

## Narrow Cavity Insulating Glass Units (IGU's) with Reduced Spacer-bar Sightlines

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## Scope of Guidance

**This guidance document is to provide technical guidance to manufacturers and specifiers of Narrow Cavity Insulating Glass Units (IGU) with cavity widths of 8mm or less and with reduced spacer-bar sightlines. Typically these reduced sightline IGU's are required to have spacer-bar sightlines that are less than the usual minimum sightline depth, determined by the depth of the spacer-bar and the minimum sealant depth stated by the sealant manufacturer. This guidance document does not apply to narrow cavity IGU's with spacer-bar sightlines of usual dimensions. Refer to GGF Datasheet 4.2 for these units.**

**NOTE:** This guidance document does not cover vacuum glazing technology in its scope.

## Definitions

**Cavity Width** – the distance in millimetres between the cavity surfaces of 2 adjacent glass panes.

**Centre pane U-Value** – Overall heat transfer co-efficient of the glasses and cavities, including the gaseous medium between the panes and is a measurement of thermal performance, the higher the number, the higher the heat transfer (loss). The centre pane U-value does not take into account the thermal transmittance of the edge seal (spacer-bar and sealant(s)).

**Desiccant** – material carried by the spacer system to remove moisture from the cavity.

**Insulating Glass Unit (IGU)** – An assembly consisting of 2 or more panes of glass, separated by one or more spacers, hermetically sealed along the periphery, to provide a mechanically stable and durable product.

**Sightline** – Sightline refers to the height, measured in millimetres, from the edge of the IGU to the top of the spacer-bar i.e. the spacer-bar and sealant combined.

**Spacer-bar** – A component used to separate the glass panes and control the width of the cavity at the edge of the IGU. There are many forms the most common being:

- Tubular which requires filling with desiccant;
- Foam formulation of inorganic material incorporating desiccant.

**System or System description** – make-up of the IGU edge detail – Spacer-bar & Sealants.

## What is a Narrow Cavity with Reduced Spacer-bar IGU?

For the purposes of this guidance document, an IGU is considered to be a Narrow Cavity, Reduced Sightline IGU where the cavity between the glass panes, is 8mm or less, and typically having spacer-bar sightlines less than the overall spacer-bar height plus the minimum sealant depth required by the sealant manufacturer, i.e. sealant depth less than manufacturers minimum.

### Where are Narrow Cavity IGU's used?

Narrow cavity units are specified for use in certain geographical locations and for various reasons. They are often specified for the replacement of single glazing in existing frames and complete replacement windows in historic/ listed buildings and conservation/Article 4 areas. In these situations, where low visual impact of glazing bars is required by the planning authorities, standard cavity IGU's with sightlines of about 10mm or more, are not considered suitable on aesthetic grounds or the existing frame dimensions cannot accommodate them as the spacer-bar may project and be visible above the frame rebate/bead sightline. In many cases the framing material will be timber.

Narrow cavity IGU's are also extensively specified for extensions or new build projects where low visual impact of glazing bars is required either by planning authorities or architects. These are usually glazed into timber window systems.

## Important Points to consider when using or specifying Narrow Cavity or Reduced Sightline IGU's

### 1 Compliance with relevant product standards:

- Ensure that the manufacturer has BS EN 1279-2 & -3 test reports for IGU's with the specific cavity width, gas type & edge-seal specification (sightline). This test evidence is required to demonstrate the IGU is manufactured in conformity with the harmonised European Standard and to enable the IGU manufacturer to place the product on the market under the Construction Products Regulations (CPR) and CE label the IGU. Many IGU manufacturers may test IGU's with a 12mm cavity and use these results to show all IGU's manufactured, with a range of cavity widths, conform to the product standard. This is the case with all units except those with reduced sightlines as the performance of the IGU under these tests is a function of the sealant depth and therefore sightline dimension.

- Narrow cavity IGU's with reduced spacer-bar sightline units should only be accepted if the manufacturer can produce specific evidence to show that the units, with the reduced sightline, have been tested to the relevant parts of BS EN 1279 parts 2 and 3 with supporting BS EN 1279 part 4 evidence and the manufacturer's system description for these units shows the actual system being supplied, not a variation of their standard IGU, using system description tolerances to bring the narrow cavity IGU with reduced spacer-bar sightlines, into the scope of the manufacturer's standard IGU's.

- The edge-seal sealant depths shown in the test evidence should match, within accepted tolerance, the sealant depth being supplied. This sealant depth tested and shown in the manufacturer's system description is subject to manufacturing tolerances but should not be less than the sealant manufacturer's minimum, when subject to the maximum negative tolerance.

- The manufacturer operates a Factory Production Control in accordance with BS EN 1279 part 6 to ensure all components used in the manufacture of the Narrow Cavity, Reduced Sightline IGU, such as initial moisture content of the desiccant, are within the required tolerances.

