

Airtightness Testing Requirements

1.0 General Requirements

- 1.1 The main contractor is to note that the buildings airtightness is a key element of the low energy strategy applied in the design.
- 1.2 Care has to be taken by the main contractor to ensure that the building as constructed will achieve the level of air permeability required. The main elements providing protection against air infiltration (the air tightness barrier) are the buildings vapour barrier (plastered walls, composite roof panel, airtight rendered blockwork etc.) on the warm side of the wall and the roof constructions, the doors & windows and junctions/sealing between these elements. It is essential that there is a continuous seal between these elements and is not breached in any location.
- 1.3 If the integrity of the airtightness barrier is broken then it must be repaired. Particular care must be taken when constructing joints and junctions in the building envelope to ensure continuity of the airtightness barrier. Repairs using duct tape, Rockwool and expanding foam are not acceptable. Duct Tape, Rockwool and expanding foams are ineffective in maintaining a durable and airtight seal and shall not be used to maintain continuity of the air tightness barrier at junctions and between construction elements.
- 1.4 In addition to the airtightness barrier continuity care must be exercised at all envelope penetrations and junctions for windows doors, services, cables etc. applying appropriate sealing and draught barriers and sealing junctions between the airtightness layer and these elements.
- 1.5 All Site workers and subcontractors to be made aware: For the airtightness strategy to be successful it is vital that all site workers are aware of the importance of maintaining the integrity of the airtightness barrier. All subcontractors are to be briefed on the airtightness strategy and encouraged to report damage of the airtightness barrier on a "no fault" basis.
- 1.6 The main contractor shall take overall responsibility for maintaining continuity of the air tightness barrier. One member of the contractor's site team will be nominated to oversee all details of the airtightness barrier and to maintain quality control in reproducing the design details accurately.
- 1.7 The contractor shall seek clarification from the architect of any construction details junctions where the method of maintaining airtightness is not clear to him before construction of the elements takes place.

2.0 Co-ordination of Work

- 2.1 The main contractor shall ensure coordination of work between different work packages/specialist subcontractors in defining responsibility for sealing at junctions between different construction elements.
- 2.2 Areas critical in maintaining airtightness include but are not limited to;
 - At the roof eaves and gable end junctions
 - Wall to roof junction
 - Changes in level in the roof construction
 - Continuity at intermediate floor wall/floor junctions.
 - Junctions at changes in building geometry
 - Junctions between different envelop systems
 - At window/door wall junctions.
 - At service penetrations.

3.0 Air Tightness Performance

- 3.1 The building shall achieve an air permeability of (2.5m³/(hr.m)) at a test pressure of 50 Pa, when tested in accordance with the requirements BS EN 13829:2001 'Determination of air permeability of buildings, fan pressurisation method' and TS1 July 2007 'measuring air permeability of building envelopes'.
- 3.2 Airtightness Specialist - to be appointed by main contractor within one month after commencement of project.
- 3.3 The contractor shall appoint a building airtightness specialist approved by the Architect who shall be accredited by INAB (The Irish National Accreditation Board) to ISO 17025 as a testing laboratory for commercial & residential building airtightness testing. The specialist must demonstrate prior experience of works on projects of similar size and complexity. A copy of the airtightness testing specialist's INAB accredited schedule/certificate should be issued to the architect before the specialists are appointed.

4.0 Air Tightness Briefing Meeting

- 4.1 Under approval and appointment of the INAB accredited airtightness testing specialist by the main contractor, and at a very early stage in the building programme, the specialist shall hold a briefing meeting with the contractors staff and the design team. Prior to this meeting, the contractor shall identify any points in the buildings that have a high risk of air leakage and shall detail the testing procedure and work required in preparation for the test.

5.0 Site Inspections by Airtightness Specialist

- 5.1 The main contractor shall include for 4 no. site inspections at the building in their tender for the appointed airtightness specialist to visit & review the ongoing site construction works. The objective of the surveys are to review the ongoing site construction works relevant to the requirements for achieving building airtightness on each house. A visual survey of the airtight barrier, construction junctions and services penetrations etc., will be conducted by the airtightness specialist & any remedial works recommended by the airtightness specialist shall be carried out by the main contractor.
- 5.2 The site survey will begin with a meeting with a member of the main contractor's site supervisory staff to review construction progress and any general issues relating to airtightness.
- 5.3 A report will be issued detailing the findings of the survey and will include photographs/comments referenced to plans, elevation drawings and details as appropriate.
- 5.4 An A3 set of the latest architectural plans & elevations of the building and construction details will be required.
- 5.5 4 no. site visits are recommended at key stages of the project.
- 5.6 ALL REPORTS OF FINDINGS ARE TO BE ISSUED TO THE DESIGN TEAM FOR REVIEW WITHIN 2 DAYS OF SITE VISIT.

