# EKO VISION™+

## Processing Guidelines

SAINT-GOBAIN

**ACKNOWLEDGMENT**

The below signature confirms that the processor has read and understood the present Guidelines and commit to respect its content.

Date:

Name: Title:

Signature:

Company:

Thank you to send back this page signed to your SAINT-GOBAIN representative.

| Document code | Date |
|---|---|
| SGG-QD-C-GUI-0016-A | 12/04/2022 |

# Table of Contents

# 1. GENERAL

## 1.1. Product description

**EKO VISION™+** is a high performance **low emissivity (low-E) glazing product, intended to be used as an insulation glass panel in oven doors**. The product is not designed to be used in residential or façade applications. The low-E coating provides enhanced thermal insulation of the oven by reflecting long-wave infrared heat radiation. It is manufactured by vacuum cathodic sputtering of several metallic and ceramic layers on PLANILUX® clear glass.

The product covered by this guideline is **"to be tempered".** This product cannot be used in annealed form since it acquires its characteristics during the tempering process.

Contact your sales representatives for more information or please refer to our commercial documentations in our website https://mx.saint-gobain-glass.com/es-MX.

To improve customer satisfaction, we constantly improve the quality of our coatings. This could lead to improvement in the processability of our coating, so please make sure you have an up-to-date version of the processing guidelines.

## 1.2. Thickness and dimensions

EKO VISION™+ is available in 3.9mm thickness and in standard sizes (in case of other thickness specification, please contact your sales representative). For more details, please refer to the relevant product documentation from Saint-Gobain Glass or contact your local sales service.

## 1.3. Quality criteria

Without prior agreement between both parties, the standard EN 1096-1 will apply.

## 1.4. Position of the coating and identification of the coated face

### 1.4.1. Position of the coating

EKO VISION™+ has been validated for use as middle and inner glass pane into multiple glazing door of all kinds of cooking ovens and stoves. **For the inner pane, the IR reflective coating must be positioned opposite to the cavity**. **For the intermediate panes, it can be either cavity or kitchen oriented, like below examples** (the 4 panes example is one amongst many possible configurations, please contact your local sales representative and/or your local Technical Support Manager (TSM) for more information on the subject):

