QUALITY TABLE – CURVED INSULATING GLASS

Date: 08.05.2024 Prepared by: Rmä Checked by: VJa Version **1**

PRODUCT DESCRIPTION: CURVED AND FLAT INSULATING GLASS UNITS

This product description has been prepared in accordance with ISO 11485:2020 Parts 1-3 and EN ISO 1279 (where applicable).

1. Product families

1. Curved float insulating glass units
2. Curved toughened safety insulating glass units
3. Curved laminated insulating glass units
4. Curved laminated safety insulating glass units
5. Bullet-resistant, explosion-resistant, signal-shielding, PLCD and electrically heated insulating glass units
6. Combinations of the above

2. Manufacturing method of the insulating glass unit

The curved glass is placed on an assembly rack designed for the fabrication of insulating glass units. The assembly rack is adjusted to the correct height, ensuring that the assembled insulating glass unit retains its intended curved shape. If the glass is flat, the assembly is carried out on the flat section of the assembly rack.

For designs and orders concerning the production of glass with a conical or cylindrical (spherical) surface, the following parameters shall be specified: the glass type and/or construction, radius of curvature, arc length, and glass height (and, where applicable, also the chord length, deflection height, and opening angle). The dimensions are normally indicated based on the outer (convex) surface of the glass (see Figure 2). If the glass shape is asymmetrical or otherwise irregular, a full-scale (1:1) model shall be provided, made from material that is stable and not affected by humidity or temperature variations. The glass manufacturer shall specify, depending on the shape, size, and thickness of the glass, the applicable bending radii (see Figure 1) and tolerances.

3. General information on insulating glass units

Curved or flat glass can be manufactured from float glass, coated glass, and certain patterned glasses. Curved or flat glass may be toughened, laminated, heat-strengthened, coated, or ceramic-coated. The spacer bar thickness varies between 6 mm and 32 mm, and the spacer material may consist of soft aluminium or rubber-like Edgetech material.The insulating glass unit is sealed using a butyl primary seal and silicone secondary sealant, which bond the glass panes together as a single unit. The cavity is filled with argon gas, achieving a concentration of over 90 % by volume.

All flat base glasses shall comply with the requirements of the relevant base glass standards, except for those specific properties covered by ISO 11485 (this part), or when it can be demonstrated that the specific requirement of the corresponding standard cannot be applied to curved glass (e.g. when testing flat samples versus curved samples).

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Where no corresponding international standard exists, any other national standard may be applied instead. When tested in accordance with Clause 5 of the standard, the curved glass shall meet the quality requirements specified in Clause 4, as summarised in Table 1.
The thickness tolerance of curved insulating glass units shall correspond to the thickness tolerance specified in the applicable base product standards, although minor variations in glass thickness may occur as a result of stretching during the bending and/or forming process.

Figure 1. Recommended minimum radii for float glass as a function of glass thickness, where the bending angle is less than or equal to 90°. The dimensions are specified at the outer surface of the glass.

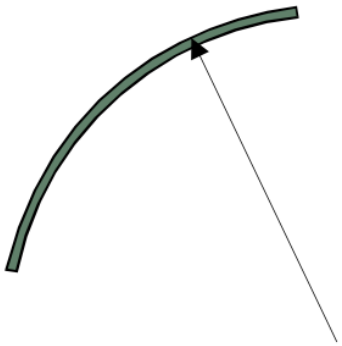

Table 1. Recommended minimum radii for curved glass

Glass thickness (mm)	***Recommended minimum radii measured at the outer surface (mm)***
12	500
10	350
8	230
6	160
4	120

Glass types and interlayers, thicknesses:

The bendable glass types, their thicknesses and manufacturers are specified in a separate document. The interlayers used for lamination, their thicknesses and manufacturers are also specified in a separate document. The glass supplier is responsible for ensuring that the supplied glass complies with one of the applicable standards listed below:

EN571-1 Soda lime Silicate Glass

EN572-2 Float Glass

(EN572-4 Drawn sheet Glass)

(EN572-5 Patterned Glass)

EN1096-1 Coated Glass

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A register of approved suppliers is maintained. Only those suppliers that have been approved through the supplier audit process are included in the list.

Table 2 — Glass bending shapes, angles and types. The numerical values are indicative.

