



**AGC** *Obekan*

# STOPRAY T COATINGS

## PROCESSING GUIDE

Stopray Grey Vision-36T  
Stopray Vision-40T  
Stopray Vision-51T  
Stopray Vision-72T  
Stopray Titanium-34T  
Stopray Ace-30T

VERSION 6.0 – December 2021

Your Dreams, Our Challenge

# WARNING

Carefully read this manual before processing Stopray Grey Vision-36T, Vision-40T, Vision-51T, Vision-72T, Titanium-34T and Ace-30T.



## Preliminary Important Instructions

- At each stage of the processing procedure, the personnel responsible for handling the glass must have the appropriate equipment: safety shoes, safety gloves, safety glasses, etc.
- Stock sheet shelf life without any protection: the glass must be consumed within 48 hours after opening the box.
- Stock sheet shelf life with protection (closed packaging): the glass must be consumed within 3 months from the delivery.
- Cut sizes shelf life: 24 hours after cutting.
- For non-taped packs: the storage time in the customer facility is < 48 hours only.
- For taped packs: 3 months.
- For cut-sizes: 24 hours only.

### **Storage conditions: *see below***

- If the glass is handled on the coated side, please use protection caps on the suction cups. Please note, the weight that can be handled by the suction cups is reduced if using protection caps.
- We strongly recommend that everything coming in contact with the coating of the glass during preliminary processing be pre-validated.
- Cutting on the coated side. Use volatile oil.
- Edge-processing and washing on appropriate machines.
- Heat-treatment: within 24 hours after cutting. A furnace with at least top convection is compulsory. No SO<sub>2</sub> inside the furnace.
- IGU assembly: within 7 days after toughening/ heat-treatment.
- Further recommendations regarding the product description and processing are available below.

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# 0. PRODUCTS

This Processing Guide concerns magnetron Stopray T coatings produced in Yanbu: Stopray Grey Vision-36T, Vision-40T, Vision-51T, Vision-72T, Titanium-34T and Ace-30T.

Product	Heat-Treatable	Bending	Silk-screening	Tempering	Curving tempered	Laminated pos.4	Edge deletion
Stopray Grey Vision-36T Stopray Vision-40T Stopray Vision-51T Stopray Vision-72T Stopray Titanium-34T Stopray Ace-30T	YES	CAN BE	CAN BE	MUST BE	CAN BE	CAN BE	MUST BE

## I. RECEPTION AND STORAGE

### 1. Unloading

The packs of glass must be inspected on arrival. AGC Obeikan shall accept no liability for coating defects arising after delivery or during handling, processing or installation of the finished product in the building if this procedure is not followed:

- The rack must be positioned on perfectly level ground.
- Use the appropriate handling equipment.
- The grab must be perfectly centered.
- Avoid damaging the protective packaging whilst handling.
- The glass must be stored on appropriate racks.
- All recommendations given in this Processing Guide shall be strictly followed.

#### **General comments:**

- Clamps, slings, lifting beams and other handling equipment must comply with prevailing regulations and be approved by the relevant authorities.
- Ensure the safety of personnel at all times. Keep all unnecessary personnel out of the handling area. Wear appropriate personal protective equipment.
- Personnel must have received the required training.

### 2. Storage of the packs

Storing packs correctly reduces the risk of chemical or mechanical damage to the glass.

As a general rule, care should be taken to avoid major fluctuations in temperature and humidity that may cause condensation on the glass. Such fluctuations generally occur near loading and unloading areas. No water must be allowed to come into contact with the sheets of glass.

Care should be taken to ensure that the ambient air is not polluted by any corrosive elements such as chlorine or sulphur. Sources of such elements include machinery fitted with heat engines, battery charging points, road salt on the ground and so forth.

Factory racks are used for packaging during transport and are not designed to be used for storage. Consequently, the PLFs (Jumbo) must be stored on racks with spacers between packs ensuring that all packs of the same size are stored together.

#### **General comments:**

If, despite the precautions taken, marks do appear on the coating (fingerprints etc.) they should be removed at once using a clean, soft and wet (water) cloth and then a dry cloth. Soft circular movement should be applied.

### 3. Packaging

The packaging of the glass blocks depends on the type of product and on the final destination. For some coatings and markets, the glass block is packed with a tape on the perimeter. Desiccant bags are placed between the glass block and the tape. When unloading the truck, the packaging must be inspected carefully. Any damage must be reported to AGC Obeikan Glass.

### 4. Shelf life

Stock sheet shelf life without any protection: the glass must be consumed within 48 hours after opening the box

Stock sheet shelf life with protection (closed packaging): the glass must be consumed within 3 months from the delivery

Cut sizes shelf life: 24 hours after cutting

For non-taped packs: the storage time in the customer facility is < 48 hours only

For taped packs: 3 months

For cut-sizes: 24 hours only

## II. PROCESSING

### 1. Safety & General Information

At each stage of the processing procedure, the personnel responsible for handling the glass must have the adequate equipment: safety shoes, safety gloves, safety glasses, etc. AGC Obeikan strongly recommends wearing protective equipment when handling glass.

