CLEARSIGHT

PROCESSING GUIDE

VERSION 2.1– DECEMBER 2020

Your Dreams, Our Challenge

This version of the guide replaces and cancels all previous versions.

Please regularly check www.agc-yourglass.com for any updates.

CONTENTS

1. TRANSPORTATION

Care must be taken to ensure that the Clearsight coating is not damaged during transport, e.g. not scratched by fixings or not struck by gravel/sand from the road.

2. STORAGE

Clearsight must be stored in a dry, well-ventilated area. It is difficult to remove traces of moisture created on the glass surface.
There is no specific shelf life for Clearsight.

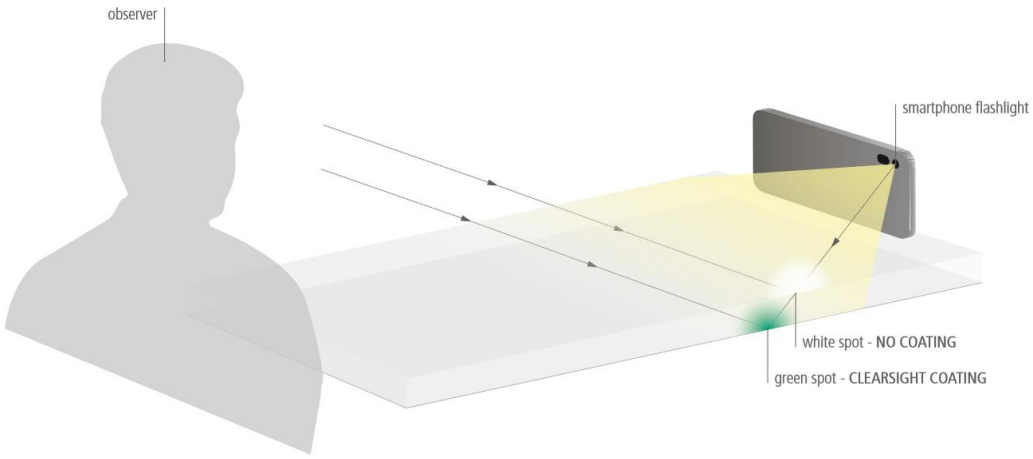
3. UNPACKING/HANDLING

- When loading or unloading, suction cups can be used on the coating. They must be cleaned before loading/unloading.
- When handling Clearsight, always wear clean gloves that do not leave behind sweat, dirt, grease residues or fingerprints on the coating.
- When handling Clearsight, care must be taken to ensure the glass sheets do not slide against each other. Before being lifted, each sheet must be separated from the next sheet.

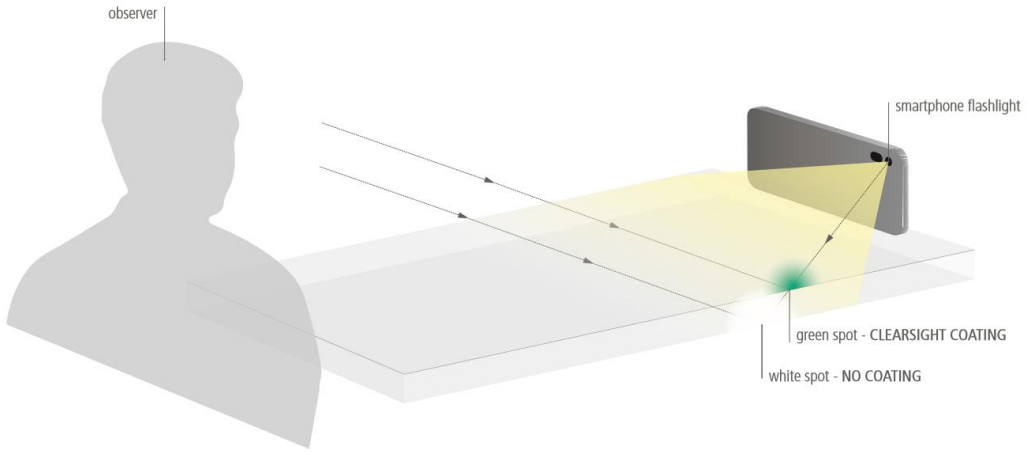
How can I determine which side of single-sided Clearsight is coated?