### 2 Compliance with building regulations or building standards thermal requirements:

- Compliance with current Building Regulations or Building Standards for windows in relation to thermal insulation (whole window U-value) may not be possible when narrow cavity IGU's are used due to the centre pane U-value of the IGU, even when the cavity is gas filled, being worse than that of an IGU with a wider cavity. Advice from local authority building control or planners may be required when installing new frames with this type of IGU fitted.

### 3 Service life expectancy of the Narrow Cavity, Reduced Sightline IGU's:

- In order to produce reduced sightline IGU's, it will usually require a reduction in the edge seal depth of the IGU. This reduction may be the result of a reduction in the height of the spacer-bar or a reduction in the depth of the perimeter sealant applied or a combination of both.

## Important Points to consider when using or specifying Narrow Cavity or Reduced Sightline IGU's

- As a general rule of thumb, as the IGU cavity width decreases, the thermal performance of the IGU also decreases (centre pane U-value increases). This may be offset by using a better insulating gas within the cavity but this may have implications on cost-effectiveness in terms of energy saving versus additional cost of the IGU.
- In standard IGU's, the manufacturer's recommended minimum combined spacer-bar height plus sealant depth will provide a substantial service life. Anything less than this minimum, with currently available IGU edge seal technology, may have a service life of 5 years or less, although this is dependent on the other factors. The expected service life of an IGU is also dependent on the glazing system (compounds) employed and the correct installation of the IGU using that system. As with all IGU's, it is vital to establish that the glazing materials being used are compatible with the edge seal compounds (re. GGF datasheet 4.9).
- A majority of narrow cavity/reduced sightline IGU's will be installed in frames that cannot accommodate a drained and ventilated glazing system and will employ a fully bedded glazing system. When using this method of glazing, the quality of the workmanship is of paramount importance in protecting the edge seal from the effects of moisture, the primary enemy of IGU edge seals. Glaziers should refer to and follow the glazing methods detailed in GGF Datasheet 4.2.
- The narrow cavity width and sealant depth reductions associated with these IGU's are likely to have an effect upon the expected service life of the Narrow Cavity, Reduced Sightline IGU, even when glazed using the correct glazing materials and installed into frames with a good level of workmanship.
- Particularly important are seal depth and the amount and quality of desiccant in the spacer system.
- The Narrow Cavity, Reduced Sightline IGU service life expectancy and the time period of any supporting warranties or guarantees should be clearly agreed between the supplier, installer and purchaser or client and subject to strict adherence to the glazing methods and materials stipulated by the IGU manufacturer.

### 4 IGU Performance:

- The IGU's may need to satisfy specific requirements either to comply with Building Regulations or client specification. These may include thermal transmittance (U-value), solar control (g-value), sound insulation (Rw), safety in relation to human impact, containment and fire-resistance. Building regulation requirements may be determined from the relevant Approved Documents in England and Wales, Technical Handbooks in Scotland and Technical Booklets in Northern Ireland.
- Where performance claims of IGU characteristics are being made by the manufacturer and where these characteristics are shown in Annex ZA of BS EN 1279-5, Type Testing evidence, carried out by a Notified Body under the CPR, should be available and the performance included on the Declaration of Performance for the product.

### 5 CE Marking:

- All IGU's, including Narrow Cavity, Reduced Sightline IGU's, when placed on the European Market, must comply with the requirements of the Construction Products Regulations.
- The CPR requires the manufacturer to comply with the following:
  - Manufacture the IGU's in conformity with the harmonised European Standard, BS EN 1279-5.
  - Have a system description in accordance with BS EN 1279-1 – Glass in building. Insulating glass units. Generalities, dimensional tolerances and rules for the system description.
  - Have carried out Type Testing to BS EN 1279-2 – Glass in building. Insulating glass units. Long term test method and requirements for moisture penetration.
  - Have carried out Type Testing to BS EN 1279-3 – Glass in building. Insulating glass units. Long term test method and requirements for gas leakage rate and for gas concentration tolerances.
  - Have carried out Type Testing to BS EN 1279-4 – Glass in building. Insulating glass units. Methods of test for physical attributes of edge seals.
  - Operate a Factory Production Control (FPC) which addresses the requirements of BS EN 1279-6 – Glass in building. Insulating glass units. Factory production control and periodic tests.
- BS EN 1279-4 test evidence will usually be supplied by the edge seal component manufacturers.
- To comply with the Construction Products Regulations (CPR), the manufacturer of IGU's should make a Declaration of Performance of the IGU's appropriate Essential Characteristics and provide a CE label, in accordance with BS EN 1279-5.