### 2. Cutting

The following specific precautions must be taken when cutting:

- When cutting, the coated side must be facing upwards to avoid any contact between the coated side and the surface of the table.
- The cutting oil used should be compatible with the coating, sufficiently volatile and water soluble.
- The table and any break-out equipment coming in contact with the coating on the glass must be prevalidated.
- Cutting personnel must wear clean gloves to avoid leaving finger marks on the coating.
- If the glass is to be cut using a template, the template must be positioned very carefully and care must be taken not to scratch the coating. We recommend placing a protective sheet between the template and the glass.
- The cut sheets of glass must be stored on racks. Care must be taken when handling them to ensure that the coating on the first sheet does not rest against the back of the rack. All subsequent sheets should be turned the other way.
- No particular spacer is needed if the original interlayer powder is still present. However, if for any reason there is not enough interlayer powder left on the glass, we recommend that you place cork spacers between the sheets. They will be placed on the perimeter of the glass, never in the centre.
- pH-neutral paper on corrugated cardboard can be used, assuming that they are clean and dry.
- The coating around the edge of the glass may be removed during the cutting process provided that dust from grinding is properly removed.
- Once the glass is cut, care must be taken to ensure that the cut edges do not come into contact with coated glass in the pack to avoid any damage, such as scratches.
- pH-neutral paper on corrugated cardboard can be used, assuming that they are clean and dry.
- The coating around the edge of the glass may be removed during the cutting process provided that dust from grinding is properly removed.
- Once the glass is cut, care must be taken to ensure that the cut edges do not come into contact with coated glass in the pack to avoid any damage, such as scratches.

**We recommend toughening the glass within 24 hours of cutting.** The glass should be shaped and cleaned during this period.

### 3. Edge-deletion

The coatings must be edge-deleted all around the edge of the glass so that the sealing compound makes contact with the glass and not the coating. AGC Obeikan recommends the grinding wheels.

The edges must be stripped to the same depth as the sealing compound. The edge of the stripped zone must meet the butyl line. Edge-stripping may be carried out either during the double glazing assembly process or during cutting. In both cases, care must be taken to ensure that dust from grinding is completely removed. The quality of the edge deletion process can be inspected in one of two ways:

- using an ohmmeter (if the ohmmeter does not react, the coating has been correctly removed);
- visual inspection of reflection.

In each individual case and for each individual production process, in addition to the coating it is necessary to test and approve the correct adhesion of the sealant used. Care must be taken to check whether it is possible to ensure good adhesion for all types of secondary sealant in a production run, together with all coatings used with one grinding disc.

### 4. Edge processing

#### 4.1. Handling the glass

The personnel responsible for handling and shaping the edges of the glass must wear perfectly clean safety gloves.

#### 4.2. Shaping the edges

Several types of edging machinery are available on the market:

##### 4.2.1. Crossed belt system

We recommend for personnel to work with diamond belts and adhere strictly to the supplier's instructions, specifically in terms of speed and cooling. For thicknesses in excess of 6 mm, we recommend 'smooth edge' shaping. The glass may be processed using dry crossed belts provided that the extraction system is sufficiently effective to remove the dust resulting from grinding.

##### 4.2.2. Vertical single edging system

Since the glass is held with chain tracks and, depending on cleanliness and maintenance of the machine, there is a risk of scratching the coating.

##### 4.2.3. Horizontal double edging system

It is possible to use this type of machine provided that the glass is held by smooth, non-textured belts. The speeds of the various belts must be synchronized. Mains water jets are placed in such a way that the coating is soaked and cleared of various impurities (e.g. separating powder or glass dust) just before they come into contact with the upper roller belts.

##### 4.2.4. Numerical Control Systems (CNC)

Shaping using a numerically controlled machine is permitted provided that the glass is placed with the coated side facing upwards.

#### **General recommendations for shaping edges:**

- The glass must remain moist throughout the shaping process in order to prevent 'natural drying'.
- The glass must be washed as soon as it has been shaped.
- The glass may be drilled provided that the press is covered with a soft protective material.

## 5. Washing

This stage involves washing, rinsing and drying the glass. Generally, the washing machine must be maintained regularly and the settings and tools must be adjusted for coated glass.

**A mains-water spray station should be installed just before the point where the glass enters the washer. This will remove any abrasive elements on the coating (cutting and edge-processing resi- dues) that could cause scratches when the brushes make contact with the coating.**

The glass must be washed in clean, deionized water with a pH of 7 ( $\pm 1$ ) and a conductivity of  $< 30 \mu\text{S/cm}$ . No hard particles (such as calcium) or acidic/detergent agents should be present in the water used for washing and rinsing as these may damage the coating.

We recommend the use of 'soft' brushes (diameter of the bristles  $< 0,15 \text{ mm}$ ), 1–2 mm of which come into contact with the glass. There must be enough water to guarantee that the water is distributed evenly and efficiently across the coating before it comes into contact with the brushes.

It is also important not to stop the cycle whilst the glass is in the washing machine. After washing, micro-suction pads should be used on the perimeter of the glass in the area that normally would be edge-stripped in order to avoid any contact between glass and coating. For large sheets of glass, a sheet of paper should be placed on the center of the glass.

Unloading the glass from the washer:

- Due to the fact that the interleaving powder is removed during the washing process, we recommend placing micro-suction pads around the edge of each sheet of glass in order to prevent contact between the glass side and the coated side.
- pH-neutral paper or corrugated cardboard can be used, assuming that it is clean and dry.

