COOL-LITE® SKN(II) / COOL-LITE® SKL and COOL-LITE® XTREME (II)

Processing Guidelines

SAINT-GOBAIN

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1. GENERAL

1.1. Product description

COOL-LITE® SKN(II) / COOL-LITE® XTREME (II) is a solar control glass family with high selectivity. These family are manufactured by vacuum cathodic sputtering either on clear PLANICLEAR®, PLANILUX®, Extra-clear DIAMANT®, low carbon footprint glass ORAÉ® or PARSOL® body tinted glass. Depending on the kind of coating and substrate used, a very wide range of products is obtained, varying both aesthetically and in terms of spectrophotometric and thermal performance.

It meets the requirements of Class C products as defined in the European standards EN1096-1 and EN1096-3. It must be used in Insulating Glass Units (IGU). For complete performance data, please refer to the Glass Guide, our commercial documentations and our website www.saint-gobain-glass.com.

- COOL-LITE® SKN and XTREME are annealed products. This means that the coated glasses must not be tempered.
- COOL-LITE® SKN II and XTREME II are "to be tempered" products. This means that the coated glasses must be tempered to reach their nominal properties (performances and colour). This range of product is available with the temporary protection EASYPRO®. Please refer to dedicated processing guideline (SGG-QD-C-GUI-006) in that case.

Exception: Cool-Lite® SKL

The "L" in the product name stands for "laminated" as this product must always be assembled with the coating against the interlayer. As such:

- This product is not meant to be used facing the cavity of an IGU;
- Since it is an annealed coating, COOL-LITE® SKL is not available with EASYPRO® protection.

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 these guidelines.

1.2. Thickness, dimensions and tolerances

1.2.1. Thickness and dimensions

COOL-LITE® SKN(II) / COOL-LITE® XTREME (II) products are available in standard thicknesses and sizes. For more details, please refer to the relevant product documentation from Saint-Gobain Glass or contact your local sales service.

1.2.2. Thickness recommendations

- Calculations and recommendations are the same as those for conventional glass sheets (annealed, tempered, laminated …) assembled in IGU.
- Relevant national and local regulations should be complied with.

1.3. CE-Marking

COOL-LITE® SKN(II) / COOL-LITE® XTREME (II) products comply with EN 1096-4 harmonised European standard for coated glass. The **D**eclaration **o**f **P**erformances (DoP) of the products are available on the CE-marking section of Saint-Gobain Glass web sites and at www.saint-gobain-glass.com/ce.

1.4. Quality criteria

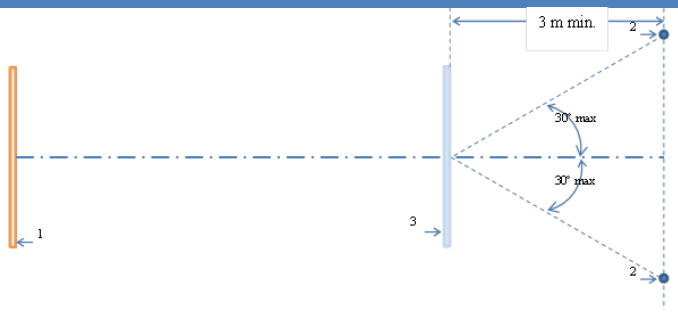
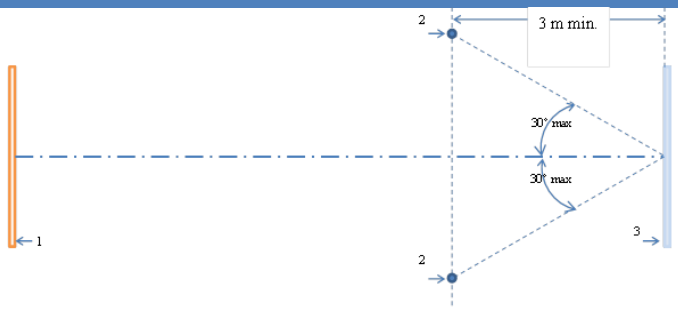
1.4.1. Defect types: definitions

