

Ecobuild

Airtightness testing, a mandatory requirement – how to ensure a pass

By David McKenna CEng MCIBSE
Managing Director, Build Check Ltd



4044



Seminar Outline

- What is air leakage and why test?
- Test procedure
- Building preparation, requirements & considerations
- The Building Envelope & Common infiltration paths
- Successful testing
- Construction details - typical examples

What is air leakage?

It is the uncontrolled infiltration of air entering the building through its envelope due to imperfections in its construction.

An Airtight building will be:
designed with Airtightness in mind
and **built** well.

Why test?

The Requirements

The Building Regulations 2006

Part L: Conservation of fuel and power

Approved Documents :

L1A: New Dwellings – mandatory testing

L2A: New buildings other than dwellings –
>500m² mandatory testing

Testing to be carried out in accordance with ATTMA TS1:
“Measuring of air permeability of building envelopes”

Pass or Failure?

It is a failure when:

Air permeability is greater than $10\text{m}^3\text{h}^{-1}/\text{m}^2$ at ΔP 50Pa

And/or

The measured air permeability rate is greater than the figure used in the TER

Consequence:

Remedial work required in sealing building

A further Airtightness test required

The Test Procedure

The Test Procedure

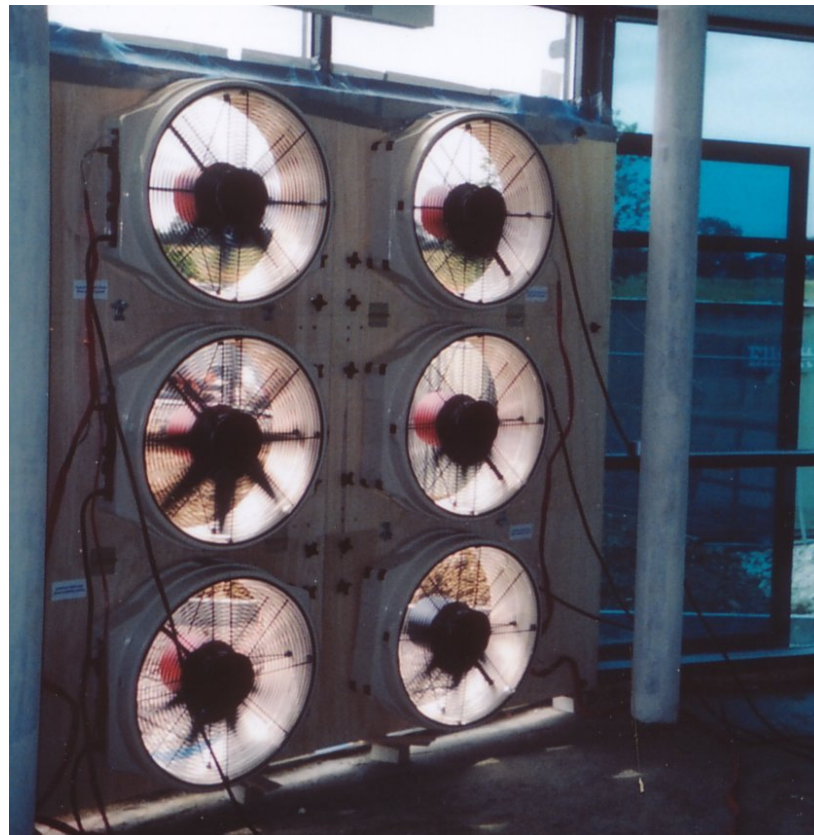
1. Fans are attached to an appropriate opening in buildings' envelope