**Two or three halogen lights should be present at the exit of the washer to light the glass correctly (vertically from top to bottom) and even detect and quickly correct any deviations from the requirements listed above.**

	SHAPING	WASHING	
		Washing	Rinsing
Coolant	See above		
Detergent		NO	NO
Temperature		$< 40 \text{ }^{\circ}\text{C}$	$< 40 \text{ }^{\circ}\text{C}$
Ph	7 $\pm$ 1	7 $\pm$ 1	7 $\pm$ 1
Conductivity	—	$< 50 \mu\text{S/cm}$	$< 30 \mu\text{S/cm}$

**Remarks:** The personnel responsible for handling the glass must wear clean gloves suitable for handling coated glass. The water in the washer tanks should have a temperature of maximum  $40 \text{ }^{\circ}\text{C}$ . We also recommend the use of closed UV light systems to ensure the water is sufficiently disinfected.

## 6. Silk screen printing

T coatings can generally be used for silkscreen printing as long as the instructions given below are followed: If the silkscreen printing is to go as far as the edge of the glass, the coating should be trimmed first and the sealing compound should be checked for compatibility with the enamel.

If it is not possible to trim the coating before applying the enamel, the silkscreen printing must be trimmed so that the subsequent coating can be stripped.

Any impurities on the upper surface (coated side) can be removed using a compressed dry-air jet.



AGC Obeikan recommends using clear-coloured enamels that have a sufficiently high energy reflection level. A dark-coloured enamel will have a relatively high energy absorption level and the coating may be damaged under the enamel during the heating process.

Similarly, when the coverage percentage is very high and confined to a very small area, the printed section of the glass may behave differently to the uncovered section in the quench.

In any case, the final result will depend on the type of furnace used, its parameters, the colour and type of enamel used and the desired pattern. The processor will have to carry out preliminary

tests on a case-by-case basis in order to avoid these problems. AGC Obeikan is not liable under any circumstances for the outcome of the operation.

The presence of enamel on the coating changes the optical properties of the final glass product. These performance properties can be obtained from our AGC Obeikan's sales team or IBP (International Building Projects) team ([info@agc-obeikanglass.com.sa](mailto:info@agc-obeikanglass.com.sa)).

## 7. Thermal Toughening / Heat - strengthening

### 7.1. Introduction

T coatings are designed to be assembled in double glazing once they have been toughened or heat-strengthened. We would advise you to process and handle this coated glass with care in order to avoid damaging the coating.

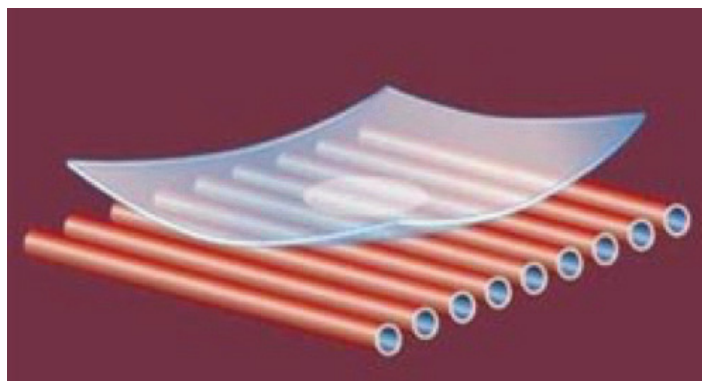
Pre-process defects will generally only be revealed by the toughening process itself and this can cause severe aesthetic defects. **Therefore we strongly recommend that everything coming into contact with the coating of the glass during preliminary processes be pre-validated.**

### 7.2. Generalities

When clear glass is placed in a toughening furnace it deforms considerably (concave shape) during the first heating cycle. The deformation is even more pronounced with low-emissivity glasses such as T coatings.

This is due to the different heating speeds of the surfaces.

In a purely radiation furnace, the lower surface is heated by conduction (contact with the rollers) and radiation (lower heating resistance). Since the upper surface is covered with a low-emissivity coating, which, by definition reflects the radiation emitted by the upper heating elements in the furnace, it does not heat up as quickly. The two surfaces do not, therefore, heat up symmetrically, leading to concave deformation of the glass due to differential expansion (see image below). This phenomenon causes a marking, or even an optical deformation of the glass in the centre of the pane.





The only way to neutralize these defects is to balance the heating process by projecting additional heat onto the upper surface. Significantly increasing the temperature of the roof does not resolve the problem because the low-emissivity coating will still reflect this increase in radiated energy. Moreover, this will cause the rollers to overheat which could aggravate the problem.

The only solution is to create additional energy via convection over the upper surface.

