



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

April 2024

1	INTRODUCTION.....	3
2	REFERENCE STANDARDS.....	3
3	COMPOSITION AND PROPERTIES OF FLOAT GLASS.....	3
3.1	CHEMICAL COMPOSITION	3
3.2	MECHANICAL PROPERTIES OF SODA LIME SILICATE GLASS	3
3.3	THERMAL PROPERTIES.....	4
3.4	OPTICAL PROPERTIES	4
3.5	ELECTRICAL PROPERTIES.....	4
4	ACOUSTIC PROPERTIES	4
5	DIMENSIONAL TOLERANCES	4
5.1	THICKNESS	4
5.2	LENGTH AND WIDTH.....	5
6	QUALITY REQUIREMENTS	5
6.1	FAULTS	6
6.2	PAINT APPEARANCE AND COLOUR	8
6.3	APPEARANCE OF THE SAFE+ VERSION	9
6.4	EDGE FAULTS	9
7	SAFETY	9
7.1	SAFETY IN USE.....	9
7.2	SAFETY IN CASE OF FIRE - REACTION TO FIRE	9
8	ENVIRONMENTAL AND HEALTH ASPECTS.....	10
9	OTHER RELATED DOCUMENTS	10

1 INTRODUCTION

This Technical Datasheet gives information about the Lacobel & Matelac range of painted glass products (except Matelac Silver), with or without the SAFE+ safety film. Lacobel & Matelac are produced by applying organic paint to a glass substrate. This substrate complies with standard EN 572-2.

2 REFERENCE STANDARDS

An EN standard has not yet been published.

All Lacobel & Matelac products are produced in ISO 9001-certified plants.

3 COMPOSITION AND PROPERTIES OF FLOAT GLASS

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

3.1 CHEMICAL COMPOSITION

Standard EN 572-1 defines the chemical composition of float glass (in percentage by mass of each element) as follows.

Component	Percentage (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.	

3.2 MECHANICAL PROPERTIES OF SODA LIME SILICATE GLASS

- Density (at 18°C): $\rho = 2,500 \text{ kg/m}^3$
- Hardness (Knoop): $\text{HK}_{0.1/20} 6 \text{ GPa}^a$
- Young's Modulus (modulus of elasticity): $E = 70\,000 \text{ N/mm}^2 (7 \times 10^{10} \text{ Pa})$
- Poisson's Ratio: $\mu = 0.2$
- Shear Modulus: $G = E / [2 (1+\nu)] \approx 29,166 \text{ N/mm}^2$
- Hardness (Mohs): 5-6
- Characteristic bending strength: $f_{g,kk} 45 \text{ N/mm}^2$
- Resistance to temperature differential and sudden temperature change 40K^b

^a Knoop Hardness in compliance 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 : $\approx 1030\text{ }^{\circ}\text{C}$
- Melting temperature T_F : $\approx 1300\text{ }^{\circ}\text{C}$ to $1600\text{ }^{\circ}\text{C}$
- Linear expansion coefficient: $\alpha = 9.10^{-6}/\text{K}$ (between 20° and 300°)
- Specific heat capacity: $C = 720\text{ J}/(\text{kg.K})$
- Emissivity of glass without coating:
 - Normal emissivity $\varepsilon_n = 0.89$
 - Corrected emissivity $\varepsilon = 0.837$

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: $5.10^7\text{ }\Omega.\text{m}$ at 1 000 Hz and $25\text{ }^{\circ}\text{C}$
- Dielectric constant: 7.6 at 1,000 Hz and $25\text{ }^{\circ}\text{C}$

4 ACOUSTIC PROPERTIES

The table lists the direct airborne sound reduction indices.

	R_w (C, C_{tr})	R_w + C	R_w + C_{tr}
4 mm	30 (-2, -4)	28	26
5 mm	30 (-1;-2)	29	28
6 mm	31 (-2;-3)	29	28
8 mm	32 (-1;-2)	31	30
10 mm	34 (-2;-3)	32	31
12 mm	35 (-2;-3)	33	32

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.