Coated glass defect types are listed and defined in EN 1096-1 standard. The following definitions are extracted from this norm:

- **Uniformity defect:** slight visible variation in colour, in reflection or in transmission within a coated glass pane or from pane to pane;
- **Stain:** defect in the coating larger than punctual defect, often irregularly shaped, partially of mottled structure;
- **Punctual defects:** punctual disturbance of the visual transparency looking through the glass and of the visual reflectance looking at the glass. Spots, pinholes and scratches are types of punctual defects;
    - **Spot:** defect that commonly looks dark against the surrounding coating, when viewed in transmission;
    - **Pinhole:** punctual void in the coating with partial or total absence of the coating. Normally contrasts clear relative to the coating, when viewed in transmission.
    - **Scratches:** variety of linear score marks, whose visibility depend on their length, depth, width, position and arrangements;
- **Cluster:** accumulation of very small defects giving the impression of stain.

1.4.2. General observation conditions and acceptance criteria

Without prior agreement between both parties, applicable defect acceptance criteria under standard observation conditions (Figures 1.a) and 1.b)) are those described in EN 1096-1:

Reflection	Transmission
	

Key:

1. Illumination source
2. Observer position
3. Coated glass sample

Figure 1: Schematics of examination procedures for coated glass (as per EN 1096-1)

"*Coated glass may be examined in stock size plates or in cut sizes ready for installation. The examination may be undertaken in the factory or on site when glazed.*

The pane of coated glass being examined is viewed from a minimum distance of 3 m. The actual distance will be dependent on the defect being considered and on which illumination source is being used. The examination of the coated glass in reflection is performed by the observer looking at the side which will be the outside of the glazing. The examination of the coated glass in transmission is performed by the observer looking at the side which will be the inside of the glazing. During the examination the angle between the normal to the surface of the coated glass and the light beam proceeding to the eyes of the observer after reflection or transmission by the coated glass shall not exceed 30°."

1.5. Position of the coating and identification of the coated face

1.5.1. Position of the coating

» *Insulating glass unit (IGU)*

COOL-LITE® SKN(II) / COOL-LITE® XTREME (II) products have been designed to be assembled in IGU with the coating facing the inert gas cavity. **The coating must be placed on side 2** and not on side 3. In triple glazing, use of solar control coating in face 2 and a low-E coating in face 5 is possible, contact your commercial representative for further information.

Only COOL-LITE® SKN183II could be placed on side 3 in an IGU (DGU or TGU), it is today the only coating authorized in this position to ensure optimal performances and color consistency of the façade. Aesthetic and performances of **COOL-LITE® SKN183II used on face #2 or on face #3 are different and not matchable**.

In any case, for all the product family (annealed or to be tempered):

- the coating must never be placed on the external faces of the IGU.
- the coating must be edge-deleted (see § 3.3). The coating deletion width should be at least 10 mm.

» *Laminated glass in IGU*

COOL-LITE® SKN(II) / COOL-LITE® XTREME (II) **are designed to be placed on the external side of the laminated glass**. For this application, the coating must also be edge deleted on a minimum of 10 mm width and be in face 2 of the IGU.

For any other configuration or application, contact your local technical support manager. Indeed, some coatings in this range can be placed inside (against the PVB) but not all and with restrictions. Moreover, it should be ensured that the chosen position of the coating will remain the same throughout a same project to ensure colours consistency (face 1' for instance). **The aesthetic of a coating when placed in contact with the interlayer differ from the aesthetic in standard configuration** (in an IGU). To now the possibilities and restriction applying please refers to the document SGG-TI-01X

Saint-Gobain Glass, as the coating glass supplier, cannot ensure that the adhesion of the assembly made by the laminated glass manufacturer will comply with any desired level of safety.

