Quality Agreement

made between

Alux GmbH & Co. KG

Robert Bosch Str. 6

41352 Korschenbroich, Germany

and

Company

Street

Place

relating to

the Supply of Vehicle Glass of Single-Pane Safety Glass and Standard Laminated Glass made from Float Glass and Ornament Glass

Changes to the Agreement are only valid if made in writing.

Date: 06/03/2025

.....	.....
Alux GmbH & Co.KG	Company

Alux GmbH & Co.KG, Robert-Bosch-Straße 6, 41352 Korschenbroich

Changes Quality agreement in general vehicle glass

The present issue 16 dated 30.01.2020 substitutes the previous edition dated 25.07.2012

The following changes had been made:

1.	Page 5	Point 1.2	Definition of a term
2.	Page 7	Point 3.3	Definition of a term
3.	Page 8	Point 3.4	Definition of a term
4.	Page 10	Point 4.1	Definition of a term
5.	Page 10	Point 4.2	Definition of a term
6.	Page 10	Point 4.3	Definition of a term
7.	Page 10	Point 4.4	Definition of a term
8.	Page 11	Point 4.5	Definition of a term
9.	Page 11	Point 4.6	Definition of a term
10.	Page 12	Point 4.7	Definition of a term
11.	Page 13	Point 4.8	Edge working of glass for thermally toughened glasses added
12.	Page 14	Point 4.9	Definition of a term
13.	Page 14	Point 4.10	Definition of a term
14.	Page 15	Point 4.11	Definition of a term
15.	Page 15	Point 4.11	Edge-working Tolerances
16.	Page 15	Point 4.11	Hole position Tolerances
17.	Page 15	Point 4.11	Bending contour Tolerances
18.	Page 16	Point 5.1	Definition of a term
19.	Page 16	Point 5.1.1	Definition of a term
20.	Page 16	Point 5.2	Definition of a term
21.	Page 17	Point 5.3	Definition of a term
22.	Page 18	Point 5.4	Edge working of glass for laminated glasses added
23.	Page 19	Point 5.5	Definition of a term
24.	Page 19	Point 5.5	Thickness Tolerances
25.	Page 19	Point 5.5	Bending contour Tolerances
26.	Page 19	Point 5.5	Displacement Tolerances
27.	Page 19	Point 5.5	Edge-working Tolerances
28.	Page 20	Point 6	Definition of a term
29.	Page 20	Point 7	Checking of heatable glasses added
30.	Page 20	Point 8	Checking methods of bending curve of one sided curved panes added
31.	Page 20	Point 9	Edge sealing of insulated glasses added
32.	Page 21	Point 10	Definition of a term
33.	Page 21	Point 10.1	Definition of a term
34.	Page 21	Point 10.2	Inspection standards added
35.	Page 23	Point 11	Position tolerance added
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1 - Introduction

1.1 Introduction

The visual quality assessment of vehicle glass panes depends on various marginal conditions and criteria. This Quality Agreement serves to establish a common assessment basis in order to avoid differences in quality evaluation.

1.2 Scope of application

This directive applies to the following products:

- **Flat and curved uniformly thermal toughened tempered safety glass** used as windscreens for slow-moving vehicles as well as side glasses and back glasses according to ECE R43 Annex 5
- **Flat and curved laminated safety glass** used as side glasses and back glasses (other than wind-screens) according to ECE R 43 Annex 7
- **Flat and curved ordinary laminated glass windscreen** used as windscreens according to ECE R 43 Annex 6
- **Flat and curved multiple glazed unit (insulated glass panes)** used as double glazed units in industrial and commercial vehicles according to ECE R 43 Annex 12

2 - Quality requirements

2.1 Quality requirements

The supplier has to fulfil quality assurance actions, which are stated in the documentation DIN EN ISO 9001.
If the previously named certificate are not existent a locally system audit will be necessary.
Depending on the requirements of the customer of the ordering company extensive and restrictive require-ments might be necessary.

2.2 initial sample inspection

2.2.1 Conditions

The initial sample inspection is used as documented evidence of conformity, that the initial sample is pro-duced on condition of serial production and that all requirements and specification of the ordering company are fulfilled.

As evidence of the initial sampling the supplier will compile an initial-sample-report including all specific doc-uments of the ordering company (see chapter 2.2.2).

The supplier has to inform the ordering company with at least two (2) weeks' notice, in writing, if the initial sampling would not be feasible due to the fact that the supplier could not fulfil these points in the preliminary stage.
Initial samples have to be taken out of production process which is ready for series production, taking into consideration appropriate tooling, schedules and parameters of serial need.
Production process which is ready for series production:
Several parts from forms, tools or samples must be measured, as well as made available and sampled.

2.2.2 Requirements

There are seven (7) reasons for an initial sampling. The reason for presenting a sample will be stated on the cover of the initial sample inspection report.

Case	Description
New product	→ a new or new bought part → adjustment of a deviation of a foregoing part
Modification of a product	→ product modified by engineering office in drawing, specification or material (revision of drawing) Specification of another optional construction or material as the one which has been accepted before.
Outsourcing	→ outsourcing to another place of production which is determined by the supplier
Modification in production process	→ production with a new or changed tooling (excepted perishables), casting, sample etc., added or changed tooling → realignment or improvement of a tooling for production → each change in the working or production process
New sub-contractor	→ change in sub-contractors, parts, materials or services (e. g. heat treating, coating etc.).
Large production break	→ restart of the production after a break of more than twelve (12) months.
Customer-requirement	→ requirement of the customer (e. g.: a new validation or changes in operation determination)

3 - Inspection and product requirements

3.1 Quality assessment

Quality assessment shall be made according to the inspection procedure described below and based on the following tables and instructions.

3.2 Inspection

The examination is made in such a manner that the eyes of the examiner are in 1m distance.
As a rule, the see-through inspection of the glass pane is relevant for assessment rather than the top view inspection.
Glass must be inspected in vertical position.
Changes to this inspection are valid only, if made in writing.

