



AAAMSA Fenestration

Selection Guide for SIGU Glazing Methods

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1. INTRODUCTION

The methods and practices outline in this General Specification are not intended to supersede manufacturers and fabricators patented or proprietary systems but provide basic and generic guidelines in the absence of such.

This standard does not preclude the use of patented or proprietary systems or other methods or systems of glazing, provided that the alternative method or system can be demonstrated to satisfy the requirements for correctly supporting the insulating glass unit within the frame, or glazing system..

2. GENERAL

The glazing methods described in paragraph 3 are suitable for:

- a. Glazing insulating glass units, in normal situations, into new frames; or
- b. Replacing failed or broken units in existing frames.

In other situations, for example, where there is a higher than normal level of condensation or where the rebates are contaminated by the previous glazing material, or where the rebate has been damaged by the removal of a unit, some minor variations on the basic methods may be equally acceptable.

Information on suitable variations should be obtained from the glazing material manufacturer or supplier.

The illustration of the glazing methods (see Figure 1, 2 and 3) are intended to indicate the design principles and the use of glazing materials. For clarity, setting and location blocks, distance pieces bead fixing and covers to holes or slots have been omitted from Figures 1, 2 and 3.

In Figures 1, 2 and 3, the glazing methods are illustrated in frames of the material or materials most likely to be used with them; however, the design of the rebate and beads is suitable, frames of other materials may also be appropriate.

3. METHODS

3.1 METHOD 1: GASKET SECTION – Drained method (See figure 1)

3.1.1 EXPOSURE RATING

The exposure rating varies from Category A1 to A6, depending upon the frame and gasket design.

3.1.2 FRAME SUITABILITY

The frames are typically aluminium, timber or uPVC, with flutes or nibs, or both, to accommodate the complementary gasket profile and with appropriate drainage design.

3.1.3 PROCEDURE

The procedure is as follows:

- a) Ensure the frame rebate surfaces and the beads are clean, and the timber frames are paint primed. If the frame is mechanically jointed, apply sealant to the frame joints, if this is specified by the frame manufacturer.
- b) If the gasket sections have not been supplied pre-cut to size, cut the gasket sections to the correct length. Where possible, gaskets should go round the frame in one piece, being nicked in the corners to ease bending, and with the joint at the top of the frame. Cut the gaskets slightly oversize to ensure that the gaskets are not under tension when assembled, which would result in creep-back in service. Fit the gaskets to the beads and to the frame upstand, where appropriate to the frame design.
- c) Place the setting blocks in the frame ensuring that the setting blocks do not obstruct drainage. Clean the perimeter of the unit with a dry cloth and insert the unit into the frame. Centralize the unit in the frame and fit location blocks as required.
- d) Apply pressure, either by insertion of the beads or by applying the beads and inserting the wedge-shaped gasket. The wedge-shaped gasket should be inserted at the corners first, then by working outwards from the centre. Check that there are no gaps at the corners of the frame.

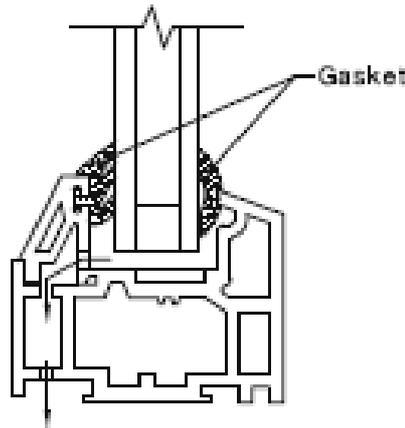


Figure 1 – Method 1

3.2 METHOD 2: GLAZING TAPES—Drained method (see Figure 2)

3.2.1 MATERIALS

The installation materials should be profiled closed cell synthetic rubber section with self-adhesive backing, closed cell synthetic rubber strip with self-adhesive backing, load bearing mastic tapes, pre-shimmed mastic tapes or foam tapes (see Figure 2).

3.2.2 EXPOSURE RATING

The exposure rating varies from Category A1 to A6, depending on the materials and design.

3.2.3 FRAME SUITABILITY

The frames are typically timber, metal or uPVC, with appropriate drainage design.