	Cylindrical surface (circular cylindrical surface) 	***Spherical surface*** 	***Conical surface*** 	***Paraboloidal surface*** 
Bending angle (indicative values)	Toughened glass Heat-strengthened glass ≤ 90 °	< 30 °	Glass bending angle < 90 ° Cone angle < 45 °	Case-specific
Glass size and thickness (mm) Float glass 4-19 Toughened glass 6-19 Heat-strengthened glass 4-8	Arc x height (indicative size) 3 m * 6 m 2 m * 3 m 2 m * 3 m	Calculated on a case-by-case basis	Calculated according to the cone angle	Calculated on a case-by-case basis
Glass types	Float glass, ballistic and pressure-resistant glass Laminated glass Toughened glass Heat-strengthened glass Laminated and tough-ened glass Laminated and heat-strengthened glass Insulating glass unit (IGU) Heated PLCD glass	Float glass Lainated glass Insulating glass unit	Float glass Lainated glass Insulating glass unit	Float glass Lainated glass Insulating glass unit

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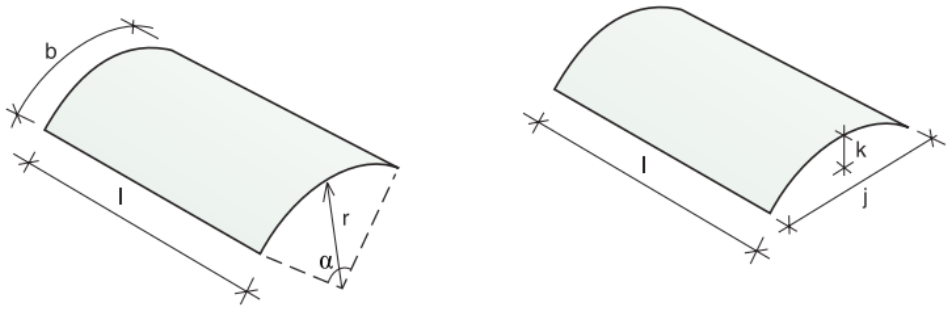
Figure 2. Dimensions of curved glass



j = chord length
α = opening angle
r = radius
k = rise (or sagitta)
b = arc length
l = height or length

Laminated curved glass consists of two or more glass panes laminated together with one or more interlayers of PVB or SentryGlass™**.**
EVA and PU interlayers can also be used, allowing the incorporation of different materials in addition to glass during the lamination process.

Lamination process

Lamination is carried out by placing a plastic interlayer between two glass panes.
This is followed by a pre-lamination process, after which the glass is subjected to autoclaving.

A laminated glass unit may also consist of multiple glass panes, in which case an interlayer, or several interlayers stacked together, is placed between each pair of glass panes.

4. Dimensions and tolerances

Thickness of laminated glass

Variations in the thickness of laminated glass shall not exceed the tolerances defined in the relevant base glass standards or the combined tolerances of the constituent glass panes.
The thickness tolerances of the glass panes are specified in the product standards referred to in Clause 2.
Only the tolerances for float glass are considered here, as drawn glass is not used in lamination and the use of patterned glass is rare.

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Table 3. Nominal thickness of glass

Nominal thickness of glass	***Thickness tolerance for float glass***
3-6 mm	±0,2 mm
8-12 mm	±0,3 mm
15 mm	±0,5 mm

Influence of interlayer on thickness tolerances shall not be taken into account when the interlayer thickness is < 2 mm.
When the interlayer thickness is ≥ 2 mm, the tolerance is ±0.2 mm.

For example, for 3+3 (0.38 PVB) mm laminated glass, the thickness tolerance is 0.2 + 0.2 mm = ±0.4 mm and the nominal glass thickness is 6.4 mm.

The thickness of laminated glass shall be measured as follows: the glass thickness is measured at the midpoint of each of the four edges, and the average of the measurements is calculated. Measurements shall be taken with an accuracy of 0.01 mm, and the average shall be rounded to the nearest 0.1 mm. In addition, each individual measurement, rounded to the nearest 0.1 mm, shall fall within the permitted limits.

When measuring laminated glass containing patterned glass, the thickness shall be measured using a flat measuring device with a diameter of 55 ±5 mm.

The thickness tolerance of curved glass shall correspond to the thickness tolerance specified in the relevant base product standard; however, minor variations in glass thickness may occur due to stretching during the bending and/or forming process.

Glass dimensions

Whenever glass dimensions are specified (for example, in orders), the first value refers to the **width** of the glass and the second to its **height**. Shaped glasses shall be accompanied by an appropriate drawing.

Once the glass dimensions have been specified, the final product dimensions shall not fall below or exceed the minus or plus tolerance limits. The diagonal measurement shall also remain within these limits (see EN ISO 12543-5, Clause 3.2.1).

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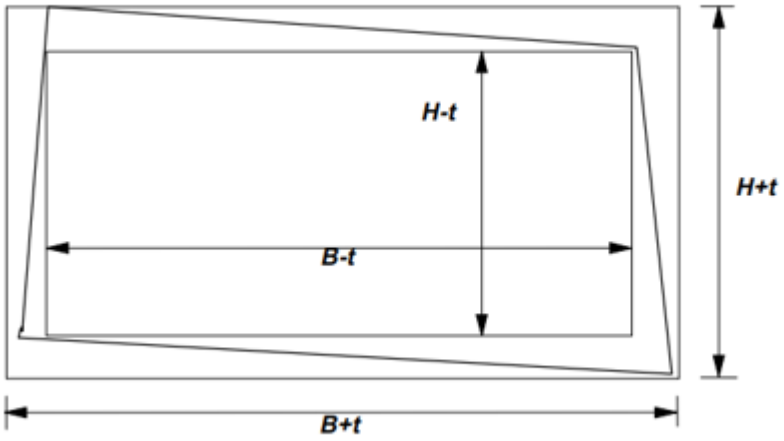
The tolerances for rectangular cut-to-size glass are as follows:

Table 4. Glass dimensions

Glass dimension (width or height)	***Tolerance when glass thickness ≤ 8 mm***	***Tolerance when glass thickness > 8 mm Each pane <10 mm / At least one pane ≥10 mm***	
< 1100 mm	+2; -2 mm	+2,5; -2 mm	+3,5; -2 mm
< 1500 mm	+3; -2 mm	+3,5; -2 mm	+4,5; -3 mm
< 2000 mm	+3; -2 mm	+3,5; -2 mm	+5; -3,5 mm
< 2500 mm	+4,5; -2,5 mm	+5; -3 mm	+6; -4 mm
>2500 mm	+5; -3 mm	+5,5 ; -3,5 mm	+6,5; -4,5 mm

Table 4. Dimensional tolerances for rectangular panes



Dimensional tolerances for curved laminated glass

Thickness

The total thickness of laminated glass shall be equal to the sum of the nominal thicknesses of its individual components.

The tolerance of the total thickness shall be equal to the sum of the tolerances of the individual components as specified in the relevant product standard.

The thickness and tolerances of the interlayer and interlayer films shall be negligible compared with the tolerances of the individual glass panes.

For cast-in-place resin interlayers, the permissible thickness tolerance shall be ±0.2 mm per millimetre of interlayer thickness (excluding the thickness tolerances of the individual glass panes).

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Alignment

The maximum permitted alignment deviation (d_1) at any individual glass edge (see Figure 3) is specified in Table 5.
In the tables, L denotes the height or length of the curved glass, and G denotes the arc length of the curved glass.

Glass offset

Glass offset refers to the displacement of the glass edges relative to each other (see figure) = d_1.

Figure 3. Offset of curved laminated glass

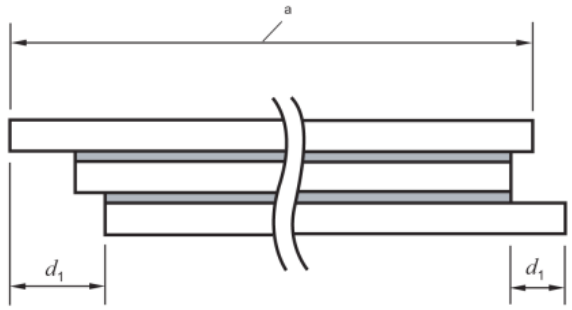

Table 5. Maximum permitted offsets for curved laminated glass d_1:

L or G	***Maximum permitted deviation***
L or G ≤ 1 000 mm	*d*1 ≤ 2 mm
L or G > 1 000 mm	*d*1 ≤ 2 mm/m

Explanation

a = L or G

Tolerances for shape accuracy, arc length and length of curved glass

When measured in accordance with Clause 5.1 of the standard, the tolerances for shape accuracy, arc length and length shall comply with Table 6.
Explanations of the parameters are given in Figure 3.

Table 6. Tolerances for shape accuracy, arc length and length

Parameter	***Tolerance***	
	Thickness < 10 mm	Thickness ≥ 10 mm
Δ*PC* [a]	2/3 *T*	1/2 *T*
Δ*G*	± 2 mm/m	± 3 mm/m
Δ*L*	± 2 mm/m	± 3 mm/m
a Measured perpendicular to the glass.		

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Where

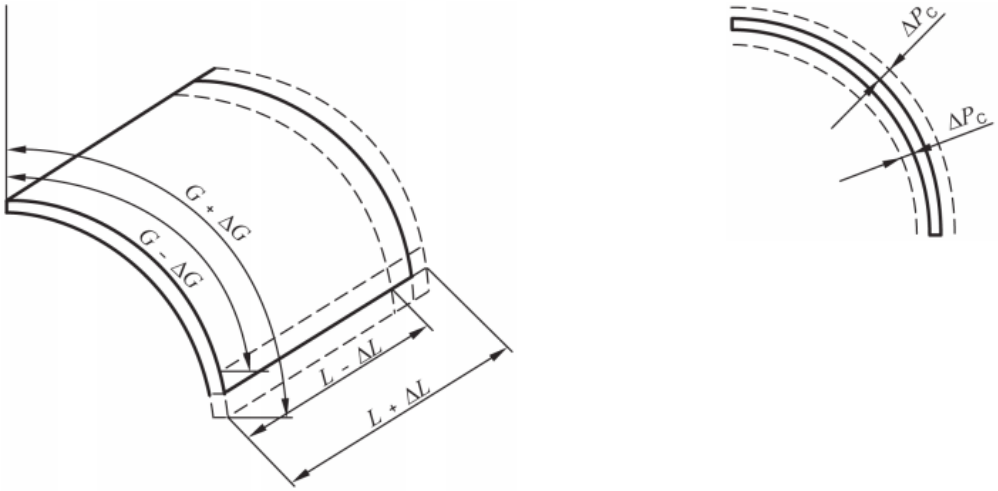
ΔP_C tolerance for shape accuracy;

ΔG total deviation of the arc length; and

ΔL tolerance for length.

