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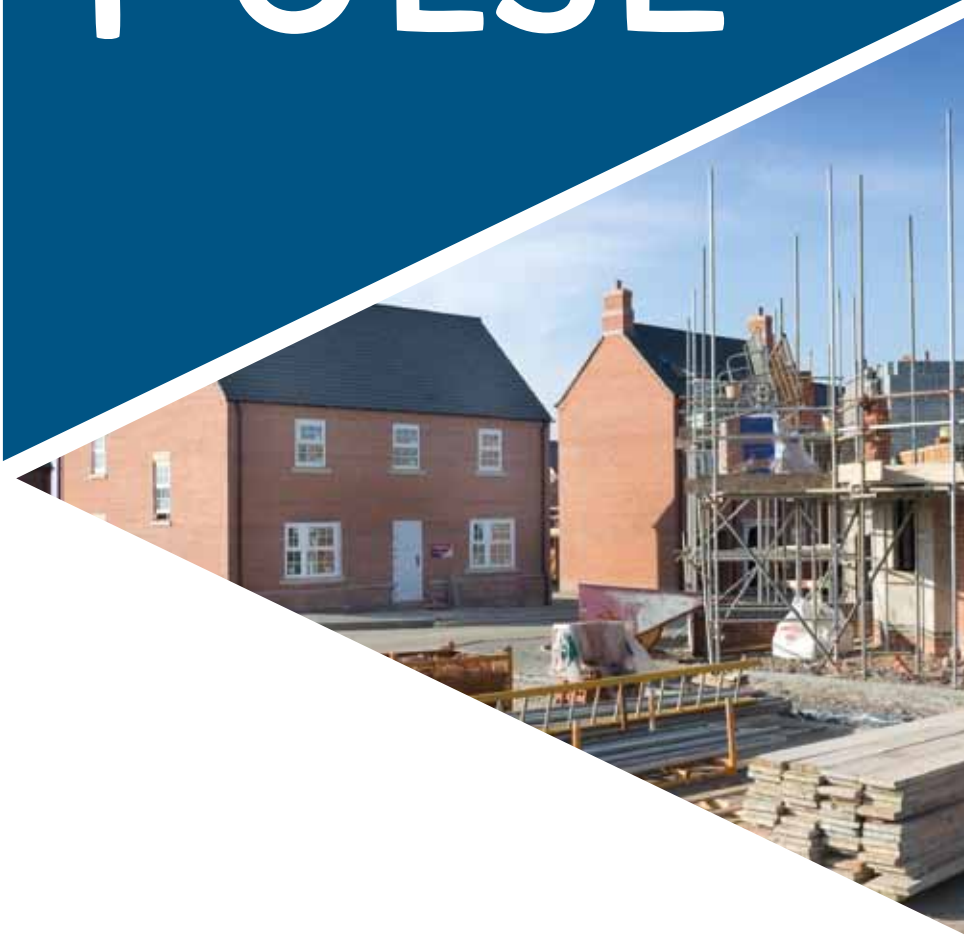
PULSE



BUILD TEST SOLUTIONS

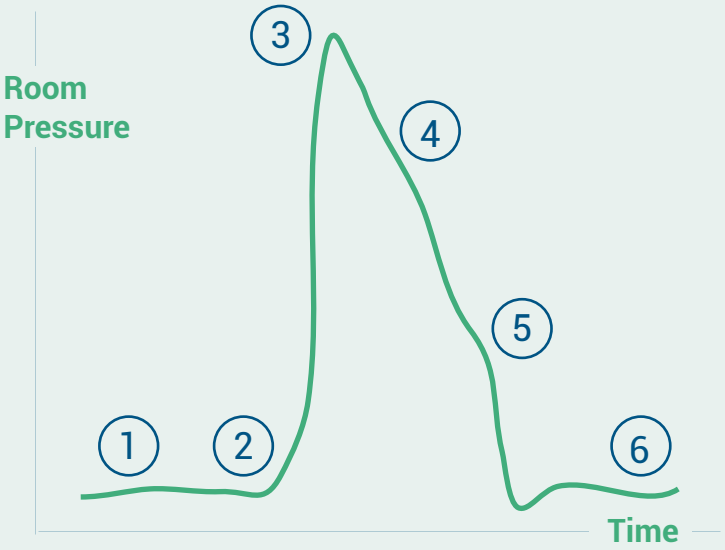
Pulse

The Pulse technique is a compressed air based system which is used to release a measured amount of air from an air receiver into a building. This generates a flow rate through the gaps and cracks in the building façade. The change of internal pressure of the building due to this flow is seen as a pulse and its representation is characteristic of the building's leakage at low pressure.

The pulse method measures the building leakage at various (low) pressure levels in a dynamic manner, rather than taking an individual steady state reading as with the blower door method. However, the results can be plotted and read in the same way as is currently done by industry. The advantage of taking measurements in a dynamic way is that the duration of the measurement phase of the test can be implemented in 11-20 seconds and makes the test less susceptible to wind disruption, especially as no external pressure tappings or envelope penetrations are required for the test to run.

With no external pressure reference required, the method negates the effects of wind and buoyancy at low pressures, reduces inertia effects associated with unsteady flow and minimises variation of the pressure difference during the test period such that no abnormal pressurisation or depressurisation loads are exerted on the building.

