

AGC

Technical Data Sheet

Planibel G

October 2024 – Version 2

Your Dreams, Our Challenge

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1 INTRODUCTION

This Technical Datasheet provides information about the glass “Planibel G”. Planibel G is a pyrolytic low-emissivity coated glass manufactured by AGC.

The information provided by this document are related to stock sizes only.

2 NORMATIVE REFERENCES

Planibel G products conform to:

- 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
- SNI-ISO 11479 – Glass in building – Coated glass

And its glass substrate has been produced under a national standard of the factory as follows:

- SNI-150047-2005 – Clear and Tinted float glass

Planibel G products are produced in a factory with ISO 9001 certification.

3 SUSTAINABILITY



Planibel G has obtained EPD verification and other sustainability certifications.

- To read more on AGC Glass Asia’s EPD, please visit [Embodied Carbon in Glass & EPD - AGC Glass Asia Pacific](#)
- To read more on our sustainability certifications, please visit [Sustainable Product Certifications - AGC Glass Asia Pacific](#)

4 COMPOSITION AND PROPERTIES OF THE GLASS

4.1 CHEMICAL COMPOSITION

Planibel G is produced with float glass substrate whose composition complies to:

SiO ₂	69 to 74 %
Na ₂ O	10 to 16 %
CaO	5 to 14 %
MgO	0 to 7 %
Al ₂ O ₃	0 to 3 %
Others	0 to 5 %

4.2 THERMAL PROPERTIES

- Softening point: 700-740 °C
- Distortion point: 500-540 °C
- Linear expansion coefficient: $\alpha = 85-92 \text{ (} \times 10^{-7}/^{\circ}\text{C)}$

4.3 MECHANICAL PROPERTIES

- Weight (at 18°C): $r = 2\,500 \text{ kg/m}^3$
- Density: 2,5
- Young's Modulus (modulus of Elasticity): $E = 70\,000 \text{ N/mm}^2$
- Poisson Ratio: $m = 0,2$
- Shear Modulus: $G = E / [2 (1+n)] \gg 28500 \text{ N/mm}^2$

4.4 OPTICAL PROPERTIES

- Refractive index N to visible radiation (380 to 780 nm):
 - air/glass: 0,67
 - glass/air: 1,50

5 DURABILITY OF PLANIBEL G COATINGS

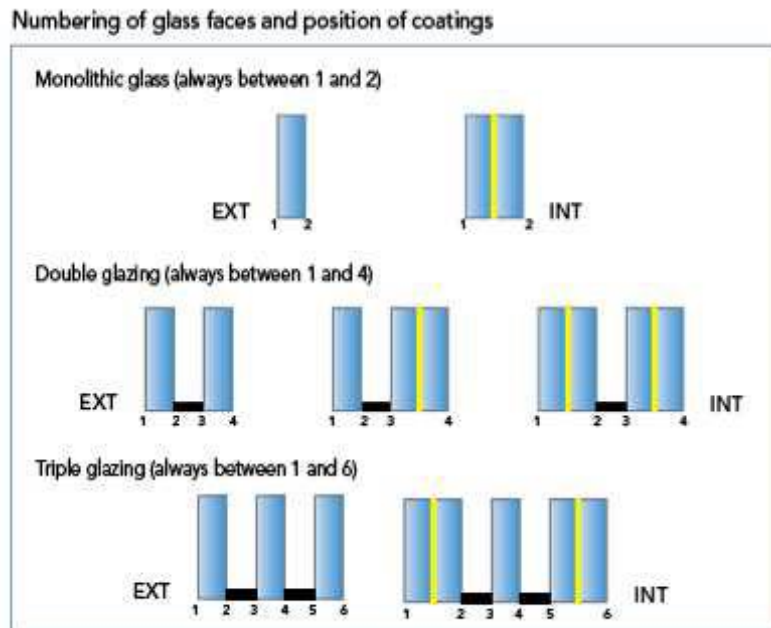
Planibel G coatings are class A following EN 1096-1.
They succeed the durability tests as prescribed by EN 1096-2:

- Resistance to condensation: 21 days
- Resistance to acid: 5 cycles
- Neutral salt spray: 21 days
- Resistance to abrasion: 500 cycles

6 LIGHT, SOLAR AND THERMAL PROPERTIES

6.1 CONVENTION FOR COATING POSITION

The following conventions are used for the numbering of the glass faces and the position of the coating.