It is thus the laminated glass manufacturer's sole responsibility to check that the adhesion of the assembly is compliant with the level required by the final intended use of the product.

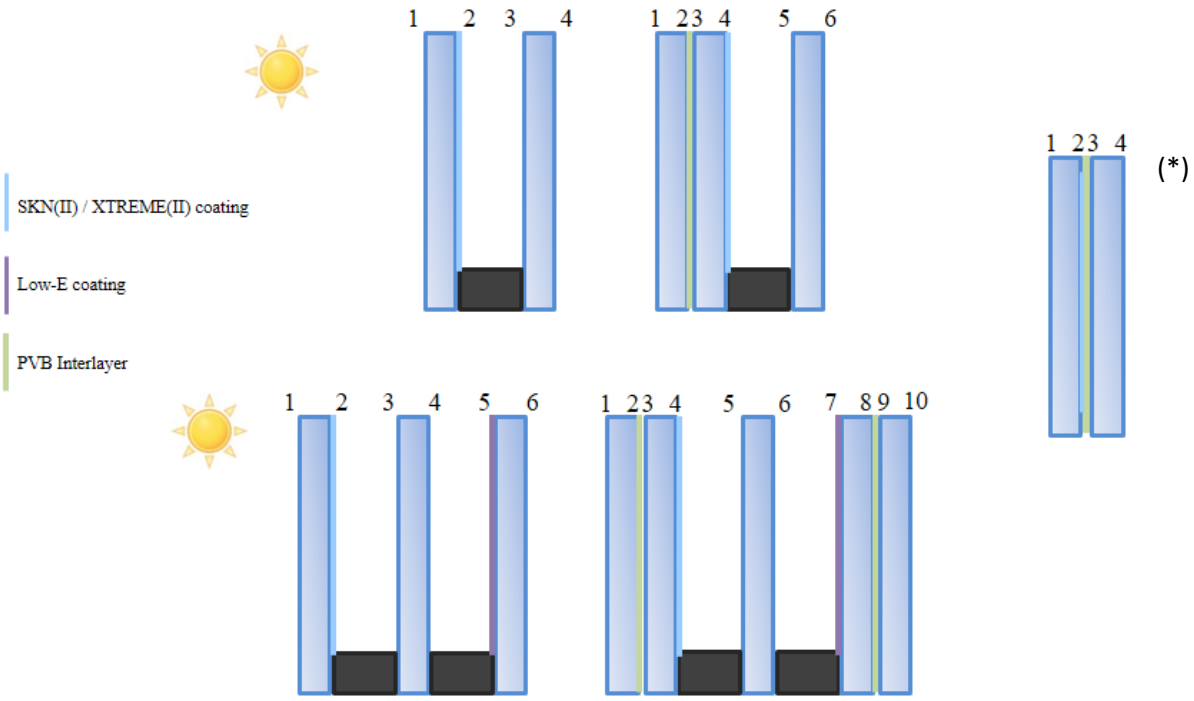


Figure 2: Possible configurations of use of COOL-LITE® SKN (II) / COOL-LITE® XTREME (II) In all cases, the coating must be edge deleted.
(*) Only acceptable configuration for Cool-Lite SKL

» *Mixing annealed / heat-treated coated glass*

For a given product of the range, the tempered and annealed products even though achieving similar performances, may exhibit shade differences. Contact your sale representative to validate a mixing configuration.

Even though normally possible, in case mixing annealed and heat treated version of a product of the range is foreseen, the following should be ensured:

- A real size mock-up, representative of the final configuration (hence mixing annealed and tempered pieces) must be proposed to the final customer.
- This mock-up should be observed and accepted by the final customer.
- A report of this observation and a signed agreement should be evidenced.

Saint-Gobain Glass cannot be held responsible of colour mismatch due to the mixing of annealed and tempered glazing on a same façade when such a mock-up validation has not been properly performed.

1.5.2. Identification of the coated face

The coated side of COOL-LITE® SKN(II) / COOL-LITE® XTREME (II) 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).