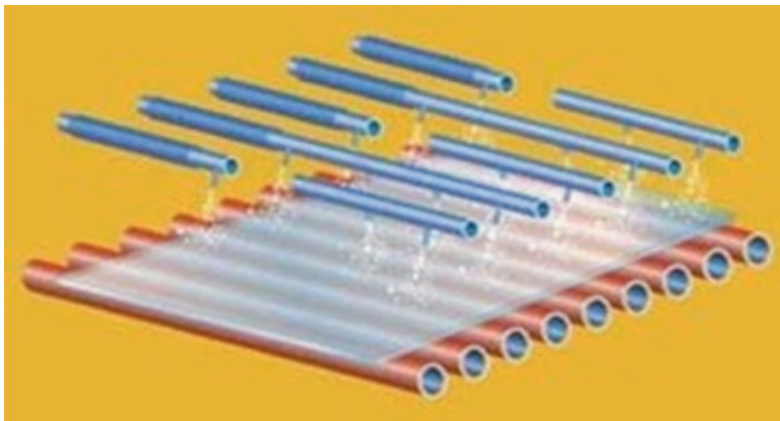
This can be done by creating an air flow over the upper surface that is hotter than the glass itself.

The air is provided by an external compressor and is pre-heated in the furnace before it is pumped over the upper surface of the glass via rollers fitted with jets (see figure below). Another technique involves drawing hot air out of the furnace and pumping it back in again (re-circulation).

The latest generation of convection furnaces no longer has internal radiation elements. They only heat the glass using pre-heated air.

This additional air supply to the upper surface of the glass helps:

- Keep the glass flat during the heating process and avoid the aforementioned defects.
- Significantly reduce the heating time and therefore boost the productivity of the plant.



### **7.3. Recommendations**

- We recommend toughening or heat strengthening within 48 hours of cutting. The glass must be placed with the coated side facing upwards.
- The personnel handling the glass must wear clean gloves. Larger and heavier sheets should be handled with suction pads covered with a protective material.
- Prior to toughening, markings may be made before toughening on the upper side of the glass coated.
- We recommend stopping the SO<sub>2</sub> supply in the toughening furnace at least 24 hours before toughening this kind of glass: the combination of SO<sub>2</sub> and a preliminary process that is not completely correct may change the appearance of the product.
- Regarding the furnaces heated by gas, some coating deterioration could occur. This will give some hazy appearance on the top layer of the coating. The level of haze depends on the gas composition and can be totally or partially washed.

### **7.4. Settings**

Each furnace has its own settings for heating and quenching. As a result, the following recommendations should be taken as general guidelines.

The furnace settings depend on:

1. The product to be thermally toughened or heat strengthened
  - a. asymmetrical absorption (emissivity of the coating/absorption of the substrate)
  - b. glass thickness
  - c. glass / furnace dimensions
2. Type of furnace
  - a. power density
  - b. convection rates
    - radiation with compressed air (type A)
    - radiation with re-circulation (type B)
    - convection (type C)
  - c. heating geometry (relative position of the heating / thermocouple / glass elements)

In practice, it is advisable to start with pieces of 1,500 × 1,500 mm

1. Temperature 700 °C at the top and bottom
2. Cycle time
  - a. Furnace type A: 60–75 sec/mm
  - b. Furnace type B: 50–55 sec/mm
  - c. Furnace type C: 40–45 sec/mm
3. Convection: The convection profile will be adapted to obtain a flat sheet of glass as quickly as possible and to maintain this flatness until the end of the heating process. If, despite a maximum convection rate, the glass retains a concave profile for too long, the temperature on the lower side will need to be reduced by 20–30 °C.

The cycle time will be adjusted to prevent breakage in the quench and to obtain an acceptable optical quality.

The quench parameters will be set to ensure that the glass comes out flat (air balance top/bottom) and that the desired break pattern is achieved.

**Note 1:** For very low-emissivity products, a much higher air pressure needs to be applied to the upper surface of the glass during the actual toughening process. This is due to the fact that the coated surface does not cool down through radiation whilst the lower surface does. This phenomenon is all the more noticeable when the air pressure is low (very thick toughened glasses > 8 mm and heat-strengthened glass > 6 mm). A quench capable of producing highly asymmetrical air pressure flows is therefore required.

**Note 2:** Gas-fired furnaces can be used for the tempering of T coatings, provided they are fitted with a heat exchanger in order to avoid direct contact between combustion fumes and the coating.

For further information, please contact AGC Obeikan's sales team or IBP (International Building Projects) team ([info@agc-obeikanglass.com.sa](mailto:info@agc-obeikanglass.com.sa)).

### 7.5. Unloading

- If the glass is unloaded manually, the personnel must wear clean gloves.
- Larger and heavier sheets should be handled with a suction-pad lifting beam. The suction pads must be covered with a protective material. The toughened sheets are then stored on racks.
- Care must be taken when handling them to ensure that the coating on the first sheet does not rest against the back of the rack. All subsequent sheets should be turned the other way.
- Given that toughened glass sheets are never perfectly flat, micro suction pads should be placed around the edge of each sheet of glass in order to prevent contact between the glass and the coatings. For large volumes, paper with a neutral pH can be placed in the center to avoid all contact with the glass/coating during handling and transport.

### 7.6. Heat Soak test

The risk of spontaneous breakage due to nickel-sulphide inclusions is inherent to thermally toughened glass. The presence of such inclusions can in no way be considered as a fault in the glass. In order to eliminate the risk of spontaneous breakage, an additional heat soak test can be carried out in accordance with standard EN 14179-1 (or equivalent standards for countries outside the EU).

AGC Obeikan highly recommends using electrical equipment. Gas-fired furnaces must not be used for heat soak tests due to the risk that the coating could react with the smoke.