3.2.4 PROCEDURE

The procedure is as follows:

- (a) Ensure the frame rebate surfaces, the beads and the areas of the unit that will be in contact with the glazing material are clean and ensure that the timber and metal frames are paint primed. Apply glazing tape to the rebate upstand. In the case of the cellular section or strips, the cellular or strips should be applied in line with the sight line. In the case of mastic tapes, the mastic tapes should be applied slightly above the sight line.
- (b) Place a shaped setting block on the rebate platform ensuring that the setting block does not obstruct drainage. Insert the unit into the frame, centralize and insert location blocks if required. Apply pressure to bed the unit against the section, strip or tape.
- (c) Apply the glazing tape to the beads. Cellular sections or strips, and foam tapes should be applied in line with the sight line. Mastic tapes should be applied slightly above the sight line. Bed the beads to the glass by applying pressure to compress both the inside and outside glazing materials, and fix the beads in position. With pre-shimmed mastic tapes, the compression should be sufficient to ensure that the shims are in compression between the glass, the bead and rebate upstand.
- (d) Where timber beads are fixed with screws, the screws have to be less than or equal to 75mm from each corner and not greater than 200mm centre-to-centre. Where pins are used, the pins have to be greater than or equal to twice as long as the thickness of the bead and fixed at less than or equal to 50mm from each corner and less than or equal to 150 mm centre-to-centre.
- (e) Where load-bearing and pre-shimmed mastic tapes are used, trim the excess material that has been compressed above the sight line using a sharp knife. Where possible, trim the excess material to form a watershed.

Unless the units are relatively small, e.g. about 1m², it may be difficult to provide sufficient compression unless the glazing is carried out in the factory.

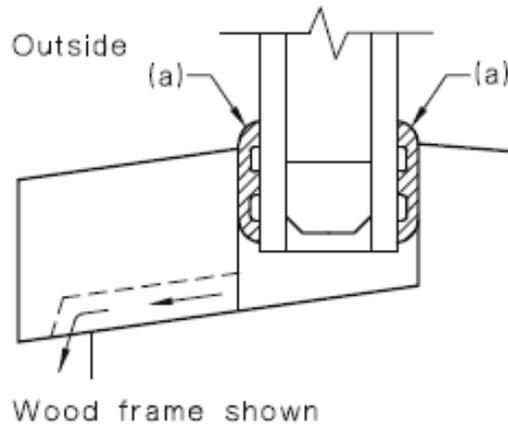


Figure 2 - Method 2

3.3 METHOD 3: GLAZING TAPES WITH SEALANT CAPPING—Drained method (see Figure 3)

3.3.1 MATERIALS

Load bearing or pre-shimmed mastic tapes or cellular adhesive section, and sealant capping.

3.3.2 EXPOSURE RATING

The exposure rating varies from Category A1 to A6, depending on the materials and design.

3.3.3 FRAME SUITABILITY

The frame should be timber or metal, with suitable drainage.

3.3.4 PROCEDURE

The procedure is as follows:

- a) Ensure the frame rebate surfaces, the beads and the areas of the unit that will be in contact with the glazing materials are clean, and that the timber and metal frames are paint primed and clean.
- b) Apply the glazing tape to the rebate upstand with the top edge set approximately 6 mm below the sight line.
- c) Place a shaped setting block on the rebate platform, to ensure that the setting block does not obstruct drainage. Insert the unit into the frame, centralize and insert location blocks if required. Apply pressure to bed the unit against the tape or strip.
- d) Apply glazing tape to the face of the bead or the face of the insulating glass unit, set approximately 6mm below the sight line, taking care that the drainage or ventilation is not obstructed.
- e) Bed the bead to the glass, compressing both inside and outside glazing tape. Fix the beads in position. Where timber beads are fixed with screws, the beads have to be less than or equal to 75mm from each corner and not greater than 200mm centre-to-centre. Where pins are used, the pins have to be greater than or equal to twice as long as the bead thickness and fixed at less than or equal to 50mm from each corner and not greater than 150mm centre-to-centre.
- f) Apply sealant capping on both sides of the glass and tool to a smooth chamfer to shed water.

NOTE: In some situations the capping sealant may not be required on the inside and the glazing tape can be fitted as per method 2.