Inspection takes place at an inspection station with diffuse daylight with 1000 lux (covered sky). It is not allowed to particularly mark the faults specially.

Maximum time for inspection is 30 sec/m².
Faults noticed during inspection shall be assessed for admissibility in accordance with the tables.
Faults which are not seen from 1m distance are not evaluated.

Some deficiencies cannot be avoided in the industrial manufacture of plate glass. Such deficiencies, eg inclusions in the glass, shall generally not be larger than 3 mm including their “halo”.
The inspection shall be made on the basis of the following standards:
DIN 1249, Part 11
ECE R 43
DIN EN 12150 – 1

3.3 Definition of Faults

Scratches: are surface damage that can be felt using the finger nail
Hairline scratches: are surface damage that cannot be felt using the finger nail
Closed bubble: is trapped air
Crystalline inclusions: are unmelted particles
Flat edge damage: is chips in the edge area
Slight shellings: are unavoidable changes of surface condition due to the thermal toughening process (not deeper than 15% of the pane thickness which do not affect the stability of the glass

3.3.1 Peculiarity of mechanical treatment of float glass with subsequent converting to tempered glass

During the mechanical treatment (e.g. cutting notches or drilling holes) little accumulations of non-visible glass splinters on the surface of the glass pane can occur. During the subsequent converting to tempered glass, these can burn in into the surface. Four or more inclusions less than 200 mm away from each other are not acceptable.

3.4 Scope of application of tempered safety glass and laminated safety glass

Table 1 Tempered: Admissible fault level per unit of tempered safety glass (ESG), **used as side glasses, back panes, roof panes and windscreens for cabs**

Faults in accumulated occurrence for single-pane tempered safety glass: Four or more faults less than 200 mm apart.

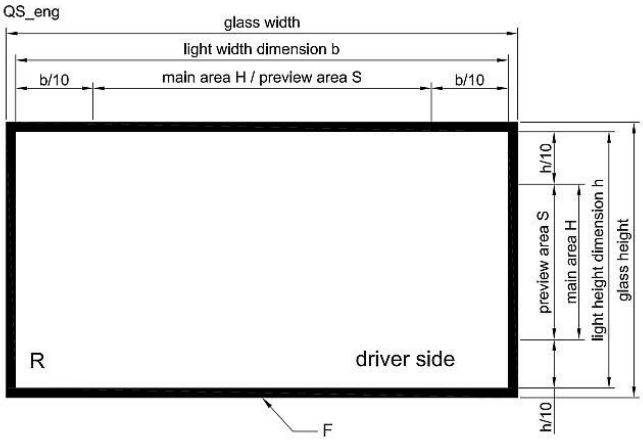
Area*	Scratches, perceptible	Hairline scratches, not perceptible	Bubbles, closed	Inclusions, crystalline	Flat edge damage**, Seamed edge	Slight Shelling**, Seamed edge
F	Admissible	Admissible	Admissible	Admissible	Admissible	Admissible
R	Admissible up to max. 50 mm	Admissible	Admissible up to 2 mm, but not in accumulated occurrence	Admissible up to a size of <1 mm	Not admissible	Not admissible
	./.	./.	./.	./.	Admissible, if F=R	Admissible, if F=R
H	Not admissible	Admissible up to an individual length of 60 mm or an added total length of 240 mm, but not in accumulated occur-rence	Max. 3 bubbles of ≤ 0.5 mm at least 200 mm apart	Not admissible	./.	./.

* F = seam area; applies only to glasses with seamed edges.
Non-framed glazings such as doors etc. shall be assessed only according to areas R and H (free edges should be at least grinded).

** Not deeper than 15% of the glass thickness into the glass volume
Due to the thermal toughening process, chemical and mechanical changes of the glass surface condition, such as pinholes and roller marks - cannot be avoided with some glass types.

Explanations:

F = Seam area – edge cover **seamed edges** (18mm)
R = Edge area - tenth of the clear width or height dimensions
H = Main area **(strictest estimation)**



Glass marking: homologation stamp according to drawing

Table 2 Laminated: Admissible fault level per unit of laminated safety glass **used as windscreens, side glasses, back panes and roof panes.**

-Faults in accumulated occurrence for 2-layer laminated safety glass: Four or more faults less than 200 mm apart.

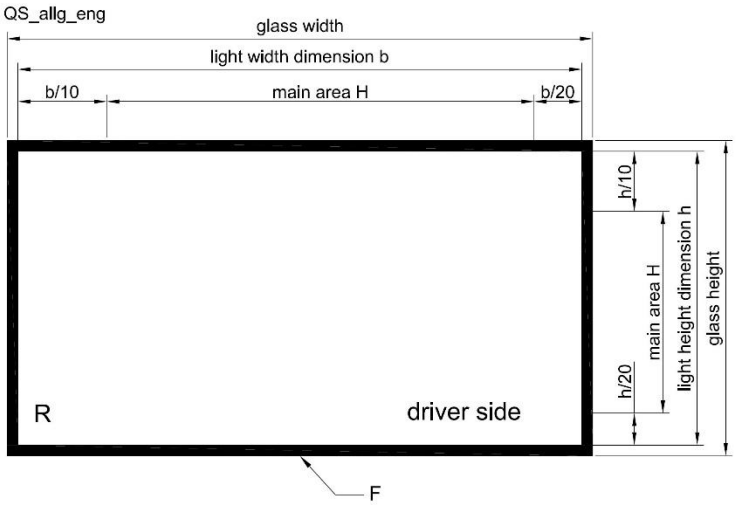
-Admissible fault level per glazing unit used as roof panes (3-layer laminated glass)
Faults in accumulated occurrence for 3-layer laminated glass panes: Four or more faults less than 180 mm apart.

