Industry Best Practice Guide
for

Full Replacement Windows

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window & glass association nz

wganz.org.nz

INDUSTRY BEST PRACTICE GUIDE TO FULL REPLACEMENT WINDOWS

Contents

1.0 Introduction

Full Replacement Windows are new windows installed into either existing or modified window openings of a home. This involves removing the existing windows and installing new aluminium, thermally broken aluminium, or uPVC frames*. The new frames should be double glazed, providing an improvement to the thermal performance of the building envelope.

*This guide does not cover the installation of replacement timber joinery.

This Industry Best Practice (IBP) for Full Replacement Windows is published by the Window & Glass Association NZ (the Association) and is intended to provide,

a) an understanding of the process involved,
b) assistance in establishing in the project,
c) setting customer expectation,
d) guidance in the regulatory requirements,
e) installation detail examples.

1.1 Disclaimer

The information contained in this IBP has been prepared by the Window and Glass Technical Committees of the Association and sourced from within its membership. The Window & Glass Association NZ makes no warranties or representations of any kind (express or implied) regarding the accuracy, adequacy, currency or completeness of the information.

Compliance with this IBP does not guarantee protection from infringement of any regulatory requirements, the New Zealand Building Code or relevant Standards. The final responsibility for the correct design and specification rests with the designers, suppliers, and/or installers of the retro-fitted glazing.

1.2 Scope

This Industry Best Practice provides requirements, information and guidance, to homeowners, designers, suppliers, and/or installers of replacement windows, in New Zealand.

The scope of this document includes the installation of full replacement frames, into existing homes and has been written based on agreed best trade practices used by the Associations members over many years.

The environment and wind categories vary throughout New Zealand and must be taken into account when establishing the requirements for each and every project to ensure compliance with the relevant clauses of the New Zealand Building Code.

1.3 Standards and Related Documents

The following Standards and Related Documents apply to the installation of full replacement windows.

NZBC Clause B1	Structure
NZBC Clause B2	Durability
NZBC Clause D1	Access Routes
NZBC Clause E2	External Moisture
NZBC Clause E3	Internal Moisture
NZBC Clause F2	Hazardous Building Materials
NZBC Clause F4	Safety from Falling
NZBC Clause G4	Ventilation
NZBC Clause G7	Natural Light
NZBC Clause H1	Energy Efficiency
NZS 3604:2011	Timber Framed Buildings
AS/NZS 1170.2:2011	Structural design action – Wind actions
NZS 4211:2008	Specification for performance of windows
NZS 4223.1:2008	Glazing in buildings – Glass selection and glazing
NZS 4223.2:2016	Glazing in buildings – Insulating glass units
NZS 4223.3:2016	Glazing in buildings – Human impact safety requirements
NZS 4223.4:2008	Glazing in buildings – Wind, dead, snow, and live actions

Window & Glass Association	Guide to the Glazing of IGU's
Window & Glass Association	Industry Standard for Glazing Blocks - WG45102.14:2023
MBIE	Guide to tolerances, building materials and workmanship.

Whilst this IBP might make reference to the Documents, Standards, and Building Code Clauses noted above, or parts thereof, the Association does not claim the contents of this IBP constitutes compliance with them.

2.0 Definitions

For the purposes of this guide the following definitions apply.

Durability	The New Zealand Building Code requires that products to be sufficiently durable, with normal maintenance, to ensure the building continues to satisfy the functional requirements of the Code throughout its specified intended life. Building products must meet minimum durability periods of 5, 15, or 50 years, depending on the product and how it is used.
FFL	Finished Floor Level. The surface on which people normally tread within the rooms of a building.
Glazing Block	The term applies to blocks placed between a glass pane and the frame, to position the glass in the frame and prevent direct contact between the two. Glazing Blocks include Setting Blocks, Location Blocks and Distance Pieces.
Guarantee	A guarantee is a promise of quality and durability with regular use.
Hardware	Hardware typically refers to the components that are used to operate, lock, or open your window or door.
IGU	Insulating Glass Unit – Two or more panes of glass spaced apart and factory hermetically sealed with dry air or specialty gas in the unit cavity. Use of two panes of glass is referred to as double glazing.
Full Replacement Frame	A window or door frame installed into existing opening in the building envelope.
Laminated Glass	A single pane of glass comprising a plastic interlayer sandwiched between two or more sheets of glass. If the glass breaks, the broken fragments adhere to the interlayer, to reduce the risk of injury.
Panel	The opening portion of a door.
Provisions	The objectives, functional requirements, and/or performance required to meet a particular Clause of the New Zealand Building Code.

R-value	The thermal resistance rating used to establish an element's ability to resist the transfer of heat. The higher the R-Value the better thermal resistance the product will provide.
Sash	The opening portion of a window.
Safety Glass	Glass designed to reduce the risk of injury if broken. Safety glass can be either toughened or laminated.
SLS	Abbreviation for Serviceability Limit State. In terms of wind pressure for windows and doors this refers to the pressure the unit might experience on a day to day basis.
Thermally Broken Frame	An aluminium frame that includes a strip of thermally improved material between the inner and outer surfaces of the frame to reduce the overall conductivity of the frame.
Tinted Glass	A pane of glass that has colourants added during its manufacturing process to change the basic properties of the glass. Most commonly in shades of bronze, grey, or green.
Toughened Glass	A pane of glass that is tempered through a heating and quenching process to increase its overall impact resistance. If broken, the pane is reduced to very small fragments.
U-value	The thermal transmittance rating used to establish an element's ability to allow the transfer of heat. As the U-value decreases, so does the amount of heat that is transferred through the glazing material. The lower the U-value, the better the insulation.
ULS	Abbreviation for Ultimate Limit State. In terms of wind pressure for windows and doors this refers to the pressure at which the unit will fail.
Warranty	A product warranty is a type of guarantee that includes an acceptance of liability, and defect correction. It is a formal, commercial agreement between a supplier and a customer, and provides a means to repair, replace, or compensate the customer, if the product fails to meet the terms set out in the warranty.

3.0 Principles

3.1 General Requirements

This section of the IBP is designed to assist in understanding the expectations and requirements of full replacement windows.
The Building Act includes for alterations to existing buildings and says that windows in existing buildings may be replaced, but to a performance level not less than that of the existing windows.
It is the Associations view that full replacement windows and doors, should be carried out to a level that best fits the building and is balanced with the customer's needs and budget. Frame and glazing options can and should be discussed to assist them in achieving their goals.

3.2 Building Consent

Does the installation of full replacement windows require a Building Consent?
In most cases, ***NO*** it will not. Schedule 1 of the Building Act 2004 provides an exemption from consent for some building work.
Section 8 of Schedule 1 refers to *windows and exterior doors in existing dwellings*. The provisions of this section can be applied to full replacement windows and confirms that the work will not require consent, provided the reason for replacing the windows is not a failure of the existing window or door to satisfy the provisions of *Clause B2 - Durability* of the Building Code.

If during the assessment of the works it is established that a window or door which was installed within the last 15 years has failed (e.g., it has rotted out), and requires replacement, this work ***will*** require a building consent, as it has failed to meet the durability requirements of the Building Code. This recognises that replacing a window or door that has failed its durability requirements could result in the replacement also failing.
The building must also be no more than two storeys in height.

Even though the work may not require a consent, Section 17 of the Building Act 2004, requires the work must comply with the Building Code.

17 All building work must comply with building code

All building work must comply with the building code to the extent required by this Act, whether or not a building consent is required in respect of that building work.

Compare: 1991 No 150 s 7(1)

3.3 Building Code

The Building Code sits under the Building Act 2004, which governs the building sector and sets out the rules for the construction, alteration, demolition and maintenance of new and existing buildings in New Zealand. It works alongside other legislation for health, safety, consumer protection and land use. As noted above in 3.2, all building work in New Zealand must comply with the Building Code, even if it doesn't require a building consent. This ensures buildings are safe, healthy and durable for everyone who may use them.

Full replacement windows fall within this narrative and must comply with the provisions of the Building Code, per Section 17 of the Building Act, such that upon completion of the works, the altered building must comply with the Building Code to at least the same extent as it did before the building work was undertaken.

There are several Clauses of the Building Code which apply, as follows.

3.3.1 Clause B1 - Structure

Section B1/AS1 refers to the *NZS 4211 Specification for the performance of windows* to ensure the replacement window frames are suitable for the site and situation they're being used in. Clause B1 only refers to structural performance, other sections of NZS 4211 are covered elsewhere. All windows must be labelled to indicate they have met the performance requirements of the wind zone in which they've been installed. Refer to 3.3.4.

Section B1/AS1 also refers to the *NZS 4223.3:2016 Glazing in buildings* suite of documents to ensure the glass is designed appropriately for the site and situation in which it is being used, including wind loads (from applicable wind zones), deflection, protection from falling, and human impact safety requirements.

A frame and glass combination of a lesser performance for strength, safety, or energy efficiency than that being replaced shall not be used.

3.3.2 Clause B2 - Durability

Table 1 from Clause B2 requires that window frames and glazing have a durability performance of not less than 15 years, i.e., they must, with normal maintenance, continue to satisfy the performance requirements of the Building Code for this period.

Table 1: Durability Requirements of Nominated Building Elements

Building Element	Component	Situation/Function	Not less than 50 years	Not less than 15 years	Not less than 5 years
Windows	Gaskets, glazing and glazing beads	Moderately difficult to access or replace		✓	
	Hardware				✓
	Frame and interior reveals	Structural units	✓		
		External window/door joinery		✓	
		Internal window joinery			✓

The 15 year durability requirement is based on building elements are,

i) moderately difficult to access or replace, where this might involve the removal or alteration of other building elements,

ii) failure of the building element to comply with the building code would go undetected during normal use of the building but would be detected during normal maintenance.

Paragraph 3.5.2 from *B2/AS1* modifies *NZS 4223.2:2016 Glazing in buildings – Insulating glass units*, and requires that they be permanently marked with,

- the name of the manufacturer,
- the year (as a minimum) of manufacture, and
- the Standard to which the glass complies.

Marking is to be visible after the IGU has been installed and must be legible and durable for the life of the unit.

> ***Note:*** *The durability requirements of replacement components are limited to only the work carried out by the contracted party and does not extend the durability/warranty of existing products not replaced. Refer to Sections* ***3.5*** *and* ***3.6*** *to understand the difference between Durability and Warranty.*

3.3.3 Clause D1 – Access Routes

The functional requirement of Clause D1 – Access Routes is that *"buildings shall be provided with reasonable and adequate access to enable safe and easy movement of people"*, as described in D1.2.1. To provide an access route useable by people with disabilities, accessible doors shall have at least 760mm of ***clear opening width***, in accordance with paragraph 7.0.3 of D1/AS1.

