SAINT-GOBAIN

SGG E-CLEAR® A

Guidance for Use
Part 4:
"Durable"
low-E coated glass

SAINT-GOBAIN GLASS CLIMATE

2015

CONTENTS

1. GENERAL

1.1. Product Description

SGG E-CLEAR A is a high performance low emissivity (low-E) glass manufactured by magnetron sputtering vacuum deposition of metallic coatings on clear float glass. The metallic low-E coating offers enhanced thermal insulation, by reflecting long-wave infrared heat radiation back into a building, thereby greatly reducing heat loss. All low-E products should always be assembled into an insulating glass unit, with the coating facing the cavity of the unit.

Depending on the composition of the coating, a wide range of products can be obtained, varying both in their spectrophotometric and thermal performance and in their processing characteristics. These products, dedicated to enhanced thermal insulation, belong to the SAINT-GOBAIN GLASS CLIMATE family of products.
For complete performance data, please refer to our commercial documentation and our website www.saint-gobain-glass.com/uk.

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.

These guidelines cover the durable low-E coated product:
- SGG E-CLEAR A

For processing annealed products, see Guidance for Use, Part 1:
- SGG PLANITHERM ULTRA N

For processing "to be tempered" products, see Guidance for Use, Part 2:
- SGG PLANITHERM ULTRA N II

For processing "single-stock" or temperable products, see Guidance for Use, Part 3:
- SGG PLANITHERM TOTAL+
- SGG PLANITHERM ONE T

SGG E-CLEAR A has been developed to propose to customers a highly durable and easy to process low-E coating. As a consequence, this coating does not require edge deletion, but an approved secondary seal must be used up to the edge of the glass in all applications. The product has an increased storage shelf life up to 12 months if stored in accordance with the storage recommendations set in §2.3 Storage. Aesthetically neutral, this durable coating can be used either tempered or annealed.

This product meets the requirements of the class C products defined in the European standards EN 1096-1 and EN 1096-3. It can only be used in insulating glass units for building applications, with the coating on face 3, or alternatively on face 2, but never on face 1 or 4. It cannot be used in single glazing, opacified single glazing or laminated without edge deletion for curtain wall applications.

This document:

Guidance for Use, Part 4 relates to the "durable low-E" product:
- SGG E-CLEAR A

Other guidelines:

Guidance for Use, Part 1 relates the "annealed" products:
- SGG PLANITHERM ULTRA N

Guidance for Use, Part 2 relates to the "to be tempered" products:
- SGG PLANITHERM ULTRA N II

Guidance for Use, Part 3 relates to the "single-stock" products:
- SGG PLANITHERM TOTAL+
- SGG PLANITHERM ONE T

1.2. Thickness and dimensions

1.2.1. Thickness and dimensions

SGG E-CLEAR A is usually available in standard thicknesses and sizes. For more details, please refer to the relevant product documentation from Saint-Gobain Glass.

1.2.2. Glass thickness recommendations

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

1.3. CE Marking

SGG E-CLEAR A complies with the EN 1096-4 harmonised European Norm for coated glass and is CE Marked.

The "Characteristics/Performances Identification Paper" – the CPIP document – of each CE marked product is available at the address www.saint-gobain-glass.com/ce

CPIP documentation is available at **www.saint-gobain-glass.com/ce**

1.4. Quality criteria for the coatings

1.4.1. Definition of appearance defects

The following definitions are given by the EN1096-1 standard:

- **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 defect:** punctual disturbance of the visual transparency looking through the glass and of the visual reflectance looking at the glass. Spot, pinhole and scratch 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 coating and it 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.

Any coated glass, even the most neutral types may show slight variances in appearance when observed in reflection. This is an inherent feature of the products, and is affected by the distance, the angle of observation, the ratio between the interior and exterior lighting levels of the building, and the type of objects reflected in the windows.

1.4.2. Conditions of observation

The conditions of observation are given in the EN1096-1 standard. Please refer to it for details.