5 DIMENSIONAL TOLERANCES

5.1 THICKNESS

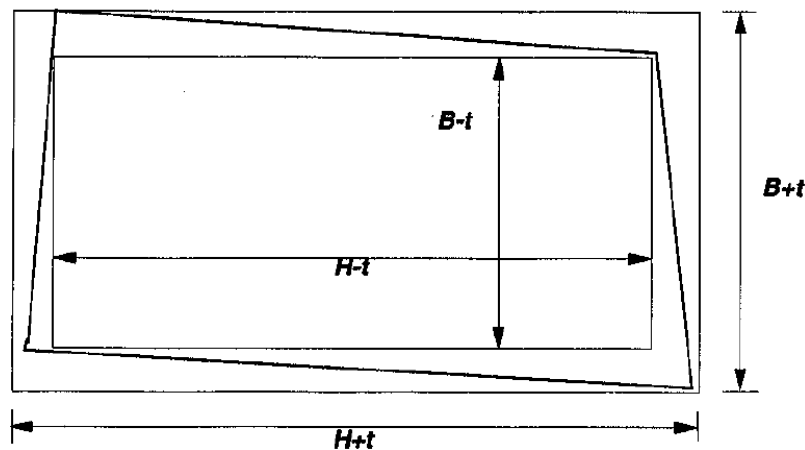
The actual thickness will be the average of four measurements (to the nearest 0.01 mm), with one measurement taken at the centre of each side.

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

	Minimum (mm)	Maximum (mm)
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
12	11.7	12.3

5.2 LENGTH AND WIDTH

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



The squareness limit is described by the difference between diagonals. The difference is no more than 5 mm.

6 QUALITY REQUIREMENTS

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

For the Matelac range, the quality of acid-etched glass can be affected by faults that alter the appearance of the transmitted image of objects. Such alterations of the image can result from spot faults, linear faults and/or faults in the glass. Faults must be detected visually by observing the processed glass in transmission.

Note: The requirements for the visual appearance of acid-etched glass apply to the glass as manufactured. They do not take into account any fault introduced during subsequent processing (toughening, laminating, fabrication into insulating glass unit, etc.), transportation or installation.

6.1 FAULTS

6.1.1 DEFINITIONS

The following definitions apply:

- Glass appearance faults: faults that alter the visual quality of the painted glass. These can be spot faults and/or linear faults and/or enlarged area faults.
- Paint faults: faults where the glass may or may not be exposed. These can be scratches, spot faults, and change of colour or loss of paint adhesion.
- Spot fault: an isolated fault that may be the result of a glass fault, such as nuclei (solid or gaseous inclusions), deposits and crush marks, or of a paint fault, such as dust, pinhole and de-wetting. Such faults are observed from the glass side.
- Loss of adhesion point: spot fault where the paint no longer sticks to the glass. Such faults are observed in reflection as a glossier point.
- Cluster: a group of no fewer than three 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.
- Uniformity fault: slight visible variation in haze effect within a pane or from pane to pane. Defects associated with a non-processed zone or different processed intensity zone (e.g. clouds).

6.1.2 METHODS OF OBSERVATION AND MEASUREMENTS

The painted glass is observed from the glass side in a vertical position against an unlit background, 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 on the painted glass), from a distance of 1 m. The direction of observation is normal, i.e. at a right angle to the painted glass. The use of an additional lighting source, such as a spotlight, is not allowed. Faults on the painted side are acceptable as long as they are not visible on the glass side.

6.1.3 ACCEPTANCE LEVELS

• GLASS FAULTS

The tables give the acceptance level for glass faults for PLFs.

The average is calculated taking into account the total individual pack area (m²).

	Acceptance level for stock size (faults/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 given do not include the halo effect and pertain to the fault with the largest dimensions.	
^b Accepted, provided they do not form a cluster (minimum distance 50 mm).	

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

- FAULTS ON THE ACID-ETCHED SURFACE**

The acceptance levels for acid-etched surface faults are given in the table below for stock sizes.

