



GLASS UNLIMITED

PROCESSING GUIDE

Stopsol Classic
Stopsol Supersilver
Stopsol Silverlight

Stopsol Phoenix (only available in the Russian Federation)

Blackpearl

Sunergy

Planibel G
Planibel G fast
Planibel A

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Revised information on products, product availability and processing guidelines is regularly updated on the AGC Flat Glass Europe website www.YourGlass.com

TABLE OF CONTENTS

I. RECEPTION and STORAGE	3
1. Unloading.....	3
2. Storage of the packs	3
II. PROCESSING	4
0. Safety	4
1. Cutting.....	4
2. Edge processing	4
2.1 Handling the glass	4
2.2 Shaping the edges	4
2.3 Unloading.....	5
3. Washing	5
4. Silk screen printing and Enameling	6
4.1 Generalities	6
4.2 Precautions for enamel on the coated side	6
4.3 Precautions for enamel on the glass side	6
4.4 Quality control	7
4.5 Performances of the enamel glass	7
5. Thermal Toughening / Heat strengthening	7
5.1 Introduction.....	7
5.2 Recommendations	7
5.3 Settings.....	8
5.4 Unloading.....	8
5.5 Heat Soak test.....	8
5.6 Quality control	8
5.7 Packaging	9
6. Bending	9
7. Lamination	9
8. Use in single glazing	10
8. Assembly in Insulating Glass Unit.....	11
9. Use in Structural glazing	12
10. Storage of cut sizes / IGU	12
10.1 During processing in the same factory.....	12
10.2 To send cut size to another factory	12
10.3 On site	12
III. CONFORMITY and GUARANTEE	13
1. Conformity	13
2. Guarantee	13
3. CE Marking.....	13
4. Disclaimer	13
IV. GLAZING INSTRUCTIONS.....	13
V. CLEANING ON FACADE.....	13
VI. NOTES.....	14

I. RECEPTION and STORAGE

1. Unloading

The packs of glass must be inspected on arrival. AGC shall accept no liability for faults 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 must be stored on racks with spacers between packs ensuring that all packs of the same size are stored together.

II. PROCESSING

0. Safety

At each stage of the processing procedure, the personnel responsible for handling the glass must have the adequate equipment: safety shoes, safety gloves¹, safety glasses, ...

1. Cutting

The following specific precautions must be taken when cutting:

- the coated side must be facing upwards to avoid any contact between the coating and the surface of the table
- The cutting oil used should be compatible with the coating, sufficiently volatile and water soluble²
- The table and any breaking equipment liable to come into contact with the coating on the glass must be pre-validated.

After cutting, when the glass is stored on racks, 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 sheets³. The same recommendations apply for packs with several glass dimensions

The Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Stopsol Phoenix, Blackpearl, Sunergy, Planibel G, Planibel G fasT and Planibel A coatings do not have to be edge-deleted.

2. Edge processing

The Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix, Sunergy, Planibel G, Planibel G fasT and Planibel A are designed to undergo, if needed, thermal toughening or heat strengthening. Accordingly, the edges of the glass must be shaped.

2.1 Handling the glass

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

2.2 Shaping the edges

All the edge-processing machines available on the market are in principle suitable for the Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Stopsol Phoenix, Sunergy, Planibel G, Planibel G fasT and Planibel A:

- Crossed belt system
- Vertical single edging system
- Horizontal double edging system
- Numerical Control Systems (CNC)

During the shaping, the coated side should preferably be facing upwards.

2.3 Unloading

Due to the fact that the interlayer powder is removed during the washing process, we recommend placing micro-suction pads³ around the edge of each sheet of glass in order to prevent contact between the glass and the coatings. Paper with a neutral pH can also be used, for example, for large volumes.

3. Washing

This stage involves washing, rinsing and drying the glass.

If the glass is fitted with hard brushes ($> 150 \mu$), it is important not to stop the cycle whilst the glass is in the washing machine.

There is no special recommendation regarding the quality of the water. Nevertheless, the PH of the water in the washer and in the edge-processing machine should be between 6 and 8.

