

Building work repairs and replacements – H1 compliance

This guide is intended to help designers, builders and building consent authorities reach a common understanding of which building work is required to comply with the Building Code Clause H1 Energy efficiency, and what is needed to comply with clause H1 when an existing building is repaired or altered.

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Of interest to Building consent authorities, Builders, Designers

Thermal resistance of repaired or replaced building elements

You need to use common sense when determining the thermal resistance that is required for repaired or replaced building elements. This is because Clause H1 of the Building Code does not specify the thermal resistance for each element and the acceptable solution is designed primarily for new buildings.

The size and extent of the building envelope that is repaired or replaced will influence how closely the repair/replacement should match the R-values specified for new buildings in H1/AS1.

Repairs or replacement of a small part of the building envelope should simply ensure the overall thermal resistance of a building is not diminished.

For example, if an old wood-framed window is replaced, you can use any of the following:

1. A new wood-framed window of the same size ('like-for-like' replacement - the material is the same, therefore the thermal resistance is the same).
2. A new PVC-framed window of the same size (PVC windows have the same thermal resistance as wooden windows).
3. A new aluminium framed window of the same size, plus additional insulation added elsewhere (roof, wall or floor) to offset the lower thermal resistance of the new window. (The thermal resistance of a single-glazed aluminium window is R0.15, as compared to a single glazed wooden window, R0.19).
4. A double-glazed aluminium framed window of the same size (this will exceed the thermal resistance of the original window).

Repairs or replacements of large parts of the building envelope are similar in effect to additions and extensions, and compliance with clause H1 should be approached in a similar fashion (you can find details in [additions and extensions \(https://www.building.govt.nz/#jumpto-additions-and-extensions\)](https://www.building.govt.nz/#jumpto-additions-and-extensions)).

Repairs or replacements that reduce the thermal performance

Provided it has a minimal effect, repaired or replaced building elements that do not strictly meet the energy efficiency performance of the old building element may be acceptable.

Slightly less performance might be accepted when:

- there is limited availability of an 'identical' replacement (such as standard sizes/dimensions may have changed slightly since the original element was

constructed)

- other considerations such as the use of second-hand parts have slightly different sizes/properties.

When considering the compliance of the thermal envelope with Clause H1, the requirement 'to limit uncontrollable airflow' is also relevant.

The overall energy efficiency of the building envelope may be the same after the repair or replacement if a decrease in thermal resistance is offset by an increase in air-tightness.

A reasonable rule-of-thumb is to allow alterations and repairs that:

1. are less than two percent of the total area of the thermal envelope
2. perform no less than 20 percent below that of the original building element.

For example, an old single-glazed wooden window may be replaced with a single-glazed aluminium window if the area of the window is less than two percent of the area of the thermal envelope of the building.

The thermal resistance of the single-glazed aluminium window is R0.15, which is 20 percent less than the thermal resistance of the single-glazed wooden window, R0.19. In a typical house, this would equate to reducing the total thermal resistance by less than one percent.

It is highly unlikely that the cost of installing insulation elsewhere in the building would be less than the small increase in the cumulative energy costs. Any increase in air-tightness would also help to counter the loss in thermal resistance.

Additions and extensions

Additions or extensions to a house involve both new construction and the alteration of an existing building. The new construction could be as small as cutting a window into an existing wall, or could be as large as adding a whole new storey to an existing building

The new construction, must meet the requirements of Clause H1, but the rest of the building does not have to be upgraded to comply with H1. The altered building must comply with Clause H1 to at least the same extent as it did before the alteration. In other words, the overall energy efficiency of the building cannot be made worse by the alteration.

A simple way to comply with H1 is to comply with the Acceptable Solution. If any of the proposed construction R-values are lower than those required in the acceptable solution, or the other requirements are not all met, you can use the calculation or modelling method to evaluate options and to come up with a design that will comply.

The only time existing parts of a building would need upgrading is if the building performs less energy efficiently because of the addition or extension. However, any required upgrade is not to the level set in Clause H1, but to bring the building back to the level of thermal performance it enjoyed before the addition or extension.

You can find two examples below of extensions to an existing house where upgrading is and is not required.

Example - extensions with no upgrade

If a new room is added to the side of an existing house, then the extension (the floor, roof, walls and windows) will need to comply with Clause H1.

The untouched existing parts of the house will have the same performance (thermal resistance) after the alteration as they did before.

Once completed, the thermal resistance of the altered house will be at least as good as it was before the alteration (it might be better, given the extension complies with H1), therefore no upgrading is required.

Any parts of the house that previously formed the thermal envelope, but are now enclosed by the alteration (such as the side of a house onto which an extension is built), are no longer part of the thermal envelope.

If the Schedule method (contained in NZS 4218:2004) is used to show compliance with clause H1 then the glazing ratio should be calculated using the wall and glazing areas of the altered building, not just the extension.

Example - extension where upgrade is required

If you are inserting a double-glazed aluminium window (R0.26) into an existing wall (R0.5-R2.0), then the window itself will comply with H1/AS1, but the thermal resistance of the building envelope will be reduced.

In this case, you will need to upgrade some of the existing building to ensure the building performs at least as well as it did before the alteration.

You will need to add sufficient insulation elsewhere in the thermal envelope to offset the loss in thermal resistance at the new window.

Garages and conservatories

New garages or conservatories that are attached to a house and sit within the thermal envelope must comply with H1. This includes conservatories that are openly connected to the interior of the house or which are actively heated or cooled.

Attached garages or conservatories that are unconditioned (for example, not heated or cooled) and are outside the building thermal envelope do not need to comply with H1.

In these circumstances, any walls, windows or doors that sit between the garage or conservatory and the interior of the house will need to be appropriately insulated as they will form part of the thermal envelope.

All guidance related to H1 Energy efficiency(<https://www.building.govt.nz/building-code-compliance/h-energy-efficiency/h1-energy-efficiency/>)



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