Luxclear

PROCESSING GUIDE

VERSION 2.1 – April 2024

Your Dreams, Our Challenge

WARNING

Please read this Processing Guide carefully before processing Luxclear products.

Important Preliminary Instructions

At each stage in the production process the personnel involved must wear the personal protective equipment required for the work they are performing, such as safety gloves, safety footwear and safety glasses.

Personal protective equipment as well as auxiliary materials and equipment that might come into contact with the coating must be tested beforehand to ensure they are compatible with the coating. AGC accepts no liability for any damage caused due to the use of non-approved materials or incorrectly used materials and/or equipment.

Additional recommendations regarding product specifications and processing are outlined and explained below. Should you have further questions or require support feel free to contact your AGC representative.

This version of the guide replaces and cancels all previous versions.

Please regularly check www.agc-yourglass.com for any updates.

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1. Handling in the factory

1.1 Unloading

All glass must be inspected immediately upon delivery. Any damage – even damage to the packing materials or racks – must be reported to AGC immediately. AGC accepts no liability for any damage that occurs after delivery or during unloading, transport, storage, processing or installation in the event of failure to comply with the following instructions:

- The rack must be placed on an even, horizontal surface.
- Only appropriate devices and equipment may used for unloading.
- The items being unloaded must be grasped and lifted exactly at their midpoint.
- The protective packing must not be damaged during the unloading process.
- The glass must be stored on appropriate racks.
- All parties must comply strictly with the instructions set out in this Processing Guide.

General remarks

- All devices and equipment used to grasp or lift the goods must comply with existing regulations and must be approved by the relevant authorities or bodies – for example *TÜV* (German Technical Inspection Association) or *Berufsgenossenschaft* (German Occupational Health and Safety Agency).

- Safe working conditions must be ensured at all times. Personnel not required for the actual unloading process must keep clear of the unloading area. Personnel must have received appropriate training.

1.2 Storage

Luxclear must be stored in accordance with the applicable rules and regulations in order to reduce the risk of the coated panes being damaged due to chemical or mechanical influences.
As a general rule, care should be taken to avoid major fluctuations in temperature and humidity that might cause condensation to form on the glass. Such fluctuations generally occur near loading and unloading areas. Water must not be allowed to come into contact with the sheets of glass.

Care should be taken to ensure that the ambient air is not polluted by any corrosive elements, such as chlorine or sulphur. Sources of such elements include machinery with heat engines, battery

charging points, road salt and so on.

Factory racks are to be used solely for transport, not for storage. Jumbo sizes must be stored on storage racks with spacers between the stacks. Care must be taken here to ensure that only stacks of the same size are stored on any single rack.

1.3 Ensuring separation between panes

Glazing units must be kept separate from each other in order to prevent any contact between the glass side of one unit and the coating side of another unit.

If, after handling and/or processing, the original interleaving powder is still present in sufficient quantities, no additional interleaving powder needs to be applied. However, there is a risk that small glass splinters remaining on the surface of the glass after cutting can scratch the coating while the panes are being moved around within the facility.

To prevent damage, the edges of the panes – even edges that have already been processed – must never come into contact with the coating.

Improper stacking can damage the coating. Coated panes must not be slid out of the stack since doing so will tend to scratch and damage the coating.

We recommend placing sheets of corrugated cardboard or pH-neutral paper between the panes of glass. The paper and/or cardboard in question must be and must remain clean and dry.
Alternatively, cork or polymeric foam spacers can be used. But since these types of spacers can leave permanent marks and impressions behind, they should only be used along the edges of the pane.
If plastic and/or polyethylene foam spacers are used, care should be taken to ensure that the temperature of the panes at the time the spacer is inserted and during the entire duration of the storage period remains below 45 °C.

1.4 Packing after processing

If the coated panes are to be shipped to another plant for processing (into thermally toughened glass, laminated glass, laminated safety glass, etc.), then the following packing recommendations must be followed:

- 1-mm thick polyethylene foam spacers must be inserted between the sheets. To ensure these spacers leave no marks on the coating, care must be taken to ensure that the temperature of the pane before the insertion of the spacers and for the entire duration of the

storage period remains below 45 °C.

- The pack of glazing units must also be properly secured and fastened to the rack so that the panes cannot rub against each other or slip out of place.
- Since toughened glass sheets are never perfectly flat, micro suction pads[3] should be placed around the edge of each sheet of glass to prevent the glass side of a sheet from coming into contact with the coating on another sheet.