2. TRANSPORT, ACCEPTANCE, STORAGE AND HANDLING

2.1. Transport

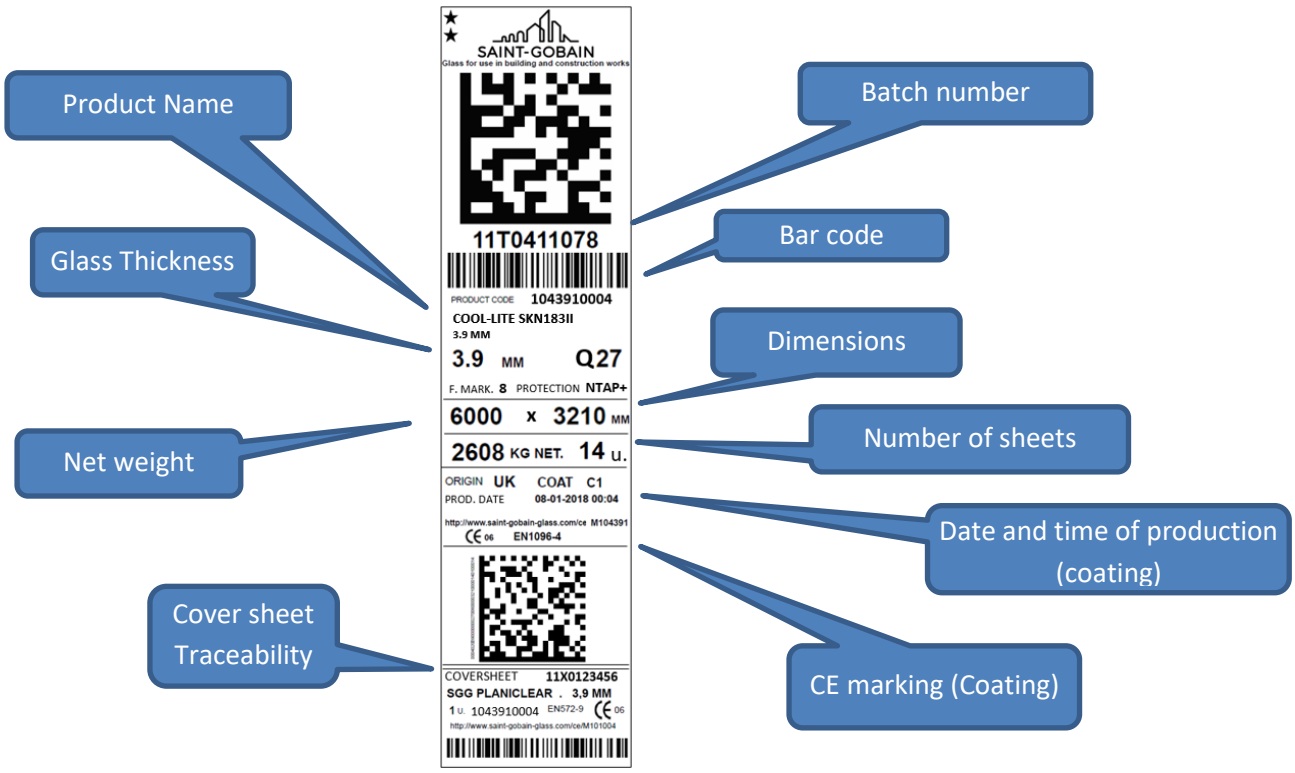
- Coated glass sheets are usually transported in 2.8 tonnes packs (jumbo or split sizes).
- Glass sheets must be transported vertically;
- The individual sheets are packed with the coated side towards the inside of the frame unless otherwise requested by the customer;
- The glass panes never come into 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. Wrapping of the pack could depend of pile destination and condition of transport;
- 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.
- 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;

- All deliveries are identified with a label providing the following data:



- In case of delivery with obvious disagreements detected at reception (water, breakages…), glass should not be unloaded and waybill (CRM) fully completed by customer and transport entities. A possible expert visit could be organized to define responsibilities.