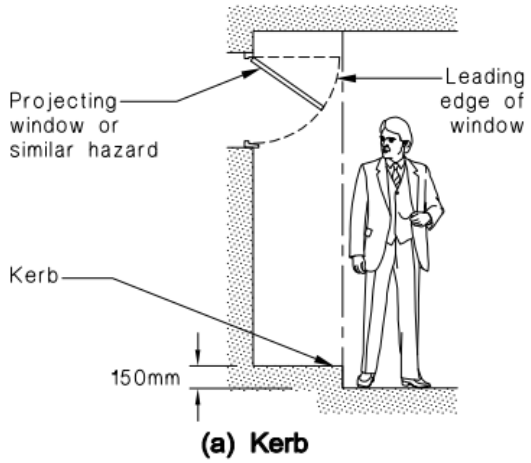
When adding or replacing high level sashes you must ensure these become a dangerous obstruction, as defined in paragraph 1.5.4 and Figure 6 of D1/AS1.

1.5.4 Dangerous projections – Windows, fittings or other dangerous obstructions may project into the space adjacent to an *access route* (see Figure 6) if users are protected from the projection by:

a) A kerb provided at floor level which defines the extent of the projection, or

b) A *handrail*, guard-rail, or other protection at sill level.

Figure 6: Protection from Dangerous Projections
Paragraph 1.5.4



(a) Kerb

3.3.4 Clause E2 - External Moisture

Clause E2 of the Building Code requires that *"buildings be constructed to provide adequate resistance to penetration by, and the accumulation of, moisture from the outside".*

As noted in 3.2 and 3.3 above, even though the replacement of windows may not require a consent, it must still comply with the provisions of the Building Code. The performance provision is noted in paragraph E2.3.2.

E2.3.2 Roofs and exterior walls must prevent the penetration of water that could cause undue dampness, damage to *building elements*, or both.

When it comes to full replacement windows, compliance with E2/AS1 is often mistakenly confused as compliance with Clause E2.

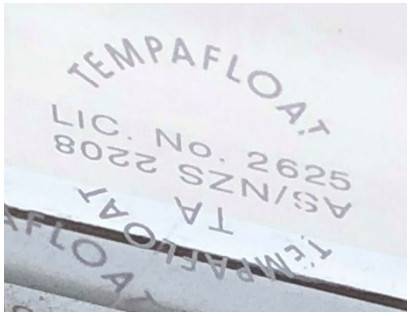
Acceptable Solution E2/AS1, provides a series of details that are accepted by Council in assessing of a building's construction as suitable for consent. These details are based on accepted practices and are designed to be used in the construction of a new building, and as such may not be suitable for the retro-fitting or replacement of windows. Certainly, the principles behind the window installation details cited in E2/AS1, often described as the 4D's of weathertightness, should be followed as closely as possible to ensure the provisions of Clause E2 are satisfied, but these details are designed based in an installation sequence that is not available to the installation of a retro-fitted/replacement window.

Section E2/AS1 states that windows shall comply with *NZS 4211 Specification for the performance of windows*, which tests windows for compliance with windloads, including weathertightness performance. All windows must be labelled to indicate they have met the performance requirements of the wind zone in which they've been installed.

> ***Note:*** *NZS 4211 tests only the performance of the window as a standalone element, and does not test its method of installation, thus the window label is simply an indication that the window is suitable for the exposure zone it is being used within. Installation must be carefully considered to ensure compliance with* ***E2.3.2****.*

3.3.5 Clause F2 – Hazardous Building Materials

Section F2/AS1 refers to NZS 4223.3:2016 Glazing in buildings – Human impact safety requirements, which sets the regulations to ensure, where required, that safety glass is used to reduce the risk of injury to the occupants. In some locations glass is required to either break safely or be strong enough to resist a reasonable, foreseeable impact. This might mean that glass that was not previously rated as safety glass will need to be updated to meet current regulation.



Each pane of safety glass is required to be ***permanently*** marked with the type of glass, the details of the manufacturer, and the Standard to which the glass has been manufactured. The stamp is small, is usually positioned in the lower corner of the pane and will look something like this.

3.3.6 Clause F4 – Safety from Falling

Section F4/AS1 also refers to *NZS 4223.3:2016 Glazing in buildings – Human impact safety requirements*, but in this case to ensure glass is strong enough to safeguard people from falling 1.0m or more (from floor level). This applies to glazing within 800mm of floor level or panes that might be mistaken for an unimpeded path of travel. Usually this will mean the use of safety glass but including transoms to divide the pane (within the correct height range) can provide a compliant barrier.

3.3.7 Clause G4 – Ventilation

Section G4/AS1 sets minimum levels of natural ventilation required in a building. Occupied spaces must achieve a net openable area to the outside of no less than 5% of the floor area. Elements that make up the net openable area are sashes, sliding door panels, and other doors that can be fixed open. Hinged and bifolding door leaves will require a hold back mechanism to be considered in the equation.

> ***Note:*** *The configuration of the window should be checked at time of measure, whether the intention is to match or modify the existing layout to ensure the 5% will be achieved.*

> ***E.g.*** *If the room is 10m^2 then it will require at least one opening sash, measuring approximately 900mm x 600mm to comply with Clause G4. This is also a requirement of the Healthy Homes requirements.*

3.3.8 Clause G7 – Natural Light

Section G7/AS1 sets minimum levels of Visible Light Transmittance (VLT) for glazing in, housing, aged care facilities, retirement complexes and early childhood centres with openings to the outside, meaning in some situations tinted glass may not be a compliant option. Check and confirm the minimum VLT requirements before proceeding with the project.

3.3.9 Clause H1 – Energy Efficiency

Section H1/AS1 describes the required thermal performance of each element within the building envelope and the windows are considered as one of those elements. The thermal performance of a window is based on a number of factors including, the type of glass used, and the depth of the space between the panes (refer also to 5.1.4) and of the frame that it is wrapped in. For compliance with Clause H1, the full replacement window should have an R-value of not less than the original glazing. Replacing the air between the panes with Argon gas will increase the performance of the insert replacement window. This is carried out at the time of manufacture of the IGU and cannot be done retrospectively.

Table A below provides examples for comparison of construction R-values for a range of frame and glazing combinations. These are generic values based on the weighted average of houselots of joinery. In terms of a houselot of full replacement windows, these values are estimates and to be used for comparison only.
For perspective, single glazed timber windows will have a thermal performance value of approximately R0.19 and single glazed aluminium of approximately R0.15.

Table A – Generic R-value Combinations				
Frame Material	Clear IGU U2.9	Low E IGU U1.6	Low E IGU U1.3	Low E IGU U1.1
Aluminium	R0.26	R0.33	R0.35	R0.37
Thermally Broken	R0.32	R0.42	R0.46	R0.50
uPVC	R0.40	R0.56	R0.63	R0.69

3.4 Performance

It must be understood what it is the customer is trying to achieve with their full replacement windows, i.e., thermal, safety, and/or acoustic improvements, and what levels of performance can be achieved?

Not all frame and glazing combinations offer the same levels of performance, whether it be for safety, thermal comfort, condensation and/or noise control. The combination of the frame and glazing, and also the make-up of an IGU can usually be tailored to achieve the customers desired result. Sometimes there might be a trade off, but the frame selection and design of the IGU should be discussed with the customer at the initial consultation.

3.4.1 NZS 4211

To satisfy the requirements of the NZ Building Code, new window and door systems must comply with the requirements of *NZS 4211 Specification for performance of windows*. Evidence of compliance comes in the form of the window labels mentioned in **3.3.4**, above. Whilst the requirements of the installation do not form a part of this Standard, the new full replacement window frames used in the building will need to comply with all its parts, to the windloads applicable to the site,

I.e., - Deflection of structural members
- Operation of opening sashes
- Air infiltration
- Water penetration
- Ultimate strength of window and fixings
- Torsional strength of sashes

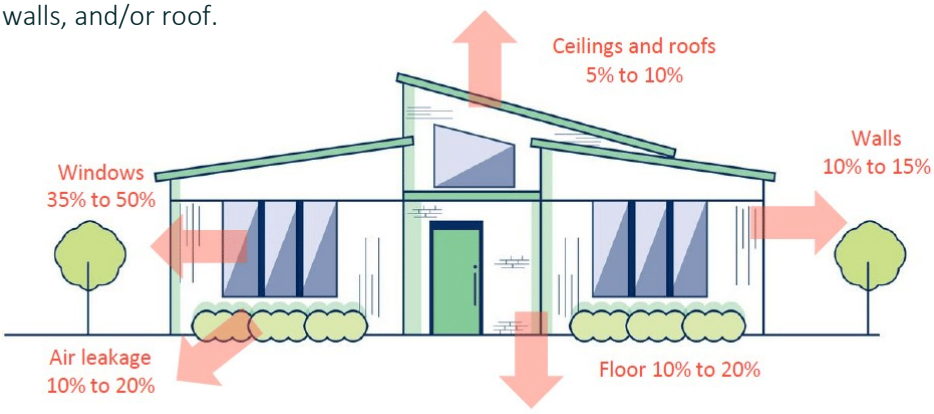
Note: *NZS 4211 considers the performance of the window as a standalone element and does not include testing its method of installation. Installation details and methods will vary*

*between manufacturer/suppliers and specific building construction and cladding types, as indicated in **3.3.4** and **3.4.1** above. This will be further discussed in Section **8.0** of this guide, but in principle they will follow the details in E2/AS1 and the Associations "Guide to Window Installation as described in E2/AS1".*

***Note:** Imported windows and doors are often tested to international standards rather than NZS 4211. Councils are often satisfied that compliance is achieved by imported product, when provided with a report from a certified engineer that the product performance is comparable to New Zealand standards and/or wind zones. If you are looking to use an imported window system, then ask that confirmation be provided, that the product is suitable for your area.*

3.4.2 Energy Efficiency

As described in 3.3.9 above, *Section H1/AS1* describes the required thermal performance of glazing to achieve the energy efficiency goals of the Building Code. If the customer is looking for improved control of warmth in the home, it is important that a discussion regarding thermal performance and the buildings thermal envelope be had. Whilst the windows are typically a weak point, it is only one element of the thermal envelope and will not solve issues with poor insulation in other elements, i.e., floor, walls, and/or roof.