P is the nominal thickness of the finished product when the curved glass is float glass, curved toughened glass, curved toughened heat-soak-tested glass, or curved laminated glass, or the thickness of the glass components when assembled as a curved insulating glass unit.

Figure 4. Tolerances for shape accuracy, arc length and length



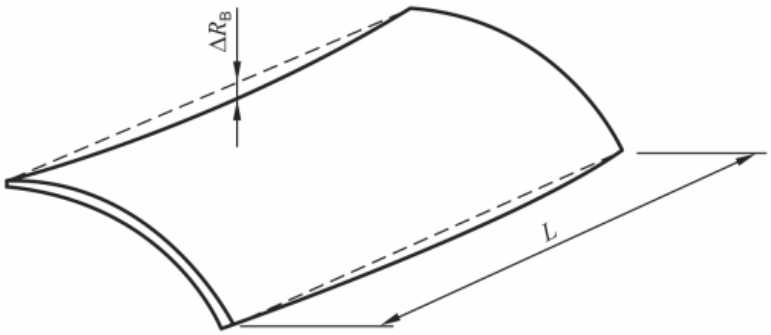
Edge straightness deviation (ΔRB)

When measured in accordance with Clause 5.2, the acceptable limits for edge straightness deviation shall be:

ΔRB ≤ 3 mm/m or 2 mm, whichever is greater.

NOTE An example of edge straightness deviation is shown in Figure 5.

Figure 5. Example of edge straightness deviation



Maximum deviation from cylindricity

The maximum deviation from cylindricity shall not exceed 4 mm/m.
The deviation from cylindricity shall be distinguished from the deviation in edge straightness.

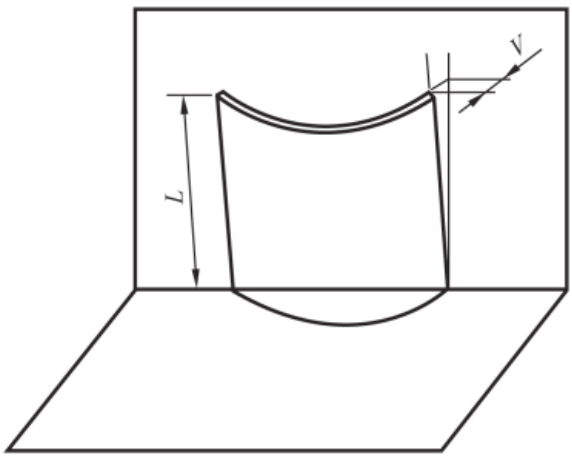
Maximum twist deviation (V)

The twist deviation shall not exceed the maximum permitted tolerances for glass thicknesses ≤ 12 mm.
For other thicknesses, any deviations shall be agreed separately between the purchaser and the manufacturer.

Table 7. Maximum permitted tolerances for twist deviation

Length (mm)	***Twist (mm)***
$L \leq 1\,200$	$V < 4$
$1\,200 < L \leq 1\,500$	$V < 5$
$1\,500 < L \leq 2\,000$	$V < 6$
$2\,000 < L \leq 2\,400$	$V < 7$
$L > 2\,400$	$V < 8$

Table 6. Twist deviation



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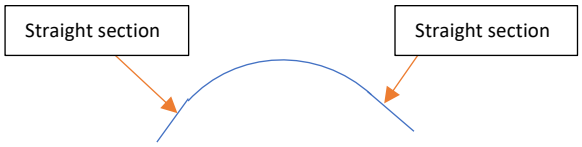
Special shapes

For shapes not described or specified above, the tolerances for such glass shall be agreed separately, based on the form illustrated in the drawing.



Edge processing, holes and cut-outs

All machining operations for toughened and heat-strengthened glass shall be carried out before the toughening or heat-strengthening process.
For non-toughened glass, the edges may be left unpolished (cut edge). Glass can also be cut to size by sawing, in which case the edge appears ground but not polished. Glass may also be cut to size using water-jet cutting, resulting in an edge that appears ground but not polished.

Available edge finishing options:

Sharp-edge grinding (TSH), where the sharp edges of the glass are ground, usually with a cross-belt grinding machine.

- The edge is ground along its full length so that the glass thickness decreases by a maximum of 20%.
- Rough or sharp V-shaped edges are not permitted.
- The maximum allowable depth of a concave ground area is 1 mm.
- The maximum allowable chip diameter is 1.5 mm.

