



GLASS UNLIMITED

---

## **Technical Data Sheet - Planibel**

**11/2011**

---

---

<b>1</b>	<b>INTRODUCTION.....</b>	<b>3</b>
<b>2</b>	<b>NORMATIVE REFERENCES.....</b>	<b>3</b>
<b>3</b>	<b>COMPOSITION AND PROPERTIES OF THE FLOAT GLASS .....</b>	<b>3</b>
3.1	CHEMICAL COMPOSITION .....	3
3.2	MECHANICAL PROPERTIES.....	4
3.3	THERMAL PROPERTIES .....	4
3.4	OPTICAL PROPERTIES .....	4
3.5	ELECTRICAL PROPERTIES.....	4
<b>4</b>	<b>LIGHT, SOLAR AND THERMAL PROPERTIES .....</b>	<b>5</b>
4.1	TOLERANCES ON LIGHT AND SOLAR PROPERTIES.....	5
4.2	TOLERANCES ON THERMAL PROPERTIES .....	6
4.3	PERFORMANCES OF PLANIBEL.....	6
<b>5</b>	<b>ACOUSTIC PROPERTIES .....</b>	<b>6</b>
<b>6</b>	<b>TOLERANCES ON DIMENSIONS.....</b>	<b>7</b>
6.1	THICKNESS .....	7
6.2	LENGTH AND WIDTH.....	7
<b>7</b>	<b>QUALITY REQUIREMENTS .....</b>	<b>8</b>
7.1	OPTICAL FAULTS .....	8
7.2	VISUAL FAULTS: SPOT FAULTS & LINEAR/EXTENDED FAULTS .....	9
<b>8</b>	<b>OTHER RELATED DOCUMENTS .....</b>	<b>10</b>

---

# 1 INTRODUCTION

This Technical Datasheet gives information about the range of float glass Planibel: Planibel Clear, Planibel Clearvision, Planibel Linea Azzurra, Planibel Azur, Planibel Bronze, Planibel Dark Blue, Planibel Dark Grey, Planibel Green, Planibel Grey and Planibel Privablue.

These information's are related to stock sizes.

## 2 NORMATIVE REFERENCES

Planibel products conform to:

- 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

All Planibel products are CE-marked following EN 572-9; CE-Marking declarations are available from [www.yourglass.com/CE](http://www.yourglass.com/CE).

All Planibel are produced in factories being ISO 9001 certified.

## 3 COMPOSITION AND PROPERTIES OF THE FLOAT GLASS

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

### 3.1 CHEMICAL COMPOSITION

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

SiO <sub>2</sub>	69 to 74 %
Na <sub>2</sub> O	10 to 16 %
CaO	5 to 14 %
MgO	0 to 6 %
Al <sub>2</sub> O <sub>3</sub>	0 to 3 %
Others	0 to 5 %

### **3.2 MECHANICAL PROPERTIES**

- Weight (at 18°C):  $\rho = 2\,500 \text{ kg/m}^3$
- Density: 2,5
- Young's Modulus (modulus of Elasticity):  $E = 70\,000 \text{ N/mm}^2$
- Poisson Ratio:  $\mu = 0,2$
- Shear Modulus:  $G = E / [2 (1+\nu)] \approx 29\,166 \text{ N/mm}^2$
- Knoop Hardnes: 6 GPa
- Mohs Hardness: 6
- Characteristic bending strength:  $45 \text{ N/mm}^2$

### **3.3 THERMAL PROPERTIES**

- Softening point:  $\approx 600 \text{ }^\circ\text{C}$
- Fusion temperature:  $\approx 1500 \text{ }^\circ\text{C}$
- Linear expansion coefficient:  $\alpha = 9 \cdot 10^{-6} / \text{K}$  (between  $20^\circ$  and  $300^\circ$ )
- 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:  $5 \cdot 10^7 \text{ } \Omega \cdot \text{m}$  at 1 000 Hz and  $25^\circ\text{C}$
- Dielectric constant: 7,6 at 1 000 Hz and  $25^\circ\text{C}$