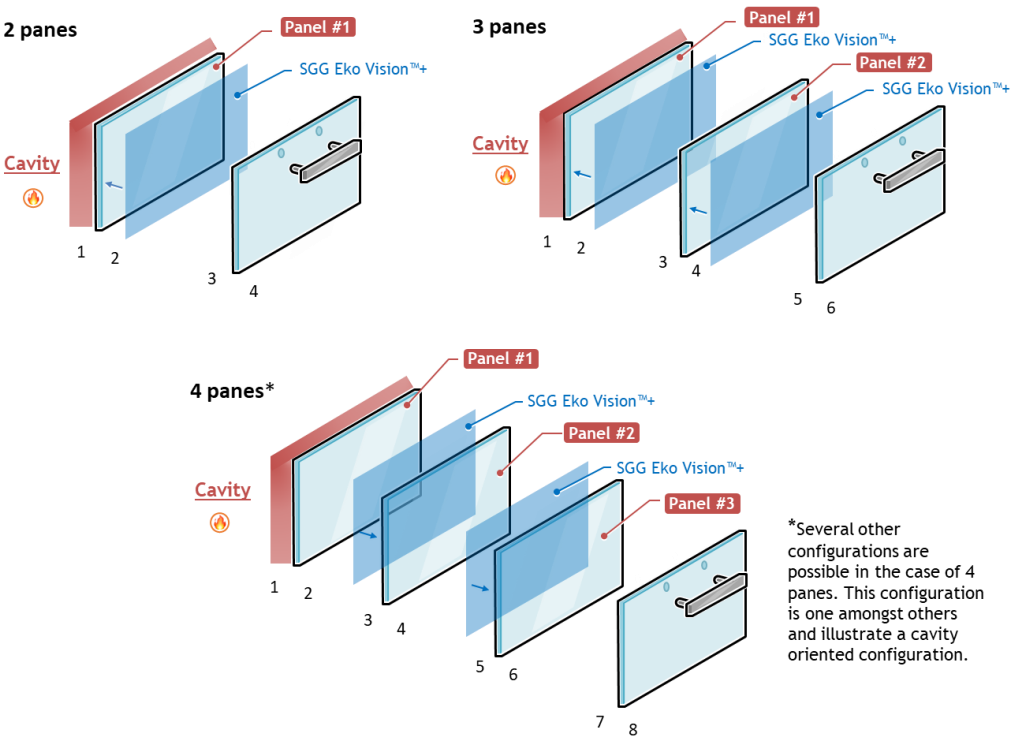



*Figure 1: Examples of oven door configuration*

Direct contact of corrosive materials on the coating, or materials likely to emit corrosive vapours with the action of heat (acids, ammonia, mortar water, acetic-curing silicones, among others) is prohibited.

### 1.4.2. Identification of the coated face

The coated side of a EKO VISION™+ is generally easy to identify as it exhibits a recognizable colour shade. Otherwise, coating detectors can be used. Information is available from your local Technical Support Manager (TSM).

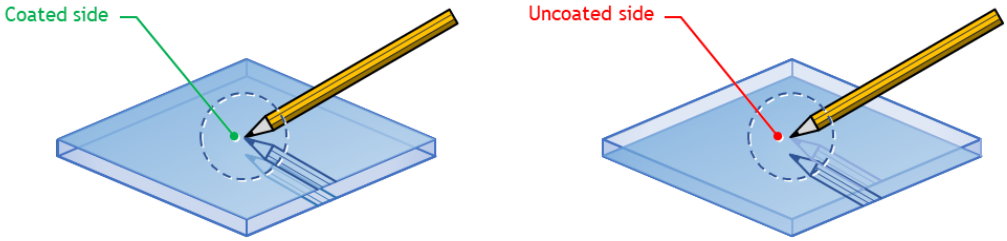



*Figure 2: Method to identify the coated side*

# 2. TRANSPORT, ACCEPTANCE, STORAGE AND HANDLING

## 2.1. Transport

- Coated glass sheets are usually transported in 2.8 tons packs (jumbo or split sizes).
- Glass sheets must be transported vertically;
- The individual sheets are packed with the coated side towards the inside of the frame unless otherwise requested by the customer;
- The glass panes never come into direct contact with each other: the glass sheets are always separated by neutral polymeric powder;
- In each pack, a clear 4 mm float glass pane is placed as the first sheet during loading to protect the coating of the first coated glass sheet;
- The pack and its contents must be protected from water.
- If the glass is wrapped and sealed, the seal should remain closed until the product is used in the factory;
- During transport, violent and repeated shocks should be avoided;
- When handling with a hoisting apparatus, measures must be taken not to damage the pack.

## 2.2. Receipt of the delivery

Care must be taken concerning the orientation of the coating that has been ordered. Please check it before starting processing.

- Every pack must be opened with care in order not to damage the glass sheets or the coating(s) (contacts, scratches, etc.). Handling instructions on the packing must be respected, particularly the instructions for opening.
- All deliveries are identified with a label providing the following data:


- Product name;
- Glass thickness;
- Pack type;
- Dimensions;
- Number of sheets;
- Net weight;
- Date and time of production (coating);
- Bar code;
- Batch number;
- Cover sheet traceability;

- Before processing, glass sheets should be checked in accordance with the specifications defined above. Any possible defect in the coating must immediately be reported to the supplier, accompanied by:
    - The date of delivery;
    - The data mentioned on the identification label;

No claim can be accepted for damages caused during and after processing due to a lack of adherence to these guidelines. Therefore, glass processor should ensure that the process is adapted for coated glass and that the quality control is relevant to detect any quality problem as soon as possible. In case of claim, samples will be required and a visit from a SGG representative may be requested.

