Technical Update:
Timber windows: avoiding common failures
Water ingress around glazing

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Failures on developments that incorporate timber windows are increasing. These failures range from failing joint integrity, drafts and water ingress resulting in damage to internal surfaces.

This article forms one of a series of articles that aim to highlight those common issues and the practices that should be advocated to mitigate their occurrence.

A major cause of failure for timber windows is water ingress around glazing. Water enters into the space between the glazing and the frame via defects during periods of rainfall and can also happen during cleaning e.g. jet washing. This water often becomes trapped and sits in concealed areas for prolonged periods until it builds to a level at which it enters frame joints emerging on the inside as water ingress.

Provision of information

A full set of design drawings and specifications shall be made available to the warranty provider and all other interested parties prior to the production of any windows, doors or door sets.

The following should be available:

- A full specification of the glazing and the method of installation being adopted e.g. drained and ventilated, types of glazing tapes, gaskets, etc. in order to prove and demonstrate performance as set out by applicable British and European standards.
- Where glazing operations have been carried out in a factory controlled environment, all supporting evidence will be required to demonstrate testing has been carried out to:
    - BS6375-1, in relation to testing the air permeability, water tightness and wind resistance for windows and external doors. This demonstrates the weather performance of the product you have tested and also is a requirement in supporting any Energy Rating given for thermal performance.
    - BS6375-2, in relation to the performance requirements for the operation and strength of glazed, fully finished windows. This includes tests to measure the level of deflection in frame components when subjected to opening and closing cycles.
- Any product certification or manufacturers accreditations that support the proposed system, such as membership to any British Woodworking Federation Groups such as 'The Wood Window Alliance'.

It should be noted that where supporting test evidence or certifications/accreditations are not available e.g. bespoke window designs produced by small joinery workshops, a full specification for the windows shall be made available for review before production commences.

On-site testing at completion of the installation will be required. For guidance on site testing for water penetration' reference should be made to CWCT test methods e.g. Technical Note No. 41 for guidance on site hose testing methodology.

What is an Insulated Glazing Unit (IGU)?

An IGU, often referred to as a 'double glazed unit', is a combination of two panes of glass spaced apart with a spacer bar and sealed to form a single airtight unit with an air space in between.

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The difference between double and triple glazing is as the names suggest. Triple glazing has an additional pane of glass, thereby creating air two spaces instead of one. The extra glass pane and gap increase the window's heat and sound insulation properties compared to double glazing.

IGUs have often included low energy coatings to the inner pane and gas fill (such as argon) in the space in between panes of glazing that make up the unit.