3.4.3 Condensation Control

Consumers often relate new windows and double glazing with the elimination of condensation from their windows and doors. Whilst higher performing glazing will shift the point at which condensation occurs, it may not prevent it altogether. Condensation is a by-product of humidity and temperature and occurs when warm moisture laden air contacts a cooler surface. There are many potential sources for the moisture laden air and many surfaces on which the air might condense and release the water it is carrying.

Designing the window components, frame and double glazing make up, to provide the best possible R-value will help control the formation of condensation on the glass, but the window frames themselves (especially aluminium) might still condensate as they did before.

Note: *In some climates, high performing double glazing may cause dew to form on the exterior surface of the glass, because the glass is colder than the outside air temperature. For further information on Condensation follow this link to our website - https://www.wganz.org.nz/guide/understanding-condensation/*

3.4.4 Safety

Full replacement windows provide an opportunity to upgrade the existing glazing to comply with current safety regulations. As noted in 3.3.5 above, *Section F2/AS1* and *NZS 4223.3:2016* describe the safety requirements for all glazing, which may have changed significantly since the existing glazing was installed. Some of the situations where safety glass might be required are as follows,

- panes within 800mm of FFL,
- full height panels / doors / windows,
- bathroom / wet area windows within 2000mm of FFL,
- window seats within 800mm of FFL,
- window or door units protecting a fall of more than 1.0m from FFL,
- window or door units separating a pool – requires the replacement/updating of hardware.

3.4.5 Acoustic

Whilst the double glazing in full replacement windows will provide an increased level of acoustic performance by default, if the customer is looking to target a specific sound or noise, then the IGU make up and frame type may need to be designed specifically for the project.

3.5 Durability

As described in 3.3.2 above, Clause B2 requires that windows and glazing have a durability performance of not less than 15 years, i.e., they must, with normal maintenance, continue to satisfy the performance requirements of the Building Code for this period.

Whilst full replacement window frames must also have a durability of not less than 15 years, this extends to the materials they are constructed of and not the coatings applied as a surface finish. There are a range of durability (and warranty) options when it comes to both powdercoated and anodised surface finishes, which should be discussed with the window supplier when selecting colour/finish options.

In most cases, hardware (locks, hinges, handles, etc) is easy to assess for damage and access to replace, and therefore require a durability of not less than 5 years. As with frames and reveals the durability refers to the function of the hardware item, rather than its finish.

As with all manufactured products, IGU's have a foreseeable lifespan. When, under normal use conditions, condensation (fogging) occurs within the space between the panes, the unit is deemed to have reached the end of its useful life. IGU's typically carry a 10-year warranty but the customer can expect their glazing to last longer than the warranty period, but they should not expect that it will last forever, even if well maintained.

With NZ's diverse climatic conditions, during its life, the IGU's will be exposed to a range of environmental influences, including temperature and atmospheric pressure fluctuations, wind loads, sunlight / UV light, water, and water vapour and in coastal locations salt laden sea air. In service history both internationally and within in NZ has shown a variety of IGU life expectancies depending not only on these environmental factors, but also on the design of the unit, its installation and how well it is maintained.

3.6 Warranty

It is usual for windows to be provided with a **Product Warranty**, covering materials and workmanship, but the Building Act also makes provision for an **Implied Warranty** as detailed below. An **Implied Warranty** includes duties that can arise automatically without a **Product Warranty** ever being offered, as detailed below, in **3.6.2**.

3.6.1 Product Warranty

A Product Warranty is a formal, commercial agreement between a manufacturer/supplier and a customer, that provides a means to repair, replace, and/or compensate the customer, if the product fails to meet the terms set out in the warranty.

Some products may carry a separate warranty differing from the given period, based on agreements in place between suppliers.

- There are a range of product options when it comes to surface finishes, each offering its own warranty period and conditions of use. The levels of performance should be discussed with the window supplier when selecting colour/finish options.
- IGU's or double glazing from an IGUMA member carries a separate, conditional warranty.

Should a defect occur, regardless of whether it applies to the frame, glazing, hardware, or other component, the first approach is to discuss the issue with the manufacturer/supplier of your windows.

3.6.2 Implied Warranty

All residential building work is covered by Implied Warranties, which apply, for up to 10 years regardless of what the contract terms are. An Implied Warranty is automatic and covers almost all

aspects of building work from compliance with the Building Code, to good workmanship, and timely completion of building work. A breach of any of these is a breach of the contract.

Implied warranties apply automatically to all contracts for building work on a residential house, whether written or verbal. For more information on Implied Warranties, visit MBIE's website…

To activate an Implied Warranty, you must take any dispute you have with defects or workmanship to court and prove loss or damage as a result. Activating your consumer rights has more information about activating your implied warranties, consumer guarantees and resolving problems under the Construction Contracts Act.

3.7 Care and Maintenance

The care and maintenance requirements for full replacement windows and their associated components will vary between manufacturers, suppliers, and installers, but each will have recommended programme, that must be followed in order to satisfy the terms of the product warranty.

The most common elements of maintenance include but may not be limited to,

- Cleaning every ***three months*** is recommended for windows and glazing. In coastal or industrial environments more frequent washing will be required
- Recommended cleaning with a ***soft brush with warm water*** and some mild household detergent. Rinse with fresh water
- ***Do not*** use abrasive steel wool, sandpaper, scrapers, scouring liquids or aggressive solvents or thinners. These are likely to damage the surface finish.
- The cleaning cycle should include the removal of build-up in door tracks to ensure the maintenance of ***drainage paths***.

Note: *For further information on maintaining your windows follow this link to our website -* https://www.wganz.org.nz/guide/maintaining-your-windows/

4.0 Assessment

Before proceeding with a full replacement window project, in fact before even pricing one, the project should be assessed for viability as not all existing windows are suitable for full replacement windows.

The following checklists provide generic guides to the considerations to be worked through to ensure the project is feasible, from both a supplier and customers perspective and to establish the customers desired outcomes.

The checklists are designed as a guide and may vary for individual supplier/manufacturers.

- Checklist 1 – General Condition
- Checklist 2 – Existing Window System Assessment
- Checklist 3 – Frame and Glass Assessment

Checklist 1 – General Condition		Yes/No Comment
1.1	Establish the approximate age of the existing joinery?	
1.2	Is replacement of the existing window system viable?	
	- Is it less than 15 years old, meaning consent may be required?	
1.3	Will the building cladding & framing accept full replacement windows?	
	- What work will be required to complete the installation?	
1.5	Does the work fit within the company's offering?	
	- Do we need a specialised contractor?	
1.6	What is the Wind zone? – L, M, H, VH, EH – Circle 1 or	
	- Specific Design	
1.7	What is the Exposure zone? – B, C, D, <100m – Circle 1 or	
	- Microclimate	
1.8	Why does the customer want full replacement windows?	
	- Thermal performance	
	- Condensation control	
	- Functionality	
	- Safety	
	- Acoustics	
	- UV / Fading protection	
	- Other specific requirements?	
1.9	Refer to Checklist 3 for details...	

Checklist 2 – Existing Window System Assessment		Yes/No Comment
2.1	Will the building cladding & framing accept full replacement windows?	
	- Are there any obvious repairs required? E.g., rot?	
	- If there is rot, is it repairable?	
	- Does the repair require the engagement of a builder?	
	- How will damage found during the installation be resolved?	
2.2	What is the cladding type?	
2.3	Are the existing head flashings to be retained or replaced?	
2.4	Are the existing jamb facings to be retained or replaced?	
2.5	Are the existing sill facings to be retained or replaced?	
2.6	Are the existing windows and doors plumb, square, and straight?	
2.7	Are the window reveals, architraves, and/or external trim to be primed after insert windows installed?	
2.8	Are the windows to be repainted after insert windows installed?	
	- Colour =	
2.9	Are any of the window or door configurations to be modified from the existing?	
	- Check compliance	
2.10	Are any of the window or doors to change size from the existing?	
	- Check consent requirement	
2.11	Are there any special requirements/considerations?	

Checklist 3 – Window and Glass Assessment		Yes/No Comment
3.1	Why does the customer want to insert replacement windows? - (from 3.4)	
3.2	Thermal performance	
	- Which of Heat gain or Heat loss causes the most concern?	
	- Glass type options - Clear, Low E, Tint (colour) - Circle appropriate	
	- U-value desired =	
	- Gas fill - Air, Argon, Other - Circle 1	
	- Frame options - Aluminium, Thermally Broken, uPVC - Circle one	
	- R-value desired =	
3.3	Has condensation control/outcomes been discussed?	
	- Is the home insulated? - Floor, Walls, Roof - Circle appropriate	
	- Does the home have a ventilation system?	
	- Does the system include/ require Condensation channels?	
3.4	What safety considerations need to be addressed?	
	- Full height panes, Stairways, Bathrooms, Protecting a Fall	
	- Low level windows, Window seats - Circle appropriate	
3.5	What acoustic considerations need to be addressed?	
	- Type of noise to be addressed, Voice, Music, Traffic, Other	
	- Circle appropriate	
3.6	Is the homeowner concerned about UV / Fading protection?	
3.7	Are there any existing butt jointed panes?	
3.8	Is there full site access to all windows and doors?	
	- Is scaffolding or special lifting equipment required?	
3.9	Are there other special requirement/considerations?	

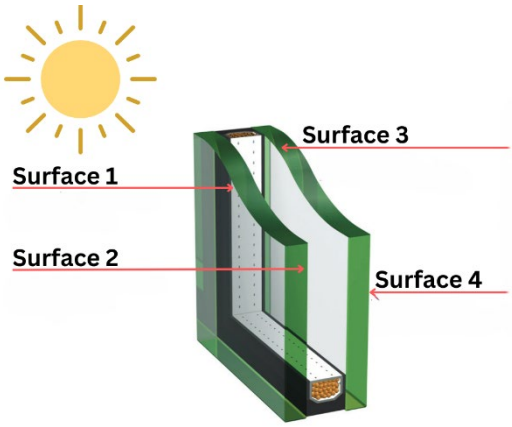
5.0 Glass Requirements

Even in situations where the project does not require a Building Consent all work should comply as closely as possible and with the relevant Clauses of the NZ Building Code, as referred to in Section 3.0 of this document.

5.1 Glass Performance

NZS 4223.1:2008 provides design criteria, guidance for specific design and procedures for glass selection, and glazing in buildings. To aide in the understanding of how the glass satisfies the requirements of the NZBC, the following offers a fundamental view of the basic glass functions.