2. Processing

2.1 Cutting

- The glass must be laid on the cutting table with the coated side up so the coating does not come into contact with the table.
- The cutting fluid used must be compatible with the coating, sufficiently volatile and water-soluble.
- If the glass is cut manually using a template, the template must be positioned very carefully and kept steady and stable so that it does not scratch the coating. AGC recommends that some kind of spacer be placed between the template and the coating in order to protect the coating.
- The cut glass must be stored on racks. The coated side of the first pane must not rest directly against the rack. All subsequent panes, or at least the last one, must be oriented in the opposite direction.
- Luxclear does not require edge-deletion.

2.2 Edge processing and drilling

All grinding tools used must be suitable for working with coated glass.
The glass must be kept wet during the grinding process so that the grinding sludge does not dry on the glass.
The water used during edge processing must have a pH value between 6 and 8.
After grinding, the glass must be washed immediately.

If the glass is also drilled – which is possible for coated glass – the drilling tools and gripping mechanisms must be such that they do not damage the glass or coating. Any machines or tools used must be fitted with suitable materials to ensure they do not damage the glass or coating.

2.3 Washing

The washer must be suitable for washing coated glazing units. Care must be taken to ensure there is no mechanical or chemical damage to the glass during the washing process.
A spraying unit should be installed just before the point in the process where the glass enters the washer so that any abrasive materials (residue from previous processing) are removed from the

coating. If abrasive materials are not removed in this way, they might come into contact with the washing brushes and end up scratching the coating. The spraying unit must be arranged in such a way that that the coating is thoroughly rinsed before the washing process begins.

The washing process must not be interrupted while the glass is still in the washer, especially if hard brushes are used (brush diameter > 150 µ). AGC recommends regularly checking the drying units (including the cleanliness of the air filters) to make sure they are working correctly. Once the panes have been cleaned the surfaces must no longer display any impurities, deposits or damp spots. AGC also recommends that appropriate lighting be used to perform a visual inspection after washing. Any remaining residues can then be carefully removed using a mild cleaning agent and a soft cloth, exerting as little pressure as possible.

Suitable washing machines and appropriate water quality are necessary in order to ensure residue-free cleaning.

There are no particular recommendations regarding water quality. However, the water in the washer and in the edge-processing machine should have a pH value between 6 and 8.

A water purification system is necessary to ensure consistent water quality.

Water can be purified by means of either a reverse osmosis system or an ion exchange system.

In addition to appropriate water purification, another important factor is the water supply. The washer must be supplied with pure water throughout the process.

In addition to water quality (as mentioned above), care must also be taken to ensure that no parts of any equipment coming into contact with the coating are themselves soiled or dirty (e.g. adipic acid).

Any additives added to the washing water must be tested to ensure they are compatible with the products.

After washing, micro-suction pads[3] should be placed between the panes of glass.

2.4 Enamelling and printing

2.4.1 General

Luxclear can be printed with ceramic paints.

Luxclear can generally be used for silk-screen printing on either the coated or uncoated side as long

as the instructions below are followed.

	Enamel on glass side	Enamel on coated side
Luxclear	OK	OK*
*Appearance, as indicated below in point 2.4.2, absolutely must be validated.		

2.4.2 Precautions when painting/enamelling the coated side

Luxclear can generally be silk-screen printed on either the coated or uncoated side as long as the instructions below are followed.

Impurities on the coating can be removed using dry compressed air.

Darker colours absorb relatively large amounts of thermal radiation. As a result, the high temperatures reached during the toughening process can damage the coating underneath the enamel/paint.

In cases where one very small area of the pane is very heavily printed, under certain circumstances the printed area of the glass will react differently when cooling down compared to the unprinted area. For these kinds of designs, AGC recommends performing tests ahead of time to check that the expected quality is achieved.

In any case, the final result depends on the type of furnace and its settings, the type of paint and the specific image to be printed on the glass. To avoid problems, tests must, in certain cases, be carried out ahead of time. AGC is not liable for the result at this stage in the process.

Paint applied to the coating has an impact on the optical characteristics of the final glass product. These performance properties can be obtained from our Technical Advisory Service (tas@eu.agc.com).

2.4.3 Precautions when painting/enamelling the glass side

Luxclear can generally be silk-screen printed on the glass side, just like normal float glass.

The presence of the coating on the other side will not affect the behaviour of the glass in the furnace. The use of SO_2 in the furnace has no negative impact on the coating.