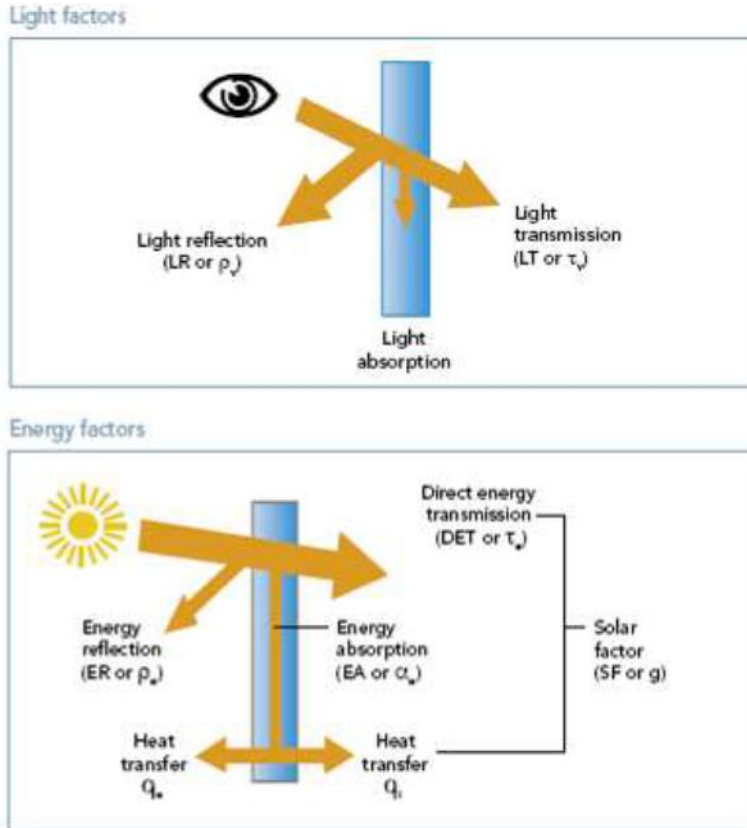
6.2 PHOTOMETRIC PROPERTIES and TOLERANCES

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

- LT (τ_v): Light transmission
- LR (ρ_v): Light reflection on coating side
- LR' (ρ'_v): Light reflection on glass side
- DET (τ_e): Direct energy transmission
- ER (ρ_e): Energy reflection on coating side
- ER' (ρ'_e): Energy reflection on glass side
- EA (α_e): Energy absorption
- SF (g): Solar factor
- SC: Shading coefficient

The tolerances on the values TL, LR, LR', DET, ER, ER' are +/- 3 %.

Note: There is no direct tolerance on SF, SC and EA as these values are calculated from the aforementioned properties.



6.3 TOLERANCES ON THERMAL PROPERTIES

The thermal transmittance U_g (W/m^2K) is calculated according EN 673. The emissivity measurement complies with EN 673 and EN 12898.

The maximum allowed tolerance on the values of normal emissivity ϵ_n is + 0.02.

6.4 PERFORMANCES OF PLANIBEL G PRODUCTS

The table lists the light, solar and thermal properties of 6 mm Planibel G in accordance to EN410.

	LT	LR	LR'	DET	ER	ER'	ϵ_n	Sheet resistance * (Ω /square)	Haze (max, %)
Planibel G Clear	0.81	0.11	0.10	0.67	0.11	0.09	0.16	13-17	0.5
Planibel G Euro Grey	0.41	0.08	0.06	0.37	0.09	0.06	0.16	13-17	0.5

Note: The emissivity and electrical resistance of Planibel G can change during the tempering process.

7 ACOUSTIC PROPERTIES

The table lists example data of the acoustic properties of glass products. The discrepancy of this property between coated and non-coated would be neglectable.

Thickness (mm)	Rw (C, Ctr)	Rw + C	Rw + Ctr
3.2	29 (-2, -5)	27	24
4	30 (-2,-4)	28	26
5	30 (-1, -2)	29	28
6	31 (-2,-3)	29	28
8	32 (-1,-2)	31	30
10	34 (-2,-3)	32	31

8 TOLERANCES ON DIMENSIONS

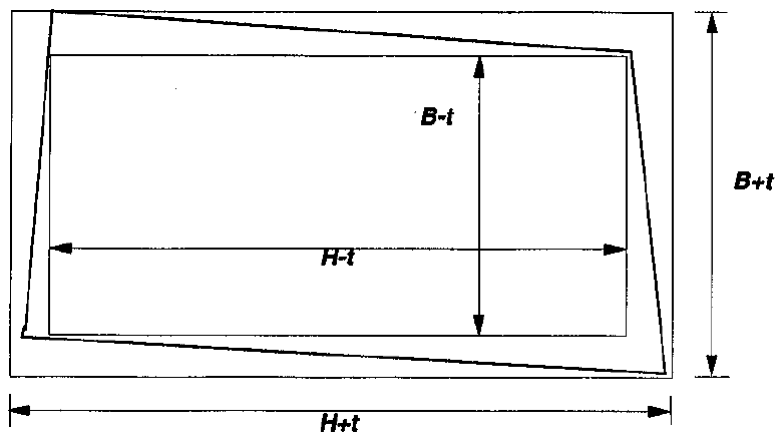
8.1 THICKNESS

The actual thickness of each designation(mm) are controlled in accordance with below table.

