

ACHIEVING AIR TIGHTNESS

INTRODUCTION

Air tightness testing was introduced into the England and Wales Building Regulations for buildings other than dwellings in 2002, but became a requirement for all new buildings in April 2006 with the introduction of the revised Approved Document L.

Performance is determined through a process of on-site testing. The test measures the amount air escaping through gaps, cracks, holes, etc. Buildings must demonstrate that they are not losing more than 10m³ of air every hour across every square metre of the envelope when pressurised to 50Pa. In general this should be a relatively attainable target, however lower figures may be required as part of the overall emission rate requirements for the building, for example to achieve particular credits under the Code for Sustainable Homes.

COMMON AIR LEAKAGE PATHS

There are certain fundamental principles which, if followed, will maximise the potential for an individual property to achieve the required levels of air tightness. Firstly it is important to understand where the common air leakage/infiltration paths occur:

Around penetrations through the air barrier

- Domestic doors and windows – good quality products, professionally installed should perform well, but we do see poor/defective products that do not close sufficiently to compress the weather seals. Problems also occur when thresholds are not fitted before the test is conducted.
- Trickle vents – are closed but not sealed during testing, so it is important they create a good seal and are not damaged, distorted or dirty.
- Loft hatches – many of the plastic hatches used for domestic applications may distort or be ill-fitting.
- Floor and wall junctions – gaps between the floor and skirting board in both solid and suspended floors can give rise to air leakage. Additionally suspended timber and pre-cast concrete floors can have large numbers of gaps both at junctions with external walls and service penetrations (see below).

Services

- Plumbing – heating, water and waste pipes may allow air to leak around them if not tightly sealed. Where the pipes run into boxing that leads into unconditioned spaces (such as the loft) an air path may be created through the building.
- Electrical fittings – sockets and light switches are unlikely, individually, to contribute a great deal to air leakage, but in combination their impact can add up so it is important to emphasise the importance of good workmanship behind them, especially on external/party walls. Down-lighters in ceilings below unventilated space such as lofts and floor voids can also present a problem, as can other electrical fittings and cables e.g. the fuse box.
- Ventilation – although the grilles of mechanical ventilation, extraction, air supply/exchange can be sealed during testing, it is important to ensure that they are well fitted and that where they run through voids or risers, air does not leak around them into these spaces and then find a path outside.

Structural members

- Where joists and beams penetrate the air barrier they will require careful sealing – this may be forgotten if they are 'hidden' above suspended ceilings. The use of joist hangers minimises the size of the penetration.

HOW TO MAXIMISE POTENTIAL FOR ACHIEVING GOOD RESULTS DURING AND AIR PRESSURE TEST

1. Consider the issues early: When a building is at concept stage, consideration should be given to air tightness. A complicated building shape with multiple levels, many corners, lots of external wall and awkward junctions will require much greater care to achieve air tightness than a rectangular one with few openings.
2. Define the air barrier: It is important to define the 'air barrier' at an early stage in the process, identifying where it is most appropriate/practicable/cost effective to create the barrier between the internal spaces and the outside or unheated spaces (e.g. plant rooms, garages, lofts, etc). This will usually be an existing element of the design such as the plaster finish, block work, cladding, fire sealing or vapour membrane.
3. Check for continuity: Ensure that existing details do not adversely affect air permeability performance. Careful detailing may be required at the junction of building elements and where different materials meet.
4. Specification of materials and products: It sounds obvious but it is important that the materials that make up the air barrier are impermeable to air i.e. a skim of plaster is preferable to taped and jointed plasterboard, but either will give a reasonable level of air tightness across its surface, with the proper attention to detail. However, other materials may be permeable for example:
 - Mineral wool - continuous insulation does not guarantee air tightness.
 - Block work - may be permeable depending on its density.
 - Suspended ceilings

Also check with the manufacturers for test evidence and/or technical specifications relating to air tightness for products that interrupt the air barrier e.g. loft hatches, smoke vents, doors, windows, etc.

5. Site Control: The main contractor will oversee the construction of the building fabric and must co-ordinate the work of their own staff and sub-contractors to ensure key details are followed. Communication is vital - if plumbers, electricians, etc are not aware of the air barrier, they cannot maintain it. Timely inspection is also important where critical work may be hidden by panels, suspended ceilings, raised floors, boxing, etc.

CONCLUSION

As the construction industry becomes more familiar with air tightness detailing, regulations are likely to get tougher; the draft 2010 version of Approved Document L is likely to suggest a reduction from 10m³ to 5m³. However even with the current standards it is important to remember that failures are possible. Testing has to be done when the building is complete, which will mean costly and time-consuming remedial measures if the building fails. Additionally test results are fed back into the SAP calculation to produce the Energy Performance Certificate (EPC) test results can have a significant influence on the final energy rating achieved.

LABC New Home Warranties provide a full air pressure testing and advisory service. For more information contact a member of our customer services team at services@labcnhw.co.uk or call 0151 650 4308.

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