The top and bottom convection profiles (air temperature, pressure, etc.), when used, must be fine-tuned in order to keep the glass flat in the toughening furnace, from the early stages until the end of the heat treatment process. The same approach applies to the heating profile, in cases where no convection is used.

2.4.4 Quality control

The coated glass must be inspected after silk-screen printing. To do so, halogen lights should be installed above the glass so that the operator can see the light reflected by the coating after silk-screen printing.

2.5 Thermal processing

2.5.1 General

Luxclear has the same normal emissivity as float glass (normal emissivity = 0.89). All toughening furnaces available on the market can be used to thermally process this product.

Luxclear must be thermally toughened using the same settings as the uncoated glass substrate.

The following options are possible for the position of the coating and the convection in the furnace.

	Coating position in the furnace		**Type of convection**	
	Face-ups	Face-down*	Top convection**	Bottom convection**
Luxclear	OK	OK	Allowed	Allowed
Luxclear Matelux	Matelux side	Luxclear side	Allowed	Allowed

* The rollers in the furnace as well as the quenching and conveyor systems must be kept clean.

** The top and bottom convection profiles (air temperature, pressure, etc.), when used, must be fine-tuned in order to keep the glass flat in the toughening furnace, from the early stages until the end of the heat treatment process. The same approach applies to the heating profile when no convection in used.

Any stamps indicating compliance with relevant standards may be applied to the upper side of the glass before heat processing.

2.5.2 Settings

Luxclear must be thermally toughened using the same settings as the uncoated glass substrate.

2.6 Heat soak test

Thermally toughened glass is at risk of spontaneous breakage due to nickel sulphide inclusions. Such inclusions, however, cannot under any circumstances be considered a material defect of the product. In order to reduce the risk of spontaneous breakage, an additional heat soak test can, or even must, be carried out in accordance with EN 14179-1 or some other equivalent guideline.

During the heat soak test care must be taken to ensure that the spacers do not leave any residue or marks on the coating due to the weight of the glass.

AGC highly recommends using an electric furnace for Luxclear. Gas-fired furnaces can be used, provided they are fitted with a heat-exchanger in order to prevent direct contact between the combustion fumes and the coating.

Once the thermal toughening process is complete, Luxclear should be inspected as follows:

- The coating must be inspected in accordance with EN 1096-1*.
- Thermally toughened safety glass must comply with EN 12150-1*.
- Where applicable, the heat soak test (HST) must be performed in accordance with EN 14179-1*.

*Or equivalent local standards for countries outside the European Union.

2.7 Bending

Luxclear can be curved or curved and heat-treated with the same furnace settings used for the glass substrate.

In order to limit the risk of breakage in the furnace (annealed curved version) or in the quench section (toughened curved version), AGC recommends a smooth ground edge for the glass.

In any case, the coating can be under compression or tension, which means S-shaped curved glass can be produced.

2.8 Laminated glass and laminated safety glass

Coated glass can be processed both into laminated glass (LG) or into laminated safety glass (LSG). Care should be taken to ensure that the rollers in the lamination press (for example when glass passes through rollers) do not damage or soil the coating. The roller pressure and the roller material should be appropriate for the type of glass and the thickness of the glass, taking into account the mechanical resistance of the coating.

For the process carried out in the autoclave the spacers between the glass panes must be mounted solely and exclusively at the edges of the glass (never in the middle of the panes).

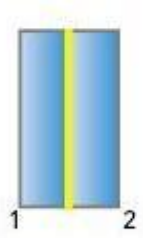
If the glass is laminated outside the autoclave or in a vacuum, the glass processor should first ensure that the coating is not likely to be damaged during the process. Compatibility between the coating and the materials it comes into contact with must be checked.

When establishing the settings for the laminating process the low emissivity of the coatings must be

taken into consideration.

Attention must also be paid to the fact that the above-mentioned parameters can vary depending on product, curve shape, radius, glass type, glass thickness, etc., and must be adjusted correspondingly. Luxclear can be laminated.

The coated side must always be placed in position 1 or 2. The coating must always be positioned on the exterior surfaces of the laminated glass and must not be in contact with the interlayer.



