



**Technical Data Sheet
Lacobel & Matelac (SAFE+)**

05/2021

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1 INTRODUCTION

This Technical Datasheet gives information about the range of painted glass Lacobel & Matelac (except Matelac Silver), safety backed or not with a SAFE+ film. Lacobel & Matelac are obtained by the application of organic paint on a glass substrate. This substrate is in accordance with EN 572-2.

2 NORMATIVE REFERENCES

There is not yet a published EN standard.

All Lacobel & Matelac are produced in factories being ISO 9001 certified.

3 COMPOSITION AND PROPERTIES OF THE GLASS

The basis glass used for Lacobel & Matelac production is float glass conform to EN 572-1 & 2. In the case of Matelac, the substrate is an acid etched float glass..

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 ₂	69 to 74 %
Na ₂ O	10 to 16 %
CaO	5 to 14 %
MgO	0 to 6 %
Al ₂ O ₃	0 to 3 %
Others	0 to 5 %

3.2 MECHANICAL PROPERTIES FOR SODA LIME SILICATE GLASS

- Density (at 18°C): $\rho = 2\,500 \text{ kg/m}^3$
- Young's Modulus (modulus of Elasticity): $E = 70\,000 \text{ N/mm}^2$
- Poisson Ratio: $\mu = 0,2$
- Shear Modulus: $G = E / [2 (1+\nu)] \approx 29\,166 \text{ N/mm}^2$
- Hardness (Knoop): 6 GPa (according ISO 9385)

- Hardness (Mohs): 5-6
- Characteristic bending strength: 45 N/mm²
- Resistance against temperature differential and sudden temperature change 40 K (Generally accepted value that is influenced by edge quality and glass type)

3.3 THERMAL PROPERTIES

- Softening temperature T_{so} : ≈ 725 °C
- Working temperature T_w : ≈ 1030 °C
- Fusion temperature $T_f \approx 1300$ °C to 1600 °C
- Linear expansion coefficient: $\alpha = 9 \cdot 10^{-6}/K$ (between 20° and 300°)
- Specific heat capacity: $C_p = 720$ 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 at 589,3 nm

3.5 ELECTRICAL PROPERTIES

- Specific resistance: $5 \cdot 10^7$ $\Omega \cdot m$ at 1 000 Hz and 25°C
- Dielectric constant: 7,6 at 1 000 Hz and 25°C

3.6 CHEMICAL COMPOSITION

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

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

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 Hardness: 6 GPa
- Mohs Hardness: 6
- Characteristic bending strength: 45 N/mm^2

3.7 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° and 300°)
- Specific heat capacity: $C = 720 \text{ J/(kg.K)}$

3.8 OPTICAL PROPERTIES

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

3.9 ELECTRICAL PROPERTIES

- Specific resistance: $5 \cdot 10^7 \text{ } \Omega \cdot \text{m}$ at 1 000 Hz and 25°C
- Dielectric constant: 7,6 at 1 000 Hz and 25°C

4 TOLERANCES ON DIMENSIONS

4.1 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 (according to EN 572-2).

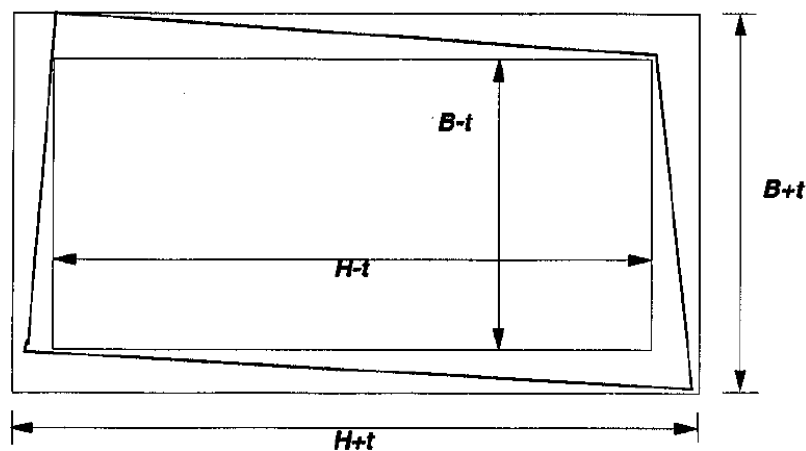
Table 1 — Tolerances on nominal thickness