No claim can be accepted for damages caused during and/or 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.

COOL-LITE® SKN(II) / COOL-LITE® XTREME (II) 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, COOL-LITE® SKN (II) / COOL-LITE® XTREME (II) are guaranteed, from the date of reception at the customer's premises:

- For two months if the glass is not sealed;
- For six months if the glass is sealed
- For twelve months in case of EasyPro® protection
- Once the seal is broken (removal of the peripheral protection tape), the shelf life is maximum 2 months (dependent upon the length of time expired since receipt - e.g. if glass was received 5 months previously, it will only have 1 month shelf life left).
- The remaining shelf life after seal breakage may also be reduced in particularly humid countries. Contact your local TSM for more details.
- The date of breaking the seal must also be noted on each pack;
- A first in – first out system must be adopted;
- In case the date of reception is lost by the customer, the date of the delivery note will serve as evidence;
- Once a SGG COOL-LITE SKN(II) / COOL-LITE XTREME (II) coated glass sheet is removed from the packing, it must be processed in order to be assembled as soon as possible into a double-glazed unit.

2.4. Handling

- COOL-LITE® SKN (II) / COOL-LITE® XTREME (II) 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-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.

- Do not place the glass sheet in a horizontal position with the coating in contact with the cutting table or conveying belts, rollers...
- 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 COOL-LITE® SKN (II) / COOL-LITE® XTREME (II)

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

COOL-LITE® SKN (II) / COOL-LITE® XTREME (II) is cut in the same way as any other ordinary coated glass. However, the following recommendations have to be respected:

- 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. Glass particle free protection (soft tissue, felt or cork pad) should be placed underneath the template;
- 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);
  - Paper interlayer (chlorine free);
  - Foam pads;
  - 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 is not recommended 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
    - In case such carts are however used: it must be ensured that the metallic wires are well protected with plastic sleeves on their whole length. Those protections must be totally free of glass shards;
    - The cut sizes must be inserted in such a way that the coating is never rubbed onto the wires;
    - Such carts must not be used in case the coating is to be tempered.

3.3. Edge deletion

COOL-LITE® SKN (II) / COOL-LITE® SKL / COOL-LITE® XTREME (II) must be edge deleted whatever the configuration of use. Please refer to EasyPro® processing guideline (SGG-QD-C-GUI-006) to be guided in case of EasyPro®protection.

- The removal of the coating from the edge of the individual panes is absolutely essential for all COOL-LITE® SKN(II) / COOL-LITE® XTREME (II) panes processed into double-glazed units, to achieve secondary seal bond strength.
- The width of the removed coating edge should be adjusted to the depth of the secondary seal – the aim is to ensure that the deleted strip reaches at least the centre of the butyl bead. This bead should not be completely on the coating. In any case the edge deletion width must be at least 10 mm.
- For COOL-LITE® SKN(II) / COOL-LITE® XTREME (II), edge deletion can be done before or after toughening (or heat strengthening).
- The coating may be removed manually or automatically. The edge deletion can be performed with suitable grinding machines either on the cutting table, stand alone or as part of the double-glazed unit line, operating horizontally or vertically, using a normal grinding wheel.
- For wide edge deletion, manual grinding or several passes with normal edge deletion equipment can be done. In this case, be aware of the aesthetics of the edge deleted area.
- Take care that grinding dust is sucked away to avoid scratching.
- Any coating trace perpendicular to the glass edge must be totally prevented.
- Check the quality of the edge deletion with a coating tester or visually by placing a sheet of white paper behind the glass.
- Edge deletion with brush milling, felt milling and hand type deletion systems are not suitable.

3.4. Edge working

It is good practice to edge work the glass directly after cutting. Provided the glass is stored under above defined conditions, 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.