5.1.1 What is Double Glazing?



Double glazing is the common descriptor for an Insulating Glass Unit (IGU), assembled and sealed in a controlled factory environment. The two panes of glass making up the IGU allows each unit to be designed to meet the performance requirements of the project.

Double glazing comprises two panes of glass, one exterior, with Surface 1, and 2, one interior pane with surfaces 3 and 4, effectively counted from the outside in. The thickness of the units will vary depending on the size of the spacer used and the thickness of the glass. Combining different types of glass, spacer size and type, along with gas options can provide a bespoke performance tailored specifically for the project and the customer's desires.

NZS 4223.2:2016 sets out the requirements for materials, design, glazing, and quality assurance of IGU's, and is referred to in Acceptable Solution B2/AS1 and is intended to provide a means of compliance with the NZ Building Code.

5.1.2 Structural Performance

NZS 4223.4:2008 provides a method for the determination of minimum glass thicknesses to resist windloads. The Standard is intended to provide a means of compliance with the NZ Building Code Acceptable Solution B1/AS1.

The environment and wind categories vary throughout New Zealand and must be taken into account when establishing the requirements of the project. The higher the windload, the thicker the glass must be to resist the loads and remain within acceptable deflection tolerances, as described in the Standard.

Windloads are selected from NZS 3604:2011, and are typically described as Low, Medium, High, Very High, Extra High or Specific Design. Specific Design or SED loads are calculated in accordance with AS/NZS 1170.2:2011.

5.1.3 Safety

NZS 4223.3:2016 is intended to provide a means of compliance with the relevant performance requirements of Building Code Clauses B1, F2, and F4 in order to minimise the potential for injury to building users, from glazing in buildings. The Standard provides information regarding the locations and situations where safety glass is required. Regardless of whether consent is required for the project, the Association recommends the use of safety glass wherever prescribed.

There are two options for safety glass, either toughened and/or laminated.

Toughened glass has undergone heat treatment and is ideal for safety, strength, and temperature resistance. If it is broken, it will break into small pieces, which reduces the risk of injury.

Laminated glass is an option for areas close to doors or latches to reduce the chance of burglars breaking the glass and entering your home. Laminated glass incorporates an interlayer between two pieces of glass. It is much more difficult to break and if it does, the interlayer holds the glass fragments together.

5.1.4 Thermal Performance

All new residential builds are required to achieve a minimum energy performance as part of the New Zealand Building Code. Given this is the primary reason most choose full replacement windows for their homes, it is the Association's perspective that the same levels of thermal performance should be aspired to for replacement windows. Acceptable Solution H1/AS1 provides a guide to the required performance levels for each of the Country's six climate zones.

There are three main ingredients that impact the thermal performance of an IGU, glass type, spacer bar, gas fill.

Glass type. Prior to the recent updates to NZBC Clause H1, most IGU's were made up using two panes of clear glass. To move towards the requirements of H1 and increase the thermal performance of the IGU's, a pane of Low E (low emissivity) glass can be included in the combination. There are a variety of options when it comes to Low E glass so discuss the projects requirements with the supplier.

Spacer bar. Switching the standard aluminium spacer bar with a thermally improved option will increase the thermal performance of the whole window frame, as it improves the thermal bridging values of the combination.

Gas fill. Typically, standard double glazing has air captured between the two panes of glass. To further improve the thermal performance of an IGU, the air can be replaced with an inert gas that is denser than air, like Argon.

5.1.5 Condensation

Thermal performance and condensation control are linked, but differing parts of the performance equation for your home. Windows and glazing don't create condensation. Condensation is a by-product of humidity, and it is the moisture level in the air of your home that causes this to happen. Low internal temperature of the surfaces in your home combined with higher internal moisture/humidity levels, the greater the chance of condensation occurring. Double glazing works to form a thermal barrier to the outside, making the inner side of the double glazing warmer, which helps prevent internal condensation.

Typically, in modern homes the increased levels of insulation and better performing windows have helped mitigate most of the weeping windows evident in older single glazed homes. Insert replacement windows, including an IGU with a high performance Low E pane, can also significantly reduce the likelihood of internal condensation, or at least modify the temperature at which it will occur, the dew point.

However, the Low E IGU can be so efficient that morning dew can form on the outside of the glass which is referred to as external condensation. When external temperatures are low, and humidity levels are high this is when it is most likely to occur. This is an indication of how well the double glazing is working, and the dew will dissipate through the morning, given a breeze or exposure to the sun.

Note: *For further information on Condensation follow this link to our website -* *https://www.wganz.org.nz/guide/understanding-condensation/*

5.1.6 Acoustic Performance

There are different ways to improve the acoustic performance or noise transmission through your windows by mass: using thicker glass, or differing thickness panes in each side of your IGU, or a wider spacer between the panes, or a combination of the above. Acoustic laminates are used in most applications to avoid extra weight and thickness on the double glazing.

However, if noise reduction is a key issue, it's best to engage an acoustics consultant or engineer to assess your home and its environment and make a recommendation in respect of the key frequencies of the sound at your location.

Note: *Whilst glazing can help to improve the acoustic performance of a room, acoustic performance is impacted by the construction of all the elements that make up a building. If the customer has a particular need, then an acoustic engineer may need to be engaged to design a specific result, possibly extending beyond just the replacement glazing.*

6.0 Frame Requirements

Again, even in situations where the project does not require a Building Consent all work should comply as closely as possible and with the relevant Clauses of the NZ Building Code, as referred to in Section 3.0. As with the glass, the frame type and material should be considered when deciding to install full replacement windows.

6.1 Frame Performance

NZS 4211 provides a test method for the assessment of the performance of window frames. The full replacement window frames being used in your project must demonstrate compliance with the requirements of the standard for the wind zone your building sits within, as described in NZS 3604. This applies regardless of the material your frames are constructed from, aluminium, thermally broken aluminium, or uPVC.

NZS 4211 tests the structural integrity, weathertightness, air infiltration, and operability of the window and door frames.

The thermal performance of a frame and glass combination will vary depending on the elements selected.

6.1.1 Wind Zones

To ensure your new windows perform as they should it is necessary to understand the wind zone that your site sits within. This wind zone provides the manufacturer of your full replacement windows with wind load information that allows them to construct them to suit. The wind loads associated with each wind zone inform the required performance for structural integrity and weathertightness. Table B sets out the zones and pressures, specific to windows and doors.

BRANZ have a website where you can check the wind zone of your address - Click here to access the site and input your address for information regarding your site.

Table B – Wind Zones		
Wind Zone	Serviceability (SLS) Wind Pressure - Pa	Ultimate (ULS) Wind Pressure - Pa
L - Low	+/- 510	+/- 720
M - Medium	+/- 680	+/- 960
H - High	+/- 970	+/- 1360
VH - Very High	+/- 1250	+/- 1760
EH - Extra High	+/- 1515	+/- 2130

Note: The window labels referred to in 3.3.4 show provide evidence that the window is suited to your home.

6.1.2 Structural Integrity

Structural integrity refers to the strength of the window or door and is based on how much it will deflect (flex) under the wind loads likely to be experienced on your site, without permanently deforming.

6.1.3 Weathertightness

The weathertightness of your windows and doors is based on the SLS wind pressures applicable to the site wind zone. The tests have a pass/fail criteria based on controlled water ingress, meaning in some cases, like sliding doors, water might enter the system, but provided it does not overflow to the inside and drains away, it is deemed as acceptable.
NZS 4211 tests just the unit itself and the rating of the window or door does not include its installation.

6.1.4 Air Infiltration

To air infiltration rating or your windows and doors, as with weathertightness, applies to the unit itself and not to its installation. At the time of testing the amount of air that the unit passes, is measured and the unit rated accordingly. This does mean in some cases, like sliding doors, air might be felt through the system.

6.2 Thermal Performance

Whilst not necessarily a requirement of full replacement windows, unless consent is applied for, the thermal performance of the window frames should be carefully considered when selecting the type of frame for your home, whether aluminium, thermally broken aluminium, or uPVC.

Generally, an aluminium frame will not perform as well as a thermally broken aluminium frame, which does not deliver the same level of insulation as a uPVC frame. The performance values are expressed as an R-value and are typically modelled using an appropriate software package. In addition to Table 1 in 3.3.8, Clause H1 of the Building Code provides a Guide to the R-value of the typical combinations in Appendix E.

7.0 Preparation

The following preparation procedures provide a generic guideline to the steps that might be expected to be performed by the window system manufacturer / supplier / installer.

7.1 Site Preparation

- Check and confirm all work instructions, including project details, drawings, and specifications, are correct and applicable to project.
- Check and confirm all windows, IGU's, flashings, and materials required to complete the project are on site, correct, and ticked off against the work instructions.
- Check and confirm all windows are correctly sized for their designed locations, and free from scratches, marks, and other defects.
- Decide and agree the order of units to be installed.
- Check and confirm all tools and equipment required to complete the job are on site.
- Health and Safety requirements are followed in accordance with Company safety plans and policies.
- Signage and barrier requirements are identified and implemented.

7.2 Removal of Existing Windows

Before proceeding with the removal of the existing windows inspect for any signs of rot, degradation, or damage. If any is found, advise, discuss, and seek instruction from the homeowner on the next steps, before commencing the work. What are the options? Can you, the installer, make the repair, or does a builder need to be engaged?

Carefully remove the windows taking care to minimise damage to the cladding, head flashing, facings, building wrap, and interior linings.

7.3 Preparation of Openings

Assuming the existing cladding and framing are in good condition, then continue and prepare the openings in accordance with either the supplier's instructions, or the details described in section 8.0 of this guide.

8.0 Installation

There are a wide range of frame designs and material options available for full replacement windows and each will have a set of installation instructions developed specifically for the product.

Installation of full replacement windows will typically follow the principles of E2/AS1 for direct fix claddings. The following installation procedures provide a generic guideline to the steps that might be expected to be performed by the window system manufacturer / supplier / installer but may vary depending on the cladding type.

8.1 Opening Preparation

Whilst the original windows may have functioned perfectly since they were installed, and are only being replaced as a performance upgrade, once removed the opening must be reconsidered and prepared in line with current methodologies.

8.1.1 Clean

After the windows and/or doors have been removed, to ensure the adhesion of new tapes, paints, and/or seals, the framed opening ***must*** be thoroughly cleaned of all dust, dirt and debris.