Dimensions in millimetres

Nominal thickness	Tolerances
2	$\pm 0,2$
3	$\pm 0,2$
4	$\pm 0,2$
5	$\pm 0,2$
6	$\pm 0,2$
8	$\pm 0,3$
10	$\pm 0,3$
12	$\pm 0,3$
15	$\pm 0,5$
19	$\pm 1,0$
25	$\pm 1,0$

4.2 LENGTH AND WIDTH

The tolerances t 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 is maximum 5 mm.

The same tolerances as for the float used as support of the painted glass apply. This information is related to stock sizes (PLF and DLF).

5 QUALITY REQUIREMENTS

5.1 INTRODUCTION

The quality of a painted glass can be affected by defects resulting from faults in the paint and faults in the glass.

5.2 DEFINITIONS OF DEFECTS

The following definitions apply:

- Glass appearance defects: faults which alter the visual quality of the painted glass. They can be spot and/or linear and/or enlarged area faults
- Paint coating(s) faults: faults where the glass may be exposed or not. They can be scratches, spot faults, and change of colour or lack of adhesion of the paint coating
- Spot faults: punctual disturbance that may come from a glass defect e.g. nuclei (solid or gaseous inclusions), deposits, crush marks... or from a paint coating defect e.g. dust, pin-hole, de-wetting...and observed from the glass side
- Lack of adhesion point: spot fault where the paint is not sticking anymore on the glass, detected in reflection as a more brilliant point
- Cluster: a group of not less than 3 spot faults, separated by not more than 50 mm.
- Linear faults: scratches, extended spot faults etc. on the glass surface or on the paint, seen from the glass surface side
- Glass brush marks: very fine circular scratches that can hardly be seen and are associated with glass cleaning techniques
- Change of colour: fading or change of colour that may occur after an ageing test.

5.3 GLASS AND PAINT FAULTS

5.3.1 INSPECTION METHOD

The painted glass shall be observed in a vertical position against a non-lighted background, glass side, with the naked eye and under normal diffused lighting conditions, (natural daylight or simulated daylight illuminant D65, observer 10°, between 300 Lux and 600 Lux at the painted glass), from a distance of 1 m. The direction of observation is normal, i.e. at right angle, to the painted glass. The use of an additional lighting source, e.g. spotlight, is not allowed. Defects on the painted side are acceptable as long as they are not visible on glass side.

5.3.2 ACCEPTANCE LEVELS

The tables give the acceptance level for glass faults respectively for PLF.
The average shall be calculated taking into account the total individual pack area (m²).

	Acceptance level for stock size (defects / 20 m ²)
Linear faults (mm)	Max/sheet
Brush marks (≤ 50 mm)	8
Scratches (≤ 50 mm)	3
Spot faults (mm)^a	Max/sheet
≤ 0,5	Accepted ^b
>0,5 and ≤ 1	10
>1 and ≤ 3	1
> 3	0
^a The dimensions stated are without the effect of halo and relate to the largest of the fault dimensions	
^b Accepted, providing they do not form a cluster (minimum distance 50 mm).	

Note: Defects on painted side are allowed if they are not visible at the glass side.

5.4 ASPECT AND COLOUR OF THE PAINTING

5.4.1 INTRODUCTION

The aspect of the painting is defined by the color measurement.

The color measurement is defined by L*, a* and b* values (illuminant D65, 10°).

The difference of color between 2 samples is calculated by

$$\Delta E^* = \sqrt{(L_1^* - L_2^*)^2 + (a_1^* - a_2^*)^2 + (b_1^* - b_2^*)^2}$$

5.4.2 MEASUREMENT OF THE ΔE^*

The ΔE^* should be measured on the glass side, according to CIE Publication N° 15: DELTA E CIE LAB D65 10° SCI.

