



Technical Data Sheet – ClearSight Lite

June 2023

1	INTRODUCTION	3
2	RELEVANT STANDARDS	3
3	COMPOSITION AND PROPERTIES OF THE FLOAT GLASS	3
3.1	CHEMICAL COMPOSITION	3
3.2	MECHANICAL PROPERTIES FOR SODA LIME SILICATE GLASS.....	4
3.3	THERMAL PROPERTIES	4
3.4	OPTICAL PROPERTIES	4
3.5	ELECTRICAL PROPERTIES.....	4
4	LIGHT, SOLAR AND THERMAL PROPERTIES	5
4.1	TOLERANCE: LIGHT AND SOLAR PROPERTIES	5
4.2	PERFORMANCE OF CLEARSIGHT LITE	6
5	ACOUSTIC PROPERTIES	6
6	TOLERANCE: DIMENSIONS	6
6.1	THICKNESS	6
6.2	LENGTH AND WIDTH.....	6
7	QUALITY REQUIREMENTS	7
7.1	OPTICAL FAULTS	10
7.2	VISUAL FAULTS: SPOT FAULTS AND LINEAR/EXTENDED FAULTS.....	10
8	OTHER RELATED DOCUMENTS	12

1 INTRODUCTION

This Technical Datasheet provides information about Clearsight Lite, a low-reflective coated glass product.

The glass substrate is Planibel Clearlite and is coated on both sides.

This information pertains to stock sizes.

2 RELEVANT STANDARDS

Clearsight Lite complies with:

- EN 572-1 – Glass in building – Basic soda lime silicate glass products – Part 1: Definitions and general physical and mechanical properties
- EN 572-2 - Glass in building – Basic soda lime silicate glass products – Part 2: Float glass
- EN 572-9 - Glass in building – Basic soda lime silicate glass products – Part 9: Evaluation of conformity/Product standard
- EN 1096-1 - Glass in building - Coated glass - Part 1: Definitions and classification
- EN 1096-2 - Glass in building - Coated glass - Part 2: Requirements and test methods for class A, B and S coatings
- EN 1096-4 - Glass in building – Coated glass – Part 4: Evaluation of conformity/Product standard

Clearsight Lite is CE-marked in accordance with EN 572-9 and EN 1096-4. CE marking declarations are available from www.yourglass.com/CE.

Clearsight Lite is produced in ISO 9001-certified plants.

3 COMPOSITION AND PROPERTIES OF THE FLOAT GLASS

The composition and main properties of the float glass are listed below.

3.1 CHEMICAL COMPOSITION

EN 572-1 defines the magnitude of the proportions by mass of the principal constituents of float glass as follows.

Constituent	Proportion by mass
Silicon (Si)	32% - 35%
Calcium (Ca)	3.5% - 10.1%
Sodium (Na)	7.4% - 11.9%
Magnesium (Mg)	0% - 3.7%
Aluminium (Al)	0% - 1.6%
Other ^a	< 5%

^a Properties other than photometric characteristics are not significantly altered by these other components.

Clearsight Lite is certified as a Class A coating under EN 1096.

3.2 MECHANICAL PROPERTIES FOR SODA LIME SILICATE GLASS

- Density (at 18°C): $\rho = 2500 \text{ kg/m}^3$
- Hardness (Knoop): $\text{HK}_{0,1/20} 6 \text{ GPa}^a$
- Young's Modulus (modulus of Elasticity): $E = 70000 \text{ N/mm}^2 (7 \times 10^{10} \text{ Pa})$
- Poisson Ratio: $\mu = 0,2$
- Shear Modulus: $G = E / [2 (1+\nu)] \approx 29166 \text{ N/mm}^2$
- Hardness (Mohs): 5-6
- Characteristic bending strength: $f_{g,kk} 45 \text{ N/mm}^2$
- Resistance against temperature differential and sudden temperature change 40K^b
 - ^a Knoop Hardness in accordance with ISO 9385
 - ^b Generally accepted value that is influenced by edge quality and glass type

3.3 THERMAL PROPERTIES

- Softening temperature $T_{SO}: \approx 725 \text{ }^\circ\text{C}$
- Working temperature $T_W: \approx 1030 \text{ }^\circ\text{C}$
- Fusion temperature $T_f: \approx 1300 \text{ }^\circ\text{C}$ to 1600°C
- Linear expansion coefficient: $\alpha = 9.10^{-6}/\text{K}$ (between 20° and 300°)
- Specific heat capacity: $C = 720 \text{ J/(kg.K)}$
- Emissivity of glass without coating:
 - Normal emissivity $\epsilon_n = 0.89$
 - Corrected emissivity $\epsilon = 0.837$