8.1.2 Protect

One of the principles of E2/AS1 is to protect the timber, framing the window or door opening, from damage should water penetrate the installation. The Acceptable Solution folds the building wrap around the framing and uses flexible flashing tapes to cover exposed corners, to achieve this. Refer to paragraph 9.1.5 a) and Fig 72A in E2/AS1 and to "Opening Preparation" section of the Associations *"Guide to Window Installation as described in E2/AS1"*.

With replacement windows there is unlikely to be sufficient building wrap remaining, after the window has been removed, to use in this way. It is therefore recommended that all sides of the opening be protected using either,

i) a flexible flashing tape as described in 9.1.5 b) i), or

ii) a coating of a liquid applied water-proofing type paint/membrane.

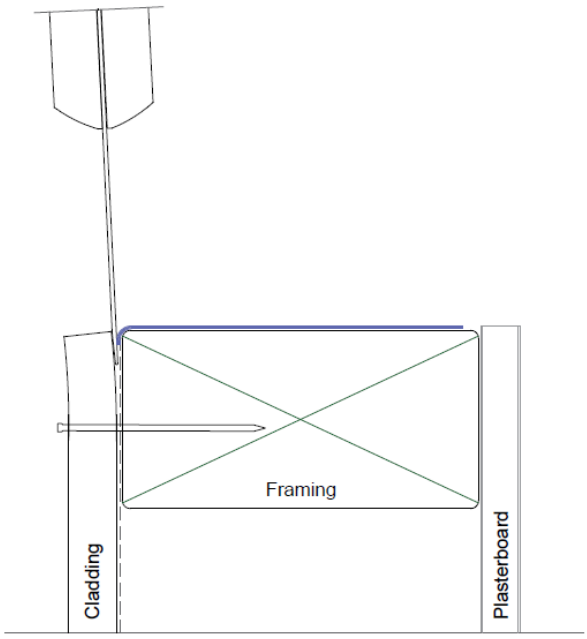
9.1.5 Wall underlays to wall openings

Prior to window or door installation:

a) Flexible *wall underlay* shall be cut and dressed into all sides of openings as per Figure 72A and B,

b) *Flexible flashing tape* shall be applied to head and sill *framing* as shown in Figures 72A and 72B. *Flexible flashing tape* shall:
   i) comply with Parts 3.2 and 4 of ICBO Acceptance Criteria AC148, and
   ii) be compatible with the *wall underlay*.

8.1.3 Flashing Tape - Typical

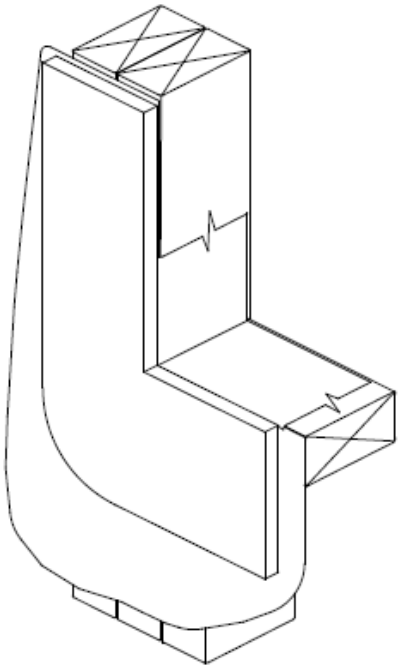


For most direct fixed cladding types, to protect the framing around the opening, run a flexible flashing tape around all sides of the opening, to create a moisture barrier. For traditional 4 inch, or 90mm, framing a 100mm wide tape will work nicely. Set the tape so there is a small return down the face of the frame, using a putty knife, power bar or similar, where required, to release the cladding and allow the tape to be pushed down into this space.

Note: *Take care not to damage fragile cladding materials.*

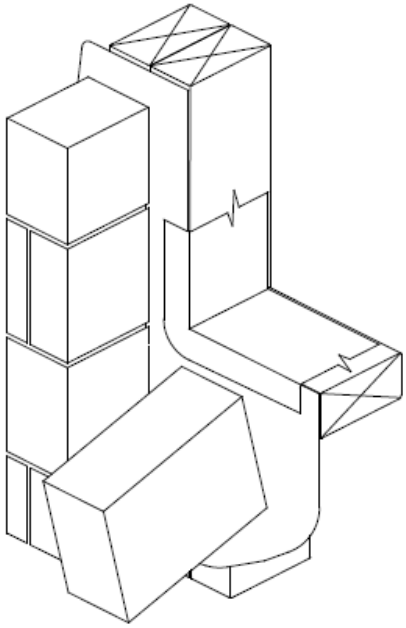
It will not matter if the tape finishes 10 - 15mm short of the inside edge of the framing, as this will be covered by the air seal referred to in paragraph 8.4.3.

After the tape has been applied to all sides, re-secure the cladding at the sill and jambs of the opening. ***Do not*** re-secure the cladding at the head, until after the head flashing has been installed.



8.1.4 Flashing Tape – Brick Veneer

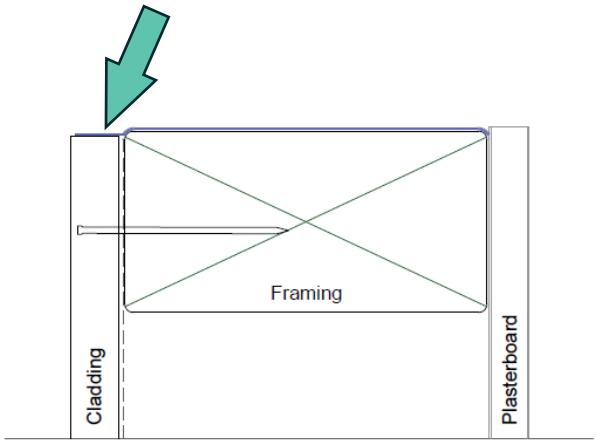
Where the replacement windows are being installed into brick veneer, there is typically sufficient room to use a standard 150mm wide tape and to wrap it further around the face of the framing, as described in E2/AS1, and capture the edge of the building wrap.



8.1.5 Liquid Applied Membrane

Another option, as mentioned in 8.1.2 above, is to use a liquid applied water-proofing type paint or membrane in lieu of a flashing tape. These products have specific preparation instructions, which must be adhered to ensure the durability of the membrane.

This option provides the opportunity to seal the edges of the cladding in addition to the framing and the junctions between the two.



8.2 Sill Tray - Typical

Full replacement window installation typically occurs within direct fix cladding construction and as such paragraph 9.1.10.5 a), from E2/AS1, can be applied to increase the weathertightness defence mechanisms of the installation.

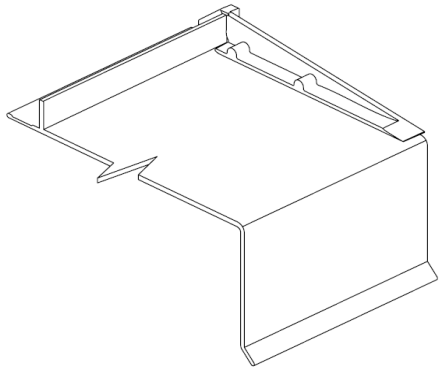
9.1.10.5 Window and door sills

a) *Direct fixed claddings* shall have

i) sill tray *flashings* as shown in Paragraphs 9.2 to 9.9 for each *cladding* type. The sill *flashing* shall extend back past the condensation channel of the window. Ensure flat sill trays do not slope backwards. The 5 mm gap between the window facing and sill tray must not be sealed.

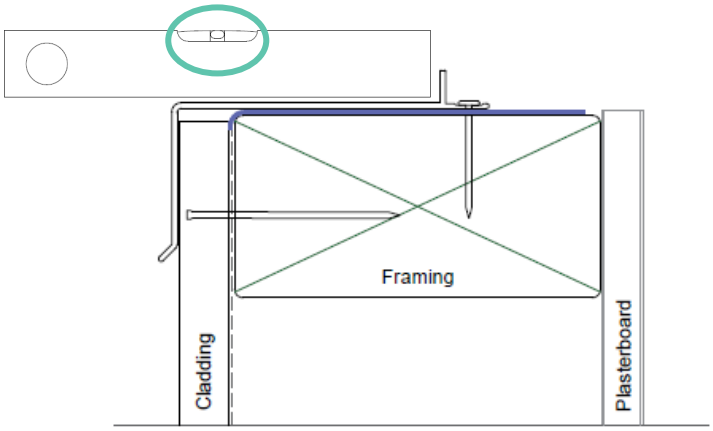
There are some important points to note when using a sill tray,

i) The sill tray is to extend beyond the inside line of the aluminium window or door frame, including the condensation channel.
ii) The sill tray is to have an 8mm minimum upstand to the inside edge.
iii) The sill tray is to have a minimum 35mm cover on the cladding and is to extend the full width of the trim opening.
iv) The sill tray requires forward sloping end dams.
v) The sill tray is to extend the full width of the opening.

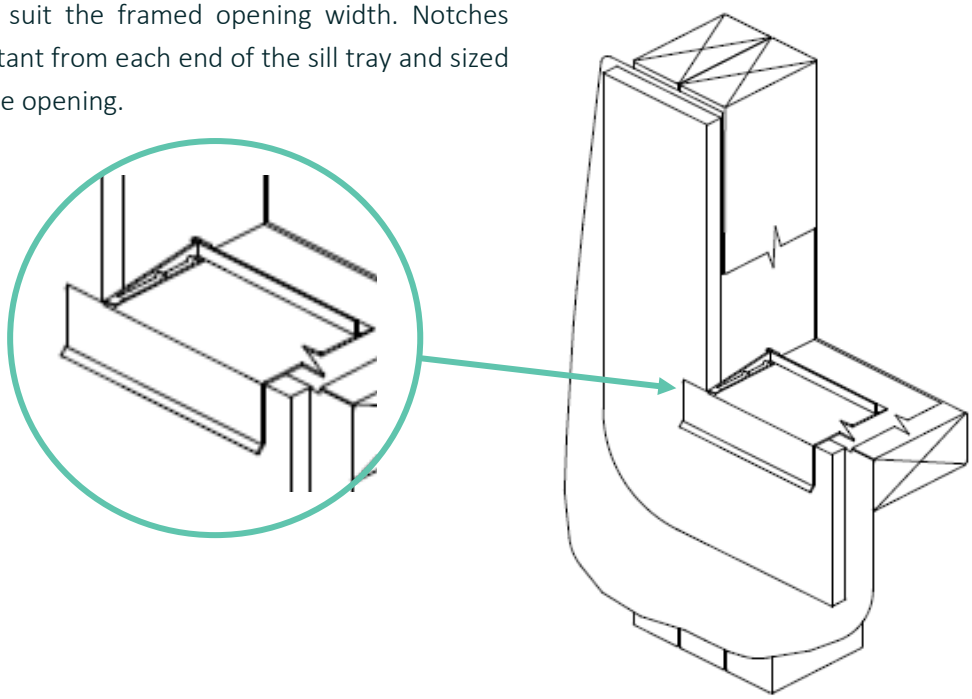


The industry standard extruded aluminium sill tray flashings include each of these features and includes a rear fixing tag to ease installation.
They can also be supplied with an injection moulded stop end which avoids the difficulties in folding extruded aluminium.
The stop end is snapped off to the correct length and is sealed in place on to each end of the tray.