5.4.3 ACCEPTANCE LEVELS

The allowable variation of the colorimetric measurements, measured on the glass side, between panes (from the same thickness) shall be:

$$\Delta E^* \leq 1$$

Note 1: In order to avoid color difference coming from deviation from batch to batch, panes placed next to each other should come from the same production batch

5.5 ACID ETCHING FAULTS

Only relative to Matelac (SAFE+).

5.5.1 INSPECTION METHOD

Same as §5.3.1

5.5.2 ACCEPTANCE LEVELS

The acceptance levels for surface defects are given in the table below for stock sizes. These defects refer to the acid etched surface only.

Punctual faults (mm)	Max/10 m ²
≤ 0,5	Accepted ^a
> 0,5 and ≤ 1	5
>1 and ≤ 2	2
> 2	0
^a Accepted, providing there is no accumulation	

5.6 ASPECT OF THE "SAFE+" VERSION

Lacobel & Matelac can be delivered with SAFE+ safety backing film on the painted side. The aspect of this film is not perfect and some bubbles can appear. Visual imperfections in the SAFE+ safety backing film do not have a negative impact on soft body impact resistance according to EN 12600.

5.7 EDGE FAULTS

5.7.1 INSPECTION METHOD

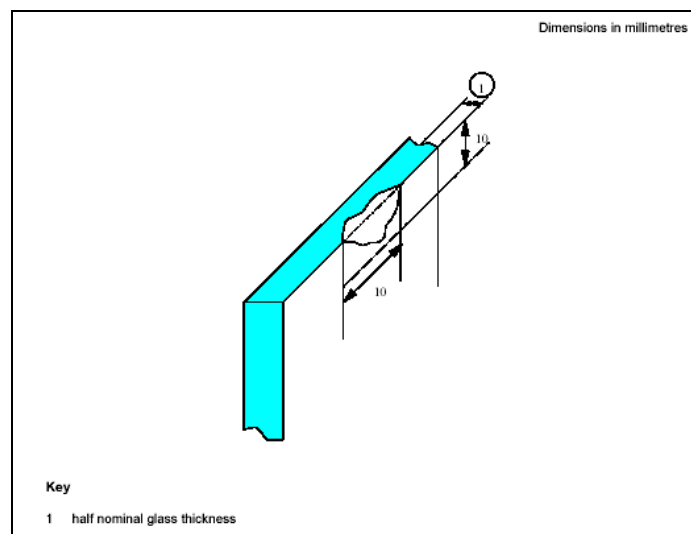
Same as §5.3.1.

5.7.2 ACCEPTANCE LEVELS

The edge quality of stock sizes of painted glass can be affected by the presence of entrant/emergent faults and shelling. Using the method of §5.3.1, the edges of the painted glass panes shall be checked for the presence of shells, corners on/off and edge vents.

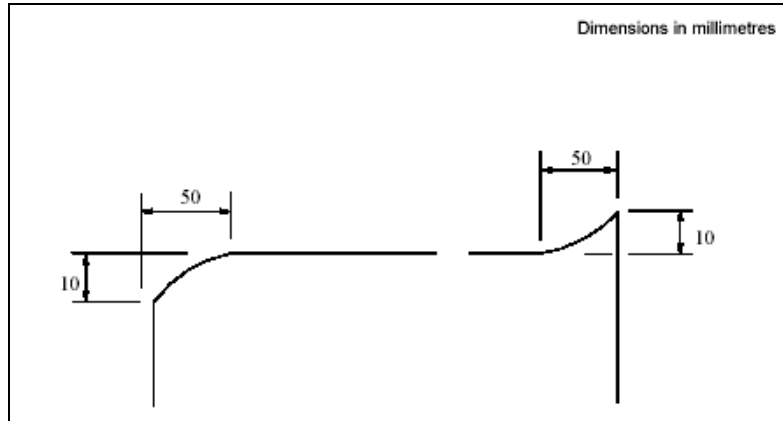
5.7.2.1 CHIPS OR SHELLS

For stock sizes, entrant or emergent chips or shells shall be accepted provided they do not exceed a maximum length and depth of 10 mm and half the nominal glass thickness.