Area*	Scratches, perceptible	Hairline Scratches, not perceptible	Bubbles, closed	Inclusions, crystalline	Flat edge damage**, Seamed edge	Slight shelling**, Seamed edge
F	Admissible	Admissible	Admissible	Admissible	Admissible, if no further consequences are to be expected	Admissible, if no further consequences are to be expected
R	Admissible up to max. 50 mm	Admissible, but not in accumulated occurrence	Admissible up to a size of < 1 mm; not in accumulated occurrence	Admissible up to a size of ≤ 1 mm; not in accumulated occurrence	Not admissible	Not admissible
	./.	./.	./.	./.	Admissible, if F=R, provided no further consequences are to be expected	Admissible, if F=R, provided no further consequences are to be expected
H	Not admissi-ble	Admissible up to an individual length of 60 mm or an added total length of 120 mm	Max. 4 bubbles of ≤ 0.5 mm at least 200 mm apart	Max. 4 inclusions of ≤ 1 mm at least 200 mm apart	./.	./.

* F = seam area; applies only to glasses with seamed edges.
Non-framed glazings such as doors etc. shall be assessed only according to areas R and H (free edges should be at least grinded).
** Not deeper than 15% of the glass thickness into the glass volume

Explanations:

F = Seam area – edge cover seamed edges **(18mm)**
R = Edge area – **tenth or twentieth** of the clear width or height (Driver side) dimensions
H = Main area **(strictest estimation)**



Glass marking: homologation stamp according to drawing

4 - Definition of Terms for tempered glasses

4.1 Tempered glass

Thermally pretensioned tempered glass according to this guideline is a kind of glass that is being heated and subsequently cooled down during the manufacturing process. This causes the tempered glass to be widely resistant against impacts, decomposition as well as temperature changes. In case of demolition the typical fracture pattern, consisting of many small pieces, occurs.

4.2 Anisotropy

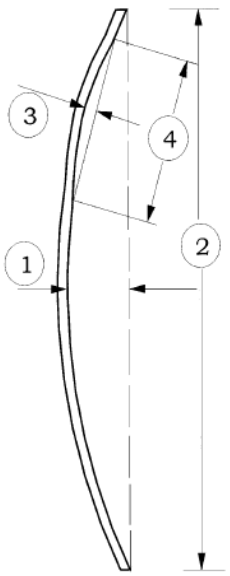
Appearance of irisations on thermally toughened glass panes (tempered safety glass - ESG).
During examination of tempered safety glasses under condition of specific light and polarised light, anisotropies, so-called polarization fields may become visible as patterns. This effect is for physical reasons for tempered safety glass and therefore characteristic.

4.3 Wettability of the glass surface by moisture

The wettability of the glass surface may vary due to marks from rollers, fingers, labels, paper grains, vacuum suckers, smoothing agents or lubricants.
For wet glass surfaces due to the fogging that are moist from steaming, rain or cleaning water, the differences in wettability may become visible. Such phenomena are characteristic features and cannot be registered as a claim.

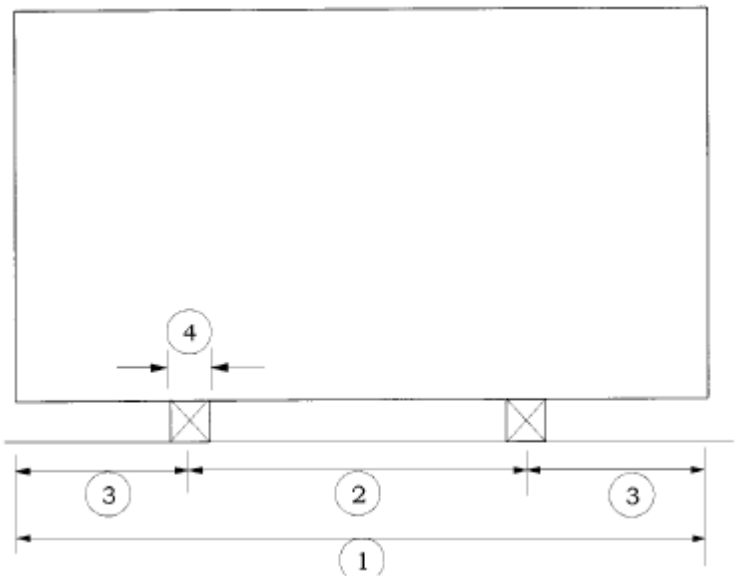
4.4 Measuring of the general distortion for straightness in relation to the glass edge length

The glass pane must be placed vertically on its long side on two blocks that are to be positioned at the fourth of the edge length away from the edge (see figure 5).
The deflection has to be measured with a straight edge or a tense wire as the maximum distance to the concave surface of the glass pane, along the glass edges and the diagonal (see figure 4).
The value of the distortion is expressed by the deflection in mm, divided by the measured length of the edge or of the diagonal in mm along which the distortion has been measured.
The measurement has to be made at room temperature.



1) Deflection for calculating general distortion
2) W or H, or the diagonal length
3) Local fault
4) 300 mm length

Figure 4: Representation of general and local fault



1) *W* or *H*
2) (*W* or *H)/2*
3) (W or *H)/4*
4) max. 100 mm

Figure 5: Installation conditions for measuring the general rejection

4.5 Measuring of the local distortion referring to the measured distance of 300 mm

Local distortion can occur within relatively short distances along the glass edges. The local distortion is being measured with a straight edge or tense wire parallel to the edge of the glass pane with a distance of 25 mm from this edge over a measuring length of 300 mm (see figure 4).
The local distortion is expressed in mm / 300 mm length.
When measuring cast glass, the local distortion has to be measured with a straight edge at the textured side, by placing the straight edge at the highest points of the structure and measuring up to its highest point

4.6 Limitation of the general and local distortion

The maximum permissible thresholds of the straightness tolerances of the general distortion, measured according to 4.4, and the local distortion, measured according to 4.5, for glass without holes and/or notches and/or cut-outs can be found in chart 3 below.