Edge grinding (KRH / RRH), where the glass edge and sharp corners are ground, usually with a diamond wheel.

- The ground surface is smooth and matte.
- Unground areas are not permitted.

Polished edge grinding, where the glass edge and sharp corners are ground and polished.

- The ground surface is smooth and glossy.
- Unground areas are not permitted.

Bevel grinding (faceting)

- The ground surface is glossy.
- The ground angle shall not exceed 60°.
- The nominal dimensions are reduced by 2–3 mm.

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Hole limitations:

The minimum diameter of a hole in glass is equal to the nominal glass thickness. The position of a hole in the glass depends on:

- nominal thickness
- glass size
- hole diameter
- glass shape
- number of holes

The minimum distance from the hole to the glass edge shall be 2 × nominal glass thickness. The minimum distance between two holes shall be 2 × nominal glass thickness. The minimum distance from the outer diameter of a hole to the glass corner shall be 6 × nominal glass thickness.

Hole tolerances: The tolerances for hole position are the same as those for glass dimensions specified in Section 3.2 of this document.

Various notches and other edge cut-outs can be made. Their limitations and tolerances shall be agreed on a case-by-case basis.

No durability warranty can be granted for insulating glass units that contain holes. For special applications, insulating glass units with holes may be manufactured; the holes shall be sealed with gaskets, using butyl sealant as the gasket sealing compound and silicone as the bonding agent.

Depending on the installation location, no durability warranty can be granted if the insulating glass unit is used in laboratories, sauna or bathroom areas, refrigerators, or other environments with abnormal conditions.

Appearance, curved laminated glass (ISO 11485-2):

Point defects

Transparency affects the bending behaviour of the glass, and depending on the glass thickness and geometry, marks may appear on the coating.

The reflection of curved glass always differs from that of flat glass due to optical laws, and such reflection is permissible provided that it is not visible from a distance of 3 metres under diffuse light and in unobstructed view conditions, where no reflections or direct sunlight are present.

The size, number, grouping, glass size and number of glass panes/layers influence the admissibility of point defects.

Point defects smaller than 0.5 mm shall not be taken into account.

Point defects larger than 3.0 mm are not permitted.

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Table 8. Point defects

Defect size mm		***0,5<d<1,0***	***1,0 < d ≤ 3,0***			
Glass area m²		All sizes	A ≤ 1	1< A ≤ 2	2< A ≤ 8	A > 8
Number of permitted defects	2 glasses 3 glasses 4 glasses ≥ 5 glasses	No limitation, but grouped formations are not permitted	1 2 3 4	2 3 4 5	1 /m² 1,5 /m² 2 /m² 2,5 /m²	1,2 /m² 1,8 /m² 2,4 /m² 3 /m²

A grouped defect is defined as a case where at least four point defects are located within a distance of less than 200 mm from each other in a double-glazed unit.
The maximum distance for triple-glazed units is 180 mm, for four-glazed units 150 mm, and for units with five or more glass panes 100 mm.

The number of permitted defects specified in the table shall be increased by one for each additional laminating interlayer thicker than 2 mm.

Linear defects

Linear defects include scratches on the glass surface longer than 30 mm, foreign particles, or similar imperfections.
On the visible area of the glass, the following defects are permitted:

Table 9. Linear defects

Glass area	Permitted defects longer than 30 mm
≤5 m²	Not permitted
5 – 8 m²	1
yli 8 m²	2

Defects in the edge areas of glazed units

During inspection in accordance with Clause 5.7, any defects detected in the edge area are permissible if the defect diameter does not exceed 5 mm.
If the glass area is up to 5 m², the edge area is 15 mm; if the glass area exceeds 5 m², the edge area is 20 mm.

In the edge areas, any possible delaminated (bubbled) area shall not exceed 5% of the total edge area.

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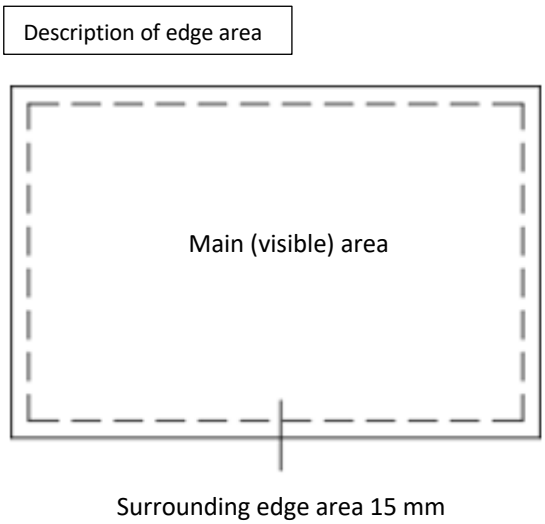

Cracks

Cracks are not permitted.

Wrinkles and streaks

Wrinkling or streaking of the interlayer film is not permitted in the visible area.