## 2.3. Storage

### 2.3.1. General

All glass products may degrade (become stained or corroded) when stored in humid conditions. The iridescence may take the appearance of a "rainbow" or milky white haze on the surface of the glass, or corrosion pitting on the coated side.

EKO VISION™+ glass sheets must be stored, as float glass, vertically (at 3 to 7 degrees) under the following conditions:

- In a dry, well ventilated warehouse, to prevent any condensation on the surface;
- Away from glass dust;
- Protected from rain and running water (e.g. any roof leakage must be rectified);
- Never outside or in the open air (even when packed);
- Protected from wide changes in temperature and humidity levels (coated glass products should be stored far from opening doors).
- In case the coated glass is delivered packed (aluminium, PE):

    Before breaking the seal, to avoid condensation, one should ensure that the temperature of the pack has reached the temperature of the environment of the warehouse.

### 2.3.2. Shelf life

If the above (§ 2.3.1) storage conditions are respected, EKO VISION™+ is guaranteed for 2 months from the date of reception at the customer's premises. Only sealed packs can be store until 6 months and when open, glass have to be processed in coming 2 months.

In case the date of reception is lost by the customer, the date of the delivery note will serve as evidence. A first-in-first-out (FIFO) system must be adopted.

## 2.4. Handling

- EKO VISION™+ coated glass sheets must be handled with dry, clean and appropriate safety gloves.
- In case handling operations with vacuum cups on the coated side cannot be avoided, make sure that the vacuum cups are perfectly clean. Not all solutions are suitable for cleaning vacuum cups, see manufacturer documentation for details. A sheet of interlayer paper (acid and chlorine free, thin, soft and air-permeable) or suitable suction-cups caps can also be placed on the coated side, between the vacuum cups and the surface, but care must be exercised as this may reduce the vacuum level (especially in the case of thick and heavy panes).
- Each coated glass pane must be released from the next pane before being lifted from the pack. Any relative movement of the coating with the next glass pane must be avoided.
- Automatic unstacking of glass sheets or removal using a glass clamp is possible, but the gripping area should be kept to a minimum and condemned from the cutting pattern;
- In case of doubt, the position of the coating must be checked (see § 1.5.2). Do not place the coating in contact with a rough surface or hard objects.
- Try to avoid wiping the coating. If necessary, the coating may be gently wiped with a soft dry cloth and a suitable solution (e.g. isopropyl alcohol (IPA)).

# 3. PROCESSING OF EKO VISION™+

## 3.1. Handling on the production lines

All the recommendations outlined in § 2.4 remain valid.

- Ensure, as much as possible, that the coating does not come in contact with guide rollers on the line; the coating must be turned towards the operator when facing the line. If it has to go through, make sure the conveying belts are perfectly clean and free from any abrasive material / particle;
- Hoisting and handling instruments, tools and vacuum cups must be kept perfectly clean (or covered with adapted caps) so as not to leave traces on the coating;
- Wear dry and clean safety gloves when lifting the glass sheet manually. Limit area of contact as much as possible;
- The coating must be protected from any contact with greasy substances;

## 3.2. Glass cutting

EKO VISION™+ is cut in the same way as any other ordinary coated glass. However, the following recommendations have to be respected:

- The cutting table must be clean to avoid scratches on the bottom of the glass.
- Cutting must be done with coating face up.
- Any irregularity or damage of the edges must be avoided since it is likely to increase the risk of breakage during the toughening process;
- Use only light **vaporising cutting oil** (for instance Acecut 5503 or 5250) adapted to coated glass;
- Do not dilute or mix the cutting oil;
- Avoid all excess of cutting oil: Max width: 1 cm;
- For cutting operation, **avoid using natural latex coated gloves as latex tends to dissolve in cutting oil**. This leaves a greasy residue on the coating which may be difficult to wash in the industrial washing machines. Grade 5 leather or PU palmed gloves as well as NBR nitrile dipped gloves should be preferred;
- Cutting templates can be used but great care must be taken not to scratch the coating. Soft protection (soft tissue, felt or cork pad) should be placed underneath the template;
- Avoid glass splinters between glass panes. Fine glass splinters on the coated surface should not be wiped off by hand, but blown off by **dry and oil-free air**;
- When stacking cut sizes prior to further processing, separate the panes by either:
  - New cork pads (recommended);
  - Foam pads;
  - Clean corrugated cardboard strips.