Interlayer's should only be placed on the perimeter of the glass.

### 7.7. Quality control

The declared properties of T coatings correspond to the performance after toughening. The coating will have achieved the performance indicated once its temperature reaches 500°C.

Heat-strengthened products offer the same optical and energy performance as the toughened version.

For further information, please contact the AGC Obeikan's sales team or IBP (International Building Projects) team ([info@agc-obeikanglass.com.sa](mailto:info@agc-obeikanglass.com.sa)).

After the toughening process, the Stopray T products should be inspected as follows:

- The coating is inspected in accordance with EN 1096-1\* Toughened glass must comply with EN 12150-1\*
- Heat-strengthened glass must comply with EN 1863-1\*.
- The eventual Heat Soak Test (HST) must be carried out in accordance with EN 14179-1\*

\* Or equivalent local standards for countries out of the EU.

### 7.8. Packaging

If T coatings are not assembled in double glazing in the same factory, the following recommendations for packaging must be followed:

- A 1 mm-polyethylene foam spacer should be placed between each sheet. The glass must be cooled to temperatures below 50 °C prior to packaging, otherwise the interlayer will leave marks on the coating.
- The pack of glass should be packaged in watertight plastic. Sachets filled with desiccating agents should be placed inside the packaging.
- Care must be taken to ensure that the pack is properly attached to the rack so that the sheets do not rub together.
- The glass will be assembled into insulating glass within one week after it has been toughened.

## 8. Bending

Bending tests have been carried out in different types of bending furnaces.

The following general recommendations refer to 6 mm. Other thicknesses have not been evaluated as such and require preliminary validation tests by the glass processor. This is particularly important for glass thicker than 6 mm that will be subject to higher temperatures for a longer period of time.

The technical values stated (cycle times, temperatures and so forth) were noted during tests on certain types of bending equipment and obviously depend on the individual characteristics (shape, strength, convection rate and so on) of this equipment. The recommendations set out here are therefore intended as general guidelines and preliminary tests must be carried out for each bending furnace.

### 8.1. Curved annealed glass (on a concave mould)

Only bending ovens with top and bottom heating elements and with an upper convection system are suitable for bending coatings. The coated glass can be bent with the coating in tension or compression.

All instructions regarding the pre-process (unloading, storage, cutting, shaping, washing and handling) must be strictly adhered to.

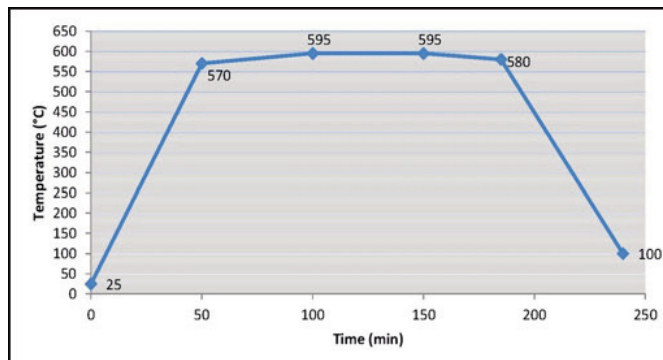
The glasses should be shaped to a smooth ground edge.

- Place the coating on the concave mould (coated surface facing upwards).
- Apply the appropriate packing powder (ESKAL 10 from KSL Staubtechnik gmbh).
- The powder will be spread without any medium, as uniformly as possible.
- Place a sheet of float glass on top, with the tin side facing upwards. Apply the appropriate packing powder (generally crystalline silica).

The same operation can be done with the float glass bottom and the coated glass on top, with the T

#### Heating / cooling parameters

- The temperatures must be adjusted so that the upper surface of the glass matches the following curve as closely as possible.
- The temperature must not exceed 580 °C.



**NB:** The final heating phase must be adjusted according to the position of the glass in the bending mould.

### 8.2. Curved toughened glass

- This operation is done on a flat tempering oven, fit with an adjustable quench in order to get the right curving radius.
- Compared to the flat tempering settings, the heating time must be increased by 15 to 30%.
- As the coating is facing upwards (opposite side of the rollers), it will be in compression, on the concave side of the glass.

## 9. Use in single glazing

Stopray T coatings cannot be used as single glazing.

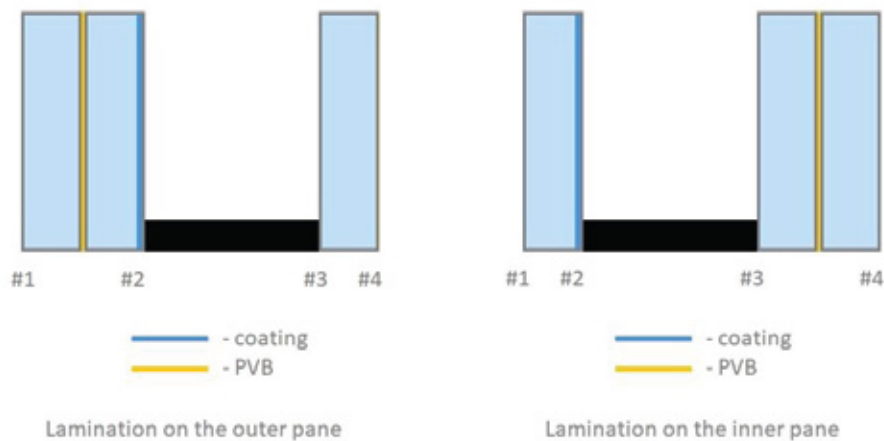
## 10. Lamination

The coated glass can generally be laminated. However, we recommend that the coating not come into contact with the PVB. In double glazing unit with lamination on the inner or outer pane the coating should be on position #2.

