Air Tightness Testing

Guidance Notes

What is Air Tightness Testing?

Air tightness testing is a recognised method of measuring the extent to which air is lost through leaks in the building fabric. It is often referred to as an air leakage test or air pressure test.

It is important to understand that air leakage is the uncontrolled flow of air through gaps and cracks in the fabric (often referred to as infiltration or draughts) and not ventilation, which is the controlled flow of air in and out of the building. Too much air leakage leads to unnecessary heat loss and discomfort for the occupants. This has been addressed in recent years with the Governments commitment to reduce CO emissions significantly, and as part of the recent changes to Part L of the [2]building regulations, more stringent Building Regulations specifically target the need to reduce uncontrolled leakage and improve buildings emissions rates. The aim of building professionals is now to 'Build tight – Ventilate right'.

Gaps and cracks within the building fabric are often difficult to detect simply by visual inspection. The only satisfactory way therefore to ensure that the building fabric is airtight to a reasonable standard is to measure the air leakage of the building as a whole. Air permeability is quantified as the leakage of air in or out of the building per square metre of building envelope at a pressure difference of 50Pa (Pascal) between the inside and outside of the building, or expressed as an equation $m^3/(h.m^2)@50Pa$.

Will I Need An Air Tightness Test?

Part L1A and L2A of the Building Regulations are specifically aimed at new buildings and most are now required to have an air-tightness test.

Part L1B and L2B cover work to existing buildings and do not generally have a requirement for air-tightness testing. All new dwellings are required to have a SAP (Standard Assessment Procedure) calculation prior to building control approval. It is ultimately the SAP calculation that determines the air permeability target needed to be achieved and whether it is a requirement.

All new non-dwellings are required to have a SBEM (Simplified Building Energy Model) calculation prior to building control approval. All buildings over $500m^2$ are required to meet air permeability targets and will require testing.

What Are Sap And Sbem? Do I Need One?

SAP and SBEM are both dynamic software measurement tools used to calculate the energy performance of a building. The calculations are expressed generally in the amount of carbon dioxide emissions that the building outputs over a year period, they also provide a target emission that the building needs to achieve. From the 6th April 2006 all new buildings needed either a SAP or SBEM calculation.

When Does The Air Tightness Test Take Place?

For single units the test is completed at the end of the construction period prior to final approval. For multiple units testing must be carried out during construction of the first 25% of each new dwelling type.

What Is The Frequency Of Testing?

Non-dwellings

All non-dwelling building need to be tested, with these exceptions:

a) Buildings below $500m^2$ can adopt a high default value of $15m^3/hr/m^2$ which may need a trade off in another area of the construction.

b) Some large or complex buildings may not be possible to test effectively and will require independently qualified external audits during the construction to ensure there is a continuity of the building fabric.

c) Modular or pre-fabricated buildings can demonstrate their performance using an independent test body to conduct the test either at the place of manufacture or on site.

d) Extensions to existing non-dwellings are also considered new build if they are over $100m^2$ and are greater than 25% of the total useful floor area.

Dwellings

For small developments of one or two units then one unit must be tested unless they are different in their construction type. The only exceptions to this rule for non-testing are:

a) If the same builder has produced an identical construction in the last 12 months and successfully passed an air tightness test.

b) A high default value of $15m^3/hr/m^2$ is used in the SAP calculation, which possibly will mean a trade-off in other areas.

For larger developments if the Accredited Construction Details have been adopted testing is required on either one of each dwelling type or 5% of each dwelling type, whichever is the greater number.

Non Accredited Construction Detail route requires two of each dwelling type in the development, or 5% of each dwelling type.

If the first five units tested all meet the target air tightness target, the sampling frequency can be reduced from 5% to 2%.

What Performance Levels Must Be Achieved?

Part L1A and L2A of the Building Regulations are specifically aimed at new buildings and most are now required to have This is down to the building designer but a minimum air permeability of 10m/hr/mhas to be set. Depending on other influences such as insulation levels and heating performance the figure will vary from building to building. This table will give good indication as to average performance levels.

Type	Air Permeability $m^3/(h.m^2)$ @ 50 pascal	
	Best Practice	Normal
Dwellings		
naturally ventilated	**3**	**9**
mechanically ventilated	**3**	**5**
Offices		
naturally ventilated	**3**	**7**
mixed mode	**2.5**	**5**
air conditioned/low energy	**2**	**5**
Factories/warehouses	**2**	**6**
Superstores	**1**	**5**
Schools	**3**	**9**
Hospitals	**5**	**9**
Museums and archival stores	**1**	**1.5**
Cold Stores	**0.2**	**0.35**

How Is The Building Tested?

All testing is completed under the strict methods prescribed by the ATTMA (Air Tightness Testing Measurement Association) technical guide TS1 which allows us to calculate the volume flow rate of air per m^2 of building envelope area at a pressure difference of 50 Pascal.

site arrival - pre test measurements
Measure air temperatures and wind speeds. Check building dimensions equal to plan.

prepare the building
Select suitable opening (normal the front entrance), seal all extract fans, close all adjustable ventilation openings, traps filled with water.

measure depressurisation rate
Check for obvious leakage paths, create 50 Pascal pressure difference, air flow measurements are taken at a number of pressure differentials.

measure pressurisation rate
Rearrange test equipment, re-check all seals and test conditions, create 50 Pascal pressure difference, take a further number of pressure differentials.

indicative test results
Calibrated software package air flow results in $m^3/hr/m^2$ of envelope area at 50 Pascal. A minimum this must be equal to is $10m^3/hr/m^2$.

How Can I Help The Building Pass?

- Adopt Accredited Construction Details for the building design.!
- Keep closer supervision of site trades.!
- Ensure continuity of insulation and building membranes.!
- Regular independent site audits.!
- Set realistic air permeability targets.

How Can Melin Energy Help?

- Testing is carried out with calibrated equipment to the ATTMA testing procedures by BINDT trained engineers.!
- Site Audits to identify problem areas avoiding costly retrospective work.!
- CPD Seminars and Training giving you the opportunity to understand how to build airtight buildings.!
- Design Review before and during construction to ensure design details are correct.!
- Fast and efficient service to keep projects on track and with minimum hold up.

Melin Energy Consultants Ltd is able to provide accredited Part L compliance certificates for both new build domestic and commercial properties. They are also registered with BINDT (British Institute of non-Destructive Testing) to perform airtightness tests in accordance with Part L1A.

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