This is especially important with glass of different dimensions. Do not put additional separating powder.

- The use of so-called **"harp carts"** to store the cut sizes **must not** be used as the contact of the wires on the coating may damage the latter when the cut sizes are pulled from or pushed in between the wires.

## 3.3. Edge deletion

Edge deletion of EKO VISION™+ glass is not compulsory.

## 3.4. Handling, transport and storage time between cutting and processing

Should cutting step happen in another site than processing site, additional recommendations are provided for handling, transport, storage time and control at reception between these two steps:

- Handling / transport:
  - In case the glass is washed at the cutting site before packing (see 3.7. Washing recommendations)
  - Use of clean and adapted gloves (see 3.2)
  - No harp carts should be used (see 3.2)
  - For transportation, the separation method between the panes should be adapted to limit friction and scratches.
  - Add a coversheet sample at the end of the samples pile to avoid last coated sample "contact" with atmosphere. It is recommended otherwise to place the last sample with the coated side facing inwards to protect the coated side from any possible damage.
  - Suitable packing procedure must be followed to avoid condensation of samples on transport racks. The coated glass should be packed in air-tight foil containing dessicant. Care should be taken to avoid direct dessicant contact with the coating (same recommendations as final recommendations for 6.2. protection during integration and transport).

- Storage time:
  - Waiting time between cutting step and other final processing steps should be minimized
  - Coordination between the two processors (cutting and processing afterwards) should exist
  - The maximum waiting time between end of cutting step and next processing steps will depend on the packing procedure followed. In case of no packing performed, a delay of 48h max is recommended.

- Control at reception (at processing site after the cutting step):
  - No breakage (Saint-Gobain Glass cannot be held responsible for any breakage during transport)
  - No visible marks of condensation or humidity
  - Any relative movement of the coating with the next glass pane must be avoided.

## 3.5. Edge working

**It is good practice to edge work the glass directly after cutting**. Provided it is stored under conditions as stated in section 2.3.1, the glass must be edge worked within 24 hours from cutting.

- Wet edge-working: it is essential to keep the glass fully wet during the whole grinding process and to wash the glass directly afterwards so that the grinding water is not able to dry on the coated surface.
- Dry edge-working: such processing is generally not recommended as small glass dust particles may be sprayed on the dry coated surface. In case of use, make sure the suction is powerful enough to avoid a too important dispersion of dust and make sure that the glass does not over-heat.

### 3.5.1. Manual Edge Working

Generally carried out using manual cross belts to achieve arrised edges (100 - 120 grit belts are recommended);

- The top belt should run downwards to minimise grit deposited on the coated surface;
- Horizontal roller backstops can be fitted to ensure consistent pressure and arris width;
- The glass should be handled (with glass dust free gloves) at the edges to avoid damaging the coating.

### 3.5.2. Automatic Edge Working

It is possible to grind the coated glass on vertical, CNC and double edger machines provided that the handling instructions are observed and adaptations of the machines are made (if necessary, contact your local Technical Support Manager). For double-edger and vertical machines, cleanliness and perfect synchronization of the pressure belts must be checked.

## 3.6. Drilling

The drilling of coated glass can be performed provided that the handling instructions are observed and adaptations of the machines are made (if necessary, contact your local Technical Support Manager - TSM).

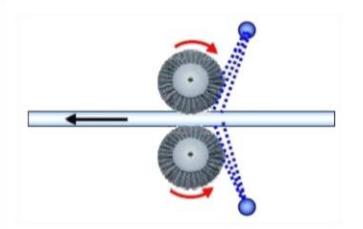
The glass must be washed immediately after drilling in a washing machine adapted to coated glass. (see § 3.6. Washing). Before being moved to the washing machine, the glass must be rinsed with plenty of water (ramp at the top of the washing machine). This prevents the water in the washing machine from becoming polluted by drilling residue hence risk of scratches.