In each case, the glass has to be perfectly clean after the washing, in order to avoid any pollution of the tempering furnace rollers.

After washing, micro-suction pads³ should be used between the glasses.

Quality control

The coated glass must be inspected after the washing. Some halogen lights should be installed above the glass, in order that the operator will be able to see the lights reflected by the coating, when the glass is coming out of the washer.

4. Silk screen printing and Enameling

4.1 Generalities

The following limitations apply for the silk screen printing and the enameling

	Enamel on glass side	Enamel on coated side
Stopsol Classic	OK	OK
Stopsol Supersilver	OK	OK*
Stopsol Silverlight	OK	OK*
Blackpearl	OK	OK
Stopsol Phoenix	OK	OK*
Sunergy	NO	OK
Planibel G	NO	OK
Planibel G fasT	OK	OK
Planibel A	OK	OK
* a validation of the appearance as indicated in §4.2 is strictly necessary		

4.2 Precautions for enamel on the coated side

The Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix, Sunergy, Planibel G, Planibel G fasT and Planibel A can generally be used for silk screen printing on the coated side as long as the instructions given below are followed.

If the silk screen printing is to go as far as the edge of the glass, the compatibility between enamel and the IGU or structural sealing sealant should be checked.

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

In each case, the final result will depend on the type of furnace used, its parameters, the color and type of enamel used and the desired pattern. The processor will have to carry out preliminary tests, on a case by case basis, to validate the visual result and the mechanical and chemical properties of the enameled glass. We recommend producing a mock-up for the final aesthetic approval.

4.3 Precautions for enamel on the glass side

The Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix, Planibel G fasT and Planibel A can generally be used for silk screen printing on the glass side as normal float glass.

The presence of the coating on the bottom side will not affect the behavior of the glass in the furnace.

The top and bottom convection pressure profiles, when used, shall be fine-tuned in order to keep the glass flat in the tempering furnace, from the early stage until the end of the heating process. The same approach for the heating profile, when no convection is used.

4.4 Quality control

The coated glass must be inspected after the silk screen printing. To do so, some halogen lights should be installed above the glass, in order that the operator will be able to see the lights reflected by the coating after the silk screen printing.

4.5 Performances of the enamel glass

The presence of enamel on the coating changes the optical properties of the final glass product. These performance properties can be obtained from our Technical Advisory Service in Brussels (technical.advisory.service@eu.agc-flatglass.com).

5. Thermal Toughening / Heat strengthening

5.1 Introduction

The Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix coatings have the same normal emissivity as a float glass (normal emissivity = 0.89). All the tempering furnaces available on the market can be used to heat temper/heat-strengthen these products.

Sunergy, Planibel G, Planibel G FasT and Planibel A coatings have a normal emissivity of, respectively 0.28, 0.15, 0.15 and 0.10. Low to medium convection rates furnaces will be suitable to temper these coatings.

5.2 Recommendations

The personnel handling the glass must wear safety gloves¹.

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

	Coating position in the furnace		Type of convection	
	Upwards	Downwards*	Convection top**	Convection bottom**
Stopsol Classic	OK	OK	Allowed	Allowed
Stopsol Supersilver	OK	OK	Allowed	Allowed
Stopsol Silverlight	OK	OK	Allowed	Allowed
Blackpearl	OK	OK	Allowed	Allowed
Stopsol Phoenix	OK	OK	Allowed	Allowed
Sunergy	OK	NO	Necessary(low)	Allowed
Planibel G	OK	NO	Necessary (medium)	Allowed
Planibel G fasT (up)	OK	-	Necessary (medium)	Allowed
Planibel G fasT (down)	-	OK	Allowed	Allowed
Planibel A (up)	OK	-	Necessary (medium)	Allowed
Planibel A (down)	-	OK	Allowed	Allowed

* The rollers of the furnace as well as the quench and conveyors systems must be kept clean

** The top and bottom convection pressure profiles, when used, must be fine-tuned in order to keep the glass flat in the tempering furnace, from the early stage till the end of the heating process. The same approach for the heating profile, when no convection in used.