Thickness (mm)	Minimum (mm)	Maximum (mm)
3.2	3.0	3.3
4	3.8	4.2
5	4.8	5.2
6	5.8	6.2
8	7.7	8.3
10	9.7	10.3

8.2 LENGTH AND WIDTH

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



The limit of squareness is described by the difference between diagonals. The difference should be 5mm or less.

9 QUALITY REQUIREMENTS

9.1 INTRODUCTION

The defect affecting appearances are:

- Specific to the coating: see hereunder.

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

9.2 DEFINITIONS OF DEFECTS

The following definitions apply:

- **Uniformity defect:** Slight visible variation in colour, in transmission or reflection, within a coated glass pane or from pane to pane.
- **Stain:** Defect in the coating larger than punctual defect, often irregularly shaped, partially of mottled structure.
- **Punctual defect:** Punctual disturbance of the visual transparency looking through the glass and of the visual reflectance looking at the glass.
Note: Spot, pinhole and scratch are types of punctual defects.
- **Spot:** Defect that commonly looks dark against the surrounding coating, when viewed in transmission
- **Pinhole:** Punctual void in the coating with partial or total absence of coating and normally contrasts clear relative to the coating when viewed in transmission
- **Scratch:** Variety of linear mark, whose visibility depends on their length, depth, width, position and arrangement
- **Cluster:** Accumulation of very small defects giving the impression of stain.

9.3 DETECTION OF DEFECTS

9.3.1 GENERAL

The defects are detected and controlled by in-process inspection in each production factory. Though AGC examines its product under stringent or automated processes, we recommend our customers to also check using the below condition. The method described in 8.3 is an example and actual QC method in-process may be an equivalent system with higher performance. (i.e. not human eye but by an automatic defect detector)

9.3.2 INSPECTION ENVIRONMENT

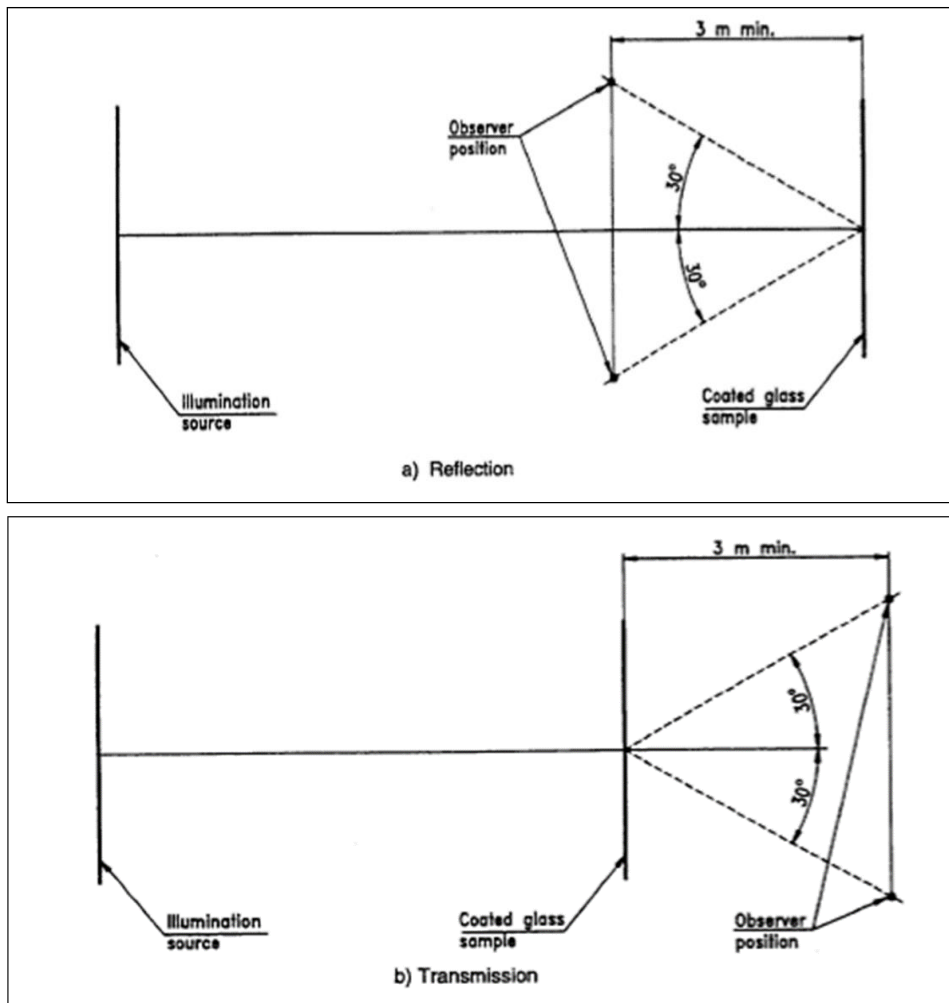
The appearance inspection should be performed under the control of the brightness of daylight or with lighting. If a Planibel G pane is inspected in a daylight environment, for example on a building site, a uniform overcast sky without direct sunlight is required. Or if in a closed area like an inspection booth of producing process, brightness control with emitting diffused light with uniform brightness and a general colouring index Ra higher than 70. It is obtained 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, without spectral selectivity. The illuminance level, on the glass surface, shall be between 400 lx and 20000 lx.