## 3.7. Washing

**It is recommended to wash the glass immediately after edge working**. In case EKO VISION™+ is submitted to several processing steps (edge working + drilling +…) each of them followed by washing, it is recommended to pass the cut sizes in the same direction for each washing phase (to avoid possible generation of multiple crossed scratches).

We recommend the use of the following installation. If the washing installation differs from the one described here, we recommend that tests be carried out to check the washing quality (traces, rings, dust, etc.) and to ensure that the installation does not damage the coating. Please contact your local TSM.

- Pre-washing area:
  - Prewash ramp followed by one pair of cylindrical brushes
  - Tap water between 30 and 40°C, preferably close to 40°C, **without any detergent**
  - The prewash ramp is particularly important for the removal of the glass dust and splinters created during the edge-working process
- Washing area:
  - 2 pairs of cylindrical brushes
  - demineralised water at temperature between 30 and 40°C
  - maximum chloride concentration 3mg/L
  - pH value comprised between 6 and 8;
- Rinsing area:
  - Demineralised water at room temperature
  - Maximum conductivity 20 µS/cm
  - maximum chloride concentration 3mg/L
  - pH value comprised between 6 and 8;
- Brushes:
  - Flexible (soft) clean polyamide bristles
  - Maximum diameter of 0.2 mm and 20 - 40 mm long.
  - Take care that all the brushes are perfectly clean and regularly maintained. Any hard brush must be lifted. Failing to do this may cause scratches.
  - Compatible rotation speed with soft coatings.
- Drying:
  - Use an air-blowing installation equipped with filters
  - Clean and regularly maintained filters;
- Water should be sprayed directly onto the glass, not onto the brushes (as per below drawing;
- The glass sheet does not stop inside the washing machine. The washed panes should not remain in the washing unit for any length of time, especially not while the brushes are rotating;



- No water must remain on the coated surface after the drying process;
- It is strongly recommended that the washing machine is regularly cleaned, especially for the brushes and in areas where demineralised water is used. Clean the filters every day, and the tanks every week. For the brushes, steam cleaning gives good results, but do not spray the bristles with high temperature and high pressure water.
- **In case dirt / stains are still present on the coating after the washer, cleaning may be performed using a soft cloth and isopropanol (IPA) or ethanol followed by rapid drying,** provided this is done carefully and immediately after contamination has occurred.
- For interim stacking of washed panes, use cork pads near the edge of the sheets. Stacking with clean strips of 2mm thick polyethylene foam film is also possible.

As EKO VISION™+ will be tempered, **it is of the highest importance that no residues or marks are left on the coating surface after the exit of the pre-processing washing machine**. Pollutions left on the coating may induce hot corrosion (giving the aspect of pinholes) of the coating in the tempering furnace. Such marks may not be washable.

## 3.8. Tempering

### 3.8.1. General

EKO VISION™+ must be heat-treated to get a tempered flat coated glass. These products have to be tempered before use as panes in oven doors. These coatings are designed to withstand the heat-treatment process. During the process, the colour and the spectrophotometric / thermal characteristics change.

### 3.8.2. Prerequisites for tempering /bending

The cleanliness of EKO VISION™+ coating before entering the tempering furnace is essential. From the exit of the washer to the entrance of the tempering furnace, only the use of perfectly clean gloves should be permitted. The coating may be gently cleaned with isopropanol (IPA) on the furnace entry bed to remove dirt or marks (from gloves, separators, fingerprints…).

Special care and attention must be taken at every stage of processing, in particular before and during the toughening process. Please consult your local TSM if necessary. Washed panes should be tempered maximum 2 days after washing.