Chart 3: Maximum values of general and local distortion

production process	Types of Glas	maximum value	
		general rejection mm/mm	local fault
hoizontally	float glas after EN 572 - 2	0,003	0,5
	other types of Glas	0,004	0,5
vertical	all types of Glas	0,005	1,0

4.7 Admissible dimensional tolerances

Some dimensional deviations are specifically mentioned in DIN EN 12150-1.

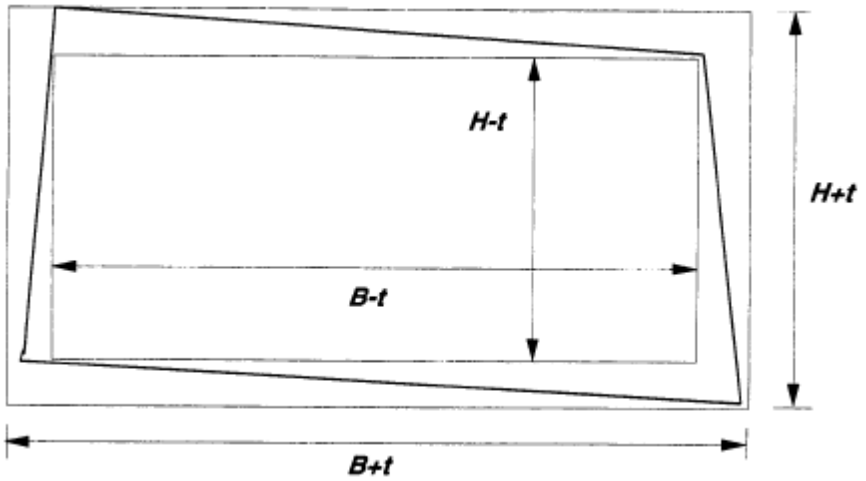


Figure 6: Tolerances for the dimensions of rectangular plates

Dimensional tolerance table for tempered glasses for flat dimensions

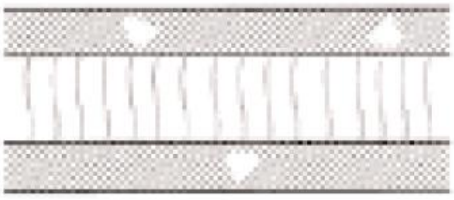
Nominal size of the Page B or H	Nominal thickness d ≤8	Nominal thickness 8< d ≤12	Nominal thickness d >12
< 500	+/- 1,0	+/- 2,0	+/- 3,0
500 < W or H ≤ 1000	+/- 1,5	+/- 2,0	+/- 3,0
1000 < W or H ≤ 1500	+/- 2,0	+/- 2,0	+/- 3,0
1500 < W or H ≤ 2000	+/- 2,5	+/- 2,5	+/- 3,0
2000 < W or H ≤ 3000	+/- 3,0	+/- 3,0	+/- 4,0
> 3000	+/- 4,0	+/- 4,0	+/- 5,0

Advice: All tolerances deviating from the ones mentioned above have to be replaced by an addition to this Quality Agreement and to be marked in the respective production drawing.

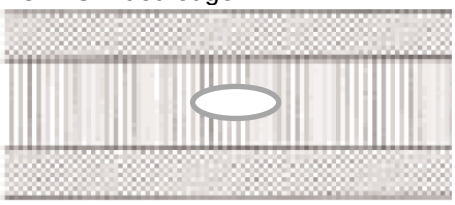
4.8 Edge working of glass for thermally toughened glasses

The simplest type of edge working is seamed edge. Common types of edge working are as the followings.

4.8.1 Seamed edge



4.8.2. Grinded edge



4.8.3. Smooth grinded edge

4.8.4. Polished edge

Specialist edge work, such as “waterjet cutting”, the manufacturer should be consulted.
Special edge work quality demands for holes, for water slots and for cut-outs etc. have to be consulted with manufacturer. If the size of the details for holes, for water slots and for cut- outs etc. are not enough for grinding, then the grinding cannot be demanded for these details. Because of producing these details without grinding, the edge work visual quality has to be checked as seamed edge work quality level for these details. The using of the chamfer for drill holes are not for visual reasons. The aim of the adding chamfers to drilling holes is to increase strongness of the hole edges for technical necessities.

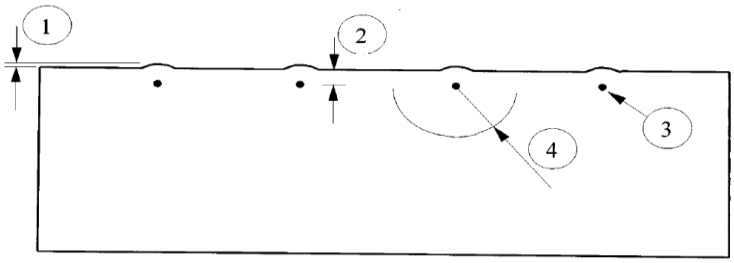
4.9 Hole, notches and cut-out spacing

Hole, notch and cut-out tolerances are dependent on production processes.
In general, Hole, notch and cut-out tolerances correspond to the tolerances given under 4.7, Table
The hole diameters and notch and cut-out sizes are to be dimensioned such that the spacing tolerances of holes and cut-outs can be compensated.

4.10 Optical and visual distortions

4.10.1 Thermally pretensioned soda-lime tempered glass produced according to the vertical manufacturing process

The suspension points can cause additional optical distortions within an area with a radius of 100 mm around the suspension points (see figure 3).



1 deformity
2 up to 20mm
3 pliers impression
4 visual disorders in the area of 100 mm radius

Figure 3: Deformation due to gripper impressions

4.10.2 Thermally pretensioned soda-lime tempered glass produced according to the horizontal complex bended and tempered glass manufacturing process by gravity bending technology with using bending mold.