Installers must ensure the sill tray is set level, and does not fall backwards, toward the interior.



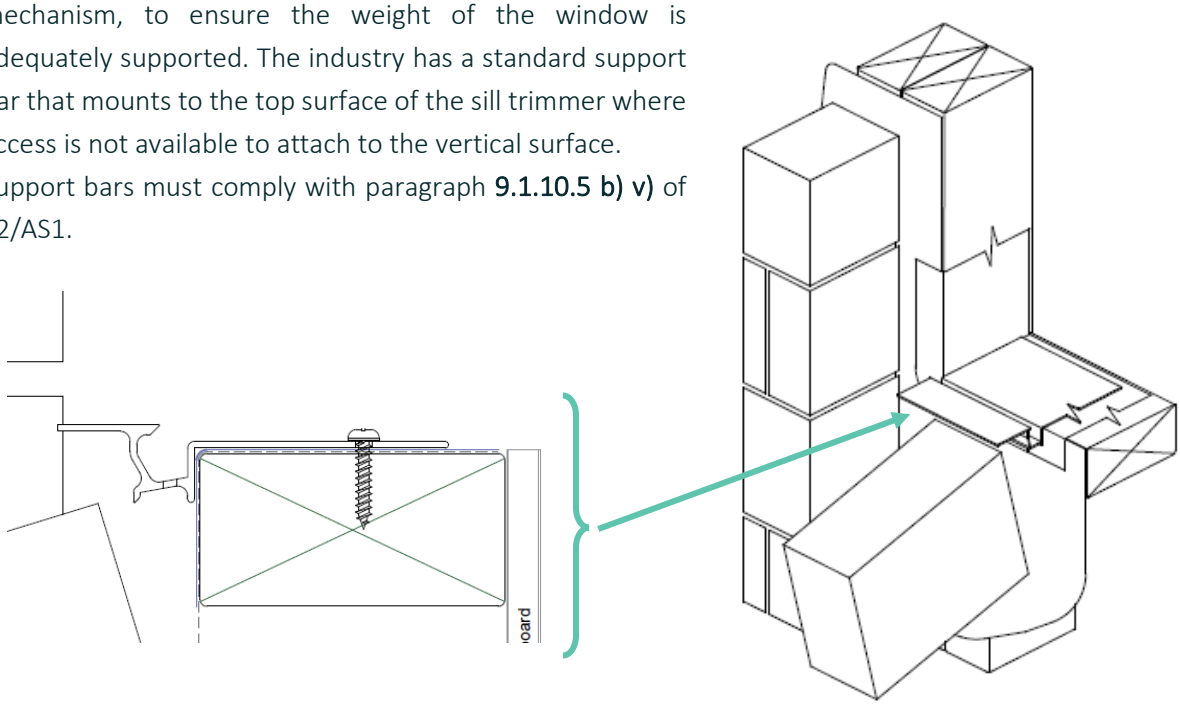
The overall length of the sill tray should match the overall width of the window, meaning it will need to be notched to suit the framed opening width. Notches should be equi-distant from each end of the sill tray and sized to fit neatly into the opening.



8.2.1 Sill Support – Brick Veneer

Brick veneer is effectively a cavity style of construction where the full replacement window will sit outside the line of the framed opening. In this case the sill tray is replaced by a sill support mechanism, to ensure the weight of the window is adequately supported. The industry has a standard support bar that mounts to the top surface of the sill trimmer where access is not available to attach to the vertical surface.

Support bars must comply with paragraph 9.1.10.5 b) v) of E2/AS1.



8.3 Head Flashing – Typical

The head flashing is possibly the most difficult part of a full replacement window installation, and there are a number of possible approaches, that must be carefully considered before progressing with the installation.

8.3.1 Head Flashing – Existing

One option is to retain and re-use the existing head flashing. The best reason for using this approach is reducing the interruption to the buildings weathertightness envelope, but as noted above, there are some considerations that must be assessed before selecting the option.

- The condition of the existing must be assessed. Has it been functioning correctly? Is it in good condition?
- Is it dimensionally suitable for re-use, in depth, width, and cover?
- The material is compatible with the new windows.
- Can it be carefully removed, or moved away from the existing window, without compromising the weathertightness envelope of the building?

8.3.2 Head Flashing – Per E2/AS1

Paragraph 9.1.10.4 from E2/AS1 describes the basics of head flashings, specifically notes a), b), c), and e).

9.1.10.4 Head flashings

Head *flashings* shall be in accordance with Paragraph 4.6.1.6 and Table 7, unless specifically shown otherwise, and shall:

a) Direct water to the outside of the *wall cladding*, and

b) Finish to the window head with clearance dimensions shown in Figure 71

c) For *direct fixed claddings*, have 50 mm bead of sealant installed between *cladding* and each end of the head *flashing*

e) For Very High and Extra High *wind zones*, have sealant installed between underside of head *flashing* and top edge of window head flange – refer Figure 71 (c) .

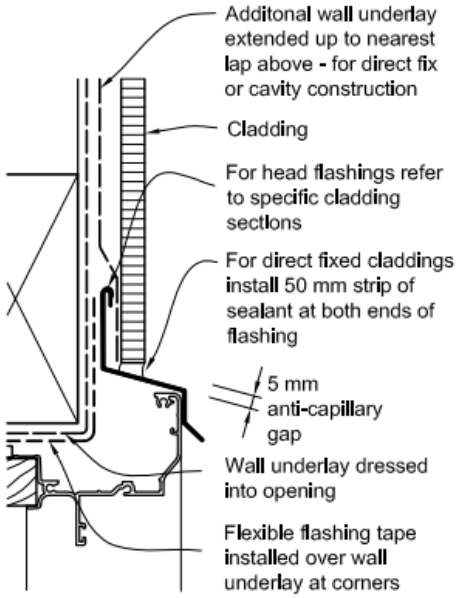
The first two "D's" of the principles of weathertightness, are deflect and drain and the role of the head flashing in a window installation fits both of these criteria. The flashing must deflect water away from the head of the window, where it is vulnerable, and to drain to the exterior any that might enter the system above the flashing.

When fitting a new head flashing during a full replacement window installation, it is important to ensure the flashing is inserted under the existing building wrap where possible so that any water entering the cladding system above the window is directed to the exterior.

Figure **71 a)** from E2/AS1 shows the general configuration.

Figure 71: General sealing of head flashing
Paragraphs 9.1.7, 9.1.10.3 and 9.1.10.4

NOTE: May also use *wall underlay* lapped over flashing upstand in lieu of *flexible flashing tape*. Refer cladding window details, for example Figure 115.



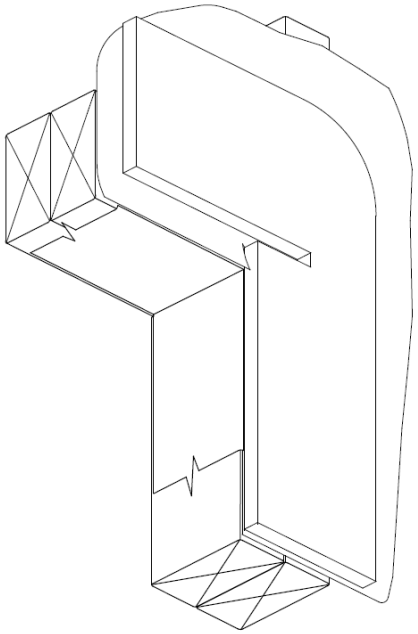
(a) METAL HEAD FLASHING - WITH ADDITIONAL UNDERLAY OPTION

In order to install the head flashing, the cladding will have to be carefully slotted at each side, at the appropriate location to provide the required minimum 20mm of overhang, past each side of the window.

There are two ways to fit the head flashing,

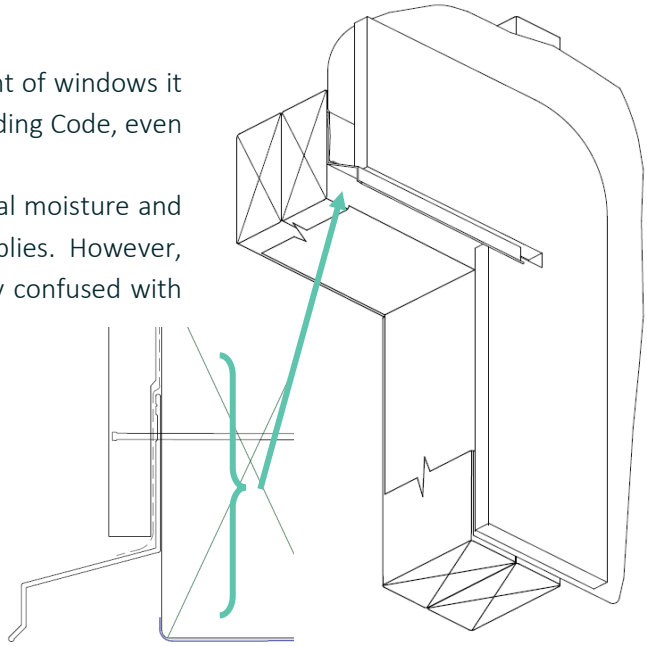
i) insert the head flashing as two separate halves and join back in the middle, or

ii) slot the cladding on one side far enough to allow the head flashing to be shuffled into place.



Whilst ii) might be more slightly difficult to achieve, if done with care it will provide a better weathering detail. The extra slot length can be sealed prior to the installation of the exterior finishing elements.

8.3.3 Head Flashing – Other



As discussed in 3.3.4 above, full replacement of windows it must comply with the provisions of the Building Code, even though the work may not require consent.

Head flashings are about controlling external moisture and therefore Clause E2 of the Building Code applies. However, compliance with E2/AS1 is often mistakenly confused with compliance with Clause E2, when in truth the work must comply with the performance provision is noted in paragraph E2.3.2.