Special care should be taken to ensure that the roller of the pre-nip presses do not damage or contaminate the coating. The pressure of the rollers and the material of the rollers should be adjusted to the glass type and thickness and should take account of the coating's mechanical resistance. During the autoclave process, spacers should be placed around the edge of the glass, never in the center. For autoclave-free or vacuum-based lamination processes, preliminary validation tests by the glass processor are recommended to ensure that the coating is not damaged during lamination. Specifically, materials in contact with the coating must be tested for compatibility.

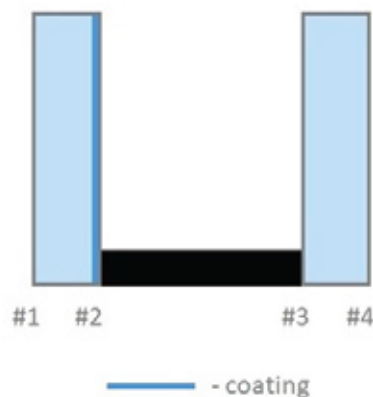
Given the low emissivity of the coatings, the settings of the laminating process should be adjusted.





## 11. Assembly in Insulating Glass Unit

The Stopray T coatings are designed to be assembled in insulating glass units with the following restrictions for the coating position.



For Stopray T products coating must be in position #2 in DGUs and TGUs.

For multiple coating combinations in DGUs and TGUs, please contact the AGC Obeikan's sales team or IBP (International Building Projects) team [info@agc-obeikanglass.com.sa](mailto:info@agc-obeikanglass.com.sa).

The glass should be assembled in insulating glazing within one week after being toughened.

The individual responsible for assembly must check that the coating is compatible with the sealing products.

Since all the T coatings and non-T coatings are highly neutral in appearance, AGC Obeikan recommends indicating the external surface after assembly to ensure that the units are installed correctly.

### Quality control

It is essential to check that the coating is in the correct position before assembly. Any mistake could lead to changes in performance and/or aesthetics.

Quality control for the final product (insulating glass) involves not only strict compliance with the instructions provided in this processing guide, but also meticulous checks at each stage of the manufacturing process.

Two or three halogen projectors must be placed at the exit of each processing machine to light the glass correctly (vertically from the top to the bottom) to immediately detect any deviation from the regulatory parameters that could affect the appearance of the coating (e.g. scratches or other contamination).

## 12. Use in Structural glazing

When installation or assembling is by mechanical methods, structural glazing or other techniques, tests for compatibility and adherence of the coating or the adhesive must be made in each case with the adhesives manufacturer.

### 13. Identifying the coated surface

Before the shaping process, the coated side can easily be identified by the cut, which is visible on the edge of the glass.

After shaping, and until the glass is assembled in double glazing, the coating may be identified using an electric tester, available on request from any AGC Obeikan representative.

Nonetheless, we recommend carrying out this test somewhere around the edge of the glass in an area that will later be stripped before the glass is assembled into double glazing.



### 14. Storage of cut sizes / IGU

#### 14.1. During processing in the same factory

After each processing step, when the glass is stored on racks, no particular spacer is needed if the original interlayer powder is still present. If for any reason there is not enough interlayer powder left on the glass, and particularly after the washing, we recommend that you place cork spacers between the sheets. The same recommendations apply for packs with several glass dimensions.

The storage must be conform to the recommendations of section I.2.

#### 14.2. To send cut size to another factory

After each processing step, when the glass is stored on racks, no particular spacer is needed if the original interlayer powder is still present. If for any reason there is not enough interlayer powder left on the glass, and particularly after washing, we recommend that you place cork spacers between the sheets<sup>4</sup>. The same recommendations apply for packs containing sheets with multiple dimensions.

Storage must comply with the recommendations set out in section I.2

#### 14.3. On site

When the glazing is delivered on site to be installed on the facade, it must be stored in a dry, sheltered and ventilated space. It must never be laid flat, nor be stored in the sun or near a heat source.

## III. CONFORMITY and GUARANTEE

### 1. Conformity

Stopray T coatings comply with standard EN 1096-1, category C.

Information regarding inspection conditions and quality criteria are available in that standard.

### 2. Warranty

The warranty is available on request from your local AGC Obeikan's sales representative.

### 3. Disclaimer

It is the responsibility of the processor to inspect the processed coated glass adequately before and after each step of fabrication and prior to installation. Failure to apply all professional standards, customary instructions and processing instructions written in this processing guide and related links will automatically void any warranty regarding coated glass of AGC Obeikan. We advise the processor to undertake some preliminary trials with the typical glass compositions for the project prior to any further commitment with his customer. The processor is solely responsible for the quality of the final product.

