Airtightness Testing

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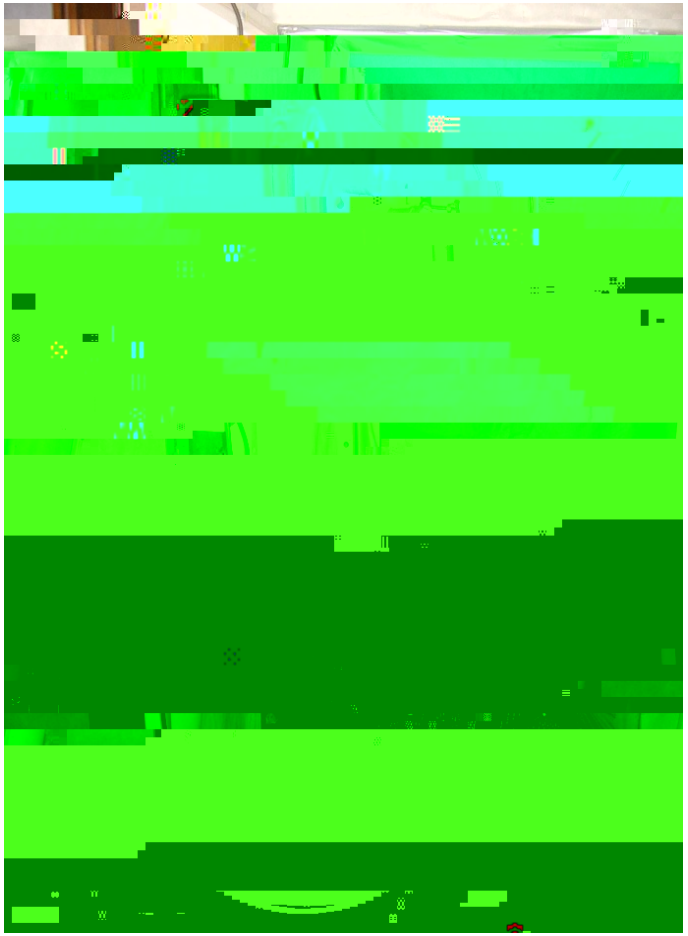
Introduction

The UK Building Regulations now require minimum standards of air-tightness to be achieved in newly constructed buildings and dwellings, proven by competent air- tightness testing.

Testing of older buildings useful to identify air leakage paths particularly when combined with thermal imaging.



Introduction

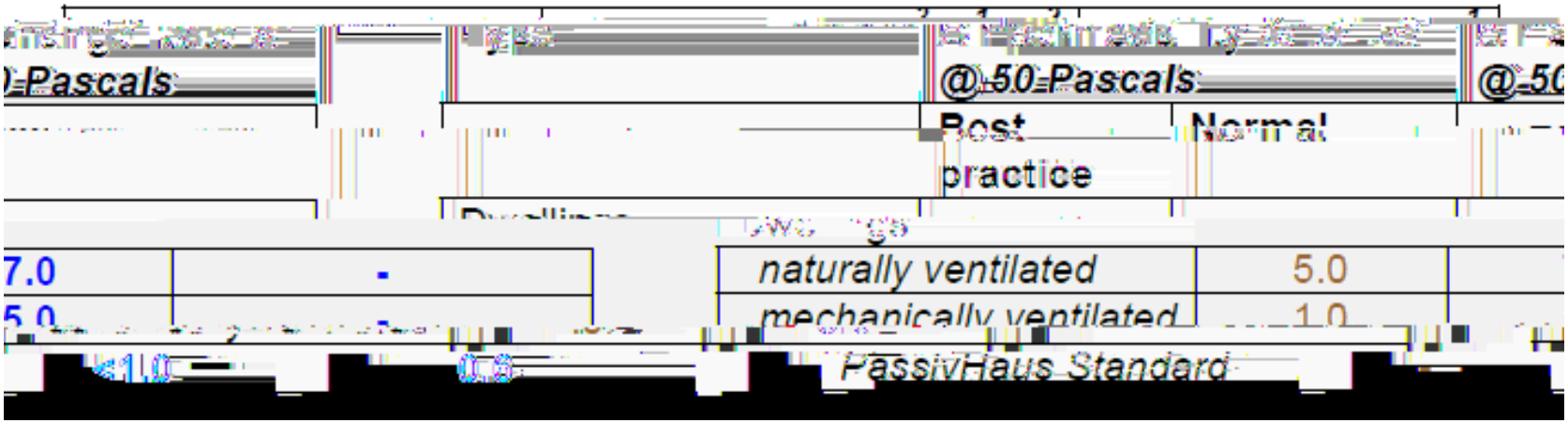
For new dwellings, as defined in Building Regulations Approved Document L1A 2010 (England and Wales), Technical Booklet Part F1 (Northern Ireland), and Section 6 of the Domestic Handbook (Scotland) advises that pressure tests should be carried out on a representative sample of dwellings.