- Position the flashlight of your smartphone perpendicular to the glass.
- Look at the reflection of the light spot on the glass from an angle of approximately 45°.
- You can identify the coated surface by its green reflection (green spot). The uncoated surface has a neutral reflection (white spot).

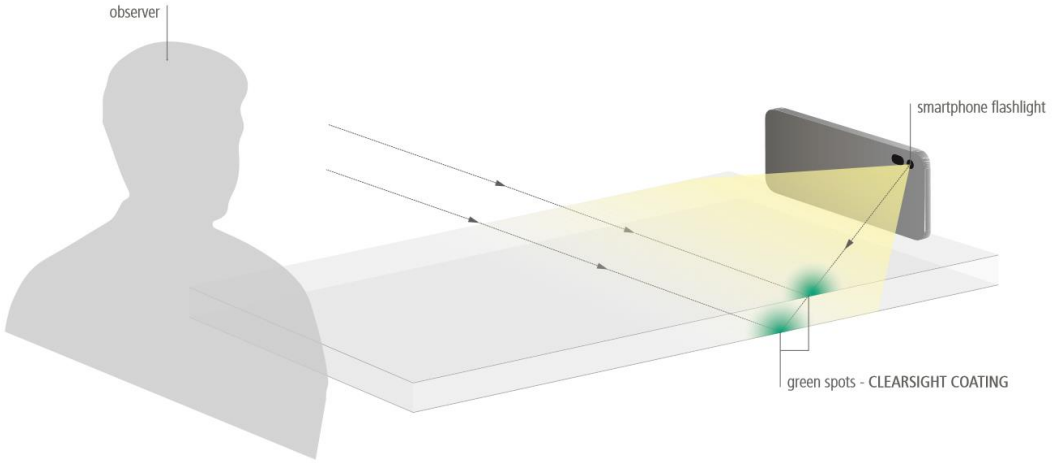
Coated side down: The white spot is on top and the green spot underneath.



Coated side up: The green spot is on top and the white spot underneath.



Double-sided (coating on both sides): The reflections of both light spots will be green (one above and one below).



How can I determine which side of double-sided Clearsight is the tin side?

- Use the Bohle TinCheck device as shown in the picture.
- Regardless of calibration, the highest value displayed will indicate the tin side.

4. PROCESSING

Throughout post-processing:

- Clean gloves must always be worn when handling the glass.
- Clearsight can be processed on standard processing machines provided they are maintained correctly and provided that anything which comes into contact with the coated surface is clean and free of any glass particles or other materials which can damage or scratch the coating.
- Scratches can be checked more easily when viewed with reflected light rather than transmitted light.

4.1 Cutting

- The cutting table must be cleaned to eliminate any glass particles or other materials. Clean the table surface before cutting each new glass sheet.
- In case of single-sided coating, the coated side must be facing upwards to avoid any contact between the coating and the surface of the table. In case of double-sided coated glass the cutting table must be covered with felt and cleaned frequently to avoid scratches on the coating.
- Keep air cushion pressure on this type of table high enough so as not to damage the coated surface.
- If roller conveyors are used to carry the glass sheets, they must be checked regularly to ensure they move smoothly. A roller which sticks or does not turn smoothly can scratch the coating. If the cutting table is controlled by glass sensors which react to visible light reflection from the glass, the sensors may not recognise the presence of Clearsight glass due to the extremely low reflection.
- AGC recommends to use the Keyence FSV21RP photo-sensor, or equivalent.
- Too much cutting oil may leave oily residue or traces on the coating. This requires meticulous cleaning before moving on to the next process. Therefore, it is recommended that Clearsight be cut dry or with as little evaporating cutting oil as possible.
- Edge-cut: For stock sheets an edge-cut of 2 cm on all sides must be applied.
- No edge-deletion is required.