Fan
Template

The Test Procedure

2. They are used to blow air into the building to pressurise it.



The Test Procedure

3. We measure:

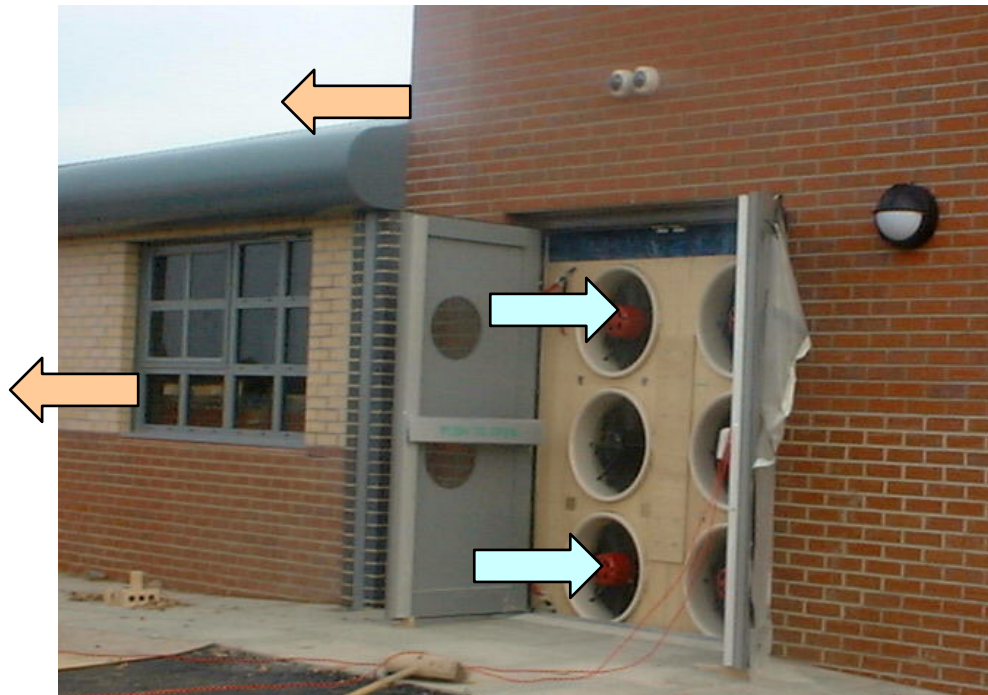
The fan speed/volume flow rate

The corresponding internal/external pressure difference.



The Test Procedure

4. The quantity of air being supplied to the building to maintain this pressure is measured
 - This will be equal to the air quantity escaping from the building through gaps.



Building Preparation Requirements & Considerations

Building Preparation

Prior to testing:

- The building should be completed
- All external doors and windows closed
- All internal doors wedged open
- All trickle vents closed but not sealed
- Mechanical ventilation turned off with inlet/outlet grilles sealed
- All combustion appliances switched off
- Drainage traps must contain water

Other Requirements / Considerations

- Internal/External temperature difference $\leq 10^{\circ}\text{C}$
- Low wind speed required $\leq 6\text{m/s}$
- Test company on site for approx. 4 hours
- Test duration 1 Hour
- External door/opening obstructed for 4 hours
- People can be in building during test

The building envelope & common infiltration paths

Building Envelope

The building envelope and its Airtight Barrier (ATB) often consists of:

- Ground floor: ATB internal surface of slab
- External walls: ATB Internal surface of walls
- Roof: ATB underside of steel decking / slab / plasterboard ceiling (not false ceiling)

It is essential to consider location of ATB at design stage

Building Envelope

Unconditioned areas often considered outside of Building Envelope

- Plantrooms
- Service risers / ventilated ducts
- Switch rooms
- Lift shafts

Any penetrations through envelope need to be sealed

Common Infiltration Paths

- At junctions between main structural elements
- At joints between walling components
- Around windows, doors and roof lights
- Through gaps in membranes, linings and finishes
- At service penetrations
- Through permeable materials

In practice....

Without prior consideration to Airtightness testing:

- Approximately 50% of projects fail on the first test – greater for housing.
- 60-70% of the time this is due to poor sealing of obvious gaps in construction
30-40% due to design issues e.g. Eaves details
- Cost of rectification (at end of project) can be high
- Sealing of gaps in envelope needs to take place throughout every stage of construction process

Successful testing

To ensure successful testing of developments, contractors should consider:

- Review of design details / drawings
- All construction teams should be aware of Airtightness requirement – onsite training seminars
- Regular site inspections throughout each stage of contract
- Pre-test site inspection by Airtightness test company

Construction details

Examples

Construction details



Chesham Park Community College
Courtesy Kingerlee Ltd.

Construction details

Perforated roofs are inherently difficult to seal



Where they pass through envelope
At Eaves



Service penetrations



Construction details

Some materials are permeable to air and will leak!



Ensure hard to get to sections are sealed



Ensure seals/brushes are fitted prior to testing

Good on-site construction practices
will ensure an air tight building

Any Questions?



4044