### 3.8.3. Tempering instructions

From a general point of view, tempering of EKO VISION™+ can be carried out using appropriately adjusted furnace settings. This will obviously vary depending upon the type of furnace being used. The sheets should be handled as “cold” as possible to achieve a flawless coating after tempering and obtain the desired level of stress (breaking pattern). This means that the temperatures and heating times are set so as just to avoid breakage in the blower box and to meet the requirements for single-sheet safety glass.

- The sheets are **always tempered with the coated side upwards**, never place the coating against the furnace rollers
- The functional layers giving their properties to EKO VISION™+ bring some low emissive characteristics to the product. This low-emissivity characteristic is to be taken into consideration when tempering EKO VISION™+.
- **Do not use $SO_2$** in the furnace when tempering EKO VISION™+. Do stop $SO_2$ right in time. $SO_2$ may remain in the furnace for up to 48h therefore EKO VISION™+ should not be tempered straight after having tempered previous glass with $SO_2$ injection. Residual $SO_2$ may attack the coating.
- As EKO VISION™+ is a low-emissive coating **it is not recommended to use radiative only furnaces.**
- **Convection furnaces are recommended for the heat treatment of EKO VISION™+**. The reason is that this system allows to heat the coating-side homogeneously and to the same temperature as the glass-side. Use of thermal scanner is recommended to help adjustment and follow up of production. Contact your local TSM for the adjustment of the appropriate settings.
- Note: the high convection furnaces give much faster cycle times as well as improved optical quality of the end-product.
- **Adjust tempering recipe to current product: adapt heating time and convection profile.**
- Get the glass flat in the furnace and **avoid overheating.**

## 3.9. Others

Please inform your local TSM if other processing steps are planned.

## 3.10. Enamelling

### 3.11.1 Logotype

Printing of the brand logotype and/or the normative stamp is possible directly onto EKO VISION™+ coating without any limitation.

### 3.11.2 Guidelines for large printed areas (frames)

EKO VISION™+ may be partially enamelled on the coating side using screen-printing. Given the variety of enamel products and different operating processes, each processor should carry out their own tests on their equipment prior to any production. It has to be noted that EKO VISION™+ interacts with enamels upon heating, leading to a different optical rendering than on uncoated clear glass. EKO VISION™+ glass has to be properly cleaned before enamel printing.

## 3.11. Handling of heat-treated glass

Following tempering, each pane should be separated with pads.

- Glass panes must be stored vertically (at 3 to 7 degrees) under the following conditions:
  - In a dry, well ventilated store, to prevent any condensation on the surface;
  - Protected from rain and running water (any roof leaks must be rectified);
  - Never outside or in the open air;
  - Protected from wide changes in temperature and humidity levels (store coated glass products far from opening doors).
- Clean, dry and soft gloves must be worn for all handling.

## 3.12. Processing quality checks

It is the responsibility of the processing plant to define and adjust the quality process control to match the quality standards acceptable for its own market and in respect of relevant national requirements.

- **Reception**: Control of delivery document of the coated glass supplier. Visual inspection of the packs (breakages, condensation…);
- **After cutting**:
  - Visual aspect control (scratches, oxidation/corrosion, splinters etc.);
  - Normal control of the cutting quality;
- **After grinding / drilling / washing:**
  - Visual aspect control (scratches, oxidation/corrosion, splinters etc.);
  - Visual control (as to whether the pane is completely dry);
  - Check for suction cups or cork pad marks etc…;
  - Normal control of the grinding / drilling quality;
- **Prior to tempering:**
  - Check for glass splinters (if present, remove them by rewashing);
  - Check for marks, dirt… If any remove them by gently wiping the coating with a soft cloth and IPA;
- **After tempering:**
  - Visual aspect control (burns, cracks, scratches, oxidation/corrosion, haze…);
  - Optical quality (distortion, bow etc.);
  - Visual detection of roller wave;
  - Normal control of the tempering quality (break pattern etc.);
- **After heat-soak testing:**
  - Visual aspect control (scratches, oxidation/corrosion, splinters etc.);
  - Check that no damage has been caused by separating blocks;

**For plants just starting to use coated glass products, a system of "first off" inspection after each process can be useful until experience is gained.** Operator training and experience in identifying faults (which are often difficult to see, especially before tempering) is important. In any case, **a visit from your local TSM should be organised**.

