Technical properties facts and figures

General information

In addition to its attractive appearance, SCHOTT ROBAX® is mainly known for its “intrinsic” values. Regardless of whether one refers to its mechanical, thermal, chemical, or optical properties, the transparent glass ceramic meets even the highest requirements with poise. The following technical information applies to ROBAX® in general. Unless otherwise indicated, the data provided is intended as a point of reference. Values for which no generally applicable measurement method exists or, alternatively, are not defined in a generally applicable manner (for instance by a standard), are specified and explained.

Mechanical properties

Density	ρ approx. 2.6 g/cm³ (at 25 °C / 77 °F)
Bending strength	σ_{bB} approx. 35 MPa*

* The test is carried out in accordance with DIN EN 1288 T5, with the surface in its normal condition of use as encouraged in practice.

Impact resistance

Comments can only be made on impact resistance when more is known about the actual application. Of particular importance here are application-specific standards that must be met with respect to strength requirements. Basic values available upon request.

Comments on mechanical properties

Values presented on the strength of glass and glass ceramic must also take into account the special properties of these materials.

In the technical sense, glass and glass ceramic are “ideally elastic”, yet brittle materials in which there are no flow patterns. When they come into contact with materials of the same hardness, this causes surface damage in the form of fine nicks and cracks. When glass and glass ceramic are subjected to a mechanical load, the build-up of critical stress at the points of such nicks and cracks cannot be relieved by plastic flow, as is possible with materials like metals.

The consequence of this behavior is that the structurally based high strength of glass and glass ceramic (≥ 104 N/mm²) is practically irrelevant. It is reduced by the effect of unavoid-able surface defects (in the case of unprotected surfaces) to a practical value of approx. 20 bis 200 N/mm² bending strength, depending on the surface state and test conditions.

The strength of glass and glass ceramic is therefore not a material constant (as its density, for example), but is dependent on the following criteria:

- processing condition of the panel (incl. edge finish, bored holes, etc.)
- usage condition (type and distribution of surface defects)
- time-related conditions or alternatively the duration of the effective load
- surrounding conditions (corrosive substances, e.g. hydrofluoric acid)
- the area subject to load, as well as the thickness of the panel
- how the panel is installed

Its strength is also subject to a statistical distribution in accordance with the type and distribution of the surface defects.

Thermal properties

Coefficient of mean linear thermal expansion $\alpha_{(20-700\,°C)}$	(0 ± 0.5) x 10⁻⁶/K

Resistance to thermal gradients (RTG)

The RTG value measures how well a material can resist temperature differences within a defined area, e.g. the temperature difference between the hot area in the center of a panel and the cold edge area (room temperature). No breakage caused by thermal stress occurs at a maximum temperature of $T_{max} \leq 700$ °C (1292 °F).

Resistance to thermal shock (RTS)

The RTS value measures the panel’s ability to withstand a sudden thermal shock. No break-age caused by thermal stress occurs at a maximum temperature of $T_{max} \leq 700$ °C (1292 °F).

Temperature/time loading

The temperature/time loading limits determine the permissible temperature for set usage times at which no breakage caused by thermal stress occurs. The pairs of values shown in the following table are relevant for the practical usage of glass ceramic as a viewing panel for stoves and fireplaces.

The temperature values refer to the hottest points on the outside of the panel. One must make sure that these temperature/time loading limits are not exceeded. Taking resistance to thermal gradients and thermal shock into account, the following applies:

Stress temperature	
560 °C / 1,040 °F	5,000 hours
660 °C / 1,220 °F	100 hours

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Chemical properties

Chemical composition

The chemical composition of SCHOTT ROBAX® complies with the requirements for a glass ceramic in accordance with EN 1748 T2.