3.4.1. Manual Edge Working

Generally carried out using manual cross belts to achieve arrissed 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 arriss width;
- The glass should be handled (with glass dust free gloves) at the edges to avoid damaging the coating.

3.4.2. 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. Not damaged, hardened belts are recommended. Low belt pressure adapted for coatings is recommended.

3.5. 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). For special glazing application (e.g. spider glass) the coating may have to be placed on the conveying rollers. In such a case, it is recommended to protect the coating with a low tack plastic film.

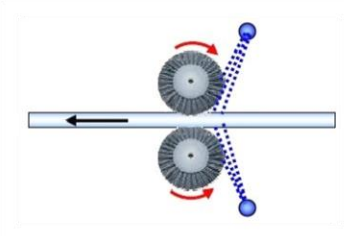
The coating must be edge deleted on the periphery of the holes.

3.6. Washing

It is recommended to wash the glass immediately after edge working. In case COOL-LITE® SKN (II) / COOL-LITE® XTREME (II) 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
  - pH value comprised between 6 and 8;
- Rinsing area:
  - Demineralised water at room temperature
  - Maximum conductivity 20 µS/cm
  - pH value comprised between 6 and 8;
- Brushes:
  - Flexible (soft) clean polyamide bristles
  - Maximum diameter of 0.2 mm, 20 - 40 mm long.
  - Take care that all the brushes are perfectly clean and regularly maintained. Any hard brush must be lifted;
  - 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.

As, in a further step, COOL-LITE® SKN II / COOL-LITE® XTREME II 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.

3.7. Tempering / Heat-Strengthening

3.7.1. General

COOL-LITE® SKN II / COOL-LITE® XTREME II must always be tempered / heat-strengthened.

3.7.2. Prerequisites for tempering / heat-strengthening

The cleanliness of COOL-LITE® SKN II / COOL-LITE® XTREME II coating before entering the tempering furnace is important. 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.

It is good practice to temper the glass directly after washing. Provided it is stored under conditions as stated in section 2.3.1, the glass must be tempered within 24 hours after washing.

3.7.3. Toughening instructions

From a general point of view, toughening of COOL-LITE® SKN II / COOL-LITE® XTREME II 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 toughening 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.

Please refer to EasyPro® processing guideline (SGG-QD-C-GUI-006) to be guided in case of EasyPro® protection.

- The sheets are always toughened with the coated side upwards, never place the coating against the furnace rollers
  - Radiation furnaces:
    - As COOL-LITE® SKN II / COOL-LITE® XTREME II coatings exhibit Low-E characteristics, it is not recommended to use radiation only furnace to temper / heat-strengthen these products;
  - Convection Furnaces:
    - Convection furnaces are recommended for the heat treatment of COOL-LITE® SKN II / COOL-LITE® XTREME II. 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.
- **Do not use SO_2** in the furnace when tempering COOL-LITE® SKN II / COOL-LITE® XTREME II. Do stop SO_2 right in time. SO_2 may remain in the furnace for up to 48h.

3.8. Heat-Soak testing

Heat-soaking toughened COOL-LITE® SKN II / COOL-LITE® XTREME II cut sizes must be carried out in accordance with EN 14179 European standard. Every piece must be individually separated. The separating blocks may be made out of PTFE (e.g. Teflon) and contact with the coating should be limited to a minimum and located at the edge deleted area so that there will be no contact of the PTFE with the coating. Gas fired heat-Soak-Test furnaces with direct combustion in the oven must not be used as hot fumes may damage the coating.

For projects, it is advised to carry out heat soak testing of tempered glass. Its purpose is to reduce the risk of spontaneous breakage due to the possible presence of nickel sulphide inclusions in the glass. Local regulation may make this test mandatory according final intended use of the glass.

3.9. Bending

COOL-LITE® SKN II / COOL-LITE® XTREME II can be curved annealed (sagging process) or tempered (in tempering furnaces fitted with a bending cell). Not all curvature radii may be attainable with convex or concave shape according to the type of process used. The processor is then asked to check and validate that its bending process is capable to obtain a good quality on a particular shape before giving a final offer for a project requesting this shape.