4.2 Edge processing

- The grinding machine must be meticulously cleaned before processing glass, especially the conveyor rollers and any other parts which might come into contact with the coated surface. The rollers must not slide on the coated surface.
- The water for the edge work must be changed regularly to avoid water residue from the edge work.
- The glass must be rinsed with clean water to remove water residue immediately after edge processing.

Traces of water must not be left to dry on the coating.
- Check that there are no traces of grease or oil from the machine.

4.3 Washing

- Use water that is warm (temperature between 35 and 40°C) and clean.
- The washing machine, especially the bristles and the conveyor rollers, must be clean.
- The rollers must turn freely and correctly.
- Clearsight glass must not stand still under the brushes in the washing machine.
- No abrasive materials, including cerium oxide, may be added to the water.
- Washing machines with standard cylindrical brushes fitted with soft plastic bristles are suitable.
- The distance between the brushes and the glass must be adjusted carefully depending on the glass thickness.
- The glass must be rinsed with clean water to remove water. Otherwise, there is a risk of water traces due mainly to limescale deposits.
- The glass must be washed in clean, deionised water with a pH of 7 (±1) and a conductivity of <50 µS/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.
- Dry immediately after washing in order to prevent water residue on the glass, which can cause water spots.
- If there are marks, traces or spots on the glass, clean carefully using a soft cloth with alcohol (not denatured alcohol) and then let dry.

4.4 Manufacturing laminated glass

- Manufacturing laminated glass requires glass that is coated on one side.
- The Clearsight coating must be on surfaces 1 and 4. This means lamination should always be carried out on the uncoated side.

Detecting the coated side:
- You can identify the coated surface by its green reflection (the uncoated surface has neutral reflection), but this is not easy to do visually.
- We recommend using commercially available coating detectors[1].
- With regard to washing, see the “Washing” section in this document.
- Make sure the transport rollers are clean and rotate correctly.
- You can use small marks or stickers for short periods of time only, so the operator can tell which side of the glass is coated. However, do not forget to remove them once the glass sheets have been laminated together.
- Distance spacers shall be placed preferably along the edges inside the autoclave.

Note: For the European Union, IGUs must be CE marked in accordance with EN 1279-5. In accordance with EU regulations, all the requirements set out by these standards (ITT, FPC, etc.) must be met by the processor.

4.5 Silk-screening

Clearsight glass can be used for silkscreen printing, roller-coating or digital printing as long as the instructions given below are followed:

- Any impurities on the upper surface (coated side) can be removed using a compressed dry-air jet.
- If the enameled area comes in contact with the IGU sealants or any other kind of sealant, a compatibility

tests shall be carried out.

The final aesthetics will depend on 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 evaluate the final aesthetics. AGC is not liable under any circumstances for the outcome of the operation. The presence of enamel on the coating changes the optical and energetic properties of the final glass product. These performance properties can be obtained from our Technical Advisory Service (tas@eu.agc.com).

The settings for the heat treatment are the same as for Planibel Clearvision with the same enamel type and deposition pattern.

Note: For the European Union, IGUs must be CE marked in accordance with EN 1279-5. In accordance with EU regulations, all the requirements set out by these standards (ITT, FPC, etc.) must be met by the processor.

4.6 Heat treatment

- Clearsight has been designed to undergo a heat treatment (thermal toughening/heat-strengthening)

- The coating can be in contact with the oven rollers, provided that :
  - the rollers are sufficiently clean.
  - The furnace temperature does not exceed 680°C

- Clearsight has no low-emissivity property. Theoretically, there is thus no need for a convection system.
  - Nevertheless, if the furnace rollers are not perfectly clean and since the glass usually tends to become slightly concave during the early stage of the heating process, a light convection on top will be helpful to avoid any “white haze” in the centre of the glass.

- The heating time is close to the one of a Clearvision.
- Same for the quenching section settings.
- A kite mark can be applied on the coating.
- The handling operations (loading and unloading the furnace) will be done according to the recommendations written in the §3 of the present document.