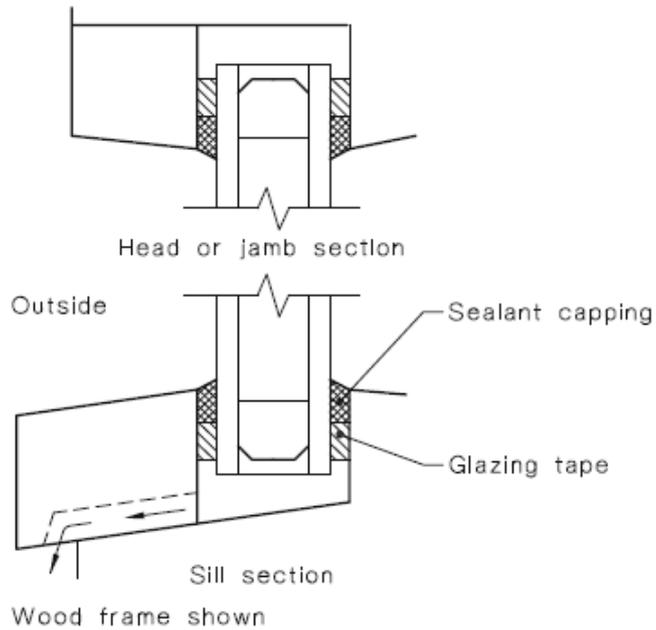
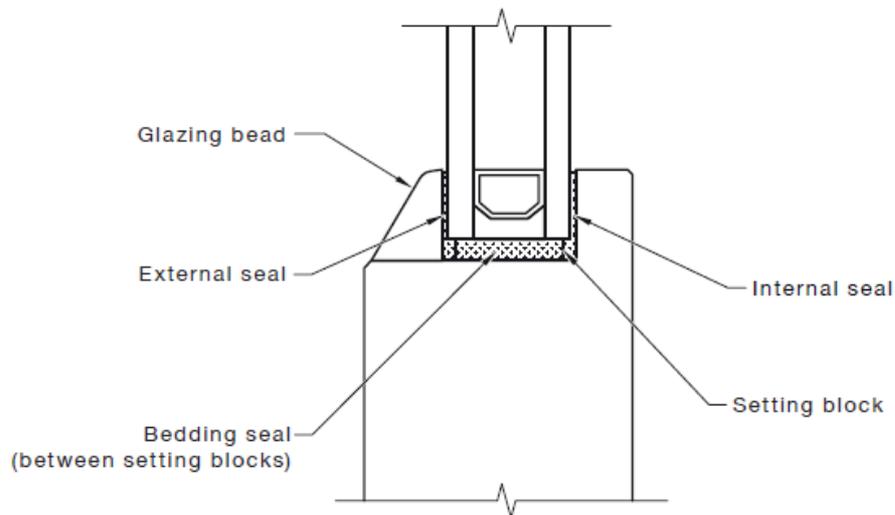


Figure 3 - Method 3

3.4 NON-DRAINED GLAZING METHODS

Glazing methods such as ‘solid bedding’ that use sealant to bed the unit or tapes, or both, and sealant capping beads to provide internal and external weather seals are the subject to specific design recommendations of the unit manufacturer. The sealant types, adhesive properties and compatibility with the unit seals are critical to the performance of the unit. See Figure 4.



Example of non-drained glazing system

FIGURE 4 Non drained system (Timber)

3.5 CHANNEL GLAZING

Channel glazing material is available in rolls or strips which are cut to be wrapped around the perimeter length of the insulating glass unit. As a common practice, the channel is clipped at the corner to fit. Framing members are then pressed into position over the boot. These framing members are then joined and fastened at the corners.

Since the channel wraps around the edge of the insulating glass unit, it may and usually does come in direct contact with the insulating glass edge sealant. Therefore compatibility must be checked. It should not be assumed the materials are compatible. The insulating glass manufacturer or the sealant manufacturer should conduct the tests.

The channel is extruded as a continuous strip. Weep holes, a minimum of 10mm in diameter, are essential and should be punched through the section that covers the bottom edge area of the insulating glass unit. They should be spaced at 100mm to 150mm on centre around the perimeter of the insulating glass unit.

The frame system weeping along with the channel system weeping should be designed to adequately drain moisture from the system. Clipping the corners does not provide an adequate, positive weep system. Setting blocks may have to be modified to suit the framing system but must be suitable for their intended function. See Figure 5.