Tempering markings may be made before toughening on the upper side of the glass.

5.3 Settings

The Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix has to be toughened / heat-strengthened with the same settings as for the glass substrate without coating.

For Sunergy, Planibel G, Planibel G fasT and Planibel A, the convection settings will be set up according the emissivity of the coating. For further information's, please contact the Technical Advisory Service in Brussels (technical.advisory.service@eu.agc-flatglass.com).

5.4 Unloading

- If the glass is unloaded manually, the personnel must wear safety clean gloves¹.
- Larger and heavier sheets should be handled with a suction-pad lifting beam.
- Given that toughened glass sheets are never perfectly flat, micro suction pads³ 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 can be placed in the centre to avoid all contact with the glass/coating during handling and transport.

5.5 Heat Soak test

For thermally toughened glass, the risk of spontaneous breakage due to Nickel-Sulfide is not covered by AGC Flat Glass Europe. If necessary a Heat Soak test can be carried out in accordance with standard EN 14179-1 (or equivalent standards for countries out of the EC).

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

5.6 Quality control

The properties of the Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix are not altered during the heat treatment (tempering/heat-strengthening, bending and heat soak).

The emissivity and electrical resistance of Sunergy, Planibel G, Planibel G fasT and Planibel A can change during the tempering process. We recommend keeping the square resistance, measured with a four-point probe, lower than, respectively, 55 Ohm for the Sunergy and 17 Ohm for the Planibel G and Planibel G fasT and 11 Ohm for Planibel A.

For further information, please contact the Technical Advisory Service in Brussels (technical.advisory.service@eu.agc-flatglass.com).

After the toughening process, The Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix, Sunergy, Planibel G, Planibel G fasT and Planibel A 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 EC

5.7 Packaging

If the Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix, Sunergy, Planibel G, Planibel G fasT and Planibel A are to be delivered to another factory in cut sizes, the following recommendations for packaging must be adhered to:

- A 1 mm-polyethylene foam spacer should be placed between each sheet⁴
- Care must be taken to ensure that the pack is properly attached to the rack so that the sheets do not rub together.

6. Bending

The Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix can be curved, curved tempered or curved heat-strengthened with the same furnace settings as for the glass substrate.

For Sunergy, Planibel G, Planibel G fasT and Planibel A, the convection settings will depend on the emissivity of the coating.

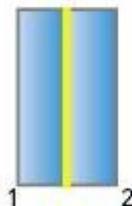
For further information, please contact the Technical Advisory Service in Brussels (technical.advisory.service@eu.agc-flatglass.com).

In order to limit the risk of breakage in the oven (annealed curved version) or in the quench section (tempered/heat-strengthened curved version), AGC recommends making a smooth-edge processing of the glass.

In all cases, the coating can be in compression or tension. It is thus allowed to produce “S – shaped” curved glass.

7. Lamination

The Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix, Sunergy, Planibel G, Planibel G fasT and Planibel A can be laminated.



The following positions are possible for the coating.

	Coating position in the laminated glass		
	1	against PVB	2
Stopsol Classic	OK	OK	OK
Stopsol Supersilver	OK	OK	OK
Stopsol Silverlight	OK	OK	OK
Blackpearl	OK	OK	OK
Stopsol Phoenix	NO	NO	OK
Sunergy	NO	OK	OK
Planibel G	NO	OK	OK
Planibel G fasT	NO	OK	OK
Planibel A	NO	OK	OK

Notes:

- pos.1 means outside the building; pos.2 means inside the building
- when a low-e coating is in contact with the PVB, the low-e effect is lost
- when the coating is in contact with the PVB, the color and the optical properties are modified

8. Use in single glazing

The Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix, Sunergy, Planibel G, Planibel G fasT and Planibel A can be used in façades in single glazing with the following restrictions for the coating position.