3.10. Enamelling

Saint-Gobain Glass cannot commit on the enamelling of any COOL-LITE® SKN II / COOL-LITE® XTREME II product.

The capability to supply enamelled COOL-LITE® SKN II / COOL-LITE® XTREME II glazing would be on the processor's sole responsibility.

Exceptions:

- Normative stamp is possible on the coating with or without EASYPRO®
- Enamel on removed coating areas (edge deletion, laser…). Use of masking tape to delimit enameled edge-deleted glazing periphery will be on glass processor full responsibility. Removal of the tape may lead to the coating tearing even if protected by EASYPRO® layer.
- COOL-LITE® SKN183II coating with followed recommendations (type of enamel, design, technology of printing …).
  Please refer to the dedicated guideline for COOL-LITE enamelling: **"Ceramic print on COOL-LITE® coatings for façade applications"**. Coating in that case should be provided without EASYPRO® protective layer. Enamelling on EASYPRO® **is not possible.**

3.11. Handling of heat-treated glass

Following toughening / heat-soaking or heat-strengthening, each pane should be separated with pads. It is also possible to stack the individual panes with strips of 2 mm thick polyethylene –

stretch – foam film (in that case, particular care should be taken when stacking different glass dimensions).

- 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.
- In case the cut sizes have to be sent to another processing location to be assembled in IGU, it is recommended to apply on the coating a low-tack polyethylene film directly after tempering. Please contact your local TSM for details.

3.12. Lamination

- Lamination of COOL-LITE® SKN (II) / COOL-LITE® XTREME (II) can be performed with the coating placed outside (not in contact with the interlayer).
- In case the coating will face the PVB interlayer, please refer to last applicable version of SGG-TI-01x document, not all coatings could be used against PVB interlayer. You can also refer to technical handbook for embedded coatings explaining the restrictions and point of attention for this kind of application.
- Products in the COOL-LITE® SKL range, like COOL-LITE® SKL 170, must always be in contact with the interlayer. This coating:
  - cannot be tempered;
  - will be cut and edge deleted to be finally assembled in laminated glass with the coating against the interlayer.

  This coating is specifically designed for this application and is not intended to be placed out of the laminated glass (facing the cavity of an IGU for instance). A special care must exercise to ensure the right coating positioning during the lamination process.
- Please refer to interlayer supplier recommendations to obtain best final qualify product (storage conditions...)
- To assemble the glass, ensure that the calendaring rollers are in good condition (clean and free of glass shards or particles). Check that the circumferential speed is regular and corresponds to that of the conveyor system. Clean off all deposits of PVB in contact with the coating before placing in the furnace or autoclave. Calendaring rollers must touch the glass and should be flat to apply regular pressure at any position.
- When laminating heat treated COOL-LITE® SKN II / COOL-LITE® XTREME II take care that the PVB thickness is adapted as to compensate the possible glass deformation (roller wave, bow, edge lift) created during the heat-treatment process. Optimised heat treatment recipes are recommended to limit glass deformation and avoid any defect after the lamination process. Contact your local TSM if necessary.
- Use of clamps to do lamination is not recommended at any time, especially during autoclaving. This could be a cause of optical distortion of the glass and possible delayed glass delamination. Use of clamps can hide possible quality deviation in production.

- In any case, the coating must be edge deleted with a minimum width of 10 mm.

3.13. Manufacture of Insulating Glass Units

It is recommended to assemble the panes in insulating glass units as quickly as possible and within 24 hours in storage conditions as described in section 2.3.1. When manufacturing double-glazed units using COOL-LITE® SKN (II) / COOL-LITE® XTREME (II) please follow the handling, cutting, and washing instructions detailed above.

The coated glass must be washed before making it into insulating glass units. Recommended washing conditions are described in § 3.6.