No optical measurement shall be made in a peripheral area 35mm from the edge of the complex bended and tempered glasses. Because of the contact of the bending tool to the glass surface there can be visible mold marks for complex bended and tempered glasses which are manufactured by gravity bending technology. This mold marks cannot be registered as claim.

4.10.3 Thermally pretensioned soda-lime tempered glass produced according to the horizontal manufacturing process

Due to the fact that during the pretensioning process the hot glass is in contact with the rolls of the furnace, distortions of the surface are caused by deviations from straightness, the so-called “roller waves”. These “roller waves„ generally become noticeable through the reflection. Glass being thicker than 10 mm may have small impressions of the rolls of the furnace on its surface. As long as these alterations do not occur over proportion-ately, they are acceptable (over proportionately = four or more alterations less than 200 mm away from each other).

4.11 Other variable characteristics tempered safety glass

Variable characteristics	Tolerances/ admissibilities	
Thickness of glass	3 - 6 mm 8 - 12 mm	± 0,2 mm ± 0,3 mm
Edge-working (including any cut-outs, water slots or drill-holes)	**Shelling:** seamed edges, drilling holes, water slots, notches, ungrinded waterjet cut – out details grinded edges **total blank spots area (missing grinded edges)**	 2 pcs./m² Ø ≤ 2 mm max. depth: 0,15 x thickness of glass max. 1% of the circumference and max. length of the one blank spot is 30mm
Surface details (holes and cut – outs)	**Holes:** Nominal diameter 4 ≤ Ø ≤ 20 mm Nominal diameter 20 < Ø ≤ 100 mm Tolerance of position **Cut-outs:** Dimensional tolerance Tolerance of position	 ± 1,0 mm ± 2,0 mm ± 2,0 mm ± 2,0 mm ± 2,0 mm
bending contour of bended glasses: for cylindrical bended glass thickness ≤ 6 mm and R ≥ 1000	-For cylindrical bended glasses: Difference to model ≤ 2mm along revolving glass edge (by a lay-on of about 30 mm) For all other thicknesses and other radius upon request (will be shown on the drawing and will be consulted with manufacturer) -For spherically or cylindrical bended glasses with more than one radii: Difference to model +/- 8mm along revolving glass edge (by a lay-on of about 30 mm). Additional tolerances in the OEM area must be clarified in advance. For all other tolerances upon request (will be shown on the drawing and will be consulted with manufacturer)	
Crossbending of cylindrical bended glasses	< 6mm	

5 - Definition of Terms for laminated glasses

5.1 Laminated glass

Assembly consisting of one sheet of glass with one or more sheets of glass and/or plastics glazing sheet material joined together with one or more interlayers.

5.1.1 Interlayer

Layer or material acting as an adhesive and separator between plies of glass and/or plastics glazing sheet material.

5.2 Limitation of the general and local distortion

The maximum permissible thresholds of the straightness tolerances of the general distortion, measured according to 4.4, and the local distortion, measured according to 4.5, for glass without holes and/or notches and/or cut-outs can be found in chart 3 below

Table 3: Maximum values of general and local distortion

production process	Types of Glas	maximum value	
		general rejection mm/mm	local fault
hoizontally	float glas after EN 572 - 2	0,003	0,5
	other types of Glas	0,004	0,5
vertical	all types of Glas	0,005	1,0

5.3 Admissible dimensional tolerances

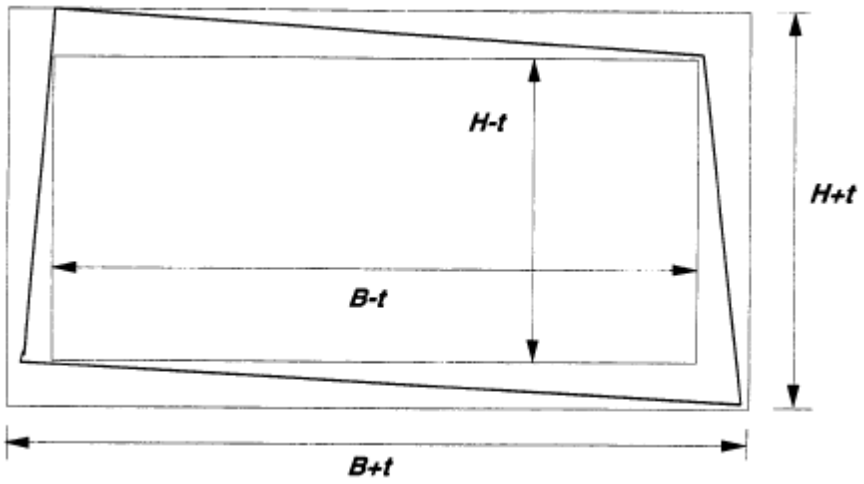


Figure 6: Tolerances for the dimensions of rectangular plates

Dimensional tolerance table for laminated glasses for flat dimensions

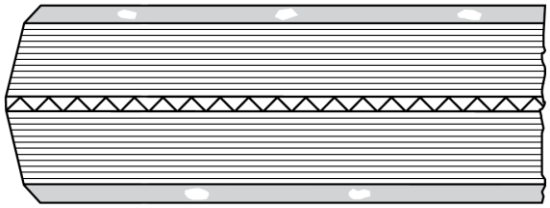
Nominal size of the Page B or H	Nominal thickness d ≤8	Nominal thickness 8< d ≤12	Nominal thickness d >12
< 500	+/- 1,0	+/- 2,0	+/- 3,0
500 < W or H ≤ 1000	+/- 1,5	+/- 2,0	+/- 3,0
1000 < W or H ≤ 1500	+/- 2,0	+/- 2,0	+/- 3,0
1500 < W or H ≤ 2000	+/- 2,5	+/- 2,5	+/- 3,0
2000 < W or H ≤ 3000	+/- 3,0	+/- 3,0	+/- 4,0
> 3000	+/- 4,0	+/- 4,0	+/- 5,0

Advice: All tolerances deviating from the ones mentioned above have to be replaced by an addition to this Quality Agreement and to be marked in the respective production drawing.