The head flashing details discussed in 8.3.2 above are based on, and make reference to, the details and principles shown and used in E2/AS1, however these details will not always work for your situation and other details may need to be specifically developed to ensure the end result is in compliance with Clause E2 and specifically E2.3.2.

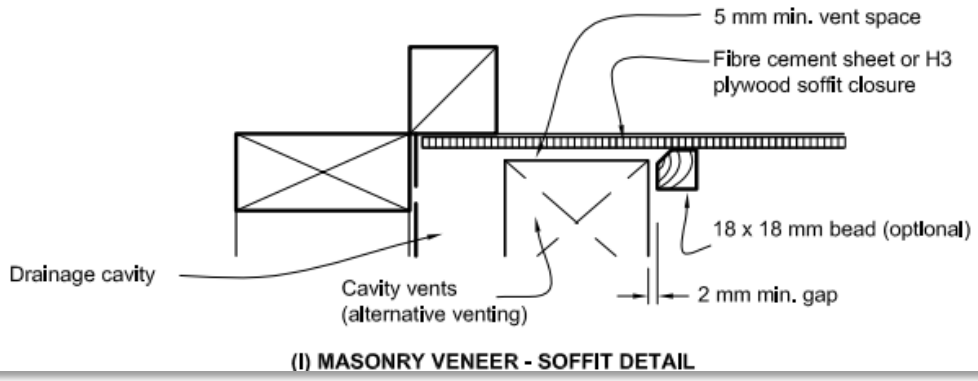
When developing specific details for a project the Four D's of the principles of weathertightness should be considered, as follows,

- Deflection. Deflect water away from potential weak points where water may enter the building envelope.
- Drainage. Accept that not all water will be deflected and develop a drainage mechanism to drain water out of the building envelope.
- Drying. Accept that not all water will be drained from the building envelope and allow a drying or ventilation mechanism to remove any residual moisture.
- Durable. Ensure that all materials, junctions and elements are durable enough to function through the cycles above for the required minimum period set out in Clause B2 (15 years).

8.3.4 Head Flashing – Brick Veneer to Soffit

Full replacement of windows inserted into a brick veneer cladding, where the opening extends to the soffit, do not suit a traditional head flashing as discussed in 8.3.2 above. In this case reverting to a detail similar to that shown in Figure 73E l) from E2/AS1 is appropriate, where a small timber bead is installed in front of the window to deflect away any water that might get to this point.

Figure 73E: Masonry veneer details
Paragraphs 9.2.5 and 9.2.6



(l) MASONRY VENEER - SOFFIT DETAIL

8.4 Install Window – Typical Facing Frame

Full replacement windows are typically installed into direct fix claddings, so once the opening has been prepared, the installation process typically aligns with the Direct Fix section of the Associations *"Guide to Window Installation as described in E2/AS1".*

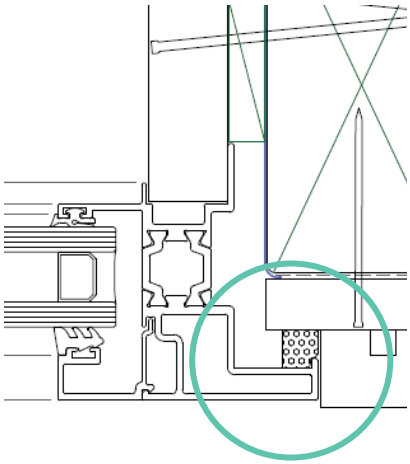
> ***Note:*** *It is important that all windows and doors are installed level, square, plumb, and in plane within accepted tolerances, to ensure their correct (and expected) operation.*

A set of guidance details are included in Appendix A, at the end of this document.

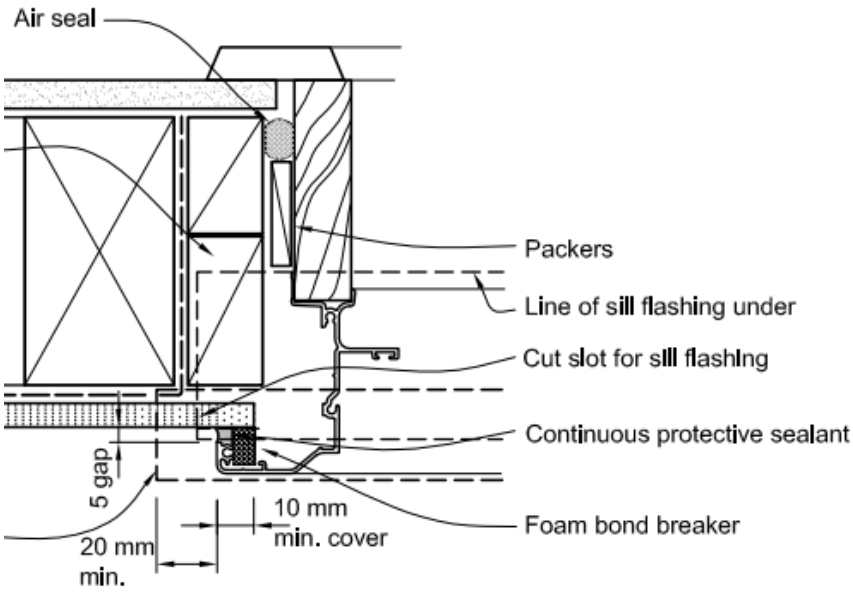
8.4.1 Jamb Seals

The details provided in Appendix A and in E2/AS1, indicate the use of a foam seal at the jambs of the window, to prevent water ingress. The requirements of the foam are nominated in paragraph 9.1.10.7 of E2/AS1.

In this case the foam tape, appropriately sized, is attached to either the window facing or the cladding before the window is inserted into the opening so that when the window is in its correct position the foam is compressed to provide a water seal.



E2/AS1 also shows an alternative detail, where the seal is moved further inward on the window facing, to act as a bond breaker, and a bead of sealant is applied over the foam to provide the weathering element.



(c) JAMB

8.4.2 Fixings

The size and frequency of the fixings required to attach your new windows into the building are nominated in paragraph 9.1.10.8 of E2/AS1.

9.1.10.8 Attachments for windows and doors

Install windows and doors using pairs of minimum 75 x 3.15 galvanised jolt head nails or 8 gauge x 65 mm stainless steel screws, through reveals into surrounding *framing* at:

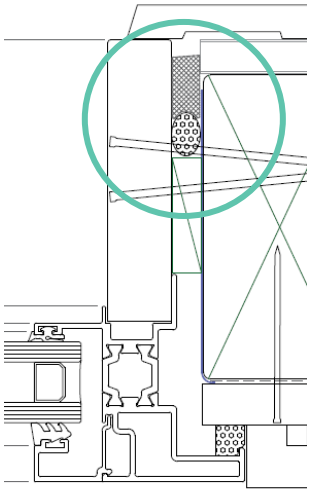
a) Maximum 450 mm centres along sills, jambs and heads, and

b) Maximum 150 mm from reveal ends.

Install packers between reveals and *framing* at all fixing points, except between head reveals and lintels.

8.4.3 Air Seal

The air seal is positioned at the inner edge of the framing line and window reveal and is designed to hold pressure in the trim cavity around the window to enable pressure equalisation to occur. Typically, the air seal is a low expansion polyurethane foam installed over a PEF backing rod to control its flow, as described in paragraph 9.1.6 of E2/AS1.



9.1.6 Air seals

Window, door and other penetration openings shall be provided with flexible *air seals* to minimise the risk of airflows carrying water into the *building* wall. The *air seal* shall be:

a) Provided between the reveal or frame and the wrapped opening (for example of use, refer to Figure 81),

b) Installed over a closed cell polyethylene foam (PEF) backing rod, or similar

c) Made of:
   i) self-expanding polyurethane foam, or

COMMENT:

Some sealants can react with bitumen based *flashing* tape, preventing full curing of the sealant. Where necessary, consult sealant manufacturers for application requirements.

Backing rods are used for sealant and for self-expanding polyurethane foam as there is a danger foam will expand to the outside of the *wall* and form a moisture bridge to the interior.

For further information refer to ASTM C1330 for backing rod material performance.

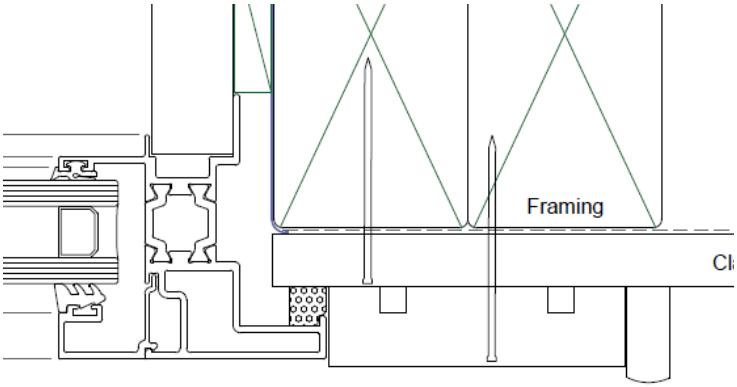
8.6 Glaze any IGU's not factory installed into the frames.

- Check the IGU is sized correctly to suit the opening.
- Install the IGU ensuring correct orientation, in accordance with the project documentation.
- Ensure the IGU is blocked in accordance with WG45102.14:2023 - Industry Standard for Glazing Blocks.
- Bead the IGU into place ensuring drainage holes are clear and in accordance with the supplier's instructions. The Guide to the Glazing of IGU's provides guidance in this area.

8.7 Exterior Finishing

The details provided in Appendix A and in E2/AS1, show the completed installation with timber facing added to the perimeter of the new window or door. The intent is to replicate the details of buildings typically represented in the replacement window industry.

The addition of the timber facings is to not only provide a visual connection to the building, but also as a support to the weathertightness of the installation. The facings act as a first D principle, helping to protect vulnerable areas of the installation by deflecting water away from them.



The inclusion of the scribers is an important layer in the line of defence, especially with claddings that have a complex form. That said, these connections are aided by a well maintained coating of paint.

8.8 Post Installation

Before leaving the site, it is important to perform a post installation check of the joinery, its installation, and your own workmanship.

8.8.1 Post installation inspection

- Check all windows, sashes, doors and door panels have been installed level, square, plumb, and in plane within accepted tolerances.
- Check all beads sit flush and are fitted within accepted tolerances.