Regarding preliminary trials advices can be obtained at AGC Obeikan's sales team or IBP (International Building Projects) team [info@agc-obeikanglass.com.sa](mailto:info@agc-obeikanglass.com.sa).

## IV. GLAZING INSTRUCTIONS

The AGC Obeikan glazing instructions are available on request from your local AGC Obeikan sales representative.

## V. CLEANING ON FACADE

The cleaning instructions for glazing installed on facades are available on request from your local AGC Obeikan's sales representative.

## VI. NOTES

<sup>1</sup>Recommended protective material for suction pads: Product description: suction cup housing

NB: max. diameter: 300 mm.

Supplier: IMPEXACOM

Rue des tourterelles 14-16

B - 5651 Thy le Château -Belgium Tel.: + 32 71 612145

Fax: + 32 71 612164

<sup>2</sup>Recommended gloves:

Product description: HYD TUF 52-547 (glove size 8-10 for handling coated glass)

Supplier: IMPEXACOM

Rue des tourterelles 14-16

B -5651 Thy le Château -Belgium Tel.: + 32 71 612145

Fax: + 32 71 612164

<sup>3</sup>Recommended cutting oil:

Product description: ACPE 5503 cutting oil

Supplier: ROLAND

Rue de la petite Ile 4 B - Brussels -Belgium Tel.: + 32 2 5250618

Fax: + 32 2 5200856

<sup>4</sup>Recommended spacer for toughened/heat-strengthened:

Product description: Cork disks with micro suction pads (3 × 20 × 20 mm)

Supplier: VITO IRMEN

Mittelstrasse 74-80

D - 53407 Remagen - Germany Tel.: + 49 26 42 40 07 10

Fax: + 49 26 42 42 913

<sup>5</sup>Recommended packing foam:

Product description: 1 mm packing foam

Supplier: SCRIPHORIA

Wellen Belgium

Tel.: + 32 11 370 111

<sup>6</sup>Recommended sachets of desiccating agents:

Product description: desiccating agent in sachets of 125 g

Supplier: STOKVIS Vilvoorde -Belgium Tel.: + 32 2 255 06 11

Suppliers are listed for reference only.

## Appendix 1

# Standard Inspection Method and Criteria For Magnetron Coated Glass\*

## EN 1096-1

### 1. Detection of defects

#### 1.1 General

The defects are detected visually by an observation of the coated glass in transmission and/or reflection. An artificial sky or daylight may be used, as the source of illumination.

#### 1.2 Artificial sky

The artificial sky is a plane emitting diffuse light with a uniform brightness and a general colouring index  $R_a$  higher than 70 (see CIE 013.3-1995).

It is obtained by using a light source whose correlated colour temperature is in the range between 4000K and 6000K. In front of the arrangement of light sources is a light scattering panel, without spectral selectivity. The illuminance level, on the glass surface shall be between 400 lx and 20000 lx.

#### 1.3 Daylight illumination

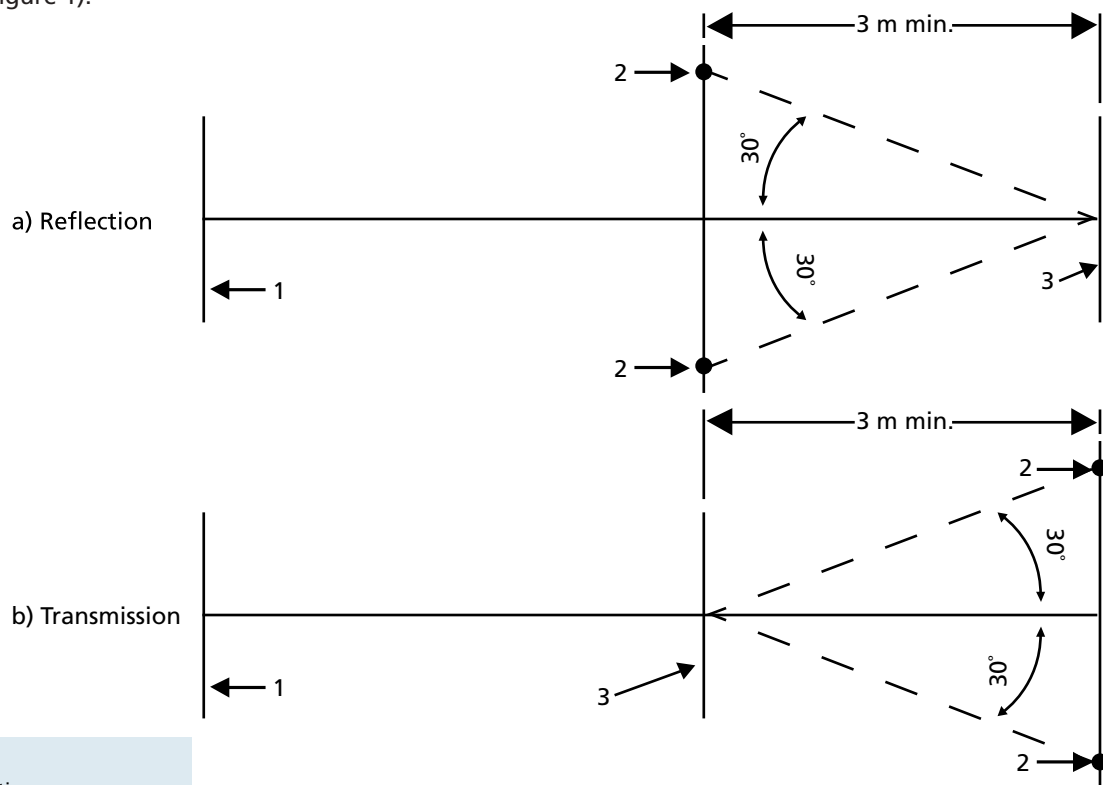
Daylight illumination is a uniform overcast sky, without direct sunlight.