- In case the coating has to be placed against the rollers / conveyors, make sure they are all free of glass particles and free to rotate;
- All types of secondary seal can be used (polyurethane, polysulfide, silicone and hot melt).

3.14. 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 toughening (or heat-strengthening):**
  - 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 toughening (or heat-strengthening):**
  - Visual aspect control (burns, cracks, scratches, oxidation/corrosion, haze…);
  - Optical quality (distortion, bow etc.);
  - Visual detection of roller wave;
  - Normal control of the toughening 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;
- **On the insulating glazing unit line:**
  - Visual aspect control in conformity with the relevant national quality standard for double-glazed units.

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 toughening) is important. In any case, a visit from your local TSM should be organised.

4. ENVIRONMENT / WASTE GLASS / HEALTH ISSUES

COOL-LITE® SKN (II) / COOL-LITE® XTREME (II) 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 ECDirective 91/155/EEC can be supplied.

5. GLAZING INSTRUCTIONS

The selection of a suitable and practical glazing method depends on a variety of factors such as the size of the glass, the exposure and the type of framing material and system.

Glazing and fixing techniques must comply with the recommendations of the relevant national standards. Glazing blocks, frame size and maximum frame deflection for double-glazed units are not specific to COOL-LITE® SKN(II) / COOL-LITE® XTREME (II) glass products.

6. PROTECTION, CLEANING AND MAINTENANCE OF THE END PRODUCTS

6.1. Protection of the glazing during building works

As for other glass products, it is important with COOL-LITE® SKN (II) / COOL-LITE® XTREME (II) glass products to respect the following:

- In order to avoid damaging the glass with aggressive contaminants from site-works (e.g. paint, plaster, mortar…), it is recommended that glazings are installed after all other work on site has been completed. In case this cannot be respected, efficient protection of the glazing, by means of polyethylene film for instance, must be put in place;
- Minimise, as far as possible, the amount of time that the glass is stored on site prior to installation;
- Follow the usual recommendations: store in a dry, well-ventilated location, protected from adverse weather conditions and variations in temperature and humidity;

- Avoid splashes of concrete, plaster, mortar residues as much as possible. To prevent a chemical attack on the glass, such substances must be removed from the glass immediately. It is recommended that the glass is cleaned as soon as it is installed.
- Glazing and fixing techniques must comply with the recommendations of the relevant national standards. Glazing blocks, frame size and maximum frame deflection for double-glazed units are not specific to COOL-LITE® SKN (II) / COOL-LITE® XTREME (II) glass products glass products.

6.2. Removal of labels and markings

- On cut-sizes, the label is to be found on the face opposite to the coating. Stickers, labels or tapes should never be placed on the coating side even when protected by EASYPRO® layer.
- 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.

6.3. Cleaning and maintenance

Alkaline products may be emitted from concrete, plaster, mortar... Such materials or materials containing fluorine and acids will lead to a staining or matting of the surface. To prevent such an occurrence, all such substances must be removed from the glass immediately. It is recommended that the glazing is cleaned as soon as it is installed.

Cleaning means: washing, rinsing and drying the glass. A mild soap or neutral detergent can be used, and subsequently and immediately rinsing with clear water. Excess water must be removed quickly. Washing tools and towels must be free of abrasive particles. Never use abrasive cleaning products or compounds likely to generate fluorine salts or hydrofluoric acid.

Grease, oil and materials used for facilitating the installation must be removed. The materials recommended for cleaning the coating are isopropanol (IPA) or ethanol. Cleaning with the help of solvents must be immediately followed by normal washing with water and rinsing.

The owner of the building must ensure the regular and proper maintenance of the glass. This entails washing the windows, checking and if necessary, repairing joints and frames, checking and, if necessary, unclogging the drain and ventilation holes and detecting any anomaly.

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 COOL-LITE® SKN (II) / COOL-LITE® XTREME (II) products that would not be contained in the present document.

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.

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