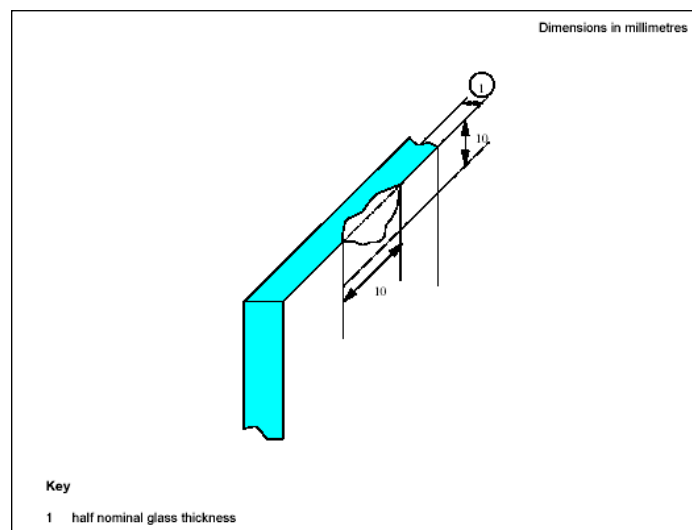
Spot faults (mm)	Max/10 m ²
≤ 0.5	Accepted ^a
> 0.5 and ≤ 1	5
>1 and ≤ 2	2
> 2	0
^a Accepted, provided there is no accumulation	

6.1.4 EDGE FAULTS

The edge quality of stock sizes of painted glass can be affected by the presence of entrant/emergent faults and shelling.

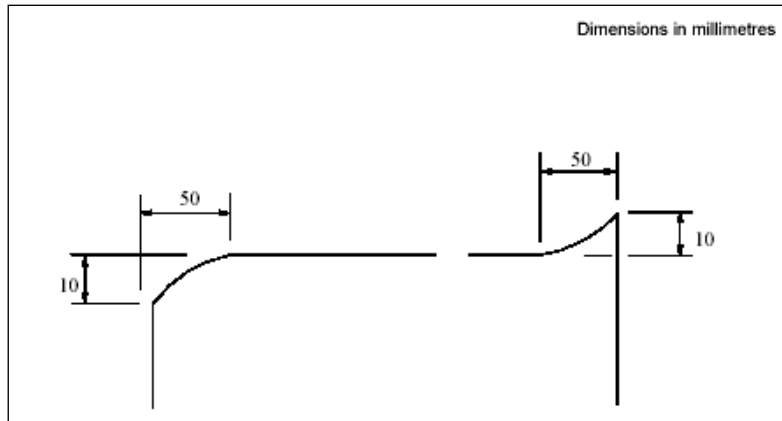
- CHIPS OR SHELLS**

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



- **CORNERS ON/OFF**

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



- **VENTED (CRACKED) EDGES**

Vented (cracked) edges are not allowed for stock sizes.

6.2 PAINT APPEARANCE AND COLOUR

6.2.1 INTRODUCTION

The appearance of the paint is defined by the colour measurement.

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

The difference in colour between two samples is calculated as follows:

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

6.2.2 MEASUREMENT OF THE ΔE^*

The ΔE^* must be measured on the glass side in accordance with CIE Publication No. 15: DELTA E CIE LAB D65 10° SCI.

6.2.3 ACCEPTANCE LEVELS

The allowable variation in colorimetric measurements, measured on the glass side and between panes (from the same thickness) is:

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

Note: In order to avoid colour differences due to deviations between batches, panes placed next to each other should come from the same production batch.

6.3 APPEARANCE OF THE SAFE+ VERSION

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

6.4 EDGE FAULTS

7 SAFETY

7.1 SAFETY IN USE

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+ include a 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.

7.2 SAFETY IN 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 for which no reaction-to-fire testing is required (e.g. products/materials belonging to Classes* A1 per Commission Decision 96/603/EC, as amended 2000/605/EC).

** 'Contribution to fire growth' ranges from Class A1 (best, not contributing to fire growth or to the fully developed fire) to class E (worst, quickly leading to flashover). In addition to the main classification for contribution to fire growth, additional classification parameters are assigned to a product for smoke production, flaming droplets and particles.*

Lacobel / Matelac (SAFE+) show a reaction-to-fire behaviour ranging from class A1 to class B, depending on paint colour, glass thickness, presence/absence of a safety backing film and type of installation.

8 ENVIRONMENTAL AND HEALTH ASPECTS

- **RoHS**

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

- **REACH**

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>

- **COV**

Lacobel / Matelac products show very little indoor emissions of Volatile Organic Compounds (VOCs), including very low levels of formaldehyde.

The Lacobel / Matelac product range (excluding SAFE+ versions) has achieved level A. Lacobel / Matelac product range including SAFE+ has achieved level A+.

- **C2C**

AGC Glass Europe is Cradle to Cradle Certified® Bronze for the Lacobel & Matelac product range, including the SAFE+ versions.

9 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>