



**Technical Data Sheet
Lacobel T and Matelac T**

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1 INTRODUCTION

This Technical Datasheet gives information about the Lacobel T and Matelac T ranges of toughenable painted glass products.

Lacobel T is obtained by applying enamel paint to a glass substrate. Matelac T is obtained by applying enamel paint to an acid-etched glass substrate.

Both substrates comply with EN 572-2.

2 REFERENCE STANDARDS

Lacobel T and Matelac T are toughenable products and must be heat-treated before use.

No standards apply to the base product prior to heat treatment.

After heat treatment, Lacobel T and Matelac T must comply with the following EN standards (in the EU):

- Heat-strengthened glass must comply with EN 1863-1*
- Thermally toughened glass must comply with EN 12150-1*
- Where performed, Heat Soak Tests (HST) must comply with EN 14179-1*

** Or equivalent local standards for countries outside the EU.*

Annealed (i.e. non-heat-treated) sheets of Lacobel T and Matelac T are produced in ISO 9001-certified plants.

Annealed (i.e. non-heat-treated) sheets of Lacobel T and Matelac T delivered by AGC are not required to bear the CE marking.

For the EU, heat-treated Lacobel T and Matelac T must be CE marked in accordance with EN 1863-2, 12150-2 or EN14179-2. In accordance with EU regulations, all the requirements set out in these standards (ITT, FPC, etc.) must be met by the processor.

CE marking declarations are available from www.yourglass.com/CE.

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: $C = 720 \text{ J/(kg.K)}$
- 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: $5 \cdot 10^7 \Omega \cdot m$ at 1 000 Hz and 25 °C
- Dielectric constant: 7.6 at 1,000 Hz and 25 °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

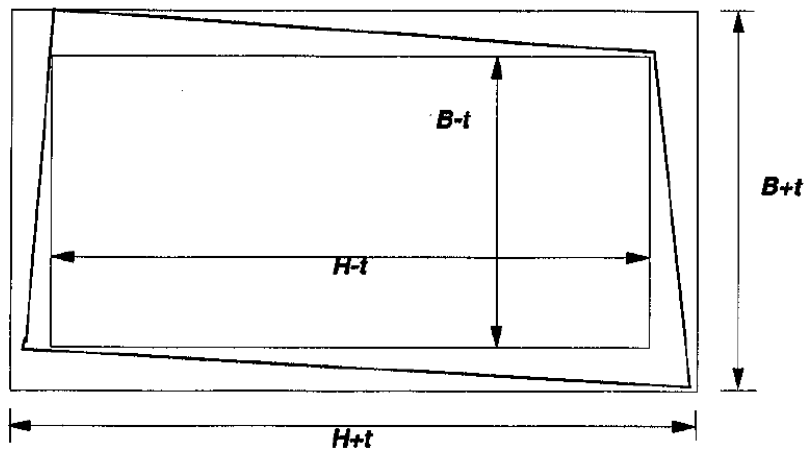
The actual thickness will be the average of four measurements (to the nearest 0.01 mm), with one measurement taken at the centre of each side.

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 T 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. Faults associated with a non-processed zone or with a 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.

Faults are observed after heat treatment.

6.1.3 ACCEPTANCE LEVELS

The tables give the acceptance level for glass faults for PLFs. The average is calculated taking into account the total individual pack area (m²).