1.4.2.1. Acceptance criteria of coated glass defects

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

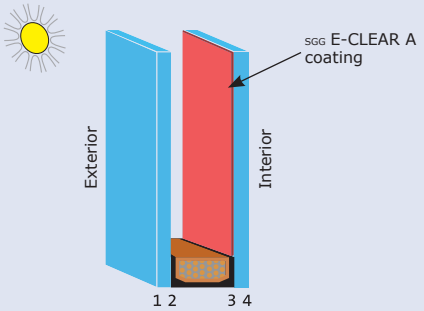
1.5. Position of the coating and identification of the coated side

1.5.1. Position of the coating

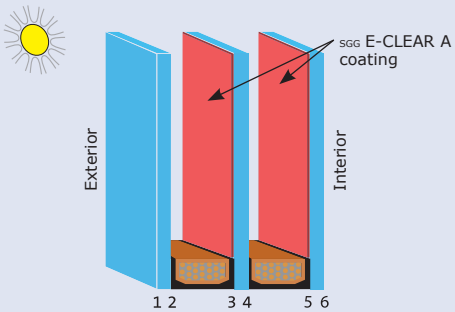
SGG E-CLEAR A coated glass sheets must always be assembled into an insulating glass unit. The coating is generally placed on face 3 of the insulating glass unit. It is possible to place the coating on face 2. However, insulating glass units will vary slightly in appearance and in spectrophotometric performances depending on whether the coating is on face 2 or face 3. It is recommended therefore to ensure that the coating is on the same face throughout the entire building. Never place the coating on face 1 and 4.

1.5.2. Identification of the coated side

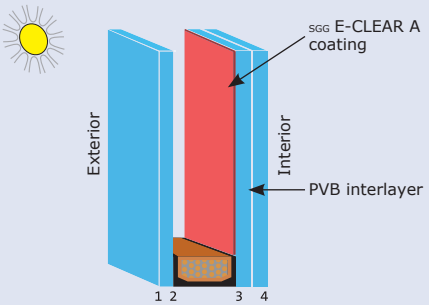
The coated side of a SGG E-CLEAR A glass sheet exhibits a slightly different appearance in reflection compared to an ordinary clear float glass. It can be checked visually by reflecting a bright light source, like a torch.
The detection of the coated side with a coating tester (high ohmic electrical resistance tester) can damage the coating, and should be used only on the edges of the glass. Coating detector details are given in the appendix. Coating detectors for DGU also exist.



Insulating glass unit with SGG E-CLEAR A (coating on face 3)



Insulating glass unit with SGG E-CLEAR A (coating on faces 3 and 5)



Insulating glass unit with laminated SGG E-CLEAR A (coating on face 3)

1.6. Thermal stress

The spectrophotometric properties of the SGG E-CLEAR A coating shows a certain degree of solar energy absorption, which may cause thermal stresses in the glass. Such stresses are often less than the critical level that may lead to thermal breakage of an annealed glass. Precautions should be taken when the glazing is likely to comprise areas of widely differing temperatures; for example, the glass edges encased within the rebate of the frame, shaded areas, the presence of blinds or curtains and the application in sliding windows will have to be taken into account.

- Every possible care should be taken during handling, transport and installation of the glass sheets to avoid damage to the edges of the sheet as this may considerably reduce glass resistance.
- Thermal breakage can be prevented by tempering SGG E-CLEAR A. For further advice concerning tempering of the glass, please see the general instructions in § 3.7., and consult our technical department for guidance. We accept no liability in the event of thermal breakage of glass sheets in applications for which our technical department was not consulted.
- As a result of our evaluation, we may recommend that the glass should be tempered in order to avoid thermal breakage.
- Tempered glass will only be requested for safety reasons, or to comply with regulations in any particular country.
- For commercial projects, we may advise the carrying out of a heat-soak test of tempered glass, according to the European standard EN 14179; the purpose of this "test" is to reduce the risk of breakage due to the possible presence of nickel sulphide particles in the glass.

Thermal breakage can be prevented by tempering SGG E-CLEAR A.