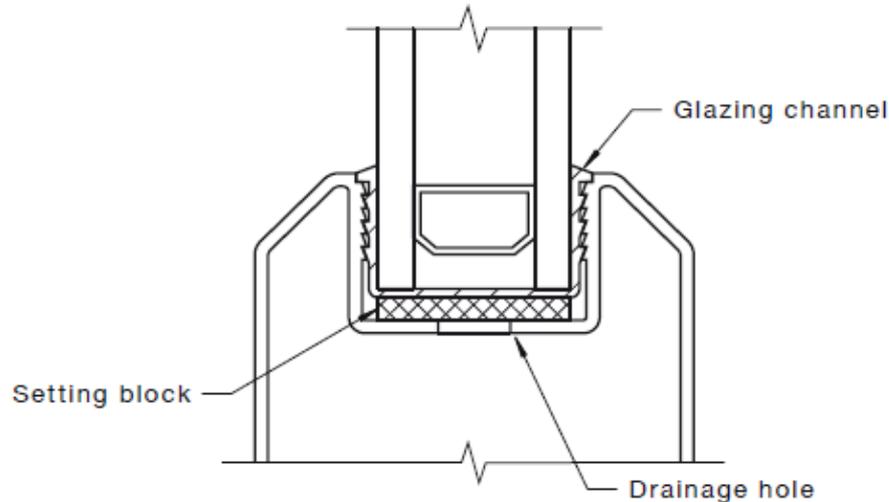


Figure 5 - Channel glazed system

3.6 STRUCTURAL SILICONE GLAZING

The unit is retained only by a structural silicone sealant. Special care should be considered in the design and execution of adhesive joints. A seal failure of a unit glazed without exterior stops could result in the exterior lite falling from the building. In the design and installation of units for structural silicone glazing, the following should be considered:

- a) The adhesion characteristics of the structural silicone sealants used should be tested with the corresponding spacer, corners, frame members and glass with any applied coatings. Tests should be repeated with each batch of component materials.
- b) The compatibility of all components in contact with each other including sealants, unit assembly sealants, setting blocks, gaskets and joint backers should be verified with the component suppliers.
- c) Sealant selection should withstand long term weathering effects including solar ultraviolet radiation, temperature extremes and water exposure. Many silicone sealants which are satisfactory for conventional glazing are not capable of meeting this criteria.
- d) Approximately 50% of the negative wind action on the unit is normally carried by the insulating glass silicone secondary sealants. In the event of insulating glass unit seal failure or inner lite breakage, an increase of the negative wind action could be imposed on the insulating glass sealants.
- e) The insulating glass unit assembly sealant and the structural silicone sealant should be able to accommodate all movements of the structural frame and glass caused by wind, live and dead action deflection and thermal expansion.
- f) Seals at the edges of the exterior glass components are weather seals and their width and elasticity should be such that excessive stresses are not transferred to the insulating glass unit. Setting blocks may have to be modified to suit the framing system, but should be suitable for their intended function.
- g) Heat treated glass should be used for the offset unit at a corner condition (see Figure 6).

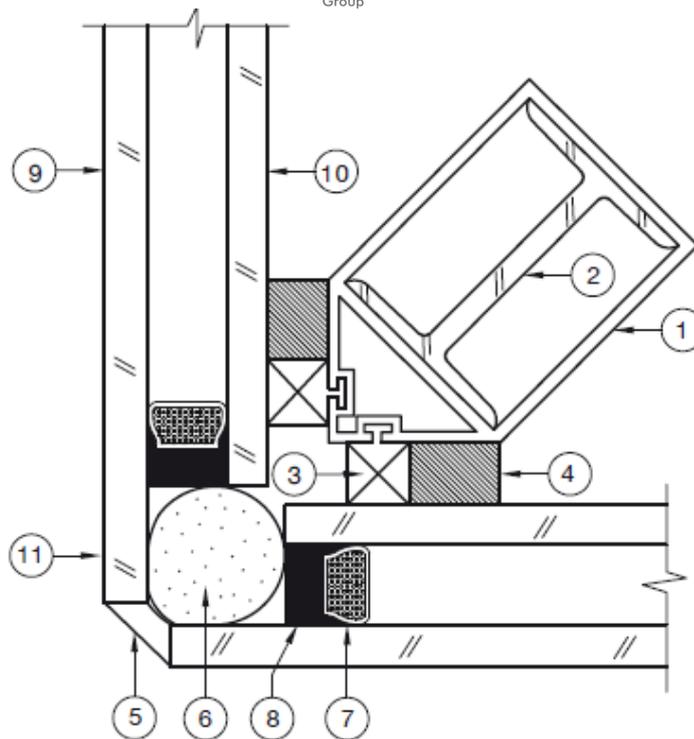


Figure 6 - Heat treated glass used at a corner

LEGEND:

1. = mullion—structural sealant adhesion to be confirmed with sealant manufacturer
2. = stiffener—if needed
3. = spacer block—50 to 70 durometer, minimum of 3mm from glass edge, compatibility to the structural silicone sealant to be confirmed by the sealant manufacturer
4. = structural silicone—type and dimensional requirements to be determined by sealant manufacturer
5. = silicone weather seal—type and dimensional requirements to be determined by the sealant manufacturer
6. = backing rod—closed cell polyethylene, 50 to 70 durometer. Have the compatibility of the backing rod to the insulating glass edge seal and the weather seal verified by the sealant suppliers
7. = insulating glass spacer
8. = insulating glass edge seal—direct contact with weather or structural seal to be avoided
9. = outside glass surface
10. = inside glass surface—surface may be coated or opacified, compatibility and adhesion to the structural sealant to be verified by sealant manufacturer
11. = insulating glass extended edge—for aesthetic appearance only, non-load bearing

NOTE: For more information on structural glazing refer to Competent Person (Glazing).