6.0 2 x Sample Room Test During Construction

- 6.1 Prototype tests of 2 x sample rooms on the external envelope, including typical construction junctions between different systems and elements are to be carried out to provide invaluable feedback to the project team before the whole building airtightness test. This is also to be carried out by the accredited airtightness testing specialists.

7.0 Airtightness Pre-test Inspection

- 7.1 The appointed airtightness specialist shall carry out a detailed pre-test inspection/snagging of the building approx. 2 weeks before the planned test date.

8.0 Whole Building INAB Accredited Airtightness Test

- 8.1 1 x preliminary site meeting with the approved accredited specialist at the start of the project to discuss airtightness detailing, approach, programme & testing schedule. Detailed envelope area calculation to be done for the building & issued to the design team before test date. 1 x pre-test site inspection of the building by the accredited airtightness testing company 2 - 3 weeks prior to the final test date to ensure that the building is properly prepared for the test.
- 8.2 Carry out 2 x accredited airtightness tests to ISO 17025 followed by 1 no. smoke test should the specification not be reached. All further airtightness tests and smoke tests required to bring the building up to the required airtightness to be at the contractor's expense.

9.0 Whole Building Thermographic Survey

- 9.1 The contractor is responsible for carrying out a thermographic survey of the completed building. The building thermography should be carried out by an individual certified as a Civil Thermographer at Level 2 or 3 under the PCN scheme (ISO 18436), and should carry out the duties permitted under ISO 18436. The thermographic equipment should be within calibration and calibration records should be issued as part of the final report.
- 9.2 The thermographic survey should be in accordance with the BS EN 13187.
- 9.3 The thermographic survey should investigate the following areas:-
- Thermal bridging of building components.
 - Potential water ingress into the building & building elements.
 - Potential air leakage & heat loss investigation.
 - Potential insulation defects within glazing systems.
 - Continuity of the insulation throughout the building.
- 9.4 It may be the case that if the building is complete in the summer months that the thermographic survey is done between the months of "November" to "February" to ensure environmental conditions are reached.
- 9.5 If possible the thermographic survey should be carried out before the final airtightness test. This will only be the case depending on environmental conditions.

10.0 Airtightness Testing Preparation

- 10.1 The building shall be subject to an airtightness test at a point in the construction programme when all elements of the external envelope/airtightness barrier are complete including all penetrations, but before internal finishes have been applied in order that remedial works can be carried if necessary with minimal disruption. The test must be completed at least 3 weeks before practical completion.
- 10.2 A detailed testing method statement shall be provided to the architect a minimum of one month before the proposed test date.
- 10.3 The building shall be pressure tested to ensure compliance with the airtightness specification. The test shall be carried out by an INAB accredited airtightness testing specialist in accordance with the following:-
- CIBSE TM 232001
 - BS EN 13829 2000
 - TS1 2007
- 10.4 In the event that the specified level of air leakage is not achieved then the contractor shall carry out a whole building leak audits and further tests at the contractors expense shall be carried out until the specified values are achieved.

11.0 Main Contractor Attendances

- 11.1 The contractor shall include for all necessary attendances during the test at the building which will typically include the following;
- 11.2 All external windows, trickle vents, smoke vents and doors must be closed.
- 11.3 All internal doors must be wedged open.
- 11.4 All drainage traps must be filled with water. If traps have not been fitted then drainage pipes must be sealed with tape.
- 11.5 All mechanical ventilation systems must be shut down and intake/exhaust louvres sealed with tape/solid sheeting/corriboard. This is most effectively achieved by sealing the intake and exhaust louvres for each fan or system.
- 11.6 Any combustion appliances within the airtight building envelope should be turned off and their flues sealed.
- 11.7 The ground floor internal and external area within 5m of the fan equipment/doorway must be level, clean and clear of all loose material. Vehicular access is required to within 3.0m of entrance doorway.
- 11.8 The contractor must ensure that no external doors/windows/trickle vents are opened for the duration of the test.
- 11.9 Some temporary minor carpentry works may be required to the doorway in which the fan equipment is mounted to accommodate the fan equipment.
- 11.10 Notices must be posted at all entry and exit points to the building "Airtightness test in progress do not open".
- 11.12 The contractor will be required to provide 3 no. 32amp 110volt power sockets in the region of the doorways being used to mount the equipment, each fed from a separate transformer box.