2. TRANSPORT, RECEPTION, STORAGE AND HANDLING

2.1. Transport

- Coated glass sheets are usually transported in 2.5 tonnes packs measuring 6000mm x 3210mm (jumbo or PLF size). Other sizes and pack weights are possible on request.
- Glass sheets must be transported vertically (at 3-7 degrees).
- 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 jumbo glass sheets (PLF) are always separated by powder (e.g. Lucite, Separol…); a SGG PLANICLEAR (clear float glass) pane is placed as a first pane in the frame during loading to protect the coating on the first pane,
  - Smaller glass sheets (SSS) are either separated by powder or by pads.
- The pack and its contents must be protected from water and moisture/humidity.
- The packaging depends on the product and may be changed by the coated glass producer.
  For coated glass delivered on frames, the usual practice is the following:
  SGG Low-E products are usually unsealed, but may be sealed with an adhesive tape to protect the coating against moisture, e.g. for overseas transport.
- All coated glass products delivered in boxes are usually sealed.
- If the glass is 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. Reception of the delivery

Care must be taken that the position of the coating is as being ordered – it can be on the inner face or the outer face of the glass sheet on request. Labels are never placed on the coating.

- Every pack must be opened with care in order not to damage the glass sheet or the coating (contacts, scratches, etc.). Handling instructions on the packing must be respected, particularly the instructions for opening.
- All deliveries are identified with an identification label providing the following data:
  - Product name,
  - Dimensions and thickness,
  - Number of sheets,
  - Net-weight,
  - Date and time of production of the coating,
  - Bar code and batch number of the coated glass,
  - Bar code of the SGG Planiclear backing sheet,
  - marking information: in addition to the CE symbol, website address and CE product code are mentioned. By going on www.saint-gobain-glass.com/ce then entering the product code and the production date, one can access the CE product declaration of performances and characteristics related to the product CE (CPIP document).
- Before processing, glass sheets should be checked in accordance with the specifications defined in § 1.4. Any possible defect in the coating must immediately be reported to the supplier, accompanied by the data mentioned on the identification label.
- No claim can be accepted for damages caused during and after the processing. Therefore the Insulating glass unit manufacturer should ensure that both his process is adapted for offline coated glass and his quality control is relevant to detect any quality problems as soon as possible (see § 3.11. "Processing quality checks"). In case of claim, samples will be required.

2.3. Storage

2.3.1. General

All glass products will become stained if they are stored under humid conditions; the iridescence has the appearance of a "rainbow" or milky white coating on the surface of the glass, and is particularly visible on coated glass.
SGG E-CLEAR A glass sheets have to be stored vertically (at 3-7 degrees) under the following conditions, as for float glass:

- In a dry, well ventilated area, to prevent any condensation on the surface.
- Protected from rain and running water (e.g. 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).

To avoid condensation on the exposed glass surface and inside the glass pack, it should be ensured that the packs are at a similar temperature to the environment in the storage building before opening sealed packs.

SGG E-CLEAR A glass sheets have to be stored in a dry, well ventilated area, to prevent any condensation and running water on the surface.

2.3.2. Storage time

- Storage times are as follows:
  SGG E-CLEAR A should be processed within 12 months from delivery.
- Packs sourced from storage other than the coating plant must have the date received by this location marked on the packs; this is the date from which the storage time starts. It is therefore important to note when packs were received into the plant.
- A first-in-first-out (FIFO) system must be adopted.
- Should the SGG E-CLEAR A coating be exposed, opened packs should always be covered with a clear float glass sheet to protect the coating.

2.4. Handling

- SGG E-CLEAR A coated glass sheets must be handled with clean gloves (see appendix) that should be kept as dry as possible.
- Each coated glass pane has to be released from the next pane before being lifted from the stack. Any relative movement of the coating with the next glass pane must be avoided.
- Automatic unloading of glass sheets or removal using glass lifting pliers or a princer grab is possible, but the gripping zone has to be minimised 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 on the support.
- 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. 75% isopropyl alcohol (IPA)).
- During handling operations with vacuum cups, make sure that the vacuum cups are silicone free and perfectly clean. Not all solutions are suitable for cleaning vacuum cups; see manufacturer documentation for details. A sheet of interlayer paper (chlorine and acid-free, thin, soft and air-permeable) or suitable sucker caps can also be placed on the coated side, between the vacuum cups and the surface, but care must be exercised as this reduces the vacuum level.

3. PROCESSING

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 the guide rollers on the line; the coating is turned towards the operator when he is facing the line.
- Hoisting and handling instruments, tools and vacuum cups must be kept perfectly clean and silicone free so as not to leave traces on the coating; they must be cleaned when necessary.
- Wear clean gloves (see appendix) that should be kept dry if possible, when lifting the glass sheet manually.
- The coating must be protected from any contact with greasy substances.