4. PRINCIPLES OF GLAZING

4.1 INTRODUCTION

The methods and practices outlined in this part are not intended to supersede manufacturer's and fabricators' patented or proprietary systems but provide basic and generic guidelines in the absence of such.

This Standard does not preclude the use of patented or proprietary systems or other methods or systems of glazing, provided that the alternative method or system can be demonstrated to satisfy the requirements for correctly supporting the insulating glass unit within the frame, or glazing system.

4.2 THERMAL STRESS BREAKAGE

Thermal breakage in annealed glass is cracking due to a build-up of excessive thermal stress from a differential in temperature gradient across the glass.

It is recommended that a thermal stress analysis be undertaken for all insulating glass units incorporating solar control glass. If a glass is deemed thermally unsafe, then the glass should be toughened glass.

There are many factors that affect thermal stress. The higher the solar absorption of the glass, the more risk.

Some factors that affect stress include: (Consult Competent Person (Glazing))

- (a) shading from frame depth or shading devices;
- (b) the type and colour of the frame;
- (c) the presence of a backup wall or blinds;
- (d) the colour of the blinds or wall;
- (e) the distance of the blinds or wall to the glass;
- (f) whether or not the gap is ventilated;
- (g) the application of films to the glass surface post installation;
- (h) transient shading from trees or structures;
- (i) the use of tinted, reflective and Low E glass.

Modification of any of these factors will impact on the thermal breakage safety of the glass.

4.3 MOISTURE ATTACK

A major enemy of insulating glass units is water. If water is trapped against the edge seal of a unit for a long period, this will result in failure of the adhesive bond of the sealant to the glass. This will allow water or water vapour, or both, to pass between the edge sealant and the glass, leading to excessive water vapour in the unit cavity and, ultimately, to condensation on the internal glass surface. When this occurs, the unit is deemed to have failed.

Water in the form of water vapour is able to permeate through the edge sealant into the unit cavity. The rate of permeation of water vapour is dependent on the properties of the edge sealant, and on the concentrations of water vapour, both within and without the unit. However low the rate of the water vapour permeation is, it is inevitable that after a period of time, excess water vapour in the unit cavity will build up and condensation on the internal glass surfaces will result, which will affect the aesthetics of the unit.

Moisture can penetrate to the rebate area, either through or around the glazing system or through frame joints into the glazing system from a variety of sources, such as:

- (a) rainwater;
- (b) window cleaning operations;
- (c) condensation within the frame sections;
- (d) condensation on the room side glass surfaces.

All glazing systems have to protect the edge seal of the unit, either by preventing access of water to the seal or by ensuring that any water that penetrates as far as the edge seal is soon removed by drainage of the rebate area. The use of open cell foam, or timber blocks which absorb moisture and hold it against the edge sealant, should be avoided.

Glazing methods for insulating glass units fall into two groups, known as follows:

- (i) Drained methods, including pressure-equalized systems.
- (ii) Non-drained or solid bedding methods.

Drained methods are based on the principle that some water may penetrate the glazing space and, while this is kept to a minimum, provision is made in the design of the frame to ensure that any water that does penetrate is removed by drainage and ventilation.

Non-drained or solid bedding methods protect the seal of the unit by embedding the edge in a compound or sealant, to prevent ingress of moisture; however, the methods are reliant on workmanship, the durability of the seal and their completeness. Cavities can occur.

4.4 COMPATIBILITY

Edge seal have different compatibilities with different glazing materials. An edge seal and a glazing material are considered to be compatible if the edge seal and the glazing material are in direct contact with each other. The performance of either is not reduced in any way because of that direct contact. When using glazing methods, where there is likely contact between the edge seal and the glazing material, it is essential to check with unit manufacturer that the edge seal and the glazing material are compatible.

Compatibility problems can also occur without direct contact where run-off or leaching from one material can affect another.