5.7.2.2 CORNERS ON/OFF

For stock sizes occasional corners on/off shall be allowed. No more than 5 % of the sheets on a delivery shall be affected.



5.7.2.3 VENTED (CRACKED) EDGES

Vented (cracked) edges shall not be allowed for stock sizes.

6 ENVIRONMENTAL ASPECT

AGC Glass Europe has achieved Cradle to Cradle Certified^{CM} Silver for the Lacobel & Matelac product range, including SAFE+ versions.

Lacobel / Matelac (SAFE+) meet the criteria stipulated by the European Directive on Restriction of Hazardous Substances (RoHS Directive 2011/65/EU) that aims to reduce the use of certain harmful substances, including lead, in production processes.

None of the substances identified as Substances of Very High Concern (SVHC) in the REACH Candidate list* is present above 0.1% in Lacobel / Matelac (SAFE+) products. (REACH Regulation 1907/2006/EC concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals).

* <http://echa.europa.eu/web/guest/candidate-list-table>

For specific product details, visit www.agc-yourglass.com, product section “Lacobel” or “Matelac”, or look in the “Tools” section under “Regulatory Documents”.

7 SAFETY

7.1 SAFETY IN USE - PENDULUM BODY IMPACT RESISTANCE

Shatter properties (safe breakability) and pendulum body impact resistance are determined and classified in accordance with EN 12600.

Lacobel and Matelac show a mode of breakage typical of annealed glass (EN 12600, type A).

Lacobel / Matelac SAFE+ comprise polymer film applied to the back of the glass. This safety backing film ensures safety in case of soft body impact.

Lacobel / Matelac SAFE+ show a mode of breakage typical of laminated glass (EN 12600, type B). Numerous cracks appear under soft body impact, but the fragments hold together and do not separate.

For specific product details, visit www.agc-yourglass.com, register and log-in under the restricted area, and go to “certificates” in the product section “Lacobel” or “Matelac”.

7.2 SAFETY IN THE CASE OF FIRE - REACTION TO FIRE

Reaction to fire is determined and classified in accordance with EN 13501-1.

Some glass products are products/materials that do not require to be tested for reaction to fire (e.g. Products/materials of Classes* A1 according to Commission Decision 96/603/EC, as amended 2000/605/EC).

** Contribution to fire growth ranges from class A1 (best, not contributing to fire growth nor to the fully developed fire) to class E (worst, quickly leading to a flashover situation). In addition to the main classification for contribution to fire growth, additional classification parameters are assigned to a product for smoke production, and flaming droplets and particles.*

Lacobel / Matelac (SAFE+) show a reaction to fire behavior ranging from class A1 to class B, depending on paint colour, glass thickness, safety backing or not, and type of installation. For specific product details, visit www.agc-yourglass.com, register and log-in under the restricted area, and go to “certificates” in the product section “Lacobel” or “Matelac”.

8 HEALTH ASPECT

AGC puts great effort in developing products that preserve our indoor air quality. Lacobel / Matelac products show very little indoor emissions of Volatile Organic Compounds (VOCs), including very low levels of formaldehyde. Following the publication of French Decree No. 2011-321 of March 23, 2011, as supplemented by the French Decree of 19 April 2011, regarding the labeling on the emissions of volatile pollutants of construction products, or wall cladding, or floors or paints and varnishes, the Lacobel / Matelac product range (excluding SAFE+ versions) has achieved the A level. Lacobel / Matelac product range including SAFE+ has achieved the A+ level *.

** Information on the emission level of volatile substances in indoor air, presenting a risk of toxicity by inhalation, on a scale from A+ (very weak emissions) to C (high emissions).*

For specific product details, visit www.agc-yourglass.com, product section “Lacobel” or “Matelac”, or look in the “Tools” section under “Regulatory Documents”.

9 OTHER RELATED DOCUMENTS

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

- Lacobel / Matelac Installation Guide
- Lacobel / Matelac Processing Guide
- Cleaning and Maintenance Guide for Decorative Glazing
- Glazing Instructions – Traditional Setting