A diagram to show how Pulse data is analysed



1. Pre-test- Background pressure is measured. This is used as a baseline and for wind adjustment.

2. Valve opens- The tank begins releasing air. The rate of release is measured.

3. Pressure peak- The pressure increases quickly and typically peaks at 10Pa.

4. Quasi-steady flow- The air flow through the fabric is greater than the air flow from the tank. The pressure drops in a constant, 'steady' manor. This 'quasi-steady' period is used to calculate the air leakage through the fabric.The calculation compares the amount of air released by Pulse with the pressure in the room during the 'quasi-steady' period to calculate air permeability.

5. Valve closes- Measurement stops and the test is complete. Pressure returns to normal through leakage.

6. Post-test- Background pressure is measured again for a baseline and wind adjustment.

Key Features

Quick
The test itself takes less than 20 seconds for 3 air releases, with charging of the vessel between tests taking approximately 10 minutes depending on the compressor used. At the same time, the tester can measure the building dimensions, prepare the building and ensure the correct system set-up.

Low disruption
Occupants may remain in the building for the duration of the testing but may not open doors or windows. The test does not penetrate the envelope and will not change the temperature of the building.

Simple to operate
The Pulse unit is simply wheeled and placed into the centre of a building and can be operated using single button operation.

Why measure at low pressure?

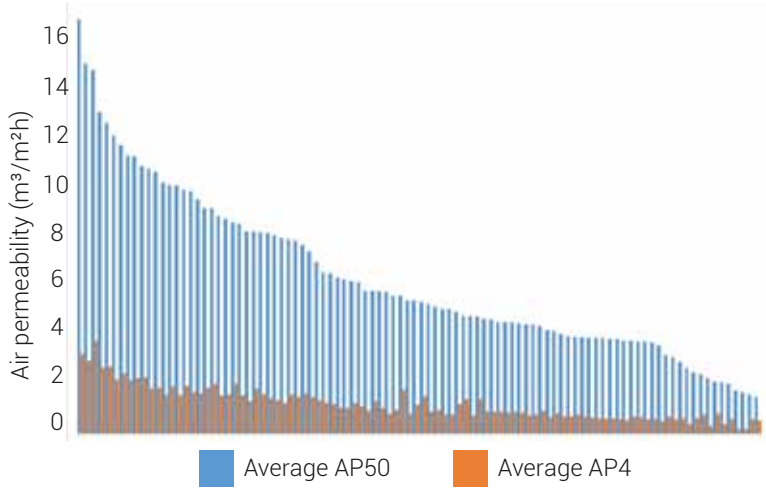
Crucially, a 4Pa reference pressure is generally considered the typical pressure differential across a building envelope over the course of the seasons (i.e. representative whole year average). It is the pressure used as an infiltration reference in the ASHRAE Handbook of Fundamentals, ASTM E741 and within the building codes used in France and Switzerland. In the UK, CIBSE TM53 also cites that calculation of effective leakage areas cited at a reference pressure between 4 Pa and 10 Pa is more representative of normal weather-induced conditions. It is this low pressure differential field of measurement where Pulse is most truly unique and innovative. Whilst the blower door fan method is a useful stress test of the fabric and able to be used for leakage path diagnostics, the motive behind introducing the Pulse test is in seeking to more accurately measure, understand and act upon the true air leakage characteristics of buildings.

Applications

Pulse can measure leakage without temporary sealing in place. It is possible to utilise Pulse to measure intended ventilation directly, allowing for much better measurement of ventilation rates in buildings. Ensuring appropriate ventilation rates are met will improve the indoor air quality in homes and reduce the risk of mould condensation and other contributors to an unhealthy living environment. Pulse is able to test at 4Pa which, as stated previously, equates to measuring air leakage at average ambient conditions.

This improves the accuracy of any energy calculation involving the airtightness of the property, such as in SAP, thus improving the accuracy of EPC's, building control requirements and circles back to informing the future design of buildings. Pulse can be used in clean rooms and other environmentally controlled environments. Clean rooms often need to be airtight to protect the perfect test conditions required by many industries from medical research to precision engineering. Traditional testing would require the facility to stop operation during testing which can be costly. A Pulse unit would be capable of periodically measuring the airtightness in the room providing accurate and regular updates while the facility remains operational.

Field trial



A large, representative sample comprising 108 homes was tested with Pulse and the blower door fan technique. This was comprised of a wide range of new build and existing homes of varying degrees of performance, form and size with testing carried out in a variety of environmental conditions throughout 2018.The field trial shows Pulse is a reliable and repeatable system with a 4.7% average difference between Pulse tests on the same property. Further, 97% of tests passed the r2 threshold check of >0.96, a key indicator of test quality. The field trial found a strong linear relationship between Pulse and the Blower Door test methods, allowing conversion between the two approaches. This allows testers using Pulse to integrate into the larger industry and use results @50Pa as required. A series of supporting third-party studies and reports were undertaken by the BRE and NPL and independently confirm the accuracy and validity of the Pulse technique.

Accurate and repeatable

The Pulse test is able to provide highly repeatable results at low pressures found in infiltration whilst the system also minimises the impact of changes in background pressure due to wind and buoyancy.

Low impact

The test process causes no change to the building fabric during testing and does not force leakage paths which would not otherwise be there in a typical as-inhabited state.

Manufacturing

The Pulse units are manufactured in the UK.

Large building tests

Multiple standard Pulse test units can be linked and used simultaneously in large buildings to achieve the required pressure rise with a uniform pressure distribution.

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Contact
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