Note: For the European Union, IGUs must be CE marked in accordance with EN 1279-5. In accordance with EU regulations, all the requirements set out by these standards (ITT, FPC, etc.) must be met by the processor.

4.7 Bending

Bending tests have been carried out with Clearsight 6 mm and 8 mm, in different types of bending furnaces (bending radius of 2.2 meters for curved thermally toughened and 1 meter for curved annealed).
Other thicknesses have not been evaluated as such and require preliminary validation tests by the glass processor.

The technical values settings (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 the equipment.

According to the trials performed inside AGC, we can conclude that :
Clearsight can be curved in annealed or heat-treated version by using the same settings as for Planibel

Clearvision, same thickness.

For further information, please contact the Technical Advisory Service (tas@eu.agc.com).

4.8 Insulated glass assembly

- The Clearsight coating is designed to be assembled in insulating glass units without any specific restrictions regarding the coating positions.
- Coatings must be compatible with sealing products. No edge-deletion is required.
- Since Clearsight is highly neutral in appearance, AGC recommends indicating the external surface after assembly to ensure that the units are installed correctly.
- In case of combination of Clearsight with other coated glasses, AGC recommends the processor to manufacture some mock-up samples, in order to make an aesthetic validation of the final product.

Note: For the European Union, IGUs must be CE marked in accordance with EN 1279-5. In accordance with EU regulations, all the requirements set out by these standards (ITT, FPC, etc.) must be met by the processor.

4.9 Recommended spacers

- **During the processing :**

Product description: Vitokork soft cork disks with micro suction pads (3x20x20 mm)
Supplier: VITO Irmen GmbH & Co. KG
Postfach 1720,
53407 Remagen - Germany
Mittelstraße 74-80,
Tel.: +49 (0) 2642 4007-0
Fax: +49 (0) 2642 42913
info@vito-irmen.de
www.vito-irmen.de

- **After IGU assembly :**

The same spacers described above can be used.
If there is a risk of damage to the IGU surface after IGU assembly (transportation, handling, setting on frames or other on-site operations), see section 5.4.

Quality control
See section 7 below.

Use in structural glazing
If installation or assembly involves mechanical methods, structural glazing or other techniques, tests must be conducted with the sealant manufacturer to ensure that the sealant is compatible with the coating and that the sealant adheres to the coating.

5. MAINTENANCE & CLEANING

5.1 Cleaning method

- Clearsight must be cleaned with water, whether installed indoors or outdoors.
  1) To remove dirt stuck to the glass, wet the glass with a moistening sponge or soft cloth.
  2) Clean with a cloth soaked in diluted detergent or a rubber squeegee.
  3) Wipe with a dry cloth.

- Use a neutral detergent to remove tough stains.
  1) Soak a soft cloth with diluted detergent.
  2) Follow the detergent manufacturer's instructions on density.
  3) When wiping away solid materials, apply only gentle pressure to the glass.
  4) Clean with a cloth soaked in diluted detergent or rubber squeegee.
  5) After cleaning with water, wipe with dry cloth.

- We recommend using a rubber squeegee to clean the glass thoroughly and to wipe away wiping marks as well.
- Fingerprints can be wiped off using a soft cloth with alcohol (not denatured alcohol) or glass detergent. Do not use rags or cleaning detergents which contain abrading agents.

5.2 Precautions when cleaning

- When using a rubber squeegee, take care to ensure that the metal handle does not come into contact with glass.
- Glass will not be damaged when wiped with a cloth, but it will be damaged if scratched with a hard material.
- Glass will be damaged if there is any dirt or solid material between the glass and the cleaning implement. Remove any dirt or solid material when cleaning.
- Wipe off detergent after cleaning.