SGG PLANITHERM glass sheets must be handled with dry, clean and ungrained gloves.

3.2. Glass cutting

Annealed SGG E-CLEAR A glass is cut in the same way as ordinary annealed glass, but the coating is susceptible to damage during the transformation processes. In particular, the following recommendations have to be respected:

- Any irregularity or damage of the edges of coated glass products must be avoided because it is likely to increase the risk of thermal breakage.
- Position the glass on the cutting table with the coating facing up, so as to prevent damaging it with any residual glass debris or dust on the cutting table.
- All SGG E-CLEAR A glass sheets have to be cut by using a light, vaporising cutting oil (e.g. ACECUT 5503). This cutting oil can be used for all other glass types.
- Do not use non-evaporating cutting oil suitable for float.
- Do not dilute or mix the cutting oil.
- Avoid all excess of cutting oil. The bead must not be wider than 10mm.
- Templates can be used but great care must be taken not to scratch the coating. Soft protection (soft tissue or felt) should be placed underneath the template.
- Fine glass splinters on the pane surface should not be wiped off by hand, but blown off by air (dry and oil-free air).
- When stacking cut sizes prior to further processing, separate the panes by either:
  - Special cork pads (recommended),
  - Chlorine-free paper interlayer,
  - Foam pads.

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

Glass cutting has to be done with the coating facing up, using a special cutting oil.

The best practice is to further process the cut panes as soon as possible after cutting.

3.3. Edge deletion

- SGG E-CLEAR A does not require edge deletion but an approved secondary seal must be used up to the edge of the glass in all applications. A list of approved sealants is available on the website: www.saint-gobain-glass.com/uk
- Coating durability is higher than standard low-E products and has been validated according to European standard EN1279-4.
- Nevertheless, SGG E-CLEAR A should respect §1.5.1 description and must not be in contact with the exterior when units are made. For instance, in case of stepped units it is necessary to remove the part of the coating that will be in contact with the outside. It cannot be used laminated without edge deletion for curtain wall applications.

SGG E-CLEAR A does not need to be edge deleted prior to IGU assembly.

3.4. Edgeworking

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.

Manual edgeworking:

- Generally carried out using manual cross belts to achieve arrissed edges (100-120 grit belts are recommended).
- Diamond belts may be used to dry-arriss the samples. Make sure that the glass doesn't over-heat and that dust from the glass and/or belts is sucked away. Standard arrissing belts are not recommended for dry arrissing.
- For wet arrissing it is important that the glass is kept fully wet during the whole grinding process.
- 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 gloves at the edges to avoid damaging the coating.
- On larger pieces, it is possible to use clean hand held pump action suction lifters to handle the glass.

For wet arrissing it is important that the glass is kept fully wet during the whole grinding process.

Automatic edgeworking:

- It is possible to grind the coated glass on the arrissing line provided that the handling instructions are observed (see § 2.4. and 3.1.) and adaptations of the machines are eventually made (if necessary, contact our technical department).
- The upper belt (which is in contact with the coating during grinding) should not be too hard, to prevent the coating from being damaged.
- An automatic belt cleaner should be in place to clean the belts.
- Water jets must be present to rinse the belts; they should spray against the direction of the glass.

3.5. Drilling

- The drilling of coated glass can be performed with drilling machines provided that the handling instructions are observed (see § 2.4. and 3.1.) and adaptations of the machines are eventually made (if necessary, contact our technical marketing department).
- Diamond drills are recommended for drilling.
- The glass should be washed no longer than 30 seconds after the drilling is finished.

3.6. Washing

It is recommended to wash the glass immediately after wet edge working. The time glass can be kept between edge working and washing critically depends on the quality of the water used during edge working. As a rough guide: 4 hours for clean tap water, 30 seconds for water containing debris and cooling agent.

- Coated glass must be washed before tempering and before assembly into a double-glazing unit.
- 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 and to ensure that the installation does not damage the coating:

Pre-washing area:
Pre-wash ramp followed by one pair of cylindrical brushes, tap water between 30 and 40°C, preferably close to 40°C, without any detergent.

Washing area:
At least 2 pairs of cylindrical brushes, demineralised water at room temperature, maximum chloride concentration 3 mg/l, and pH value 6-8.