Removal of coatings in the edge area of insulating glass units

Coated and solar control glasses shall have their coatings removed from the edge area of the insulating glass unit to ensure proper adhesion of the butyl sealant and to guarantee the long-term durability of the unit.
The coating shall be removed from beneath both the sealing compound and the butyl layer.

Unless otherwise agreed with the customer, the coating removal width shall have a tolerance of +2.0 mm / –3.5 mm.
On the visible (vision) side, the coating removal may be visible by a maximum of 2.0 mm, while under the butyl it may extend up to 3.5 mm, i.e. to the midpoint of the spacer bar.

If the butyl is partially on top of the coating, colour variation may occur depending on the coating type; the hue may range from red to green to blue depending on the viewing angle.

The butyl layer shall be continuous and at least 3 mm wide at its thinnest point. The butyl shall not extend into the visible area.

These tolerances do not apply in corner areas. A corner area is defined as the area extending 150 mm from the glass corner.

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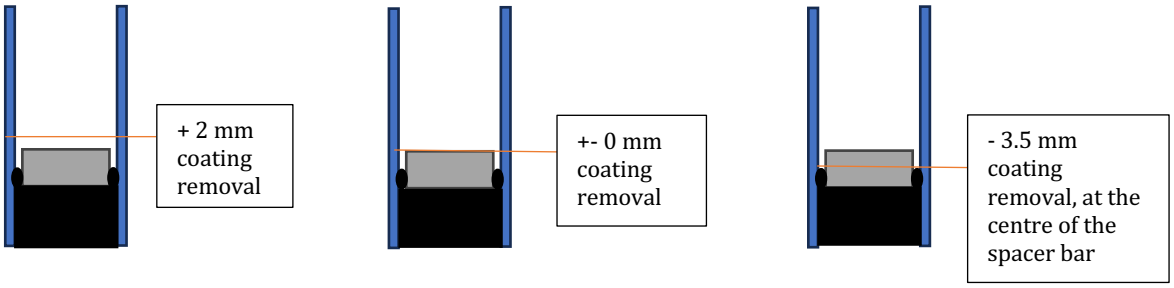

Edge areas of SG-installed glass

Insulating glass units are usually installed in framed systems. If the glass is not installed in frames, the edges may be:

- Ground
- Ground and polished
- Edge clearance filled with black silicone sealant
- Aluminium (hollow) or soft (solid) spacer bar

In accordance with EN ISO 12543-5, EN ISO 1279, EN 14449 and EN 11485-2.

Under these conditions, shell-shaped defects, mould marks, bubbles, interlayer defects and retracted interlayer film are not considered defects if they are not visible in the inspection described in Clause 5.7.

Spacer bar straightness deviation: 3 mm maximum over 3.5 m length; 6 mm permitted for lengths exceeding 3.5 m.

The butyl sealant shall be continuous and at least 3 mm wide at its thinnest point. The butyl shall not extend into the visible area. The straightness and width of the butyl may vary on top of the spacer bar provided the above criteria are met. The butyl tape used to seal the gas filling hole in the spacer bar shall not be visible (aluminium surface).

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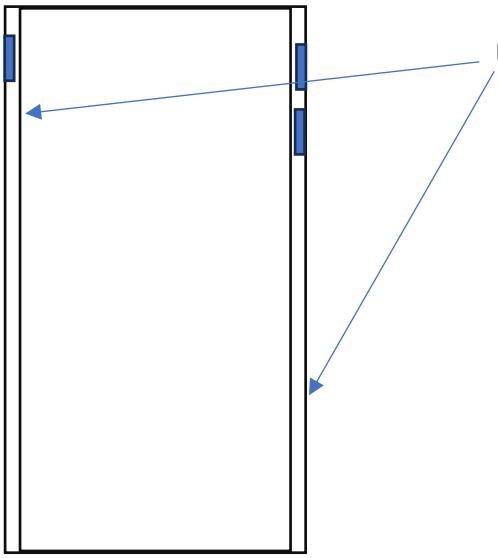
The minimum silicone sealant depth shall be 9 mm.
For U-profiles, the profile depth plus a minimum of 3 mm sealant allowance shall be maintained between the profile and the spacer bar, and a minimum sealant allowance of 2 mm shall be maintained between the glass and the profile.



U-profiles

The lengths, widths and positions of aluminium blocks depend on the glass installation method.
Profile positioning in the vertical direction: ±5 mm.
Profile depth positioning: +1 to –2 mm.
Profile alignment between glass panes: ±2 mm.

U-blocks shall be treated with an activator before sealing, and the silicone sealant shall be prepared in accordance with the manufacturer's instructions.

Edge areas of glass installed in frames

Insulating glass units installed in frames where the glazing beads cover the sealant area and where the glass is not subjected to shear loads or UV radiation may use polysulphide, polyurethane or silicone as the sealant material.
We always seal insulating glass units with silicone and use a 9 mm sealant allowance.
For bends exceeding 80 degrees and for triple-glazed (3K) insulating glass units, the tolerance coefficient for this sealant allowance is –0.7 / +1.4, regardless of the sealant width.