### 6 Narrow Cavity, Reduced Sightline IGU Maximum & Minimum width and height:

- The maximum size of narrow cavity, reduced sightline IGU's will depend upon a number of factors, including glass thickness, glass type, cavity width and wind load. There are too many variables to set maximum sizes that cover all systems.
- Minimum sizes are also determined by IGU construction.
- The general rule is that the narrower the cavity the smaller the maximum overall size of the IGU.
- Please consult the IGU manufacturer for guidance on maximum and minimum sizes for the specific IGU specification required.

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### 7 Glazing Methods:

- Glazing methods for narrow cavity / reduced sightline IGU's are critical to their performance and service life.
- The glazing method employed should be based on the IGU manufacturer's recommendations.
- The glazing system should also comply with methodologies described in the current Glass & Glazing Federation (GGF) Glazing Manual, particular attention should be paid to Datasheets 4.2 & 4.9.
- Installers of IGU's should ensure all glazing compounds being used are compatible with the sealants used in the construction of the IGU edge-seal (ref. GGF Datasheet 4.9).
- It should be noted that with reduced sightline IGU's, it may not be possible to meet all of the requirements of the GGF Datasheet 4.2.

### 8 Gas Type, Gas Mix and Gas concentration:

- Various gas types, gas mixtures & concentrations are available, these provide varying levels of thermal performance (U-value).
- Gas concentrations should conform to the tolerances given in BS EN 1279 part 6, -5% - +10% of nominal concentration levels (usually 90%).
- All claims relating to thermal performance (centre pane U-value) should be supported by test evidence from a Notified Body under the CPR.

### 9 Desiccant:

- Desiccant is incorporated in the spacer-bar, either as a loose fill in hollow spacer-bars or incorporated in the spacer-bar material. Its purpose is to remove moisture vapour from the cavity to prevent condensation forming within the cavity.
- Spacer-bar Desiccant content varies according to the IGU construction, cavity width and the resultant spacer-bar cross section area available to fill with desiccant. In IGU's manufactured using conventional cavity widths of 12mm and above, when using hollow spacer-bars, desiccant manufacturers recommend that at least 50% of the available total spacer-bar volume should be filled with desiccant, this is usually achieved by filling the 2 longest sides. However, when manufacturing narrow cavity reduced sightline IGU's using hollow spacer-bars, to maintain the ratio of desiccant to cavity volume, it is recommended that all 4 sides rather than just 2 sides, should be filled with desiccant of the smallest bead size to maximize the amount of desiccant contained within the spacer-bar.
- Where foamed spacer-bar systems are used, they should be designed for use in IGU's with the finished cavity width being manufactured, and they are not to be modified in any way, e.g. cutting to height or width.

## Summary

### 10 Manufacturers and specifiers of Narrow Cavity, Reduced Sightline IGU's should ensure that the following evidence is available:

- IGU manufacturers test evidence from a Notified Body in accordance with BS EN 1279 part 2 – Moisture penetration.
- IGU manufacturers test evidence in accordance with BS EN 1279 part 3 – Gas Retention.
- Test evidence in accordance with BS EN 1279 part 4 – Edge seals – this will normally be supplied by the manufacturers of the spacer-bar and/or sealant manufacturer.
- A specific system description in accordance with BS EN 1279 part 1 for the Narrow Cavity, Reduced Sightline unit.
- IGU manufacturers test evidence from a Notified Body determining the thermal transmittance based on a centre pane U-value for the specific IGU being supplied.
- The IGU manufacturers periodic test evidence as required by BS EN 1279 part 6, Factory Production Control, to demonstrate that on-going production will reflect the evidence obtained during BS EN 1279 parts 2 and 3 Type Testing.

The manufacturer should be operating a Factory Production Control system in accordance with BS EN 1279 part 6 to ensure the continued conformity of manufactured IGU's to the standard and to ensure the IGU's Essential Characteristics, as declared on the Declaration of Performance, are maintained.

The manufacturer, in accordance with the Construction Products Regulations should make a Declaration of Performance (DoP) for the IGU and provide a CE label with all products supplied.

The manufacturer should make the DoP available, either in printed form or another suitable medium, including via the internet, to their customers.

To ensure a suitable service life of the installed unit, the manufacturer should provide installation instructions and suggest generic glazing compounds, to ensure compatibility with the IGU sealants, to be used when installing Narrow Cavity, Reduced Sightline IGU's.

Specifiers should ensure that the IGU's are installed in accordance with both the IGU manufacturer's and the glazing compound manufacturer's instructions, using a glazing system detailed in GGF datasheet 4.2, taking notice of any specific preparation requirements of the glazing rebate and beads.

Provided the test evidence is made available and recommendations detailed above are adhered to, Narrow Cavity, Reduced Sightline IGU's should provide a reasonable service life. Specifiers of Narrow Cavity, Reduced Sightline IGU's should obtain a service life guarantee from the IGU manufacturer.