Water resistance
Hydrolytic resistance to ISO 719 Grain class: **HGB 1**

Alkali resistance
In line with ISO 695: **min. Class A2**

Acid resistance
DIN 12116: **min. Class S3**

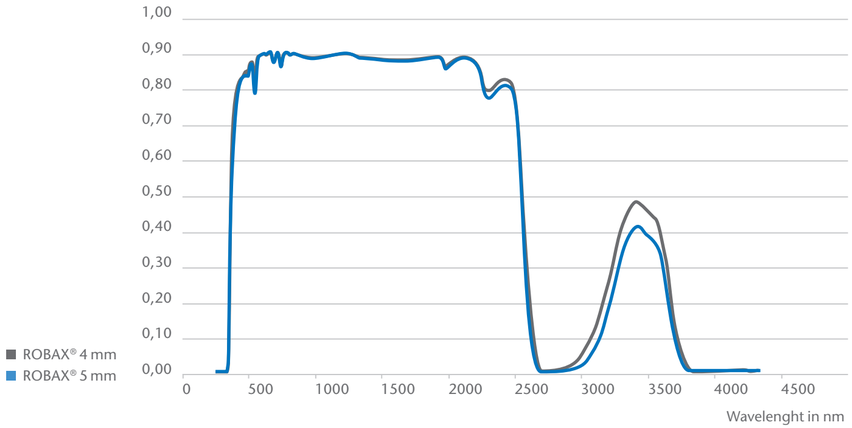
Hydrolytic class
DIN ISO 719 Class: **HGB 1**

Surface modifications caused by use

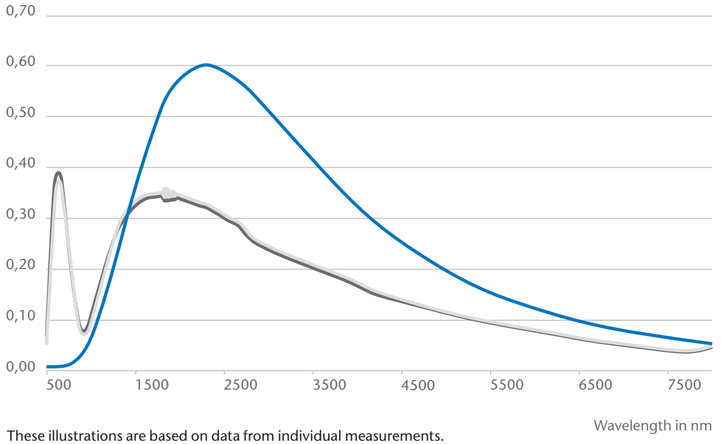
ROBAX® has a high degree of resistance to surface attacks. In individual cases, however, surfaces can experience changes under critical conditions, e.g. corrosive combustion gases (formation of acid at high temperatures). In such cases, practical tests should be conducted before using ROBAX®.

Optical properties

Transmission ROBAX® | 4 mm and 5 mm thicknesses



Reflection glow spectrum compared with ROBAX® Energy Plus | 4 mm



These illustrations are based on data from individual measurements.
Deviations may result from manufacturing processes.

General Information on Installation

Perfection is always a question of more than just materials and design. Proper handling is also very important. If you follow the appropriate guidelines, you will always be on the safe side.

The following guidelines for glass and glass ceramic apply to the installation and handling of SCHOTT ROBAX®:

- When determining the sizes of the frame and panel, the differences in thermal expansion behavior of SCHOTT ROBAX® (nearly zero) and the respective frame materials, but also possible manufacturing tolerances, need to be taken into account.
- If the design requires the panel to be pressed against the frame, one must make sure that the panel is never subjected to high pressure at any time as a result of clamps or mounting.
- Non-distorting frames should be used. If slight distortion cannot be avoided, a suitable permanently elastic gasket must be used to prevent the distortion of the frame from being transferred over to the glass ceramic panel.
- Direct contact between glass and metal (or other hard construction elements) should be avoided. We recom mend permanently elastic heat-resistant materials, such as mineral fiber materials, as an insert between the glass ceramic and the metal.