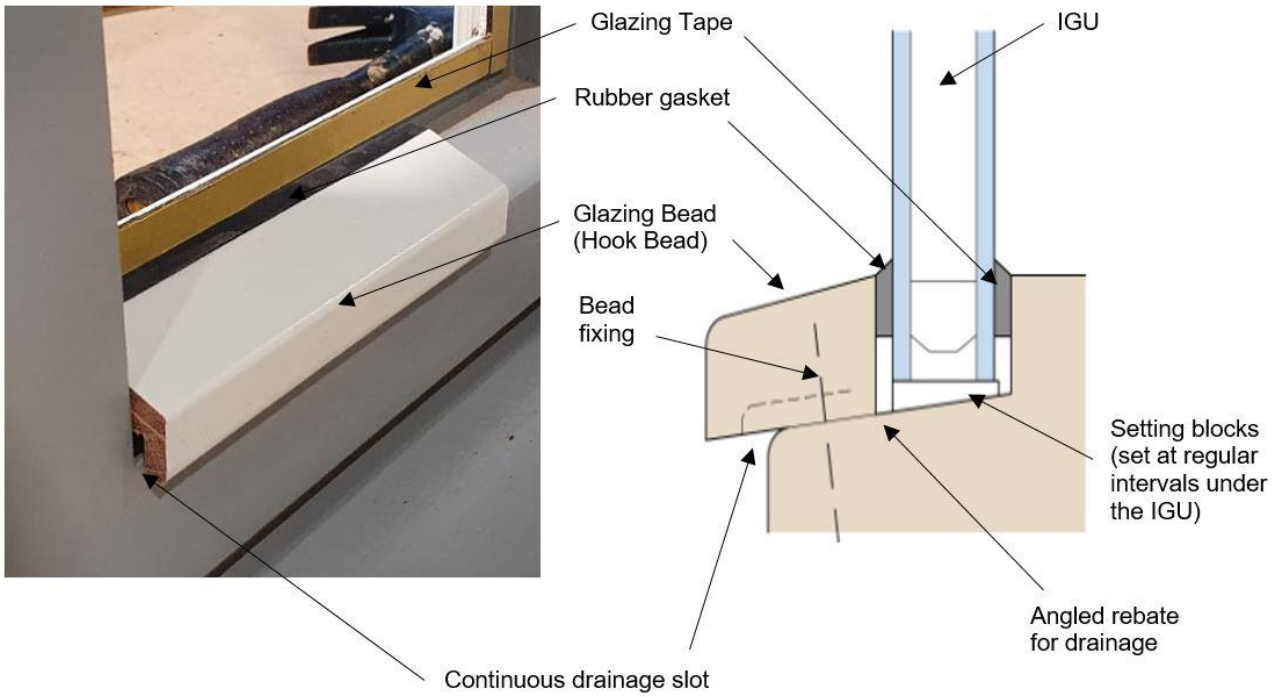
The use of IGUs referred to as 'double glazing' has been common within timber windows for a number of years. In the coming years, it is likely that an increase in the use of triple glazed units will become common practice to meet growing fabric energy standards.

Approaches to glazing with IGUs

'BS 8000-7 Workmanship on building sites — Code of practice for glazing' covers various methods that are applicable to the installation of IGUs. Of these however, within timber framed windows, we are likely to encounter the following approaches to glazing in most instances.

- Glazed from the outside using glazing tape with a drained and ventilated beading system

  IGUs are installed on setting blocks and secured using proprietary self-adhesive glazing tape. The external glazing beads can be timber or even aluminium, but all incorporate a gasket which exerts pressure on the IGU face to create a weatherproof seal when fixed into position.



Bead clips – often referred to as hook bead clips, as they 'hook into' the back of the bead to locate and exert pressure on the glazing face. Set at intervals they hold the bead clear of the glazing rebate and allow drainage.

Setting blocks keep the IGU elevated from the rebate (set at regular intervals under the IGU)

The lowest horizontal bead is set down on proprietary bead clip which holds the bottom bead higher than the surface of the glazing rebate to create a slot which allow drainage of water from the rebate. *Note: Often the bottom bead is referred to as a 'hook' bead, as they 'hook' or locate into the clip system they are installed upon, often referred to as a 'hook bead clips'.*

- <u>Glazed from the outside using glazing tape and sealant capping with a drained and ventilated beading system</u>

  IGUs are installed on setting blocks and secured using proprietary self-adhesive glazing tape. The timber external glazing beads incorporate a tape which exerts pressure on the IGU face when fixed into position.

  The joint between the face of the glazing and the glazing bead then receives a capping of a one or two part curing sealant. The lowest horizontal bead must allow drainage of water from the rebate.