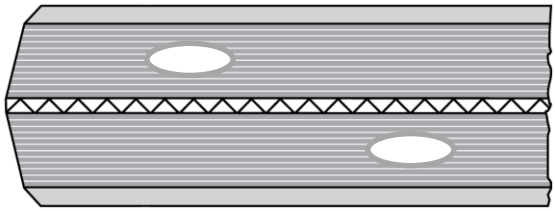
5.4 Edge working of glass for laminated glasses

The simplest type of edge working is seamed edge. Common types of edge working are as the followings

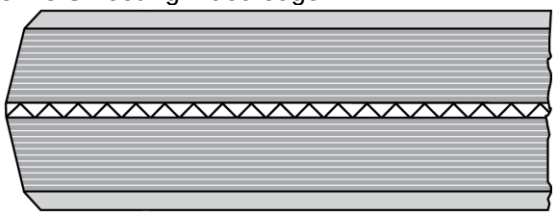
5.4.1 Seamed edge



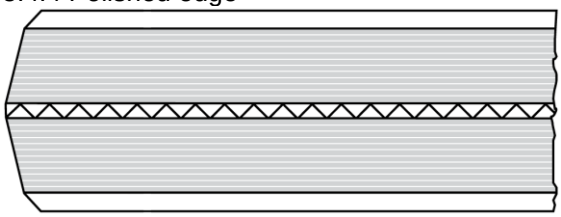
5.4.2 Grinded edge



5.4.3 Smooth grinded edge



5.4.4 Polished edge



Specialist edge work demand, such as “waterjet cutting”, “holes” etc. the manufacturer should be consulted.

5.5 Other variable characteristics laminated safety glass

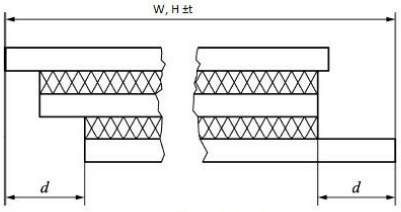
<table>
<tr><th>Variable characteristics laminated glass</th><th colspan="3">Tolerances/ admissibilities</th></tr>
<tr><td>thickness laminated glass</td><td>< 6,9 mm
7 < 10 mm
>10 mm</td><td colspan="2">± 0,5 mm
± 1,0 mm
acc. to ISO 12543-5</td></tr>
<tr><td>Cross bending of one sided bended glasses</td><td colspan="3">< 6 mm</td></tr>
<tr><td>Bending contour for curved laminated glass panes</td><td colspan="3">Difference to model +/- 8mm along revolving glass edge (by a lay-on of about 30mm).
Additional tolerances in the OEM area must be clarified in advance.
For all other tolerances upon request (will be shown on the drawing and will be consulted with manufacturer)</td></tr>
<tr><td>Torsion</td><td colspan="3">≤ 1,5 mm</td></tr>
<tr><td>Displacement (pane offset)</td><td colspan="3">The individual panes can shift against each other during the lamination production process. This offset is defined in the table below and is independent of whether two or more glass panes or pasting glazing sheet are joined together.
 

Table - offset
The maximum offset for d must match the table. Width W and height H must be considered separately.

Table - maximum offset for machined sizes and bearing dimensions
<table><tr><th>Nominal size W or H</th><th>Maximum allowable offset, d in mm</th></tr><tr><td>W, H ≤ 1 000</td><td>2,0</td></tr><tr><td>1 000 <W, H ≤ 2 000</td><td>3,0</td></tr><tr><td>2 000 <W, H≤ 4 000</td><td>4,0</td></tr><tr><td>W, H > 4 000</td><td>6,0</td></tr></table></td></tr>
<tr><td>Defects of the interlayer</td><td>Overhang of the interlayer

Heeling of the foil
Seamed edges
covered glazing
(glass edge not visible)

Glazing flush to the outside
(glass edge visible)
Border-bubbles
Seamed edges
Covered glazing
(glass edge not visible)

Glazing flush to the outside
(glass edge visible)</td><td>not admissible

≤ 2 mm admissible

≤ 0,5 mm admissible

1 pcs./lin. m
circumference Ø<2mm
Area of 0 - 3 mm from the glass edge admissible

It is not admissible to see the bubbles from the outside</td></tr>
<tr><td>Edge-working</td><td>Shelling:
seamed edges

grinded edges
total blank spots area (missing grinded edges)</td><td>2 pcs./m² Ø ≤ 2 mm
max. depth: 0,15 x thickness of glass

max. 1% of the circumference and max. length of the one blank spot is 30mm</td></tr>
</table>

6 - Optical distortions

Optical quality requirements for windscreens and glasses other than windscreens (side glasses, back glasses and roof panes) have to be suitable according to ECE R43 requirements.

If extra optical quality requirements are demanded (like windscreen optical quality demand for side or back glasses etc.), the requirements as well as the criteria for acceptance have to be stipulated previously and the manufacturer should be consulted.

The inspections are to be carried out according to ECE 43 and for all optical characteristics according to appendix 3 paragraph 9.2.

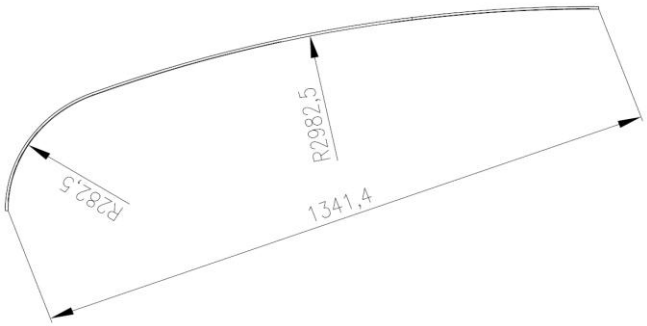
Generally, distortions of the ability to look through the glass can occur when laminated glass has various superstructural parts made of glass and/or a greater thickness of foil.