Some units are provided with an edge tape. In such cases, it is also essential that a check be made with the unit manufacturer to ensure that the tape is compatible with the glazing material. Where the tape is not compatible, the tape should be removed before installation.

4.5 SOLAR RADIATION EXPOSURE

The edge seal on most units can degrade if exposed to sunlight or UV. Therefore, it is important to ensure that rebates provide full cover of the seal on a flush-edged or stepped unit. The exception to this rule is the special silicone sealant used to manufacture insulating glass units specifically designed for structural glazing and solar exposure applications.

4.6 FRAME DESIGN

4.6.1 DIMENSIONS

The minimum dimensions for edge clearance, edge cover, front clearance and back clearance, for individual frame glazing of insulating glass units are as follows (see Figure 1.1):

- (a) Edge clearance:
 - (i) Sill (bottom of pane) min. 6.0 mm.
 - (ii) Head (top of pane) and jamb (sides of pane) with unit height < 2000 mm min. 3.0 mm.
 - (iii) Head (top of pane and jamb (sides of pane) with unit height > 2000 mm min. 5.0 mm.
 - (iv) Protrusions (e.g. screw heads, rivet heads) min. 3.0 mm.
- (b) Edge cover for all types of units min. 12 mm.
- (c) Front and back clearances for all types of units, including protrusions min. 2.0 mm.

The primary objective is to ensure that there is no glass to metal (frame, screw, rivet head and the like) contact.

4.6.2 DRAINED GLAZING SYSTEMS

4.6.2.1 GENERAL PRINCIPLES

All glazing systems for drained frames should have both, internal and external seals designed and applied to prevent the passage of water either around or through the seal. The drainage system of the frame is intended as a backup for these primary seals. The drainage system has to ensure the rapid removal of any water that may penetrate the rebate platform.

The rapid removal of water from the glazing area to the outside is best achieved by the incorporation of a sloping platform. A slope of 1 in 6 (15°) is generally recommended for the bottom platform of a timber frame with a shaped setting block.

Alternatively, gutters with holes may be used for aluminium or uPVC frames.

To ensure the passage of water, a typical system may include three drainage holes with a minimum diameter of 10mm or slots of 20mm × 5mm minimum. It is difficult to ensure the removal of all water from the glazing area by drainage alone.

Water may be trapped or may be held by surface tension, either as droplets or between opposing surfaces, even though the design should prevent this happening. Some additional ventilation is, therefore, necessary to dry out these areas. This is particularly true of frames with horizontal glazing platforms.

There may be problems where the top edge of an insulating glass unit forms a collection area for moisture. Where this is likely to occur, the moisture cannot be removed by drainage, and ventilation is essential to remove the moisture. The design of drainage and ventilation systems is a complex matter and has to be considered in conjunction with the sealing system used in the glazing. The degree of ventilation achieved is not only dependent upon the size of the ventilation holes or slots, but also upon the position and accessibility of the holes and slots to prevailing winds. Slots of 20mm × 3mm can be adequate for ventilation in exposed parts of the window, but further ventilation is probably necessary in more protected parts.

To prevent wind-driven water being carried into the frame section, all holes and slots should be protected, either by fitting hoods or by forming the slots in a position in the frame where the slots are not subject to direct wind and weather conditions.

In general, there should be:

- (a) a drainage hole near each end of the sill member;
- (b) between the corner and the setting block;
- (c) a central drainage hole; and
- (d) additional holes as necessary.

Ventilation slots may be necessary at the head of the window and at each end of the head member, to ensure ventilation at the top of the unit.

It is advisable to mark the top of some factory-glazed, fixed light windows, as the difference between the head and the sill, with respect to drainage and ventilation, may not be immediately obvious. Similarly, for site-glazed windows, top and bottom beads should be identified.

Example of drained glazing systems and typical positions for drainage holes are shown in Figure 7 and Figure 8, respectively. The frame manufacturer should be consulted to ensure the frame meets all the design requirements.