# 4. ENVIRONMENT / WASTE GLASS / HEALTH ISSUES

EKO VISION™+ coated glass product can be disposed of as per clear float glass.

Edge working residues have to be continuously and completely collected during the grinding process. These residues must be further treated in compliance with national legislation about industrial wastes. In some legislation, residues from grinding process have to be treated as toxic wastes.

As for any dust coming from the grinding process, any inhalation or skin contact of these residues must be avoided.

On request, a **S**afety **U**se **I**nstruction **S**heet (SUIS) relating to the EC Directive 91/155/EEC can be supplied.

# 5. GLAZING INSTRUCTIONS

**Framing**

It is the responsibility of the processor to ensure the compatibility of its framing materials with EKO VISION™+. The use of clean and adapted gloves (see 3.2) is recommended to handle EKO VISION™+ single glass during mounting operation and integration into the oven door. Glazing and fixing techniques must comply with the recommendations of the relevant national standards.

# 6. PROTECTION, CLEANING AND MAINTENANCE OF THE END PRODUCTS

## 6.1. Removal of labels and markings

- On cut-sizes, the label is to be found on the face opposite to the coating.
- The identification labels on the glass sheets must be removed before or immediately after installation. Do not use sharp tools for this purpose. Acetone and alcohol are the approved solvents.
- To indicate the presence of the glass sheet, do not use materials such as lime, chalk or soap on the coating. If warning signs must be placed, we suggest fixing a notice or streamer to the frame, making sure they do not touch the glass.

## 6.2. Protection during integration and transport

During all steps of transport and final integration into the oven door, the coated side of EKO VISION™+ tempered panes has to be protected against mechanical shock, friction with other materials etc. and against contact with water, fingerprints or any chemical compound.

- For transportation, the separation method between the panes should be adapted to limit friction and scratches.
- Add a coversheet sample at the end of the samples pile to avoid last coated sample "contact" with atmosphere**.** It is recommended otherwise to place the last sample with the coated side facing inwards to protect the coated side from any possible damage.
- Use thermally sealed Alufoil packing filled with dessicant in order to reduce the risk associated to vapor condensation or contact with water during the panes shipping. Care should be taken to avoid direct dessicant contact with the coating. The relative humidity inside the packaging should be lower than 40% at its arrival at the final customer plant.
- At reception check:
    - No damaged packing
    - No breakage (Saint-Gobain Glass cannot be held responsible for any breakage during transport)
    - No visible marks of condensation or humidity.

## 6.3. Cleaning and maintenance

**Warm water and dish-washing liquid, with a soft and completely clean cotton cloth** should be used to clean the surface of the coated side of EKO VISION™+. Cleaning instructions is to use the clean cotton cloth lightly moistened with pH neutral water or dish-washing liquid, to gently wipe the interior surface. The use of glass cleaners or other cleaning agents available in stores **ARE NOT ALLOWED**, as they can damage the EKO VISION™+ coated side.

**DO NOT USE** cleaning tools like **abrasive microfiber cloth, glass wiping squeegee and absorbent sponge.**

Saint-Gobain declines any responsibility in case of damage of EKO VISION™+ further to non-respect of the above cleaning instructions.

# 7. DISCLAIMER

SAINT-GOBAIN GLASS has taken every reasonable measure to ensure that the information contained in the present leaflet was exact at the time of its publication.

However, SAINT-GOBAIN GLASS keeps the right to modify or add any information without previous notice. SAINT-GOBAIN GLASS is not liable for the possible lack of information on EKO VISION™+ product that would not be contained in the present document.


**SAINT GOBAIN**

Tour Saint-Gobain

12 place de l'Iris

92400 Courbevoie

France