3.4 OPTICAL PROPERTIES

- Refractive index N to visible radiation (380 to 780 nm):
 - air/glass: 0.67
 - glass/air: 1.50

3.5 ELECTRICAL PROPERTIES

- Specific resistance: $5.10^7 \Omega.m$ at 1000 Hz and 25°C
- Dielectric constant: 7.6 at 1000 Hz and 25°C

4 LIGHT, SOLAR AND THERMAL PROPERTIES

4.1 TOLERANCE: LIGHT AND SOLAR PROPERTIES

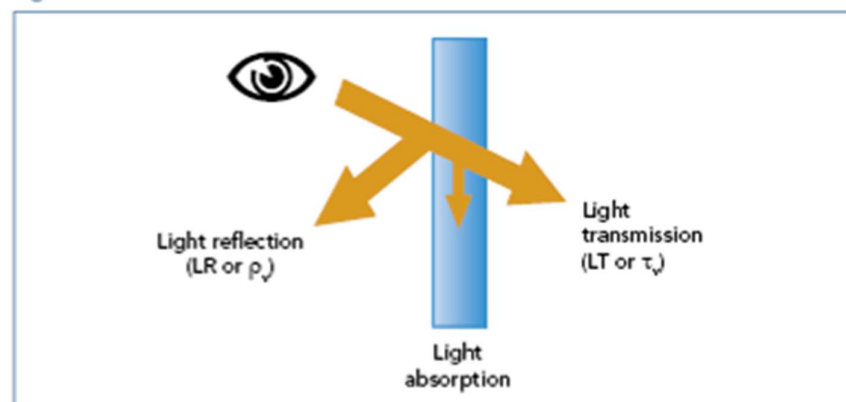
Light and solar properties are calculated using spectral measurement that complies with standard EN 410. The following properties are given:

- LT (τ_v): Light transmission
- LR (ρ_v): Light reflection
- DET (τ_e): Direct energy transmission
- ER (ρ_e): Energy reflection
- EA (α_e): Energy absorption
- SF (g): Solar factor
- SC: Shading coefficient

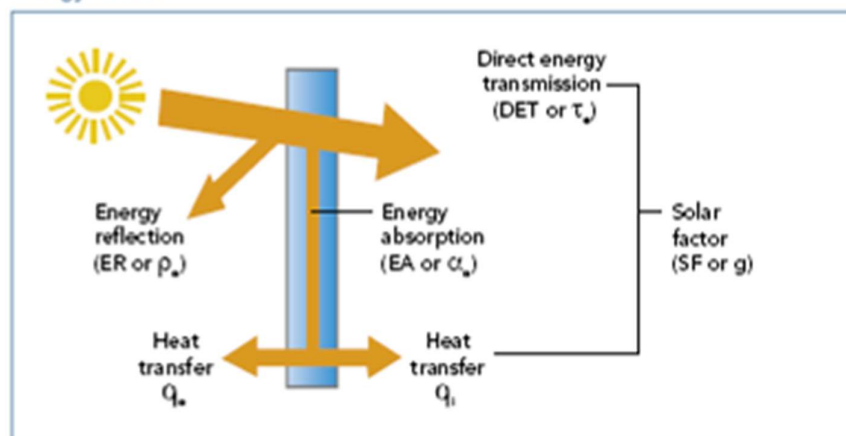
The tolerance for values LT, LR, DET and ER is $\pm 3\%$.

Notes: There is no direct tolerance for SF, SC and EA, as these values are calculated on the basis of the previous values.

Light factors



Energy factors



4.2 PERFORMANCE OF CLEARSIGHT LITE

The table below lists the light, solar and thermal properties of ClearSight Lite (double-sided).

ClearSight Lite	LT	LR both sides	DET	ER Ext/Int	SF both sides	ϵ_n
4 mm	97	1	82	10/10	84	0.89

5 ACOUSTIC PROPERTIES

The table below lists the direct airborne sound reduction indices.

	Rw (C, Ctr)	Rw + C	Rw + Ctr
4 mm	30 (-2, -4)	28	26

These sound reduction values correspond to glazings of 1,23m by 1,48m according to EN ISO 717-1 & EN ISO 10140 which are tested in laboratory conditions. The accuracy of the given indexes is not better than +/- 1dB. In-situ performances may vary according to the effective glazing dimensions, frame system, noise sources, etc.