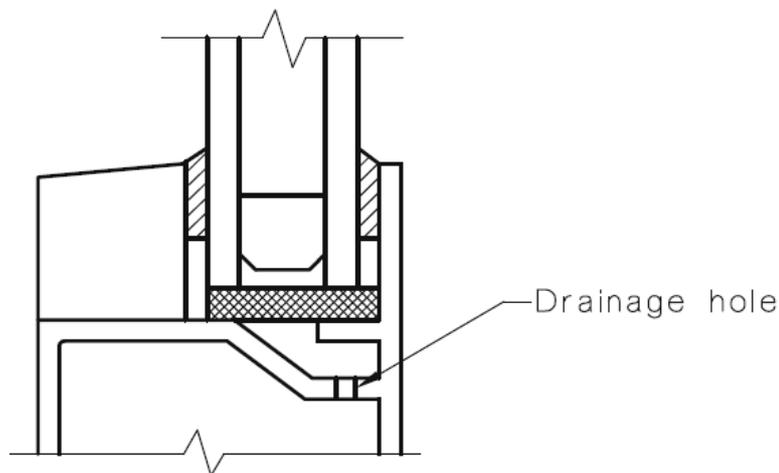


Figure 7 – Example of drained glazing systems

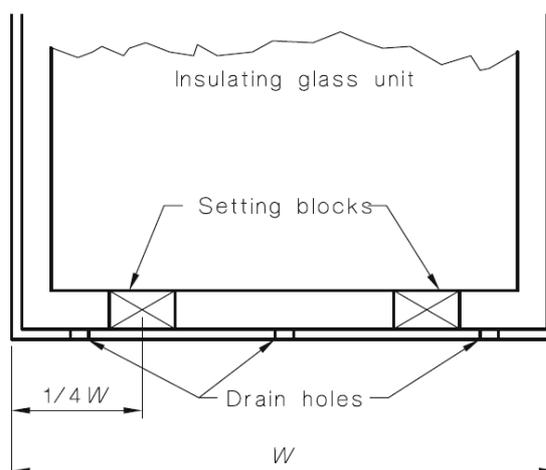


Figure 8 – Typical position for drainage holes

4.6.2.2 EDGE CLEARANCE

Edge clearance is necessary to prevent frame-to-glass contact and to prevent water from bridging between the rebate platform and the edge seal of the insulating glass unit. Edge clearance can be compromised by the projection of screw heads or rivet heads into the space.

4.6.2.3 EDGE COVER

Edge cover is required around the edge of an insulating glass unit, to provide both adequate mechanical support for the unit and to protect the edge sealant of the unit from solar radiation.

The rebate upstand and bead provide mechanical support against wind action. The amount depends on the type and thickness of the glass and the degree of exposure of the building. Advice on the cover should be obtained from the glass supplier or the specialist design consultants; however, the edge cover should be not less than 12 mm.

The rebate upstand and bead also provide protection for the edge sealant from solar radiation; however, in some cases, for example with steel frames, some protection can be obtained from the glazing material, which can be sloped to finish several millimetres above the sight line. For most insulating glass units, the minimum edge cover should be 12mm for the protection of the edge sealant. For units made with internal colonial bars or grids, a minimum edge cover of 15mm is recommended.

4.6.2.4 REBATE DEPTH

The rebate depth should provide adequate edge cover to protect the edge sealant from solar radiation, allow sufficient edge clearance for good drainage, and should take into account the size deviations for both the unit and the frame.

The following example for a timber frame describes how the actual edge clearance, and hence, the rebate height is affected by the deviations of the frame's tight size and the unit's size.

Example:

For a unit less than 2000mm long, which requires a minimum 3mm edge clearance at the sides and top, and 6mm in the bottom rebate and which also requires 12mm of edge cover, a minimum rebate depth of 18mm (12mm + 6mm) at the bottom is required and 15mm (12mm + 3mm) is the minimum at the head and jamb. This will give adequate drainage and protection of the edge sealants, around all four edges, for most, but not all of the combinations of frame and unit sizes.

The required rebate depth is the sum of the required edge cover plus the actual edge clearance. An allowance for manufacturing tolerances for both the glass and frames should also be made.

The required nominal size of a unit is calculated from the nominal tight size of the frame.

4.6.2.5 REBATE WIDTH

The width of the rebate platform should be sufficient to provide the required front and back clearances, and to provide sufficient contact of the glazing beads onto the platform. The width of the rebate platform should be equal the sum of the front and back face clearances, the nominal thickness of the unit, the width of the bead and an allowance for the deviations on the unit and bead thickness.

For example, in order to achieve 3mm of glazing material for each side of the unit, for a 14mm unit, the rebate platform should be 14mm + 6mm + the width of the bead, plus an allowance for the deviations on unit thickness, say 1mm, making a total of 21mm plus the width of the bead.

4.6.2.6 BEADS

Glazing beads should have a height equal to the rebate height and a width in contact with the rebate platform greater than or equal to the height, to enable firm fixing of the bead to be achieved.

Preferably, top and side beads should not project beyond the face of the frame, and should be flush with the face. If the top beads project, this will encourage water penetration, which could reduce the life of the unit; therefore, additional sealing of a projecting top bead is required.