7. Checking of heatable glasses

The requirements, as well as the acceptance criteria for heating glasses, are specified in the drawings.
The tests are carried out with the necessary measuring devices (connecting devices).
The results are to be documented on first delivery. The heating glass must be tested under operation condition (heated).
Distortions of laminated heatable windscreens when the heater is switched on are not permitted during the inspection.

8 – Checking methods of bending curve of one sided curved panes

The glass pane to be tested must be placed on a previously printed contour of the pane in M 1: 1.
This plot must contain at least one length and one width dimension, which according to the plot must be checked for correctness in relation to the scale. The max. printing deviation may be 0.5 mm and must be taken into account when measuring the contour deviation. Decisive for measuring the bending of spherically curved panes is the borderline (about 30mm).



Picture 8: Example plot

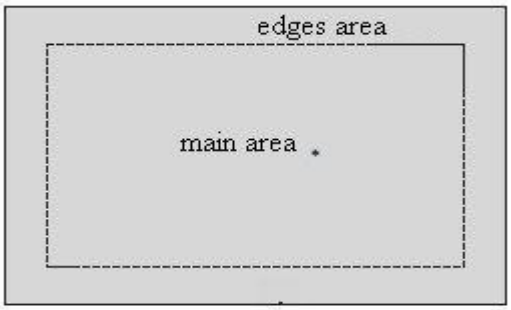
9 - Edge sealing of insulated glasses

The edge sealing of insulated glass shall connect the panes permanently and establish a steam-proof barrier, that has to avoid the diffusion of steam for many years. Moreover it shall elastically adjust natural alterations of the volume of the air in the gap between the single glass panes and be resistant against chemical influences of the atmosphere and light (in particular UV rays). These properties have to remain preserved from -40 °C up to +100°C. The edge sealing is to be constructed in such a way, that a linear bearing within the frame is possible.

10 - Silkscreen Printing

10.1 Inspection conditions for silkscreen printing

Inspection system will be same as chapter 3.2
During the inspection, always the side without silkscreen is checked.
According to the following sketch, a main area and an edge area are to be distinguished.



Edges area: Rebate zone circumferential 18mm. (only for covered edges)
Main area: Remained area after edge area. (only for printing quality control) So only printed parts in the main area have to be checked for printing quality.

If visible edges are requested when the order is placed, edge zone is omitted and printing quality for all glass surface can be checked same as main area. The visual quality requirements are specified for main area and edge area in part 10.2.

10.2 Admissible faults

Type of defects

-Defects in enamel point-wise and/or linear:
(marks, pits and other defects)

Main Area
∅ < 0.5 mm are disregarded
∅ 0.5 – 1.0 mm max. 3 marks per m² >=100mm apart
∅ 1.0 – 2.0 mm max. 2 marks per m² >=100mm apart
For linear faults none >=10mm² per m² >=100mm apart
Sum of all defects: max. 25mm² per m²
Edge Area
Width max. 3mm
Sporadically 5mm
Length: no restriction

-Burned in foreign bodies:
(fibres, hairs etc.)

Main Area
Admissible up to 10mm length
Max. width 0,5mm and 2 foreign bodies per m²
Edge Area
Allowable / no restriction

-Clouding / misty areas /shading:

Main Area
Not permitted
Edge Area
Permitted / no restriction

-**Water stains**:	**Main Area** Not permitted **Edge Area** Permitted / no restriction
-Coating over-run at edges:	**Main Area** Not applicable **Edge Area** Permitted
-Reworking of defects:	**-**Repairing defects up to 2 mm (maximum 3 defects in a circular area of d = 300 mm) using enamel paint prior to the tempering process and or bending process of the bended laminated glasses are permitted. However repaired defects must not be visible from outside surface (unprinted surface) of the pane. -Repairing defects up to 2 mm (maximum 3 defects in a circular area of d = 300 mm) using organic paint or primer after to the tempering process or bending process of the bended laminated glasses are permitted. However repaired defects must not be visible from outside surface (unprinted surface) of the pane.
-Screen marks	**:**Screen marks are admissible in the case of full-area screen printing

-Tolerances for screen print placement:
Print size: ≤ 200 cm:

Seamed edges (for glasses which have edge area)	± 2.5 mm
Other edge treatment (for glasses which have only main area)	± 2.0 mm

-Tolerances for screen print placement:
Print size: > 200 cm:

Seamed edges (for glasses which have edge area)	± 4.0 mm
Other edge treatment (for glasses which have only main area)	± 3.0 mm

-**Glasses with seamed edges**: (for glasses which have edge area)	All screen print faults are admissible in a 3 mm wide surrounding edge area.
Other edge treatment:	In the case of full-area and edge-printed panes, the printed (for glasses which have only main area) edges must be visually clean. The margin between the ink film and the glass edge must not exceed 2 mm (± 1 mm unparallelism). Ink noses are not admissible.
-Holes, notches and cut – outs	:In the case of holes, notches and cut-outs a distance of 2 mm is admissible between the edges of the print and holes, notches and cut-outs.
-General print faults:	The print contours must be neat in appearance. Heavily serrated contours are inadmissible. Heavy pinholing, heavy doctor blade marks, blurring, etc. are inadmissible.
Multiple printing:	Where a multiple printing process is used, it is indispensable to print samples (standard off-register tolerance: ± 2 mm).

10.3 Colour reproduction

According to the standard process, the silk screen print is applied to float glass. We do not recommend choosing the colour exclusively based on a colour chart, as the coloured pane may show a deviating colour due to the glass's own colour and the glass surface reflection. Minor colour deviations between production different lots cannot be ruled out on account of process-related variations in the ink manufacturing or baking processes. Moreover, colour reproduction depends on the glass thickness and the glass type.