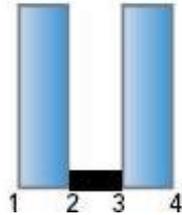


	Coating position	
	1	2
Stopsol Classic	OK	OK
Stopsol Supersilver	OK	OK
Stopsol Silverlight	OK	OK
Blackpearl	OK	OK
Stopsol Phoenix	NO	OK
Sunergy	NO	OK
Planibel G	NO	OK
Planibel G fasT	NO	OK
Planibel A	NO	OK

Notes: pos.1 means outside the building; pos.2 means inside the building

8. Assembly in Insulating Glass Unit

The Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix, Sunergy, Planibel G, Planibel G fasT and Planibel A are designed to be assembled in double glazing with the following restrictions for the coating position.



	Coating position in the IGU			
	1	2	3	4
Stopsol Classic	OK	OK	NA	NA
Stopsol Supersilver	OK	OK	NA	NA
Stopsol Silverlight	OK	OK	NA	NA
Blackpearl	OK	OK	NA	OK
Stopsol Phoenix	NO	OK	NA	NA
Sunergy	NO	OK	OK	NA
Planibel G	NO	NO*	OK	NA
Planibel G fasT	NO	NO*	OK	NA
Planibel A	NO	NO*	OK	NA

* Optical aspect is not perfect
 NA: no technical reason to put the coating in this position; see comment after the table.

The Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Stopsol Phoenix, Blackpearl, Sunergy, Planibel G, Planibel G fasT and Planibel A coatings do not have to be edge-deleted.

Comment: Efficient use of the coatings:

- To optimize the solar control:
 - The Stopsol Classic, Stopsol Supersilver and Stopsol Silverlight are used in position 1 or 2
 - the Stopsol Phoenix and Sunergy are used in position 2
- To optimize the thermal insulation, the Planibel G, Planibel G fasT and Planibel A are used in position 3
- When used as the back glass in a spandrel application, the Blackpearl must be in position 4

When the coating is in contact with the IGU sealant, the compatibility of the primary and secondary sealants of the DGU with the coating(s) will be validated on a case to case basis. The same validation will be necessary for the structural bonding.

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).

9. 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 glue must be made in each case with the manufacturer of the glue.

10. Storage of cut sizes / IGU

10.1 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 sheets³. The same recommendations apply for packs with several glass dimensions.

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

10.2 To send cut size to another factory

If the Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix, Sunergy, Planibel G, Planibel G fasT and Planibel A have to be delivered from the processing factory to another factory, the following recommendations for packaging must be adhered to:

- A 1 mm-polyethylene foam spacer should be placed between each sheet⁴
- Care must be taken to ensure that the pack is properly attached to the rack so that the sheets do not rub together
- The pack of glass should be packaged in watertight plastic. Sachets filled with desiccating agent should be placed inside the packaging

10.3 On site

When the glazing is delivered on site to be installed on the façade, 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

The Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Sunergy, Planibel G, Planibel G fasT and Planibel A comply with the standard EN 1096-1, category A.

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

2. Warranty

The warranty is available on www.YourGlass.com.

3. CE Marking

All information and declarations related to the CE Marking of the Stopsol Classic, Stopsol Supersilver, Stopsol Silverlight, Blackpearl, Stopsol Phoenix, Sunergy, Planibel G, Planibel G FasT and Planibel A are available on www.yourglass.com/CE.

4. 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. 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.

IV. GLAZING INSTRUCTIONS

The AGC glazing instructions are available at www.yourglass.com/agc-flatglass-europe/download.html?objectid=75977.

V. CLEANING ON FACADE

The cleaning instructions for glazing installed on façades are available at www.yourglass.com/agc-flatglass-europe/download.html?objectid=76140.

VI. NOTES

¹ **Recommended gloves:**

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

² **Recommended cutting 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

³ **Recommended spacer for storing the glass**

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

⁴ **Recommended packing foam:**

Product description: 1 mm packing foam
Supplier: SCRIPHORIA
Wellen Belgium Tel.: + 32 11 370 111