



**Technical Data Sheet
Matelac Silver (SAFE+)**

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1 INTRODUCTION

This Technical Datasheet gives information about the Matelac Silver range of acid-etched decorative glass products, with or without the SAFE+ safety film. The Matelac Silver substrate is float glass that complies with standard EN 572-2.

2 REFERENCE STANDARDS

An EN standard has not yet been published.

All Matelac Silver 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}
3 mm	29 (-2;-5)	27	24
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

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 $\pm 1\text{ dB}$. In-situ performances may vary according to the effective glazing dimensions, frame system, noise sources, etc.

5 DIMENSIONAL TOLERANCES

5.1 THICKNESS

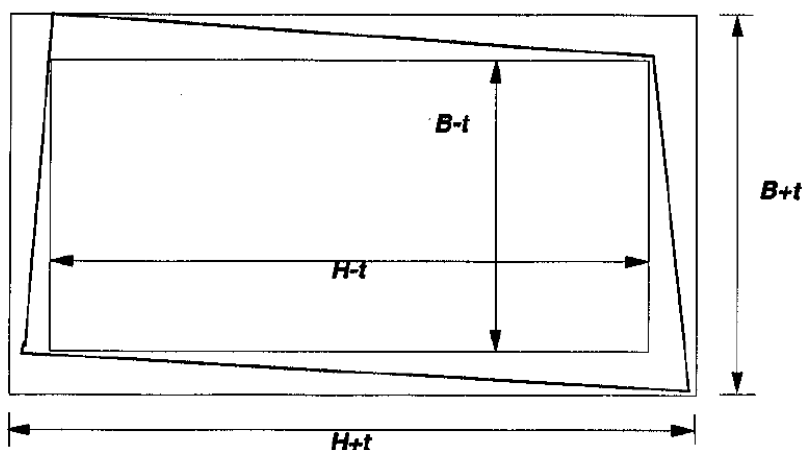
The actual thickness will be the average of four measurements (to the nearest 0.01 mm), with one measurement taken at the centre of each side.

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)
2	1.85	1.95
3	2.8	3.0
4	3.8	4.2
5	4.8	5.2
6	5.8	6.2
8	7.7	8.3

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.

The same tolerances as for the float glass used as a substrate for Matelac Silver apply. This information is related to jumbo sizes (PLF and DLF) of float glass without the paint coating.

6 DURABILITY OF MATELAC SILVER

Matelac Silver products are tested in accordance with the durability method described in EN 1036-1.

	EN 1036-1 criteria	Performance of Matelac Silver
Neutral salt spray test: <ul style="list-style-type: none"> Maximum corrosion around the edge 	1.0 mm	Spot: 1.0 mm Average: 0.05mm
Copper accelerated acetic acid salt spray test:	1.5 mm	Spot: 1.5 mm Average: 0.25 mm

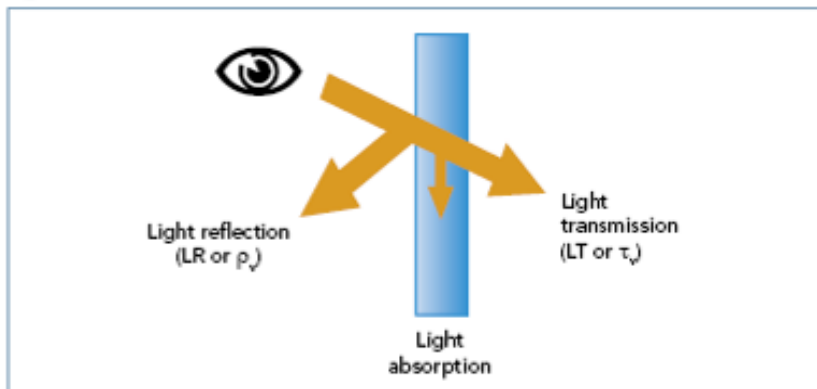
<ul style="list-style-type: none"> Maximum corrosion around the edge Maximum number of spots (diameter between 0.2 and 3 mm) 	<p>2</p> <p>(accepted, provided ≤ 0.2 mm)</p>	<p>≤ 1</p> <p>(accepted, provided ≤ 0.2mm)</p>
<p>Condensation water test</p> <ul style="list-style-type: none"> Maximum corrosion around the edge Maximum number of spots (diameter ≤ 0.3 mm) 	<p>0.2 mm</p> <p>1</p>	<p>Spot: 0.2mm</p> <p>Average: 0.05 mm</p> <p>0</p>

7 LIGHT PROPERTIES

Light properties are calculated using spectral measurement that conforms with standard EN 410.