The bottom bead should not be recessed in from the face of the frame and should preferably project beyond the face.

4.6.3 NON-DRAINED GLAZING SYSTEMS

All glazing systems for non-drained frame design should have internal, external and bedding seals that prevent the passage of water either around or through the seal. Water that passes these seals cannot drain and will cause premature failure of the unit.

The glazing sealant types, their adhesive properties and their compatibility with the unit seals are critical to the performance of the unit and are therefore subject to specific design recommendation of the unit manufacturer.

The frame design, such as edge cover, edge clearance, rebate size and bead design are similar to those for drained glazing but are subject to specific design recommendations from the unit manufacturer.

4.6.4 UNSUPPORTED EDGES

Specific design should take into account the edge deflection of insulating glass units with unsupported edges. The manufacturer should be consulted concerning the effects of deflection of the edge seals.

5. SLOPED OVERHEAD GLAZING

5.1 LEGAL REQUIREMENT

Sloped overhead glazing must be signed off by Competent Person (Glazing) and/or Competent Persons (Structures).

5.2 DESIGN AND GLAZING

For sloped and overhead glazing, the following should be considered:

- (a) Use a glazing system especially designed and engineered for sloped glazing.
- (b) Use design actions and design data for sloped glazing, not for vertical glazing.
- (c) Provide adequate edge clearances and edge cover for the units.
- (d) Support individual unit load weight with shoes or transoms.
- (e) Protect all edge seals from UV and sunlight exposure if not structurally glazed.
- (f) Use only sealants that are compatible with the insulating glass unit seals, gaskets, glass and frame.
- (g) Maintenance, such as cleaning and traffic.
- (h) Solar control glasses to control glare and solar heat gain.
- (i) Thermal stress breakage causes, such as shading flashings and structure backups
- (j) The best airspace and glass type, to provide the best insulation (U-value).
- (k) Ventilation, condensation and the effects of air conditioning systems.
- (l) Ensure rain water and condensation drain from the glazing system.
- (m) The weight of the insulating glass unit when determining the sizes of the insulating glass unit.
- (n) The effects of unit deflection on seal and aesthetics.
- (o) Glass selection.

ANNEX STORAGE, HANDLING, TRANSPORT AND PRESERVATION (Informative)

1 TRANSPORT AND STORAGE

Units should be transported and stored so that panes of glass are equally supported on a 90° angle rack (see Figure App 1).

Units should not be stacked more than six deep without intermediate support for each stack. For units of various sizes, the largest unit should be stacked against the supports.

Additional consideration should be given to the clamping of an insulating glass unit when being loaded onto a vehicle for transportation purposes. Care should be taken that both, the position and pressure of clamping devices does not apply excessive force onto unsupported areas of the insulating glass unit.

2 HANDLING AND PRESERVATION

Units should not be covered in plastic for weather protection, as this will allow condensation to accumulate, which may damage the edge seal.

Units should be handled with care to prevent damage to the glass and edge seals. Extreme care should be taken when handling with suckers, as this can put undue stress on the edge seal.

3 SPECIAL INSTALLATION CONSIDERATION

Units intended for glazing or transportation 650m above sea level, or both, should be referred to the manufacturer for consideration.

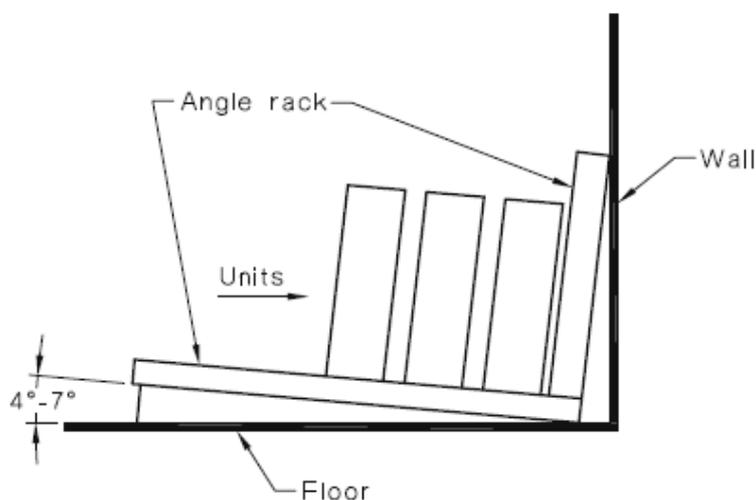


Figure App 1 Recommended transport and storage configuration