6 TOLERANCE: DIMENSIONS

6.1 THICKNESS

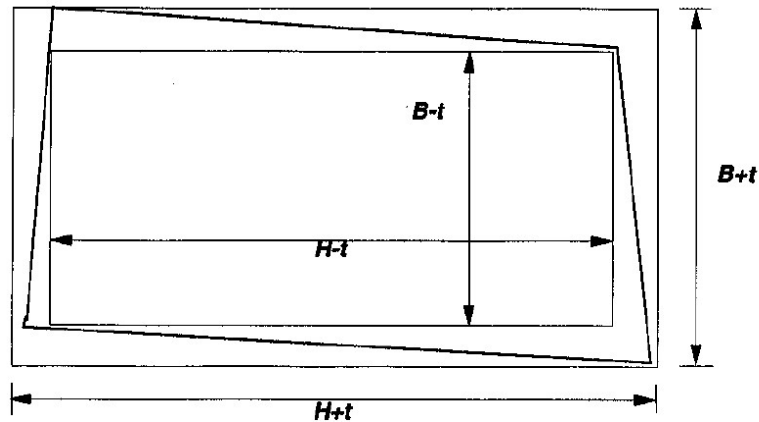
The actual thickness shall be the average of four measurements, to the nearest 0.01 mm. One measurement shall be taken at the centre of each side.

The actual thickness, rounded off to the nearest 0.1 mm, shall not vary from the nominal thickness by more than the tolerances shown in the table below (according to EN 572-2).

	Minimum (mm)	Maximum (mm)
4	3.8	4.2

6.2 LENGTH AND WIDTH

The tolerances t on nominal dimensions length H and width B are ± 3 mm and ± 2 mm, respectively.



The limit of squareness is described by the difference between diagonals. The difference may not exceed 5 mm.

7 QUALITY REQUIREMENTS

Defects in Clearsight Lite 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.

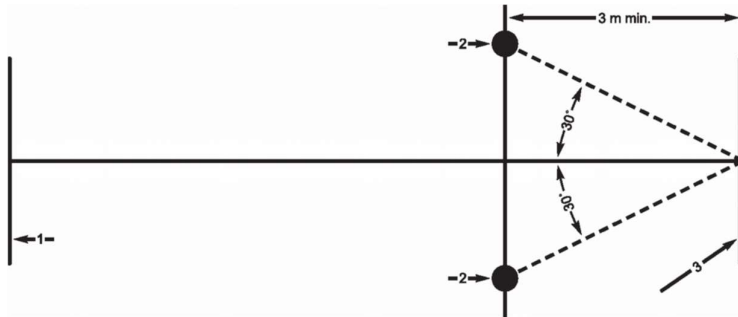
Daylight illumination is a uniform overcast sky with no direct sunlight.

Examination conditions

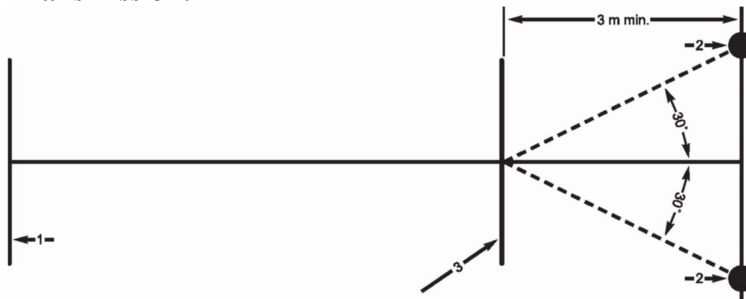
Coated glass may be examined in stock size sheets or in finished sizes ready for installation. The examination may be conducted in the factory or on-site when glazed.

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:



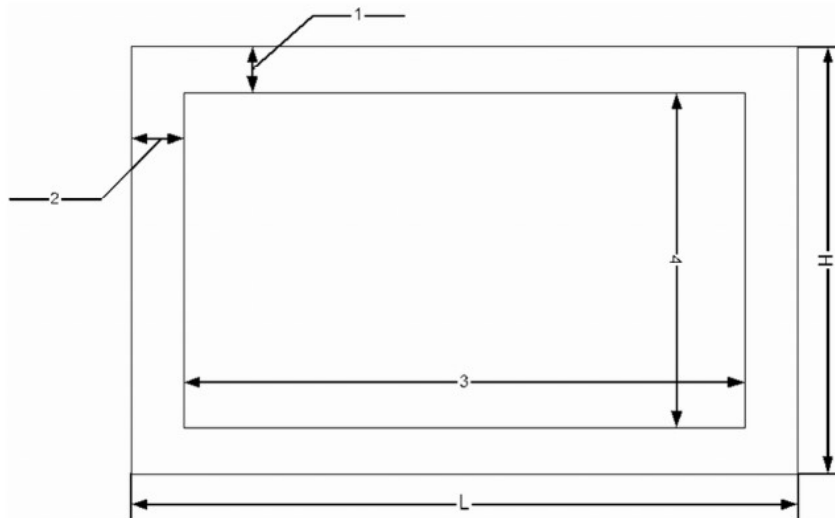
Transmission:



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	
PUNCTUAL Spots/Pinholes; > 3 mm > 2 mm and ≤ 3 mm Clusters; Scratches; > 75 mm ≤ 75 mm	Not applicable	MAIN AREA	EDGE AREA
		Not allowed	Not allowed
		Allowed if not more than 1/m ²	Allowed if not more than 1/m ²
		Not allowed	Allowed as long as not in area of through vision
		Not allowed	Allowed as long as they are separated by > 50 mm
		Allowed as long as local density is not visually disturbing	Allowed as long as local density is not visually disturbing

Important remarks

- Due to Clearsight Lite's extremely low light reflectance, the colour of the Clearsight lite 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.
- Clearsight Lite 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 Lite 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 Lite coating shows dirt very clearly. We recommend carefully and periodically cleaning Clearsight Lite 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.

- Clearsight Lite coating cannot be repaired if scratched.
- Some defects can appear in the float glass. To evaluate these defects, the following definitions, methods of measurement and acceptance levels apply.

7.1 OPTICAL FAULTS

7.1.1 DEFINITION

Optical faults: faults which lead to distortions in the appearance of objects observed through the glass.

7.1.2 METHODS OF OBSERVATION AND MEASUREMENTS

See EN 572-2 § 5.2.1.

7.1.3 ACCEPTANCE LEVELS

When viewed under the observation conditions described in 5.2.1 the angle α at which there is no disturbing distortion shall not be less than the appropriate critical viewing angle given in the table.

Thickness	Angle α in Zone D	Angle α in Zone d
4 mm	50°	45°

These values could be 5° lower if they are measured in the zone corresponding to 100mm from the edges parallel to the drawing line in a jumbo size.

7.2 VISUAL FAULTS: SPOT FAULTS AND LINEAR/EXTENDED FAULTS

7.2.1 DEFINITIONS

Visual faults: Faults which alter the visual quality of the glass. These are spot faults and linear/extended faults.

Spot faults: A spot fault is a nucleus, which is sometimes accompanied by a halo of distorted glass. The dimension of a spot fault comprising a nucleus with a halo is obtained by multiplying the dimension of the nucleus by a factor of approximately 3.

Linear/extended faults: Faults which can be on or in the glass, in the form of deposits, marks or scratches that occupy an extended length or area.

7.2.2 SPOT FAULTS

7.2.2.1 METHODS OF OBSERVATION AND MEASUREMENTS

The number and dimensions of spot faults relate to the four categories as shown in the following table.

Category	Dimension of nuclei of spot faults (mm)
A	> 0.6 and ≤ 1.5
B	> 1.5 and ≤ 3.0
C	> 3.0 and ≤ 9.0
D	> 9.0

7.2.2.2 ACCEPTANCE LEVELS FOR STOCK SIZES (PLF)

The allowable numbers for each category of fault for stock sizes (PLF) are shown in the following table.

The word “average” is intended to indicate a cumulative average over at least 20 tonnes.

Category	Average per pane	Maximum per pane
A	any number	any number
B	3	5
C	0.6	1
D	0.05	1, but faults that cause breakage are not allowed

7.2.2.3 ACCEPTANCE LEVELS FOR STOCK SIZES (DLF)

The allowable numbers of for each category of fault for stock sizes (DLF) are shown in the following table. The word “average” is intended to indicate a cumulative average over at least 20 tonnes.

Category	Average per pane	Maximum per pane
A	any number	any number
B	3	2
C	0.6	1
D	0.05	1, but faults that cause breakage are not allowed

7.2.3 LINEAR/EXTENDED FAULTS

7.2.3.1 METHODS OF OBSERVATION AND MEASUREMENTS

The glass pane to be examined is illuminated in conditions approximating diffuse daylight and is observed in front of a matt black screen (reflection coefficient between 0.2 and 0.4).

Place the pane of glass to be examined vertically in front of the screen and parallel to it. Arrange the point of observation 2 m from the glass, keeping the direction of observation normal to the glass surface. View the pane of glass and note the presence of visually disturbing faults.

7.2.3.2 ACCEPTANCE LEVELS

The allowable numbers of faults is an average 0,05 faults in 20 m² of glass (for a batch of at least 20 tonnes).

8 OTHER RELATED DOCUMENTS

The following documents are also available from www.agc-yourglass.com:

Processing Guide: <https://www.agc-yourglass.com/en-BE/document-library>

Cleaning and Maintenance Guide for Facade Glazing: <https://www.agc-yourglass.com/en-BE/document-library>

Glazing Instructions: <https://www.agc-yourglass.com/en-BE/document-library>

CE Marking and Declaration of Performance: <https://www.agc-yourglass.com/configurator/app/login?redirectTo=request>.