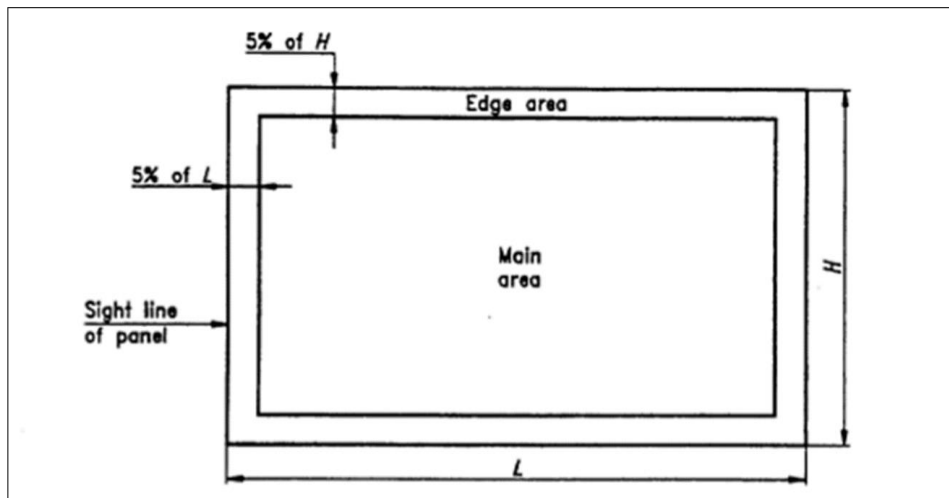
9.3.3 CONDITION OF OBSERVATION OF DEFECTS

Coated glass may be examined in stock size or in finished sizes ready for installation. The examination may be undertaken in the factory or on site when glazed. Though AGC examines its product under stringent or automated processes, we recommend our customers to also check using the below condition:

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. 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).



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



Each examination for detection in the initial by human's eye should take no more than 20s for each pane. And only the defects detected within 20s per required condition should be controlled.

9.3.4 UNIFORMITY DEFECTS AND STAINS

Under the condition of examination given in 9.3.3, note any coating variations either within on pane or between neighboring panes which are visually disturbing.

9.3.5 PUNCTUAL DEFECTS

Under the conditions of examination given in 9.3.3, 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, ≤ 75 mm long, note any area where their density produces visual disturbances.

9.4 ACCEPTANCE CRITERIA OF COATING DEFECTS

The acceptance criteria for the defects of coating glass are given in the table.

Defects Types	Acceptance Criteria		
	Pane/Pane	Individual Pane	
UNIFORMITY/STAIN	Allowed as long not visually disturbing	Allowed as long not visually disturbing	
PUNCTUAL Spot/pinholes > 3 mm > 2 mm and ≤ 3 mm	Not applicable	Main area	Edge Area
		Not allowed	Not allowed
		Max 1 by m ²	Max 1 by m ²
Clusters	Not applicable	Not allowed	Allowed as long as not in area of through vision
Scratches > 75 mm ≤ 75 mm	Not applicable	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

10 OTHER RELATED DOCUMENTS

Following documents are also available from www.agc-glassasia.com

- Processing Guide
- Façade Glazing Cleaning and Maintenance Guide