5.3 Cleaning tools

- Use the following tools for cleaning:
  - sponge
  - water
  - soft cloth
  - alcohol
  - rubber squeegee.
  - neutral detergent

- Do not use the following materials, as they may scratch or deteriorate the coating:
  - abrasive sponge (sponge made from melamine resin)
  - steel wool
  - metal squeegee
  - strong acid
  - alkali detergent
  - abrasive detergent
  - water-repellent detergent
  - denatured alcohol

5.4 Precautions when installing the glass in frames and on-site

- The recommendations set out in the first two points of section 3 apply to the handling of glass and glazing units.
- After the glazing units have been installed, if the inside and/or outside surfaces of the glazing are liable to be damaged during on-site activities, then we recommend that the companies involved protect the glazing surfaces by applying a protective electrostatic plastic film to them. This film can be removed immediately prior to final acceptance.
  AGC has a good experience with the following supplier :
  https://www.polifilm.com/fr-en/products-solutions/protection-films/protection-for-glass/

6. APPEARANCE

Defects in Clearsight are characterised by European Standard EN 1096-1.

Defects affecting appearance are:

a) specific to the glass substrate;
b) specific to the coating.

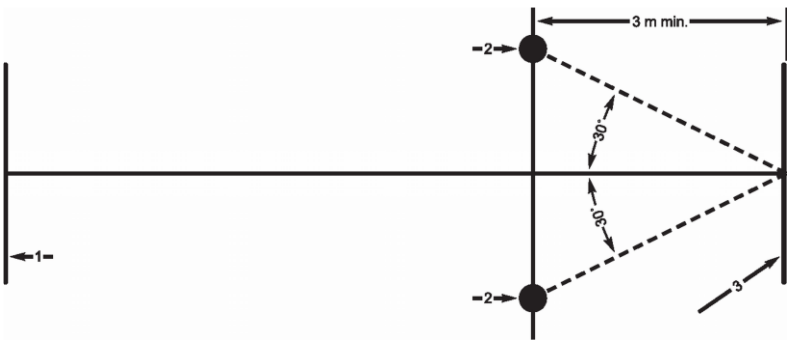
If a defect specific to the glass substrate is more visible because of the coating, it will be treated as a coating defect.

Detecting defects

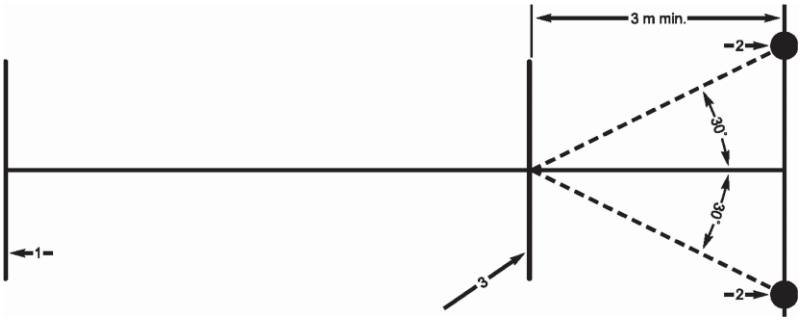
Defects are detected visually by observing the coated glass in transmission and/or reflection. An **artificial sky or daylight** may be used as the source of illumination.
The artificial sky is a flat surface that emits diffuse light with a uniform brightness and a general colouring index *R*a higher than 70 (see CIE 013.3-1995).
This is achieved by using a light source whose correlated colour temperature is in the range between 4000 K and 6000 K. In front of the arrangement of light sources is a light scattering panel that does not have spectral selectivity. The illuminance level on the glass surface must be between 400 lx and 20000 lx.
Daylight illumination is a uniform overcast sky with no direct sunlight.