Rinsing area:
Demineralised water at room temperature, maximum conductivity 20 µS/cm, maximum chloride concentration 3 mg/l, and pH value 6-8.

Brushes:
Flexible (soft) clean polyamide bristles with a maximum diameter of 0.15mm and 20-40mm length should be used.
- Take care that all the brushes be perfectly clean and regularly washed and trimmed. Failing to do this may cause scratches.
- Brushes may be trimmed by washing un-arrised glass panes. Any hard brushes must be lifted.

Drying:
Use an air-blowing installation equipped with clean and regularly maintained filters.

After the drying section:
Two anti-static devices should be provided to prevent dust deposits on the glass surface.

Glass washing is a critical step in achieving a high quality end-product.

It is recommended to wash the glass immediately after wet edgeworking.

Coated glass must be washed before tempering and before assembly into a double-glazing unit.

Flexible (soft) clean polyamide bristles should be used.

Any hard brushes must be lifted.

- Water should be sprayed directly onto the glass, not onto the brushes.
- Ensure that 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.
- A UV source can be used to avoid bacteria growth.
- Regular cleaning of the washing machine is strongly recommended, especially for the brushes and in the areas where demineralised water is used. Clean the filters every day, and the tanks every week (or sooner depending on production volumes). For the brushes, steam cleaning gives good results, but do not spray the bristles with high temperature and high pressure water.
- In case of stains on the coated surface, it may be possible to remove them with a soft dry cloth, or clean Spirit followed by rapid drying, provided this is done carefully and immediately after contamination occurred.
- For interim stacking of washed panes, use cork pads near the edge of the sheets. Stacking with strips of 2mm thick polyethylene foam film is also possible.

Ensure that the glass sheet does not stop inside the washing machine.

Regular cleaning of the washing machine is strongly recommended.

3.7. Tempering

3.7.1. General

SGG E-CLEAR A can be heat-treated to get a tempered coated glass. This coating is designed to withstand the heat-treating process. Before and after tempering, the colour and the spectrophotometric/thermal characteristics are within the same product specifications.

Before and after tempering, the colour and the spectrophotometric/thermal characteristics are within the same product specifications.

3.7.2. Prior to tempering

- 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.
- As in the normal case for all tempered glass, notches and holes are made before tempering; neither cutting nor edge work may be carried out thereafter.
- The kite-mark, if any, of the tempered glass pane is always on the coated surface.

It is good practice to temper the glass directly after washing.

3.7.3. Tempering instructions

Tempering of SGG E-CLEAR A 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; 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 ask our technical marketing department for guidance.

- The sheets are always tempered with the coated side up, i.e. the glass side to the furnace rollers.

The sheets are always tempered with the coated side up, i.e. the glass side to the furnace rollers.

Radiation furnaces (not recommended for offline coated glass):
Using a standard radiation-only furnace, E-Clear A can be toughened to a very good quality standard by increasing the heating time to around 50% more than standard clear glass.

Convection furnaces:
A system of air injection or full convection is used in the heating part of the furnace permitting the coating-side to be heated homogeneously and to the same temperature as the glass-side.

- Heating time:

Heating Time	Full Convection	High Flow		Medium Flow
		Hot Air	Cold Air	
Seconds per mm glass thickness	30-45	45-55	55-60	65-70

- Set point furnace temperature (top): it must be run between 690 and 710ºC to prevent the coating from over-heating.
- Air injection system: use the maximum capacity of the air flow during 75% of the heating time. Set it with the Zebra optical control.
- High convection furnaces give much shorter cycle times as well as improved optical quality of the end-product.
- The furnaces require frequent cleaning; any dust (e.g. coming from arrised edges or from enamelled or screen-printed glass) will increase quality defects like dust bands.
- Do not use SO_2 in the furnace when tempering SGG E-CLEAR A. Do not temper this product straight after tempering with SO_2 injection. Residual SO_2 may attack the coating.

High convection furnaces give much shorter cycle times as well as improved optical quality of the end-product.

Do not use SO_2 in the furnace when tempering SGG E-CLEAR A. Do not temper this product straight after tempering with SO_2 injection. Residual SO_2 may attack the coating.