- Glass edges: ground with arrised (seamed) edge or ground and polished
- Sealant: silicone, colour black
- Spacer bar: aluminium (hollow) or soft spacer (solid)

In accordance with EN ISO 12543-5, EN ISO 1279, EN 14449 and EN 11485-2.

The edge area is limited to a maximum of 12 mm.
Within the edge area, shell-shaped defects, bubbles, mould marks, interlayer defects and retracted interlayer film are permissible.

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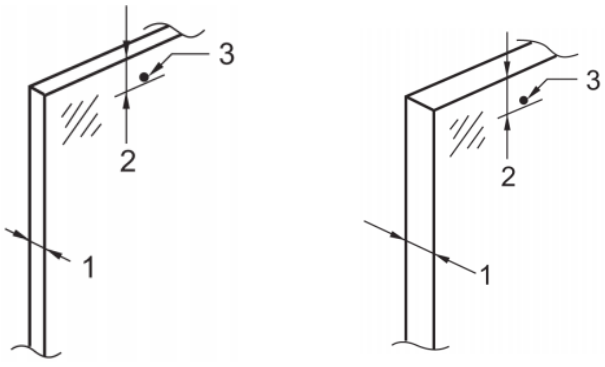
Appearance

When tested in accordance with Clause 5.5 of the standard, the appearance of curved glass shall meet the acceptance criteria specified in Table 10.

Table 10. Appearance acceptance requirements

Defect type	***Acceptability***
Crack (cold crack)	Non permitted
Chipping	Concealed edge: No chips whose width or length exceeds the nominal glass thickness. Exposed edge: No chips that impair serviceability.
Mould marks	In cases where the nominal glass thickness is 6 mm or less, marks are permitted only within 8 mm from the glass edge, as shown in Figure 4. If the nominal glass thickness exceeds 6 mm, marks are permitted within the glass thickness plus 2.0 mm, as shown in Figure 4. For thicker glasses or glass assemblies, mould marks are permissible provided that, when viewed perpendicularly from a distance of 2 m against a white background, no visible marks are detected. However, accumulation of defects is not permitted; the minimum distance between marks shall be 150 mm.
Bubble	The diameter of bubbles shall not exceed 2.0 mm.
Edge marks	In cases where the finished glass is installed in a frame that conceals the glass edge(s), marks may be present within the concealed edge area(s). Where the glass edge(s) remain visible in the final installation, marks on the glass edges are acceptable only by agreement between the parties concerned, provided the glass thickness is +2.0 mm.

Figure 7. Mould marks



Explanation

1 Nominal thickness 6 mm or less
2 8 mm maximum
3 Mould mark

1 Nominal thickness greater than 6 mm
2 Nominal thickness + 2 mm maximum
3 Mould mark

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Interference phenomena, anisotropy and colour variations

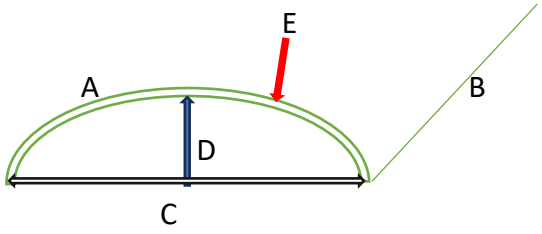
Deviations in insulating glass units made of float glass may appear as spectral effects, which can be intensified by various coatings.
Colour variations may become visible when the façade is viewed from different angles. These effects are caused by differences in coating thickness, colour tone variations of coatings, and the bending angle of the glass.
If the insulating glass units include heat-treated glass, visual phenomena such as anisotropy may occur.

With annealed mould bending the glass is heated up in furnace for a longer period.
Increased burn-in and coating defects are permissible when they are not visible from a distance of 3 meters in diffuse daylight and clear view.

Dimensional deviations

The dimensions of curved insulating glass units shall be specified in the following order:

A) first, the arc;
B) second, the height;
C) third, the chord length;
D) fourth, the rise (sagitta);
E) fifth, the outer radius of the arc



Dimensional deviations
Dimensions A and B:

- Less than 2000 mm +-3 mm
- Less than 3500 mm +-4 mm
- Less than 5000 mm +-5 mm

QUALITY TABLE – CURVED INSULATING GLASS

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Dimensions D:

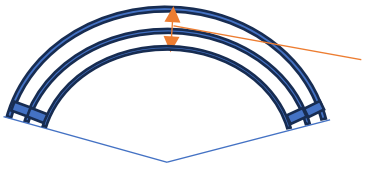
- +-3 mm for arcs less than 3500 mm
- +-5 mm for arcs greater thatn 3500 mm

THICKNESS

For 2K and 3K insulating glass units, when the bending angle (F) is less than 90 degrees:

• assembled with float glass: thickness tolerance –2 mm / +3 mm
• made with laminated glass: –2 mm / +5 mm

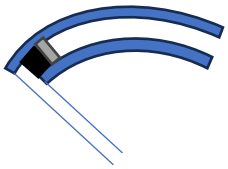
When the bending angle exceeds 90 degrees, thickness tolerances shall be determined on a case-by-case basis.