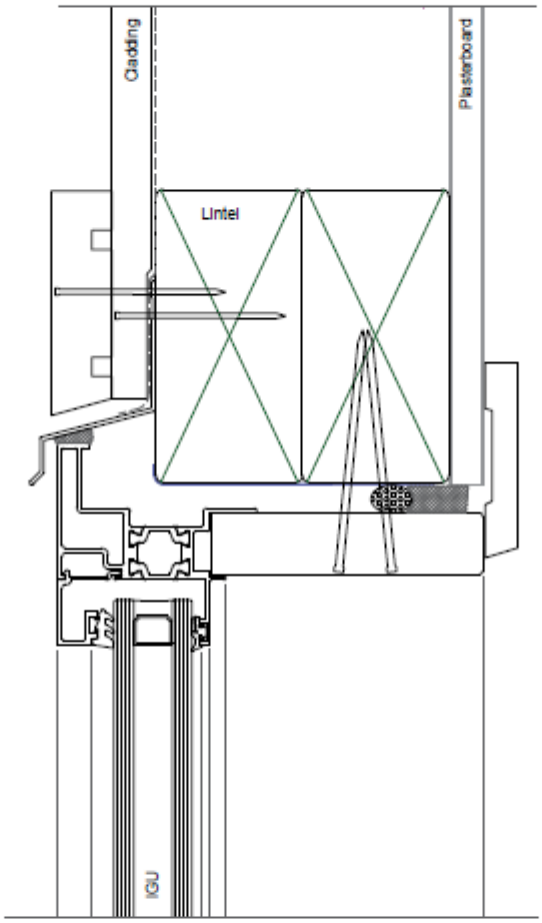
- Check all IGU's are sitting squarely within their frames and that they are free of blemishes. Refer to our website for more information on the Visual Quality of Glass and what defects are acceptable - https://www.wganz.org.nz/wp-content/uploads/2024/02/WG-460101.11-2024-Industry-Standard-for-Quality-of-Glass-in-Residential-Buildings-ver-1.1-20.02.24.pdf
- Check all drainage holes, both interior and exterior are clear of obstruction – dirt, dust, debris etc.
- Check and ensure all units operate correctly, including opening, closing, and handle/lock operation.
- Check all seals are fitted correctly.
- Sign off paperwork confirming job is checked and completed.

8.8.2 Clean up

- Work area is cleared, and materials disposed of, re-used, or recycled in accordance with legislation, regulations, codes of practice and job specification.
- Tools and equipment are cleaned, checked, maintained, and stored in accordance with standard work practices.

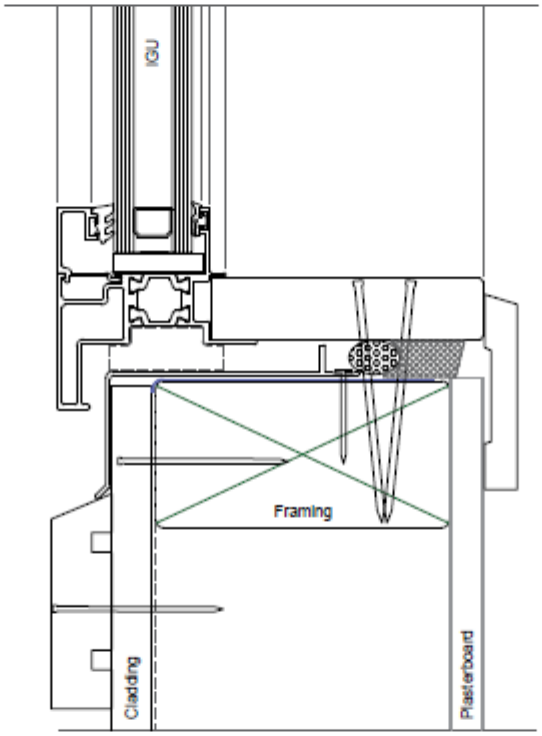
9.0 Appendix A

Generic Installation Details



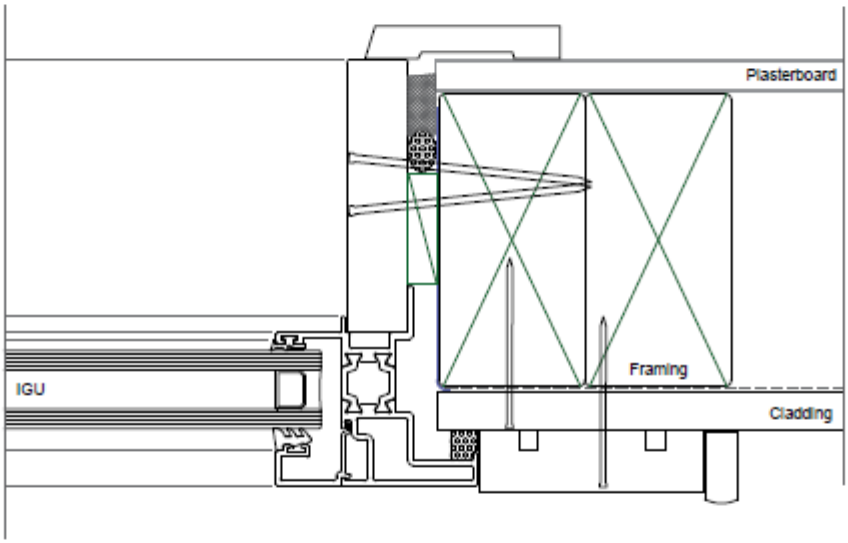
Head Detail

Generic Cladding



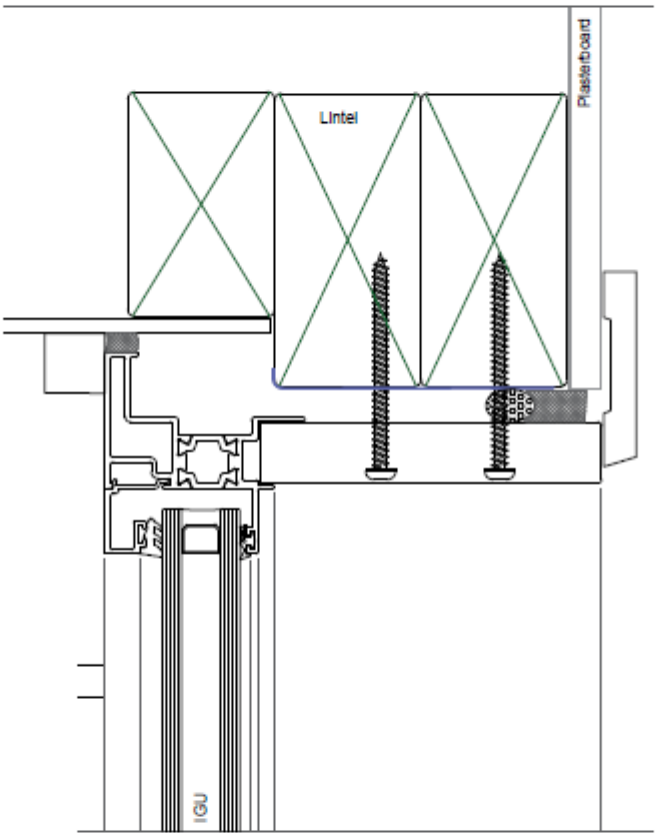
Sill Detail

Generic Cladding



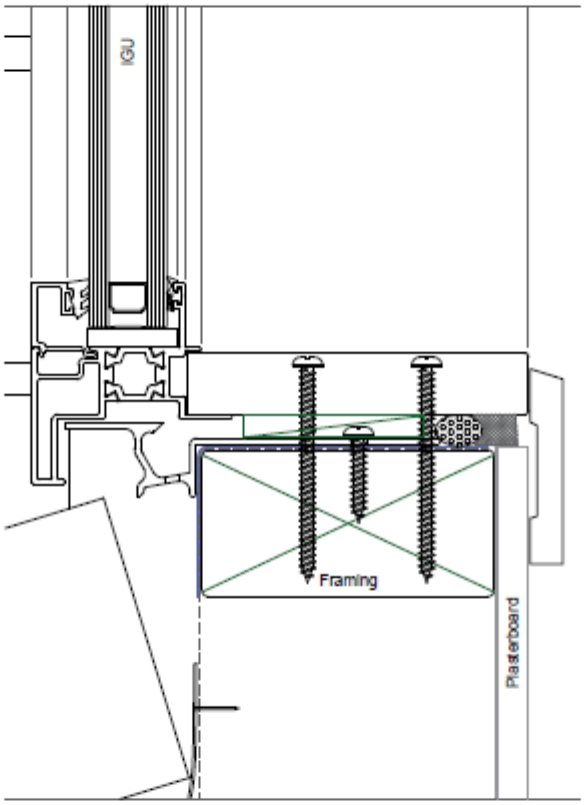
Jamb Detail

Generic Cladding



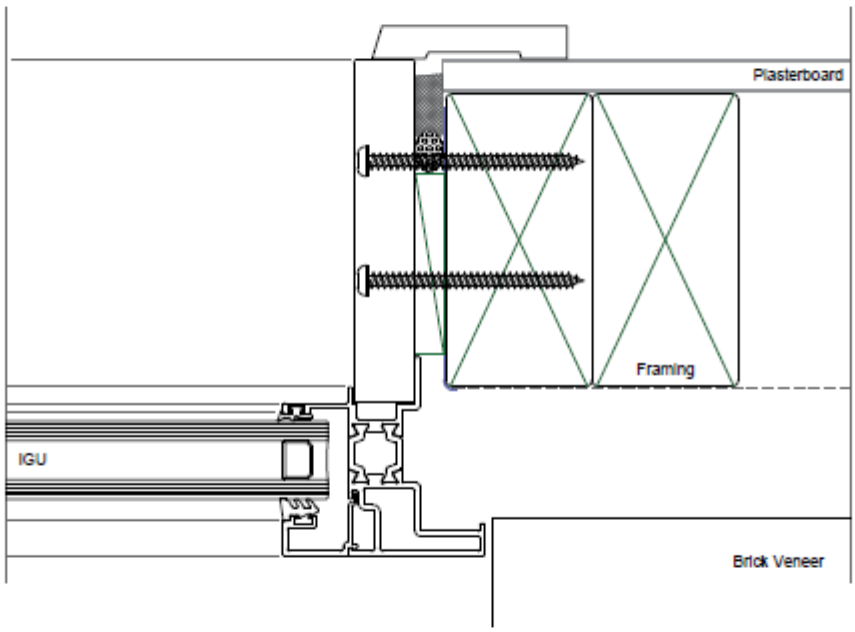
Head Detail

Brick Veneer



Sill Detail

Brick Veneer



Jamb Detail

Brick Veneer