on the internal face of the airtight floor, walls or ceiling. If we let the air escape past this point we will be unable to inspect the locations in the event of a test failure and carry out any necessary remedial works.

As a result it is important that the internal finishes are installed and sealed prior to installation of any fixtures and fittings.

We would normally expect the internal walls to be rendered, plastered or dry lined. It is therefore imperative that these finishes are fully sealed down to floor slabs and up to soffits.

In addition, all openings for windows and doors must be fully sealed on the internal faces.

Once the building shell is complete and fully sealed you can then begin to fit baths, sinks, kitchen units etc.

Any subsequent holes made for service runs etc. must be fully sealed on the internal face.

Bare masonry allows a considerable amount of air to escape and so any areas that are located on external walls must be covered with a suitable airseal coating.

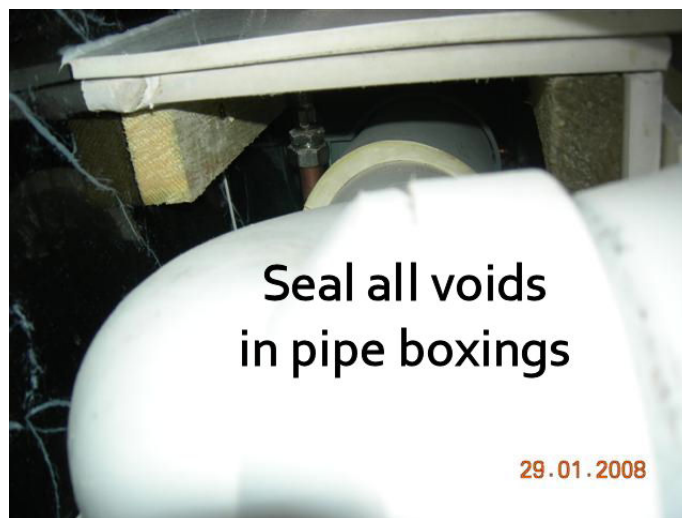
## Typical Problem Areas -1

Pipes not sealed behind kitchen units and bath panels



## Typical Problem Areas-2

Air escaping into pipe boxing that lead to unheated spaces such as garages and roof voids



Poor quality or badly fitting trickle vents



## Typical Problem Areas-3

Air escaping around hatches and under doors to unheated areas



Air escaping through gaps in plaster/dry lining to frames





## The Air Leakage Test

It is important that conditions for the test are as ideal as possible. It must not be carried out too early as incomplete electrical fittings can allow air to escape.

Conversely you do not want to leave it to the last minute in case there are problem areas that require attention.

The following items should be complete prior to the test:

- All windows and doors installed and sealed around on the inside.
- All internal finishes complete.
- Drainage complete and water in all traps.
- All light fittings installed.
- All socket covers fitted.
- All service penetrations sealed where they penetrate airtight walls.
- All boxing to pipes and service fully sealed.

The test cannot be carried out if it is too windy as an accurate measurement cannot be taken. Dimensioned drawings should have been supplied to Permagraeen in advance of the test to allow the building envelope area to be calculated.

240 or 110 Volt power will be required in each unit to be tested.

The house or flat should be clear of other personnel during the course of the test but you may have a representative stay with the test engineer to observe the process.

It is normal for small areas to have the test equipment installed on the inside face of an external door. The test fan will then depressurise the building to at least -50 Pa pressure and a number of readings taken at different pressures.

The final result will be expressed in an air leakage factor of 'X' m<sup>3</sup>/hr/m<sup>2</sup>.



At the end of the test the fan direction will be reversed to blow air into the building. The test engineer will then use a smoke pencil to identify the areas where undue air is escaping.



A written report will be supplied by Permagreen containing the test data and certification coupled with comments on areas that require attention. In this way we hope to aid Clients and Contractors to develop good practice and produce a good air leakage result every time.

## The Test Rig





## The Permagenta Service

Permagenta Insulation are able to draw on many years experience of inspection and testing to aid you obtain the best possible airtightness result for your building.

Typical services are as follows:

- Scrutiny of project drawings and production of written report outlining areas of concern.
- Supply of a range of tested airseal materials including mastic sealants and coatings.
- On-site advisory service
- Building Air Leakage testing
- Thermographic imaging to identify insulation discontinuity