Thickness of the insulationg glass unit

F) bending angle

Offset



offset between glass panes

Arc less than 1000 mm: permitted offset less than 3 mm
Arc greater than 1000 mm: permitted offset 3 mm/m

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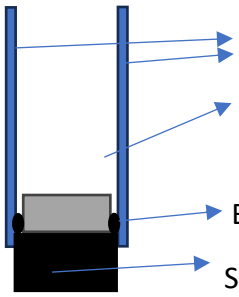
STRUCTURE

Insulating glass unit with a factory-made flexible spacer bar.
The primary sealant (butyl) is pre-applied to the spacer.



Glass

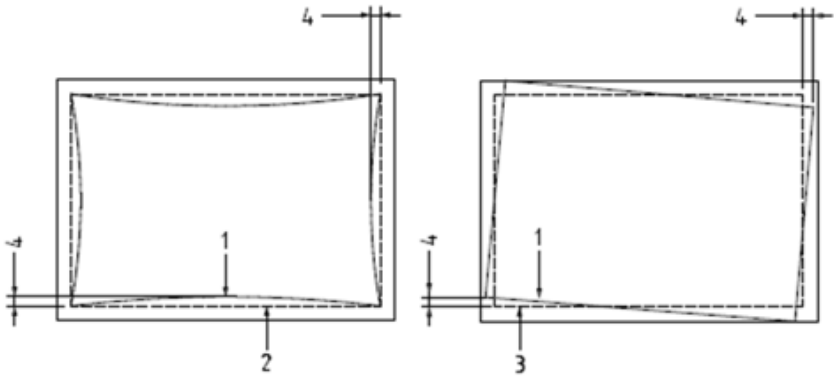
Flexible spacer containing moisture-absorbing polymer, with adhesive surface against the glass.

Butyl, primary sealant applied at the coating removal area.

Silicone, secondary sealant.

STRAIGHTNESS AND POSITIONING OF SPACER BAR

Spacer bar straightness deviation: 4 mm maximum over a length of 3.5 m; 6 mm permitted for lengths exceeding 3.5 m.



Key
1 spacer
2 theoretical shape of the spacer
3 theoretical position of the spacer
4 deviation

QUALITY TABLE – CURVED INSULATING GLASS

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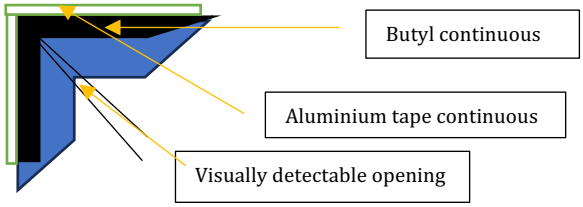
SPACER BAR CORNERS

In insulating glass units manufactured with Edgetech spacers, a small opening may appear on the inner side of the corner area, i.e. on the cavity side. This is acceptable provided that the butyl and aluminium tape are continuous.



Testing method for the appearance of curved insulating glass

Perform a visual inspection from a distance of 3.0 metres from the glass product, in a vertical position, under daylight conditions without direct sunlight or backlighting.
Measure the length or diameter of any visual defect using a metal ruler at 0.5 m intervals.

Product quality control

For laminated glass, type testing (ITT) is carried out by an approved external laboratory in accordance with EN ISO 12543-3, and production is monitored through internal inspections (FPC) to demonstrate conformity.

For laminated safety glass, testing is performed in accordance with EN ISO 12543-2.
The pendulum impact test is not included in the test programme for curved glass; therefore, the testing and construction requirements for flat laminated glass are applied.

Type testing includes a high-temperature test (EN ISO 12543-4), a moisture resistance test, and a radiation test.

For laminated safety glass, a pendulum impact test (EN 12600) is also required.

Internal factory production control includes regular heat testing and moisture testing with condensation.

The heat test is performed collectively once a week, and the moisture test is conducted on a sample every second week, with samples remaining in the moisture test for two weeks.

For insulating glass units, type testing is performed by an approved external laboratory in accordance with EN ISO 1279-2, and production is monitored through internal inspections (FPC) to demonstrate conformity.

Type testing includes long-term test methods for gas leakage rate, gas concentration, and moisture penetration.
Internal tests for insulating glass are carried out in accordance with EN ISO 1279-6.

Factory production control for insulating glass includes regular spacer moisture tests, gas content measurements, sealant mixing ratio tests, and adhesion tests.

5. Glass marking

There is no harmonised requirement for the marking of curved insulating glass units.
The glass is marked on the vertical spacer bar located at the bottom of the unit.
The marking indicates the structure of the insulating glass unit.