The general requirement is for the dwellings to be tested to comply with a maximum air permeability of 10 $m^3.h^{-1}.m^{-2}$ at a reference pressure differential of 50 Pascals.

However, in order to comply with the carbon emission target, lower air permeability may be required by the Building Regulations and dwellings tested for compliance accordingly.

Introduction

The following table provides current normal and best practice airtightness criteria for different dwelling types:



Air Leakage vs. Ventilation

Air leakage is the uncontrolled flow of air through gaps and cracks in the fabric of a building (sometimes referred to as infiltration or draughts). This is not to be confused with ventilation, which is the controlled flow of air into and out of the building through purpose built ventilators that is required for the comfort and safety of the occupants.

Too much air leakage leads to unnecessary heat loss and discomfort to the occupants from cold draughts.

The increasing need for higher energy efficiency in buildings and the need in future to demonstrate compliance with more stringent Building Regulations targets means that airtightness has become a major performance issue.

The aim should be to 'Build tight – ventilate right'.

ATTMA TECHNICAL STANDARD L1. 2010

Introduction

ATTMA's Technical Standards and BS EN:13829 (2001) describe how to carry out air pressure testing of buildings and the analysis required to determine the air permeability.

ATTMA (The Air Tightness Testing and Measurement Association) is a professional association dedicated to promoting technical excellence and commercial effectiveness in all air tightness testing and air leakage measurement applications.

- See http://www.attma.org/about -air-testing/
- BS EN:13829 (2001) 'Thermal Performance of Buildings - Determination of air permeability of buildings - Fan pressurisation method'

Preparation before testing

Close outside doors and windows.

Open all interior doors leading to conditioned spaces.

Turn gas appliances off or on pilot light.

Shut off and temporarily seal (as appropriate) HVAC, combustion appliances, exhaust fans, dryers, A/C, passive ventilators.

Check external wind speed.

Blower Door

A device known as a ‘blower door’ is used for measuring the airtightness of buildings.

It includes a calibrated fan, some means of controlling air flow rate, and instrumentation for measuring pressures, fitted within an adjustable frame with a flexible covering impermeable to air, that can be clamped and sealed to the frame of an external doorway.

By adjusting the fan speed the air flow rate (m^3/h) is measured for a range of pressure differences, measured using a manometer over the range 10 -50+ Pa at approximately 5Pa intervals.

For the best results, measurements should be carried out under calm conditions, with wind speed less than about 2m/s.

Pressurisation and depressurisation tests can be carried out, as differences may occur due to air leakage paths opening or closing under positive or negative pressure.

Analysis

A power law fit is applied:

$$Q = a \times \Delta P^{c}$$

where Q is the volume air flow rate (m^3/h), ΔP is the pressure difference (Pa), and ***a*** and ***c*** are constants.

The correlation coefficient, R^2, which shows the goodness of fit, is usually expected to be better than 0.99.

GCU’s blower door kit

Retrotec 1000