

Why the need for a frame protection system to be installed over timber or steel framing...

Governments all over the world are looking at minimising the effects on Climate Change and improving sustainability within the building industry. One of those options includes the improvement of energy efficiency – especially for the manufacture and use of residential buildings. Improving airtightness has a significant effect on energy efficiency and is so to speak, low hanging fruit for authorities to encourage.

The International Standards organisation, ISO, has already set out ‘Sustainable Development Goals’ as guidance for all Governments and Authorities to achieve a more sustainable planet.

<https://www.iso.org/sdgs.html>

Affordable and clean energy is one of the top priorities.

The Technical Committee responsible for International Classification 91.120 Construction Materials and Building has developed a Classification 91.120.10 Protection Of and In Buildings, which includes the Standard “ISO 9972:2015 Thermal Performance of Buildings — Determination of Air Permeability of Buildings — Fan Pressurization Method”. Clearly, the need for air tightness of buildings is directly related to energy efficiency. Some research indicates that some houses need up to 20 times more heating than an airtight one!

For these reasons, the design and construction of the building envelope of houses, needs to ensure air tightness to achieve high performing energy efficient houses.

A wind-tight and water-tight “frame protection system” is one way of achieving high performing energy efficient houses. In fact, it could be argued that not having an airtight envelope will never allow for energy efficiency!

The Architectural Science Association at its 40 conference, reported in a paper titled ‘REDUCING AIR INFILTRATION THROUGH IMPROVED WRAPPING’, that “The movement of air through leaks, cracks, or other openings of a building’s external envelope significantly affect its thermal performance. Franklin Associates (2000) report that the U.S. DOE has determined that about one-half of all energy used in heating and cooling homes results from air infiltration from the outside of a house to the inside. The Australian Greenhouse Office’s (AGO) Passive Design 1.4 brochure (2005), states that air leakage accounts for 15 to 25 percent of winter heat loss in Australian buildings. It recommends a range of actions to reduce this leakage including weather stripping doors and windows and sealing gaps between the window/door frame and the wall prior to fitting architraves. With the increasing adoption of performance testing for doors and windows, the performance of these openings is likely to be improving. However, there is probably considerable scope to improve the thermal performance of Australian light weight timber framed buildings by wrapping the building more effectively and sealing around any openings.”

Based on the above, it is clear that what is required, is for either an airtight flexible or rigid air barriers to be installed, over the timber or light gauge steel framing. A 'flexible air barrier' uses underlays or building wraps as opposed to 'rigid air barriers' which use stiff sheet materials, such as plywood or fibre-cement sheets. Under the current Acceptable Solution E2/AS1, the installation of a building wrap requires no thought about airtightness and its effect on energy efficiency. Interestingly, The Building Code under clause H1 states:

Performance

H1.3.1 The building envelope enclosing spaces where the temperature or humidity (or both) are modified must be constructed to—

- (a) provide adequate thermal resistance; and
- (b) limit uncontrollable airflow.

Airtight barriers provide conformance with both the requirements of clause E2.3.2 covering weathertightness and clause H1.3.1 covering energy efficiency requirements.

To be effective, a system for the protection of framing will include (at least) the following components, each complying with a relevant performance requirement of the New Zealand Building Code:

1. A water-resistant, vapour permeable, flexible, tear resistant, moisture wick-resistant 'Underlay' – also known as 'wall wrap' or 'building wrap';
2. Strongly adhering and durable 'Seam Tape' – for the prevention of the passage of both wind and moisture through overlaps and perimeter of the Underlay;
3. Nail and or screw puncture resistant, flexible and strongly adhering 'Flashing Tape' (where required) – designed for waterproofing around openings such as windows, doors and meter boxes
4. Durable, strongly self-adhering 'Pipe Penetration Gaskets' (also called "Boots") – for sealing between round pipes and similar penetrations of various diameters and the underlay;
5. Durable, strongly self-adhering 'Double Sided Tape' or, Durable, strongly self-adhering 'Single Sided Tape' – for sealing between the underside of the bottom edge of the Underlay overlapping the concrete foundation, and the concrete foundation, to prevent the passage of wind;
6. Durable fixings that when applied, prevent the tearing of the Underlay (and increasing the fixing penetration holes) when subject to exposure to the weather for the stated time before which the system is to be over-clad.

A system may have additional components.

The installation of the frame protection system is typically by the builder, representing the owner, prior to the installation of any battens and cladding system.

To achieve the performance of the frame protection system over time, it is essential that the designers or the building owner ensures the manufacturer's site checklist is completed.

As can be seen from the foregoing, a frame protection is not only a means for demonstrating compliance with the New Zealand Building Code, but is essential in providing the energy efficiency for buildings which is our country's aim for reducing emissions and therefore making a significant contribution to minimising climate change.