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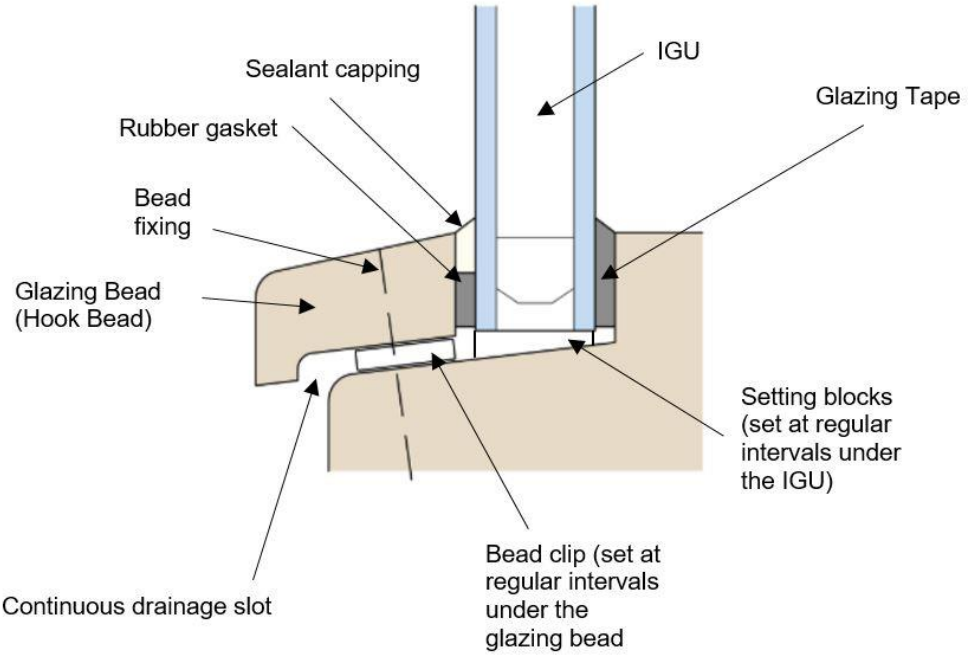


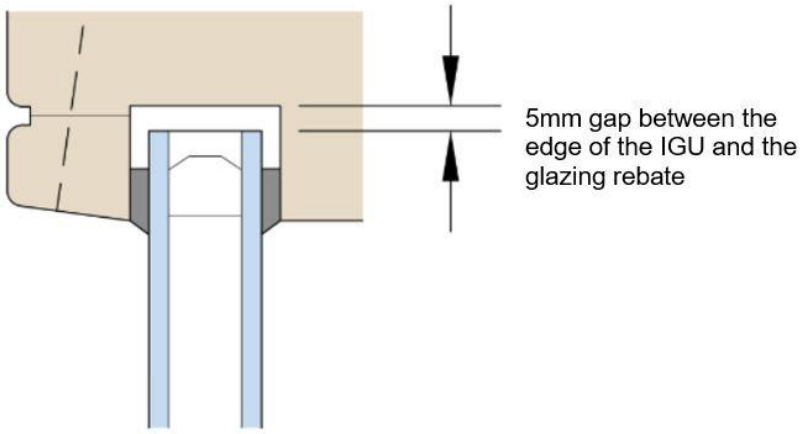
Common failures in IGU installation

One or more of the following are often present in failing installations. Each can contribute in allowing water to enter the glazing rebate and become trapped in the area under the glazing. This eventually causes IGUs to fail, or allows water to enter concealed parts e.g. the joints, eventually finding a passage to the inside face of the window. In winter, any trapped water can freeze contributing to the IGU's seals failure and it is not until the spring where misting in the IGU's occurs, can the issue be seen.

No allowance for drainage

The IGU has been set too close or touching the rebates of the frame and inhibits the drainage of water. A 5mm drainage path between the edge of the IGU and the rebate should be provided all round the IGU perimeter as this space allows any water that does penetrate seals to run to the bottom of the glazed area where it can drain out.

