SCHOTT ROBAX®

Transparent glass ceramics
for extreme temperature

SCHOTT
glass made of ideas

1. ROBAX® – the temperature miracle

ROBAX® is an extremely heat-resistant, transparent glass ceramic which can be produced in a wide variety of shapes and sizes to meet your specific needs.

We thus offer you all the advantages of a true temperature miracle: thanks to its extremely low thermal expansion, ROBAX® glass ceramic is not affected by extremely high temperatures (up to 760 °C) or substantial temperature shifts and differences. In addition, ROBAX® is highly permeable to thermal radiation, especially in the shortwave infrared range. This is the area with the largest and most intense amount of thermal expansion during combustion (for example in stoves) which we perceive as pleasant warmth.

As a result, the glass ceramic can be used everywhere that very high thermal strength is required in combination with good transparency.

ROBAX® has thus proved a reliable vision window for room heating devices such as fireplaces and stoves for more than 20 years. Onlookers can enjoy the dancing flames and cozy warmth, are protected from flying sparks, and make optimum use of energy through targeted regulation of ingoing air and flue gas.

with a clear view

Aesthetics play an important role as well: whether flat, curved, and angular bent panels or innovative three-dimensional forms – ROBAX® designs cater to every wish. You can also choose between various decorative patterns and an optional heat-reflecting coating.

The multitalented ROBAX® can do even more than that, however! It is ideally suited for extremely heat-resistant cover panels on heating radiators, high-performance floodlights, and reflectors. The resistant glass ceramic is also used for a wide variety of industrial applications.

In addition to transparent ROBAX®, the SCHOTT product line also includes a dark transparent variant with a black appearance: ROBAX® COLOR HT boasts the same thermal properties but absorbs visible light while transmitting thermal radiation. This makes ROBAX® COLOR HT the material of choice for high-power heating radiators and industrial IR drying appliances.

1.1 Fields of application

Thanks to its extremely low thermal expansion, ROBAX® is especially well-suited for areas subject to large temperature differences and extreme temperature shocks:

- vision panels for room heaters
  - oil or gas-powered room heaters and stoves
  - room heaters and stoves with conventional heating system
- cover panels for heating radiators
- cover panels for reflectors and high-performance floodlights
- cover panels in IR drying appliances
- cover panels for beamers
- UV blocking shields
- cover panels for kebab grill radiators

1.2 Appearance

ROBAX® glass ceramic is transparent and has very little natural coloring in the material or as a result of the manufacturing process.

The surface is smooth on both sides and acquires a slight texture as part of the manufacturing process.

1.3 Quality

The externally certified management system introduced is in accordance with DIN EN ISO 9001 (for quality management) and DIN EN ISO 14001 (for environmental management) and represents a high quality standard. It also ensures compliance with customer demands as well as official regulations and guidelines.

2. Forms available – custom-tailored variety

Whatever you are planning, there are no limits to your ideas. ROBAX® offers you a multitude of existing forms and a secure basis for the development of your own personal design plan.

2.1 Random sheets

Random sheets, i.e. stock sizes and jumbo formats, are large-format glass-ceramic sheets which have not been further processed, in particular the edges. They serve as the base material for cut-to-size panels.

Stock sizes are available in the following sizes:

Minimum usable area	Thickness	Packaging	Number per packaging unit
1,580 x 840 mm	3.0 mm	Wooden crate	70 sheets
1,580 x 840 mm	4.0 mm	Wooden crate	60 sheets
1,580 x 840 mm	5.0 mm	Wooden crate	55 sheets

Jumbo formats are available in the following sizes:

Minimum usable area	Thickness	Packaging	Number per packaging unit
1,954 x 1,100 mm	3.0 mm	Wooden crate	55 sheets
1,954 x 1,100 mm	4.0 mm	Wooden crate	45 sheets
1,954 x 1,100 mm	5.0 mm	Wooden crate	35 sheets

2.1.1 Flatness

Flatness (f) describes the maximum deviation from flatness for stock sizes and is tested with the aid of a straightedge and a feeler gauge. The following applies to stock sizes:

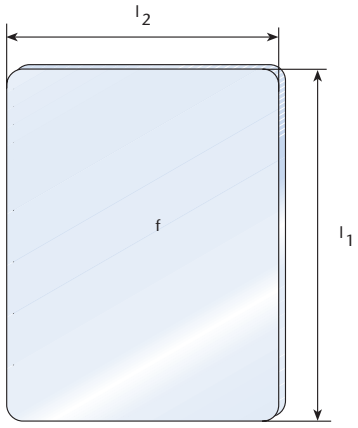
Flatness ≤ 0.3 % x measured length. Measured length at least 500 mm.

2.2 Flat cut-to-size panels

ROBAX® can be cut to size according to your wishes within the standard dimensions. The minimum dimensions of cut-to-size panels will be gladly supplied to you on request. The maximum dimensions of cut-to-size panels are equivalent to the minimum usable area of the stock sizes.