3.8. Heat-soak testing

Heat-soaking of tempered SGG E-CLEAR A pieces has to be carried out in respect to the draft European standard EN 14179 and the national legislation.

During heat-soak test, the separating blocks may be made out of PTFE (e.g. Teflon®) and should only make contact with the deleted edge of the glass.

3.9. Handling of heat-treated glass

- Following tempering/heat-soaking, each pane should be interleaved using a special offline coating compatible chlorine-free paper, or separated with pads as with cut sizes. It is also possible to stack the individual panes with polyethylene cling film (e.g. "blue film" from Britton Merlin) or polyethylene foam film. Particular care should be taken with this in the case of different glass dimensions.
- Glass panes must be stored vertically (at 3-7 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),
  - To avoid condensation on the exposed glass surface and inside the glass pack, it should be ensured that the packs are at the similar temperature as the environment in the storage building.
- Clean, dry and ungrained gloves must be worn for all handling.

3.10. Manufacture of insulating glass units

- It is recommended to assemble the panes in insulating glass units as quickly as possible and within 48 hours in storage conditions as described in section 2.3.1.
- Clinging polyethylene film (e.g. "blue film" from Britton Merlin) to the coating directly after tempering is found to increase the time the glass can be kept between tempering and IGU production by about 3 days.
- If the freshly tempered panes are separated using pads and packed with a silicon desiccant in plastic and sealed with adhesive tape (see images), the shelf-life may be extended to up to 2 weeks. However, the final manufacturer should assemble the tempered pieces into an IGU within 48 hours of unpacking.

For the manufacturing of an insulating glass unit with SGG E-CLEAR A, please follow the handling, cutting, edge-deletion and washing instructions detailed above.

- The coated glass must be washed before making it into an IGU. Recommended washing conditions are described in section 3.6.
- The coating should always face outwards on the production line to avoid contact with the guide rollers.
- SGG E-CLEAR A does not require edge deletion but an approved secondary seal must be used up to the edge of the glass in all applications. A list of approved sealants is available on the website: www.saint-gobain-glass.com/uk
- Georgian bars can be used with rubber small piece as protection against rattling on the bars.
- Leaded strips should not be applied to the coated surface.

It is recommended to assemble the panes in insulating glass units as quickly as possible and within 48 hours in storage conditions as described in section 2.3.1.

3.11. 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 with relevant national requirements.

- **Reception (all offline coated glass):**
  - Control of delivery document of the coated glass supplier.
- **After cutting:**
  - Visual aspect control (scratches, oxidation/corrosion, splinters etc.),
  - Normal checking of the cutting quality.
- **After grinding/drilling/washing (all offline coated glass):**
  - Visual aspect control (scratches, oxidation/corrosion, splinters etc.),
  - Visual control as to whether the pane is completely dry,
  - Check for sucker or cork pad marks etc.,
  - Normal control of the grinding/drilling quality.
- **Prior to tempering:**
  - Check for glass splinters (if present, remove them carefully by blowing or rewashing).
- **After tempering:**
  - Visual aspect control (burns, cracks, scratches, oxidation/corrosion, roller pluck, red haze etc.): use an artificial sky according to the EN 1096-1 standard,
  - Colour consistency,
  - 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.): use an artificial sky according to the EN 1096-1 standard,
  - Check that no damage caused by separating blocks.
- **On the insulating glass unit line:**
  - Visual aspect control in conformity with the relevant national quality standard for insulating glass units.

For plants just starting to use offline 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 case of doubt about the quality of the offline coated glass received, refer to the procedure given in § 2.2. "Reception of the delivery".

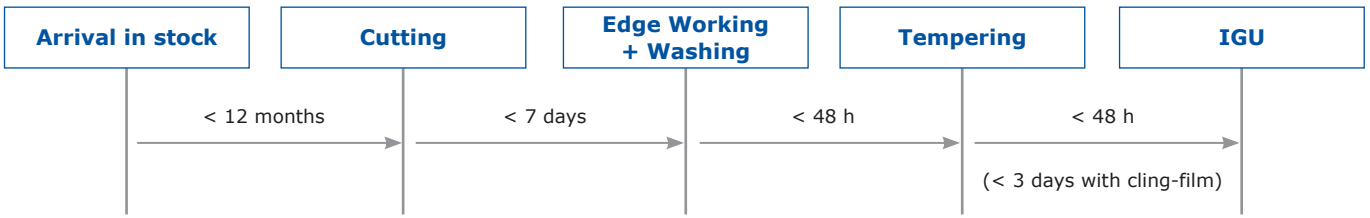
For plants just starting to use offline coated glass products, a system of "first off" inspection after each process can be useful until experience is gained. Operator training and experience in identifying faults (which are often difficult to see, especially before tempering) is important.