Section through head detail

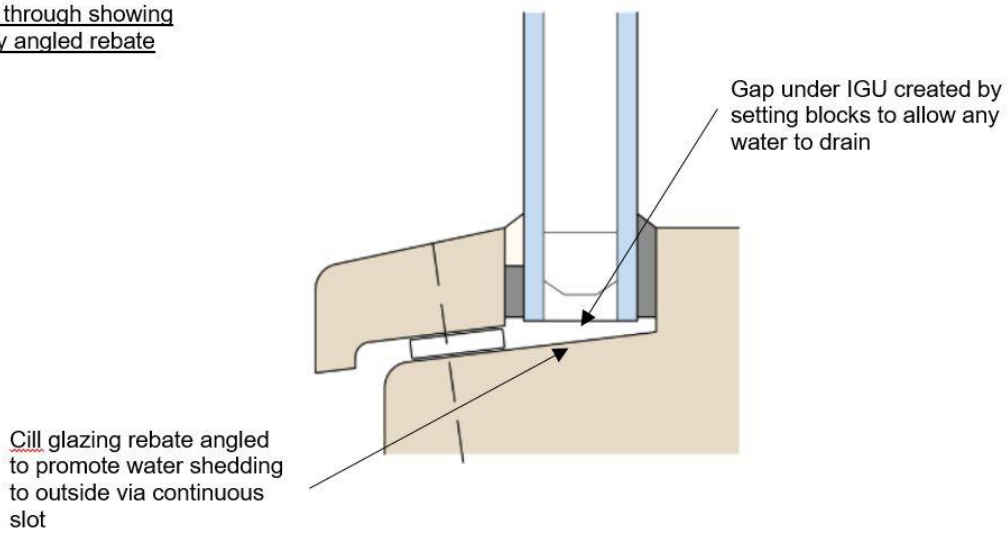


No setting blocks under the IGU

IGUs should be set into position using location and setting blocks. These blocks should be placed at intervals around the perimeter of the IGU. The spaces in between allow for any penetrating moisture to run to the bottom rebate and drain out.

The upper surface area of the cill rebate should be angled at a 1:10 (approximately 5.5° angle) so that any water driven into concealed spaces is directed out to the external face via a continuous drainage slot.

Section through showing correctly angled rebate



Failing glazing beads

Mitred beading often leads to joints opening in service giving a direct path to moisture at corners. At the junction of bottom bead and vertical beads, water penetrating this area either becomes trapped or is directed into concealed areas of the frame.

To ensure robust and sustained weatherproof details, glazing beads should not be mitred at joints but cut squarely. The top horizontal glazing bead should run the full width of the opening to protect the top of the jamb beads on either side and the wider bottom bead should also run the full width of the opening and project to conceal the drainage weep slot provisions below.

The side (jamb) beads should be cut to stop short of the bottom bead by 3mm – where the bottom bead has a 1:6 (11° angle) weathering slope on its top surface, the gap can be reduced at the glass face by cutting the ends of the side beads to a shallower pitch.

Image showing correctly scribed beading

Jamb bead cut short, with bottom bead and seals connecting with glazing to ensure water cannot run in through bead joints

The glazing beads should be securely fixed with non-ferrous pins or screws at a 200mm maximum spacing, starting at 50mm from corners to create a compression seal between the bead and the glass surface.

Incorrect use of sealant

The designed system of glazing has not been followed, and sealant has been used where it was not intended. Various systems can be used to seal contact points between glazed unit faces and beads e.g. self-adhesive dry glazing tapes, extruded gaskets, butyl tapes/gaskets with sealant capping. Importantly however mixing and matching approaches should be avoided and the ventilated and drained system must follow that proposed within designs.

On site operations that incorporate site applied capping sealant on drained and vented glazing systems should be executed in strict accordance with the design and specification.

Incorrect specification of sealant

In instances where butyl tapes/gaskets with sealant capping has been used, the use of an incorrect sealant specification can be the cause of many failures. Any voids that are created by shrinkage or lack of adhesion of the sealant will allow water through or become trapped resulting in water ingress or failure of the IGU.

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Warranty stance

For the purpose of warranty:

- Ensure that full specifications have been made available – in the event of a review as part of the risk management process, they should demonstrate how the aforementioned failure items have been avoided
- Fully bedding glazing units on sealant should not be accepted as a method to install IGUs as it leads to failures
- Drained and ventilated bead systems must be used for installation of IGUs
- Window systems should be supported by relevant testing – refer to Provision of Information for details.
- The warranty surveyor should receive sufficient information on the drained and ventilated beading system and how it is installed as part of the specification package for the windows – this must be followed

Timber windows should be preferably supplied to site fully finished and fully glazed to minimise the opportunity for moisture ingress to affect any part of the window during the build stage.

Ref: TS3209

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