Examination conditions

Coated glass may be examined in stock size plates or in finished sizes ready for installation. The examination may be conducted in the factory or on-site when glazed.
The pane of coated glass being examined is viewed from a distance of at least 3 m. The actual distance will depend on the defect being considered and which illumination source is being used. When examining the coated glass in reflection, the observer looks at the side that will be the outside of the glazing. When examining the coated glass in transmission, the observer looks at the side that 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 directed to the observer's eyes after reflection or transmission by the coated glass must not exceed 30°.
Reflection:

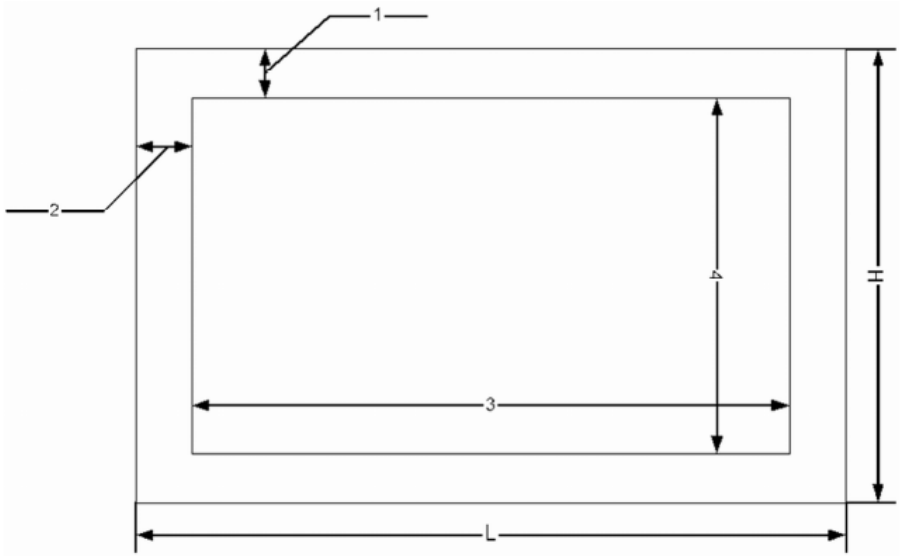


Transmission:



Key
1 illumination source 2 observer position 3 coated glass sample

For panes of coated glass in finished sizes ready to be installed both the main area and an edge area of the pane must be examined.



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

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	
		MAIN AREA	EDGE AREA
PUNCTUAL	Not applicable		
Spots/Pinholes; > 3 mm		Not allowed	Not allowed
> 2 mm and ≤ 3 mm		Allowed if not more than 1/m^2	Allowed if not more than 1/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
≤ 75 mm		Allowed as long as local density is not visually disturbing	Allowed as long as local density is not visually disturbing

Important remark

Due to Clearsight's extremely low light reflectance, the colour of the Clearsight coating is, by its very nature, barely visible and difficult to measure. However, depending on observation conditions and lighting, colour differences within the same glass pane or between different panes may be visible. Such differences are inherent to the product. Accordingly, the requirements set out in standards such as ISO 11479 or documents such as the Code of Practice for in-situ Measurement and Evaluation of the Colour of Coated Glass used in Façades issued by Glass For Europe, which were defined for reflective glass coatings, do not apply.

7. OTHERS

Clearsight should be viewed at a 90° angle. The coating is applied so that it can work most effectively when viewed straight on. This means about ≤1 % of the residual reflection is achieved at a right angle (90° angle) to the glass.

The reflection of Clearsight is lower than normal uncoated glass even at lower angles to the glass, but the effectiveness of anti-reflection decreases as the angle decreases.

The residual reflection is greenish and can vary as the angle changes. This reflected colour can be more noticeable depending on the surrounding environment, including lighting conditions, viewing angles, etc.

These reflections are normal with anti-reflective (AR) coatings (similar to AR coatings for eyeglasses). However, the appearance of the glass – and especially its colour – should be validated using samples if needed.

The Clearsight coating shows dirt very clearly. We recommend carefully and periodically cleaning Clearsight glass using a soft cloth with alcohol (not denatured alcohol) or water containing a neutral detergent.

Do not apply any stickers to the glass as they could damage the coating when removed.

The Clearsight coating cannot be repaired if scratched.

[1]Recommended coating detector

Product description: RX 1550 RefleX Programmable Coating Detector

Supplier: EDTM, INC.

http://www.edtm.com/

Telephone: (419) 861-1030, Fax: (419) 861-1031, email: sales@edtm.com