3.12. Environment/Waste glass/Health issues

- SGG E-CLEAR A coated glass products can be disposed of in the same way as clear float glass.
- As for any grinding process, the 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 waste. In some legislation, residues from grinding process have to be treated as toxic waste.
- As for any dust coming from a grinding process, any inhalation or skin contact of these residues has to be avoided.
- On request, Safety Data Sheet according to EC-Directive 91/155/EEC can be supplied.

3.13. Processing Time Line

The "Processing Time Line" below is an overview of the most important times to watch when processing SGG E-CLEAR A coated glass. The information is not exhaustive; please see the relevant paragraphs in this section for more detailed information.



4. GLAZING

The selection of a suitable and practicable 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.

Glass sheet blocks, rebate dimensions and admissible deflection of frames for insulating glass units are not specific to SGG E-CLEAR A.

Glazing and fixing techniques are not specific to SGG E-CLEAR A; they must comply with the relevant standards of each country.

5. PROTECTION, CLEANING AND MAINTENANCE OF THE END-PRODUCTS

5.1. Protection of the glazing during building works

As for other glass products, it is important to respect the following instructions for insulating glass units with SGG E-CLEAR A:

- In order to avoid damaging the glass with aggressive contaminants from site-works (e.g. paint, plaster, mortar), it is recommended that the insulating glass units are installed after all other work on site has been completed.
- 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 far as possible. To prevent a chemical attack of 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.
- If other works are being carried out close to the vicinity of the window installation, protect the glass with a clean plastic sheet to prevent staining (e.g. from paint, varnish, glue, sealant, cement, plaster, mortar, etc.) and splashes of abrasive or hot particles (grinding or welding sparks, etc.) on the glass.

5.2. Cleaning and maintenance

Cleaning and maintenance instructions of insulating glass units with SGG E-CLEAR A is identical to those of a standard insulating glass unit.

APPENDIX

List of distributors for key Consumables:

Coating detectors:

PAMA Testers
Kibbutz Givat Brener
60948 Kibbutz Givat Brener
ISRAEL

Phone: 972 54 6614761
Fax: 972 8 9917054
Email: pamatesters@gmail.com

Cutting oil:

ACECUT 5503
Aachener Chemische Werke
Gesellschaft für glastechnische
Produkte und Verfahren mt
Adenauerstr. 20 - Europark C3
52146 Würselen
Germany

Tel: 49 (0)2405-4497-0
Fax: 49 (0)2405-4497-30
Email: acw@chemetall.com

www.acw-info.de

Gloves:

We recommend gloves which are compatible for handling coated glass from the suppliers listed below:

Globus
Globus Building, 14 Central Park
Mosley Road, Trafford Park
Manchester, M17 1NY

Telephone: 0161 8774747
Email: sales@globus.co.uk

Tilsatec
Flanshaw Lane, Wakefield
West Yorkshire, WF2 9ND

Telephone: 01924 375742
Email: info@tilsatec.com

Tornado Gloves
5B Colwick Quays Business Park
Colwick, Nottingham, NG4 2JY

Telephone: 0115 9619555
Email: sales@tornadogloves.com
or technical@tornadogloves.com

Other glove manufacturers are available, for further advice please contact us.

NOTES

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SAINT-GOBAIN GLASS CLIMATE

This document contains essential instructions for the use of SGG E-CLEAR A glass.

All documents previously published by SAINT-GOBAIN GLASS are replaced by the present document.

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 SGG E-CLEAR A products that would not be contained in the present document.

Distributor

SAINT-GOBAIN

Saint-Gobain Glass UK Ltd
Weeland Road, Eggborough
East Riding of Yorkshire, DN14 0FD, UK

www.saint-gobain-glass.com/uk

SGG0133/07/15