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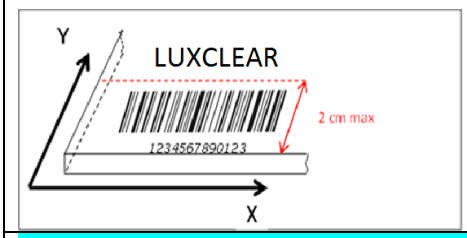
3. Identifying the coated side of the glass

Luxclear is a non-conductive coating and cannot be detected by conventional means. During manufacturing and packaging the coated side of Luxclear is always oriented in the same direction. The word **LUXCLEAR** is printed once on each sheet of Luxclear (DLF or PLF) no more than 2 cm from the corner. The printing is non-washable but disappears after toughening. Another method for determining the coated side is that the coating is always opposite the tin bath side of the glass. Tin bath side detectors are available from the AGC webshop at www.agc-store.com.

	
Luxclear trademark printed on the glass: non-washable ink disappears after toughening	AGC Luxclear stickers to be applied by processors

As glass coated with Luxclear cannot be visually distinguished from normal float glass, panes coated with Luxclear must not be stored or transported mixed with normal float glass - in order to avoid subsequent identification issues. In any case, it is important that the uncoated surface is labelled with the correct Luxclear sticker after cutting.

4. Quality control

Luxclear's properties are not altered during heat treatment (toughening, bending and heat soak test). The visual quality of the coatings is tested in accordance with EN 1096-1. The above-mentioned products are also tested in accordance with the applicable product standards. These include:

- Thermally toughened glass: EN 12150-1
- Heat-strengthened glass: EN 1863-1
- Insulating glass units: EN 1279-5
- Heat soak test (HST): EN 14179-1
- Laminated glass: EN 14449

or in accordance with applicable national rules and regulations.

5. Conformity and warranty, declaration of performance, CE marking and disclaimer

Any party processing AGC products (the 'processor') is responsible for complying with this Processing Guide and for complying with all relevant standards applicable to the product and application in question, as well as national guidelines. The processor is also responsible for drawing up a declaration of performance and for the CE markings for the products manufactured by it and installed in the EU. The declaration of performance and CE markings for AGC products can be found online at www.agc-yourglass.com and www.interpane.com. The same remarks apply to other markets, in accordance with the relevant local standards.

In addition, the processor is responsible for properly checking and testing the coated glass before and after every step in the work done to it and prior to its installation. If the relevant professional standards, procedures usually followed in the industry, stipulations on how to proceed properly and/or the guidelines set out in this Processing Guide are ***not*** followed, then the relevant AGC warranties will be rendered null and void. The processor alone is responsible for the quality of the final product.

6. Glazing instructions

AGC's Glazing Instructions and any other relevant guidelines and regulations, including the processor's own, must be followed when installing AGC products.
AGC's Glazing Instructions can be found at www.agc-yourglass.com.

7. Cleaning windows and facades

Instructions for cleaning glazing installed in facades can be found at www.agc-yourglass.com, where AGC also sets out the specific cleaning rules and regulations applicable to certain products. In some cases, AGC's manufacturing centres may direct processors to additional special cleaning instructions and regulations.

8. Sustainability

The materials used in the coatings are not harmful to the environment, which means there is no problem with recycling coated glass and introducing it back into the glass melting process. Additional information on sustainability and environmental impact can be found in our Environmental Product Declarations.

9. Auxiliary materials and equipment

To ensure durability, only appropriate and authorised materials, auxiliary materials and personal protective equipment may be used when working on or with AGC products. Please contact your AGC representative for more information and for any questions you might have about auxiliary materials and equipment.

[1] **Recommended gloves**
Product description: HYD TUF 52-547 (glove size 8-10 for handling coated glass). Supplier: IMPEXACOM, Rue des Tourterelles 14-16, B-5651 Thy le Château, Belgium. Tel.: +32 71 612145 Fax: +32 71 612164

[2] **Recommended cutting fluid**
Product description: ACPE 5503 cutting fluid. Supplier: ROLAND, Rue de la Petite Ile 4, B-1070 Brussels, Belgium. Tel.: +32 2 5250618 Fax: +32 2 5200856

[3] **Recommended spacers for storing glass**
Product description: Cork disks with micro suction pads (3x20x20 mm). Supplier: VITO IRMEN Mittelstrasse 74-80, D-53407 Remagen, Germany. Tel.:+49 26 42 40 07 10 Fax:+49 26 42 42 913

[4] **Recommended packing foam**
Product description: 1-mm packing foam
Supplier: SCRIPHORIA
Wellen, Belgium Tel.: +32 11 370 111