11 - Marking

The glasses are usually stamped with logo. The logo information is given on the drawing to apply on the glass during production. The logo may include the approval or standard numbers and / or a customer logo.

The logo must show the marking specified on the drawing or the order. The position tolerance of the logo stamp is generally ± 5 mm; if deviating tolerances are specified on the drawing, these must be observed.

12 – Damages / Claims

Damages and claims related with visual quality of the glass like e.g. scratches which are complained after an installation of glass, will not be accepted.

13 - Storage

Screen-printed glass panes, especially those stacked with intermediate layers placed between them, are liable to corrosion, if they are exposed to moisture over an extended period of time. For that reason, it is absolutely necessary to protect the panes from moisture during shipment and storage.

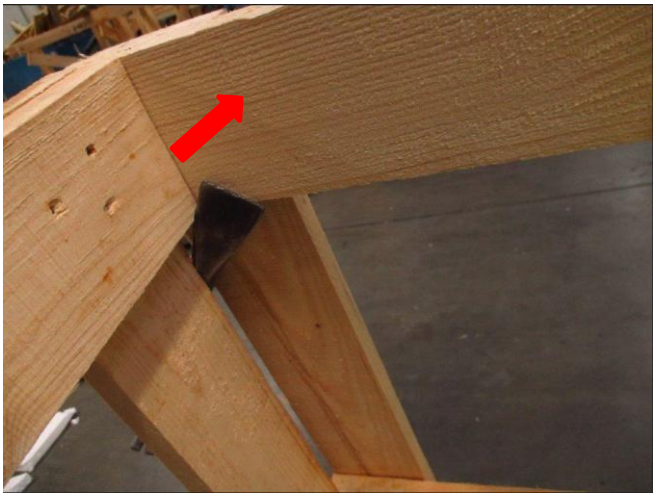
14 – Unpacking the products

Glass, windows, glass with add-on parts and all spare parts must always be removed from the front of the crates. After removing the crate lid, the front panel must be removed. The crates must be positioned at an angle on one side to prevent tipping. Furthermore, the inclined elevation prevents the products from falling over or out.

Inclined position of the box

Removal of the cover boards (of the cover)

Removal of the front panel

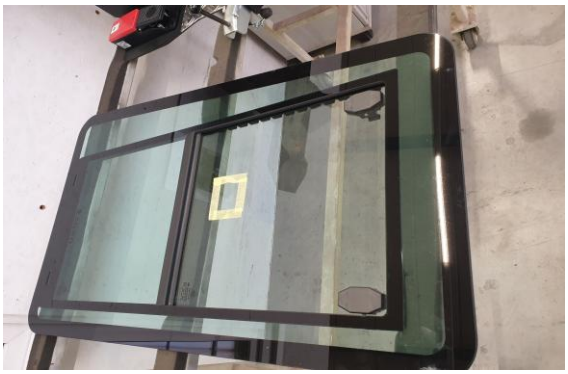
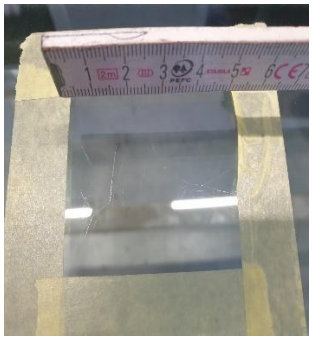


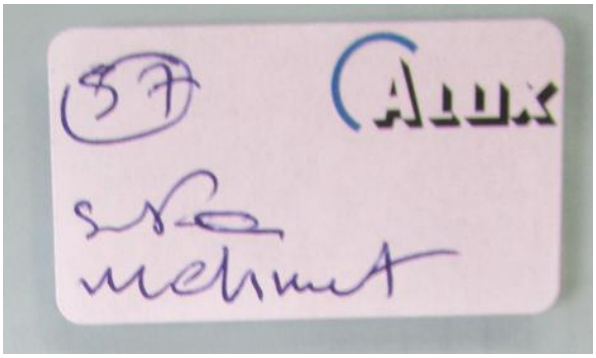
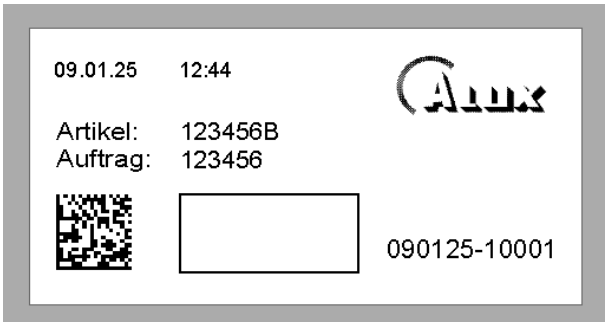
15. notification of complaints

In order to ensure smooth and prompt processing of any complaints that may arise, the following points must be stated in advance when reporting the complaint to ALUX GmbH & Co. KG in advance:

- Customer complaint number
- ALUX order confirmation number of the respective delivery (also partial deliveries)
- ALUX article number
- Complained quantity of the rejected articles with error pattern (Example: Article: 123456, delivered 10 pieces, of which 3 pieces complained about. 1 piece with scratches and 2 pieces with moulding on the glass edge.
- Images according to the following specifications:

1. glass stamp of the damaged goods	

2. overall picture of the damaged goods with marking where the defect is located.	
3. picture of the defect with indication of the degree of damage. (Example: deep, noticeable scratches or hairline scratches). The extent and/or the affected area of the glass defect must always be measured with a tape measure or other suitable measuring device.	  

4.image of the existing test stickers Examples:	  
5. image of the specified order number on the profile frame for production goods. Example:	

6. image of the existing box label for Trading goods.