# 4 LIGHT, SOLAR AND THERMAL PROPERTIES

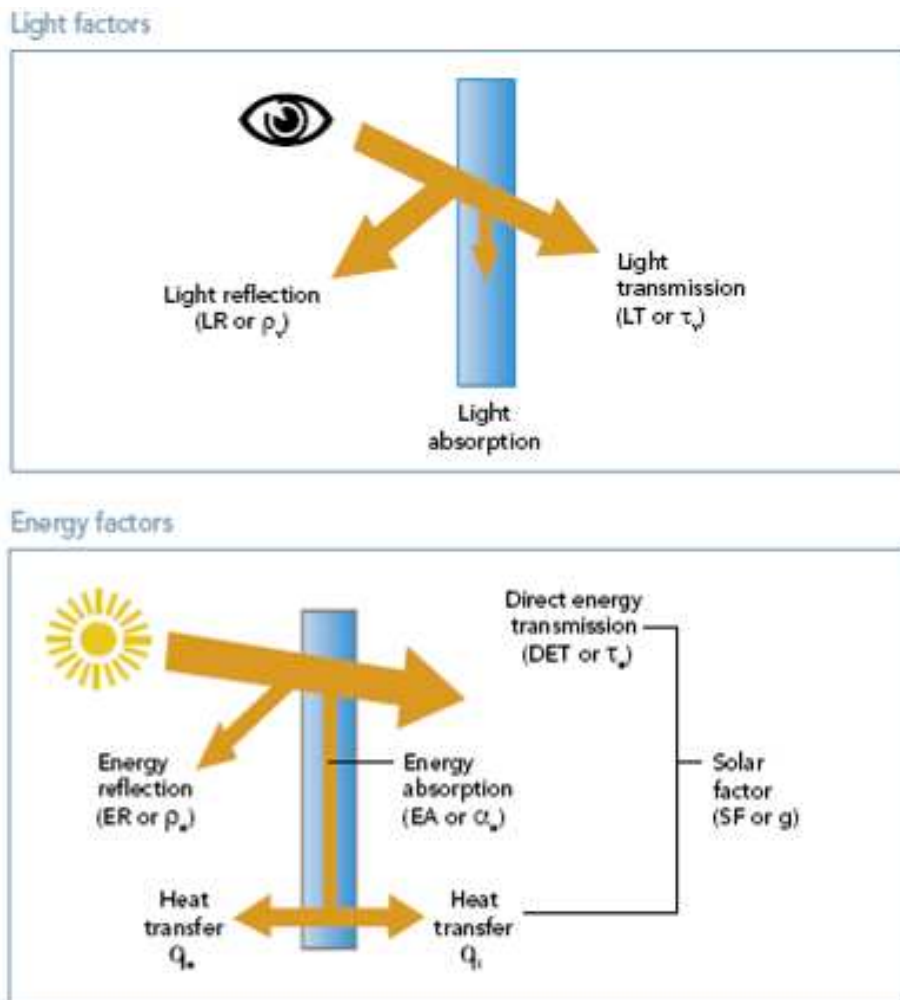
## 4.1 TOLERANCES ON LIGHT AND SOLAR PROPERTIES

The light and solar properties are calculated using spectral measurement that conforms with standards EN 410 and WIS/WINDAT. The following properties are given:

- LT ( $\tau_v$ ): Light transmission
- LR ( $\rho_v$ ): Light reflection
- DET ( $\tau_e$ ): Direct energy transmission
- ER ( $\rho_e$ ): Energy reflection
- EA ( $\alpha_e$ ): Energy absorption
- SF (g): Solar factor
- SC: Shading coefficient

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

Notes: they are no direct tolerances on SF, SC and EA as these values are calculated from the previous ones.



## 4.2 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.

Note: Planibel have no emissivity (normal emissivity  $\epsilon_n = 0,89$ ).

## 4.3 PERFORMANCES OF PLANIBEL

The table lists the light, solar and thermal properties of the Planibel products of 6 mm thickness. For other thicknesses, see [www.YourGlass.com](http://www.YourGlass.com).

	<b>LT</b>	<b>LR</b>	<b>DET</b>	<b>ER</b>	<b>SF</b>	<b><math>\epsilon_n</math></b>
6 mm Planibel Clear	89	8	81	7	84	0,89
6 mm Planibel Clearvision	91	8	90	8	90	0,89
6 mm Planibel Bronze	51	6	50	5	62	0,89
6 mm Planibel Green	73	7	44	5	57	0,89
6 mm Planibel Grey	44	5	46	5	59	0,89
6 mm Planibel Dark Grey	8	4	8	4	31	0,89
6 mm Planibel Azur	73	7	49	6	61	0,89
6 mm Planibel Dark Blue	57	6	44	5	57	0,89
6 mm Planibel Privablue	35	5	20	5	40	0,89

## 5 ACOUSTIC PROPERTIES

The table lists the acoustic properties.