- Light reflection (LR- ρ_v), measured in accordance with EN 410, must be at least 85% for Matelac Silver on Planibel Clearvision substrate.
- 80% for Matelac Silver on Planibel Clearlite substrate
- Between 30 and 50% for Matelac Silver on Planibel Bronze substrate
- Between 22 and 42% for Matelac Silver on Planibel Grey substrate

Light factors



8 QUALITY REQUIREMENTS

The quality of Matelac Silver can be affected by faults that alter the appearance of the image of reflected objects. Such alterations of the image can result from faults in the glass, faults in the acid etching and faults in the reflective coating.

8.1 FAULTS

8.1.1 DEFINITIONS

The following definitions apply:

Glass appearance faults: faults that alter the visual quality of the silver-coated float glass. These can be spot faults and/or linear faults and/or enlarged area faults.

- 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 coating fault, such as dust, pin-hole and de-wetting. Such faults are observed from the glass side. Spot faults may also be caused by cutting oil droplets, silicone pollution, etc. on the acid-etched surface. In certain instances spot faults are accompanied by a distortion zone called 'halo'. The nucleus of the spot fault is measurable.
- Cluster: group of no fewer than three spot faults, separated by no more than 50 mm.
- Linear faults: scratches, extended spot faults, etc. on the glass surface or on the silver-coated side, seen from the glass surface side.

Reflective silver coating faults: faults in the reflective silver layer that alter the appearance of the silvered glass. These include scratches, stains, colour spots and edge deterioration.

- Stain: alteration of the reflective coating characterised by a more or less brownish, yellowish or greyish coloration of zones which can sometimes cover the whole reflective surface
- Colour spots: alteration of the reflective coating in the form of small, generally coloured spots
- Edge deterioration: discoloration of the reflective silver at the edge of the silvered glass

Protective coating faults: faults where the metallic layer is exposed. These can be scratches in or loss of adhesion of the protective coating(s).

Uniformity faults: 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)

8.1.2 METHODS OF OBSERVATION AND MEASUREMENTS

The processed glass is observed in a vertical position with the naked eye and under normal diffused lighting conditions (natural daylight or simulated daylight, between 300 lux and 600 lux at the processed glass), from a distance of at least 1 m. The direction of observation is normal, i.e. at right angles to the processed glass. The use of an additional lighting source, such as a spotlight, is not allowed.

Faults on the silver-coated side are acceptable as long as they are not visible on the glass side. The dimension and number of scratches and spot faults which disrupt diffused reflection are noted.

8.1.3 ACCEPTANCE LEVELS

- GLASS FAULTS

The tables show the acceptance level for glass faults in standard sizes.

Acceptance level for linear faults in standard sizes

	Matelac Silver with clear and tinted glass substrate	
	Jumbo size (faults per 6 m x 3.21 m sheet)	Other sizes (faults/m ²)
Scratches (≤ 50 mm)	3	0.139

Acceptance level for spot faults ^a in standard sizes

	Matelac Silver with clear glass substrate			
	Jumbo size (faults per 6 m x 3.21 m sheet)		Other sizes (faults/m ²)	
	Max/sheet	Average/sheet	Max/sheet	Average/sheet ^b
≤ 0.2 mm	Accepted ^c	Accepted ^c	Accepted ^c	Accepted ^c
> 0.2 mm and ≤ 0.5 mm	26	18	1.35	0.93
> 0.5 mm	3	2	0.16	0.11
^a The dimensions given do not include the halo effect and pertain to the fault with the largest dimensions.				
^b The average is calculated taking into account the total individual pack area (m ²)				
^c Accepted, provided they do not form a cluster.				

	Matelac Silver with tinted glass substrate			
	Jumbo size (faults per 6 m x 3.21 m sheet)		Other sizes (faults/m ²)	
	Max/sheet	Average/sheet	Max/sheet	Average/sheet ^b
≤ 0.2 mm	Accepted ^c	Accepted ^c	Accepted ^c	Accepted ^c
> 0.2 mm and ≤ 0.5 mm	30	29	1.55	1.50
> 0.5 mm	4	3	0.21	0.16
^a The dimensions given do not include the halo effect and pertain to the fault with the largest dimensions.				
^b The average is calculated taking into account the total individual pack area (m ²)				
^c Accepted, provided they do not form a cluster.				