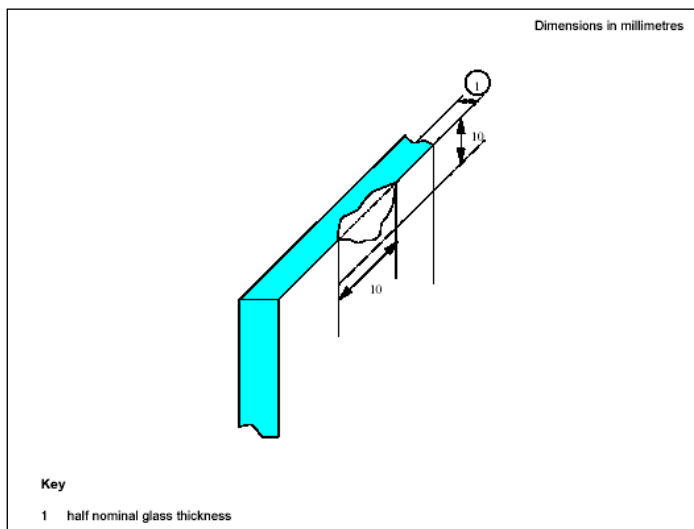
	Acceptance level for stock size (faults/20 m ²)
Linear faults (mm)	Max/sheet
Brush marks (≤ 50 mm)	8
Scratches (≤ 50 mm)	3
Spot faults (mm)	Max/sheet
≤ 0.5	Accepted ^b
>0.5 and ≤ 1	10
>1 and ≤ 3	1 for Lacobel T 4 for Matelac T
> 3	0
^a The dimensions given do not include the halo effect and pertain to 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.

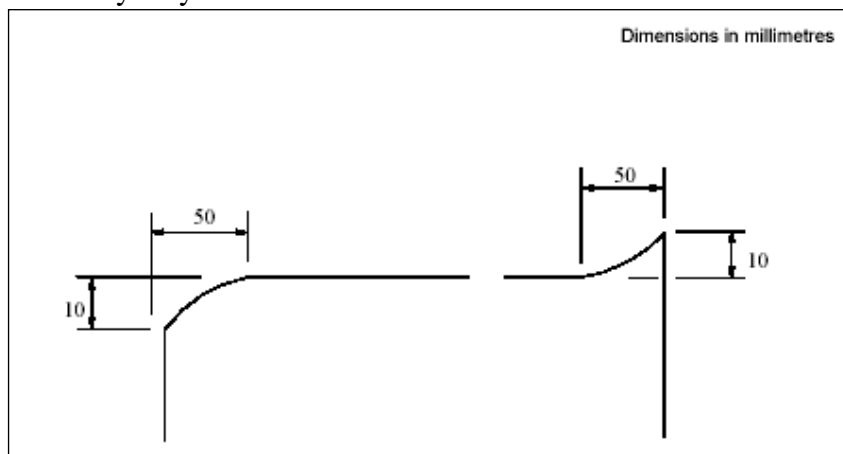
6.1.4 EDGE FAULTS

The edge quality of painted glass in stock sizes 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, after tempering and between panes (of the same thickness) is:

$$\Delta E^* \leq 2$$

Note 1: In order to avoid colour differences due to deviations between batches, panes placed next to each other should come from the same production batch.

Note 2: The final colour of the product is obtained only after heat treatment; the colour changes due to the heat treatment.

6.2.3.1 OPACITY

Lacobel T and Matelac T are designed to be opaque after heat treatment (except Crisp White, which is not fully opaque; objects behind Lacobel T and Matelac T Crisp White could be visible).

7 SAFETY

7.1 SAFETY IN USE

Thermally toughened Lacobel T and Matelac T show a mode of breakage typical of toughened glass (EN 12600, type C).

Disintegration occurs under impact, leading to a large number of small particles that are relatively harmless.

Lacobel T and Matelac T are classified:

- 1C3 for 4mm and 5mm glass substrate
- 1C2 for 6mm and 8mm glass substrate
- 1C1 for 10mm and 12mm glass substrate

7.2 SAFETY IN CASE OF FIRE – REACTION TO FIRE

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

Thermally toughened soda lime silicate safety glass products are products/materials for which no reaction-to-fire testing is required (e.g. products/materials belonging to 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 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 T and Matelac T show a reaction-to-fire behaviour ranging from Class A1 to Class B, depending on type of installation according to EN 13501-1.

8 ENVIRONMENTAL AND HEALTH ASPECTS

- **RoHS**

Lacobel T and Matelac T 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 T 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**

Heat-treated Lacobel T and Matelac T show very little indoor emissions of Volatile Organic Compounds (VOCs): Classification A+.

- **C2C**

AGC Glass Europe is Cradle to Cradle Certified® Bronze for the Lacobel & Matelac T product range.

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 at <https://www.agc-yourglass.com/configurator/app/login?redirectTo=request>.