RETROFITTING DOUBLE GLAZING

There are different options for retrofitting insulated glazing units (IGUs) into existing homes. Some can be problematic, as found recently during the Beacon Papakowhai NOW Home® Renovation Project.

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Before the year 2000, single glazing was the normal practice for homes in New Zealand, and traditional timber joinery was built to accept 4 mm glass. But single glazing doesn't have good thermal performance and can contribute to high heating bills, moisture problems and uncomfortable living environments.

Double glazing units (or IGUs) have better thermal performance, and the recent changes to the Building Code Clause H1 *Energy efficiency* recognise this for new houses. However, retrofitting IGUs can also improve the living environments in existing homes.

Options to retrofit IGUs

IGUs require two panes of glass with an airspace of at least 12 mm between them, so are typically a minimum thickness of 20 mm. Another option is filling the space with Argon gas, which can allow the interpane gap to be reduced from 12 to 8 mm. However, standard timber joinery sashes do not have a wide enough rebate (10 mm) to accept IGUs, and neither may older aluminium windows.

There are methods available to retrofit timber and older aluminium joinery with a space large enough to accept IGUs. These include:

- complete replacement of the window
- replacement of the glazing only
- replacement of the sashes only
- installation of an adapter system to allow aluminium or timber joinery to accept IGUs
- re-machining timber joinery to accept IGUs.

There are also a number of technologies that allow the insertion of a second pane of glass or plastics material on the inside (or the outside) of an existing pane. These can be mechanically, adhesively or magnetically attached to provide most of the benefits of IGUs, but they cannot completely prevent moisture getting between the panes.

A large replacement window with IGUs being installed into an existing house.

Papakowhai window retrofits

The Beacon Papakowhai NOW Home® Renovation Project included retrofitting nine houses to improve sustainability (see pages 34–35). Upgrading the windows was one part of the retrofit. Each of the nine houses had different window sections, and it was not easy to determine which window thermal improvements would work for each house.

In two of the houses, the original timber windows had been replaced with single-glazed aluminium-framed windows within the last decade. These frames had a wide enough glazing space to accept double glazing, and replacing the single glass with IGUs took little time and caused minimal disruption.

Two other houses (where the frames were in need of replacement) had their entire windows removed and replaced with new aluminium frames with IGUs. An occupant in one house was an experienced double glazing installer and installed his own windows quickly. For the other house, the expense and number of issues faced went well beyond expectations.

Consent issue or not?

Advice on requirements for building consent differed between the window installers and the building consent authorities. Installers generally considered the replacement of window frames as 'like for like' and 'a maintenance issue' rather

than a building and structural modification issue. The building consent authority considered the replacement of windows to be a modification to the exterior envelope of the house and therefore required consent for at least weathertightness reasons. BRANZ also recommends obtaining a building consent in these situations.

These differing views resulted in various delays. For example, the withdrawal of consent, possibly due to requirements to follow E2/AS1, the non-acceptance of installation (twice), the need to develop new details (twice), the use of three construction crews, and eventually a 4-month construction period.

Installation problems

Installing large, heavy IGUs with standard aluminium window joinery into framing timbers that may not be straight and level became an issue. Work was required to make the openings suitable for new, square windows, since insufficient fitting tolerance had been allowed for the additional packing needed.

The potential exists for wind suction to remove large windows from building faces that have inadequate fixing to connect the aluminium joinery to the timber reveal. The joinery, in turn, relies on nail fixings between the timber reveals and the framing. Where E2/AS1 details with a cavity are used, the window frame is cantilevered out from the structure, and considerable torsion is placed onto the frame. Often not considered is the durability of steel staples in sea spray zones.

In the case of construction in areas where the wind pressure requires specific engineering design, an engineer must be involved. But it is unclear whether the connection of the window reveal to the aluminium frame is within their role.

In this project, the use of non-rebated reveals would have improved matters considerably. Typically, the 18 mm thick timber reveals around aluminium windows have a groove in them that accepts the wall linings to allow rapid and easy finishing around the window without the need for architraves (Slimline). But it means that the internal linings are damaged if the windows are removed.

A better solution for this renovation would have been to cut the lining around the window reveal to allow removal without disturbing the interior wall linings and then finishing the installation with architraves covering the joint between window reveal and lining.

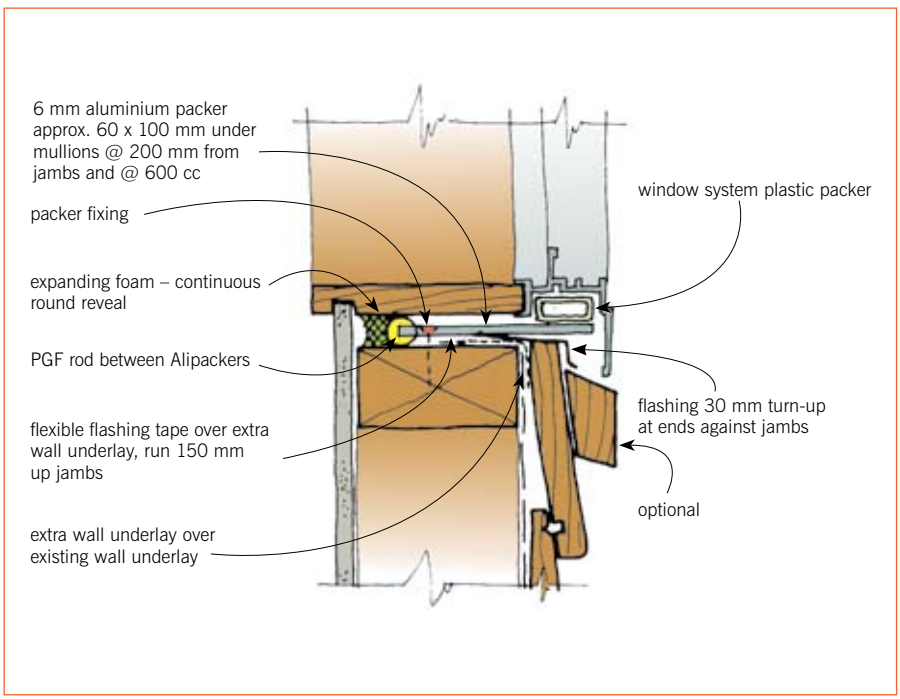
Installing replacement glazing into an existing window frame was quick and caused little disruption.

Guidelines needed

As the replacement window industry develops in New Zealand, additional guidelines will be needed to cover the different structural issues surrounding the use of large IGUs as replacements for single glazing (particularly where cladding is fixed over a cavity), the fixing of reveals to window frames with steel staples and the retention of these heavy windows in wall framing.

Despite the difficulties in some cases, the Beacon Papakowhai NOW Home® Renovation Project found that the replacement of the single glazing with IGUs in aluminium existing frames is a viable option. The results of the performance of the IGUs will be available early in 2009.

More information on retrofitting IGUs can be found in Build 100 June/July 2007, see pages 30–31.



Sill detail designed for one of these retrofit installations.