- **FAULTS ON THE ACID-ETCHED SURFACE**

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

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	

- **REFLECTIVE SILVER COATING FAULTS**

Reflective silver coating faults are not allowed if they are visible under the inspection conditions described above.

- **PROTECTIVE COATING FAULTS**

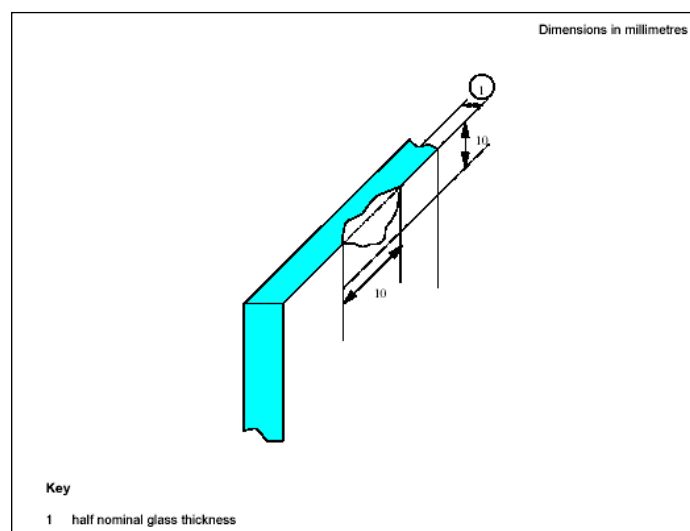
Presence of pinholes, burst bubbles, flaking of the protective coating along the edges or other faults in the protective coating(s) are not allowed.

8.1.4 EDGE FAULTS

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

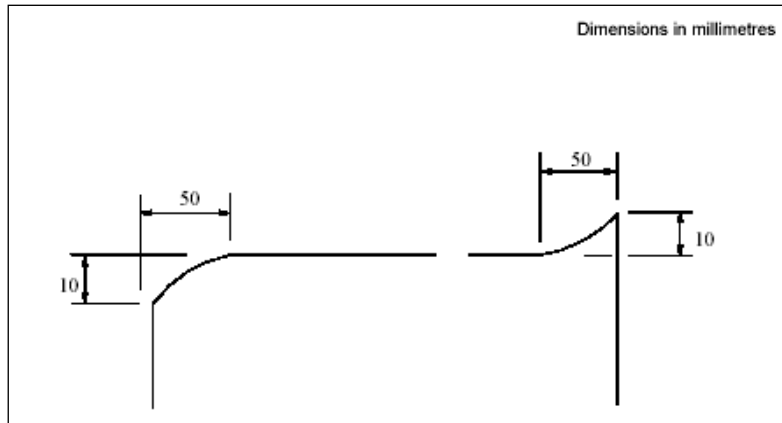
- **CHIPS OR SHELLS**

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.

8.2 APPEARANCE AND COLOUR OF THE ETCHING

8.2.1 INTRODUCTION

The appearance of the etching 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:

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

8.2.2 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.

8.2.3 ACCEPTANCE LEVELS

The allowable variation in colorimetric measurements, measured on the acid-etched side 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.

8.3 APPEARANCE OF THE SAFE+ VERSION

Matelac Silver can be delivered with the SAFE+ safety 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.

9 SAFETY

9.1 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.

Matelac Silver shows a mode of breakage typical of annealed glass (EN 12600, type A).

Matelac Silver SAFE+ includes a polymer film applied to the back of the glass. This safety backing film ensures safety in case of soft body impact.

Matelac Silver SAFE+ shows 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.

9.2 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.*

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

10 ENVIRONMENTAL AND HEALTH ASPECTS

Matelac Silver colour options have been developed to be environmentally friendly decorative glass products. Matelac Silver products are available with MNGE coating technology.

The current production line for Matelac Silver, comprising the MNGE coating technology, has, among other things, made it possible to:

- eliminate the copper layer
- reduce the lead content to < 0.3 % (< 3000 ppm) for MNGE produced in Europe
- reduce ammonia waste by 90%.

• REACH

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

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

• COV

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

The Matelac Silver product range (including the SAFE+ version) has achieved level A+.*

• C2C

AGC Glass Europe is Cradle to Cradle Certified® Bronze for the Matelac Silver product range, including the SAFE+ version.

11 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>