### 2. Conditions of examination

#### 2.1 General

Coated glass may be examined in stock size plates or in finished 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 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° (see Figure 1).



- Key
- 1. illumination source
  - 2. observer position
  - 3. coated glass sample

NOTE: These are a plan views.

Figure 1 — Schematics of examination procedures for coated glass

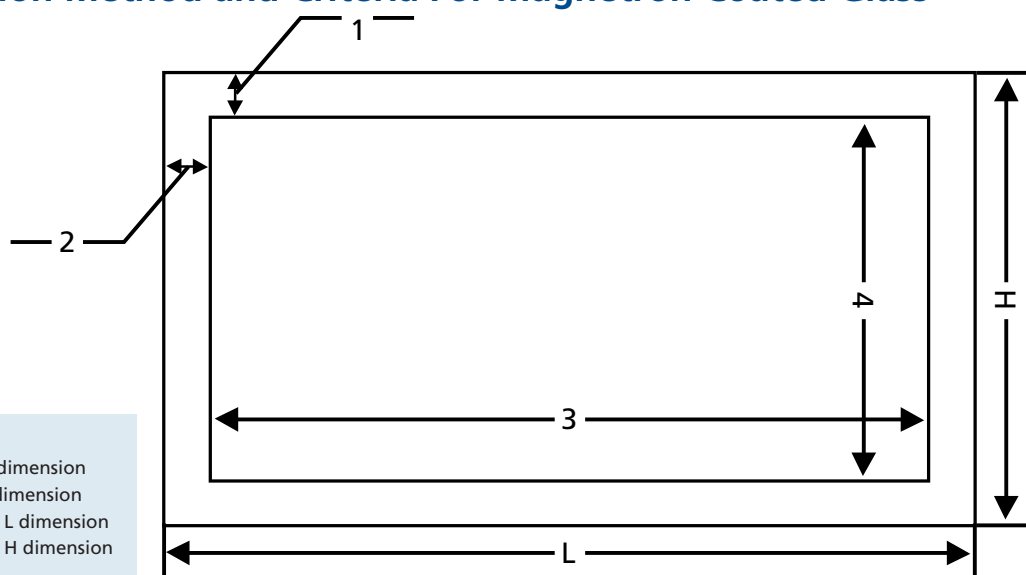
For panes of coated glass in finished sizes ready to be installed both the main area and an edge area of the pane shall be examined (see Figure 2).



## Appendix 1

# Standard Inspection Method and Criteria For Magnetron Coated Glass\*

### EN 1096-1



#### Key

1. edge area height is 5% of  $H$  dimension
2. edge area length is 5% of  $L$  dimension
3. central area length is 90% of  $L$  dimension
4. central area height is 90% of  $H$  dimension

Figure 2 — Areas to be examined on finished sizes ready for glazing

Each examination will take no more than 20s

## 2.2 Uniformity defects and stains

Under the conditions of examination, given in clause 2, note any coating variations either within one pane or between neighbouring panes which are visually disturbing.

## 2.3 Punctual defects

Under the conditions of examination, given in clause 2, note any spots, pinholes and/or scratches that are visually disturbing.

For spots/pinholes measure the size and note the number relative to the size of the pane. If there are any clusters found their position relative to the through vision area shall be determined.

For scratches determine whether or not they are in the main or edge area. Measure the length of any scratches noted. For scratches  $> 75$  mm long determine the distance between adjacent scratches. For scratches  $\leq 75$  mm long note any area where their density produces visual disturbance.

## 2.4 Acceptance criteria of coated glass defects

The acceptance criteria for defects in coated glass, examined according to clause 2, are given in Table 1.

Table 1 — Acceptance criteria for coated glass defects

DEFECT TYPES	ACCEPTANCE CRITERIA		
	PANE/PANE	INDIVIDUAL PANE	
UNIFORMITY / STAIN	Allowed as long as not visually disturbing	Allowed as long as not visually disturbing.	
PUNCTUAL	Not applicable	Main area	Edge area
Spots/Pinholes $> 3$ mm		Not allowed	Not allowed
$> 2$ mm and $\leq 3$ mm		Allowed if not more than $1/\text{m}^2$	Allowed if not more than $1/\text{m}^2$
Clusters		Not allowed	Allowed as long as not in area of through vision
Scratches $> 75$ mm		Not allowed	Allowed as long as they are separated by $> 50$ mm
$\leq 75$ mm		Allowed as long as local density is not visually disturbing	Allowed as long as local density is not visually disturbing

\* Appendix 1 is an extract from the standard EN1096-1. For more details, please refer to the full version of EN1096-1.