	<b>Rw (C, Ctr)</b>	<b>Rw + C</b>	<b>Rw + Ctr</b>
<b>3 mm</b>	29 (-2, -5)	27	24
<b>4 mm</b>	30 (-2, -4)	28	26
<b>5 mm</b>	30 (-1, -2)	29	28
<b>6 mm</b>	31 (-2, -3)	29	28
<b>8 mm</b>	32 (-1, -2)	31	30
<b>10 mm</b>	34 (-2, -3)	32	31
<b>12 mm</b>	35 (-2, -3)	33	32

# 6 TOLERANCES ON DIMENSIONS

## 6.1 THICKNESS

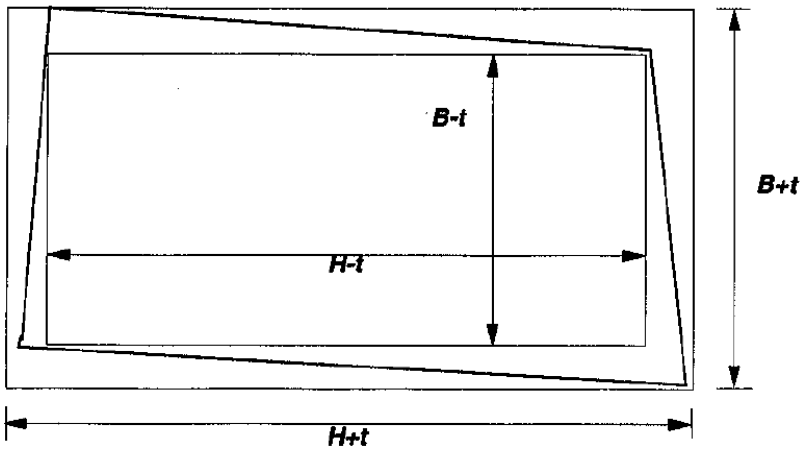
The actual thickness shall be the average of for measurements, taken to the nearest 0,01 mm, one taken at the center of each side.

The actual thickness rounded to the nearest 0,1mm shall not vary from the nominal thickness by more than the tolerances shown in the table.

	Minimum (mm)	Maximum (mm)
<b>2,1</b>	2,0	2,2
<b>3</b>	2,8	3,2
<b>3,15</b>	3,0	3,2
<b>4</b>	3,8	4,2
<b>5</b>	4,8	5,2
<b>6</b>	5,8	6,2
<b>8</b>	7,7	8,3
<b>10</b>	9,7	10,3
<b>12</b>	11,7	12,3
<b>15</b>	14,5	15,5
<b>19</b>	18,0	20,0
<b>25</b>	24,0	26,0

## 6.2 LENGTH AND WIDTH

The tolerances  $t$  on nominal dimensions length  $H$  and width  $B$  are respectively  $\pm 3$  mm and  $\pm 2$  mm.



The limit of squareness is described by the difference between diagonals. The difference is maximum 5 mm.

# 7 QUALITY REQUIREMENTS

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 conditions of observation in 5.2.1 the angle  $\alpha$  at which there is no disturbing distortion shall not be less than the appropriate critical viewing angle given in the table.

Thickness	Minimum value
2 mm	50°
3 mm	50°
4 mm	52°
> 4 mm	55°



## 7.2 VISUAL FAULTS: SPOT FAULTS & LINEAR/EXTENDED FAULTS

### 7.2.1 DEFINITIONS

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

**Spot faults:** 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

Measure the largest dimension (diameter or length) of the faults with a micrometer with graduations in tenth of a millimeter. Note the number and dimensions of the spot faults and relate to the four categories as shown in the table.

Category	Dimension of nuclei of spot faults (mm)
A	$> 0,2$ and $\leq 0,5$
B	$> 0,5$ and $\leq 1,0$
C	$> 1,0$ and $\leq 3,0$
D	$> 3,0$

#### 7.2.2.2 ACCEPTENCE LEVELS FOR STOCK SIZES (PLF)

The allowable numbers of the categories of faults for stock sizes (PLF) are shown in the table.

Category	Average per pane	Maximum per pane
A	any number	any number
B	3	5
C	0,6	1
D	0	0

### 7.2.2.3 ACCEPTANCE LEVELS FOR STOCK SIZES (DLF)

The allowable numbers of the categories of faults for stock sizes (DLF) are shown in the table.

Category	Average per pane	Maximum per pane
A	any number	any number
B	3	2
C	0,6	1
D	0	0

## 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 to 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 meter 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 m<sup>2</sup> of glass, related to at least 20 tons.

## 8 OTHER RELATED DOCUMENTS

Following documents are also available from [www.YourGlass.com](http://www.YourGlass.com):

- Processing Guide
- Cleaning and Maintenance Guide for Façade glazing
- Glazing Instruction
- CE-Marking declarations