Standard length tolerance cut-to-size panels, standard form cut-to-size panels

Edge length l_1, l_2	Tolerance
≤ 500 mm	± 1.0 mm
> 500 mm	± 1.5 mm

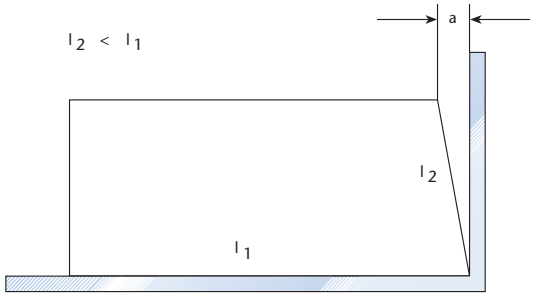


2.2.1 Flatness

Flatness (f) describes the maximum deviation from flatness and is tested with the aid of a straightedge and a feeler gauge. Maximum deflection for cut-to-size panels: Flatness ≤ 0.3 % x diagonal of the cut-to-size panel.

2.2.2 Squareness

The limits shown in the sketch below apply to the squareness of the panels:



Tolerance area a is the range within which the actual dimensions of the panel vary.

Squareness tolerance

Edge length	Tolerance
≤ 500 mm	a ≤ 1.0 mm
> 500 mm	a ≤ 1.5 mm

2.3 Shaped glass-ceramic panels

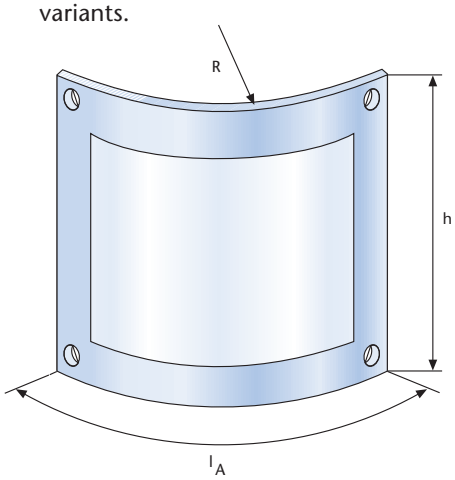
ROBAX® curved and angular bent panels are available in various versions in 3, 4 and 5 mm thicknesses.

If you need a custom-tailored solution, please enquire early about our available models and shapes. This helps us reduce delivery times and costs. For curved panels, we recommend selecting radii in increments of 10 (200, 210, 220, etc.) or in increments of 20 (600, 620, 640, etc.) for a radius of 600 mm or above.

All geometric tolerances are ascertained using a two-dimensional slot gauge. This is a level plastic gauge with a defined slot. The glass-ceramic panel must fit easily in the gauge. We will be happy to provide you with a drawing of the slot gauge on request.

2.3.1 Curved

Curved ROBAX® glass-ceramic panels are available in a number of different variants.

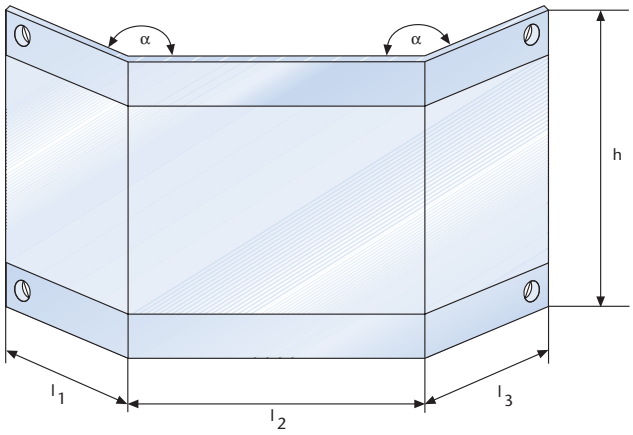


	Maximum	Size	Tolerance
h panel height	800 mm	h ≤ 500 mm	± 1.0 mm
		500 mm < h ≤ 600 mm	± 1.5 mm
		h > 600 mm	Determined after first sample
l_A bow length	1,000 mm	l_A ≤ 500 mm	± 1.5 mm
		l_A > 500 mm	± 2.0 mm

Minimum bending radius R: 200 mm.

Special sizes on request. All sizes are outer dimensions.

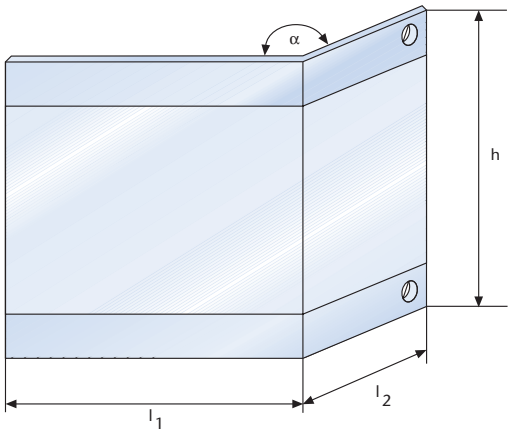
2.3.2 Angular bent, 2 angles



		Minimum	Maximum	Size	Tolerance
h	panel height	200 mm	600 mm	h ≤ 500 mm	± 1.0 mm
				500 mm < h ≤ 600 mm	± 1.5 mm
l_2	center section length	170 mm	580 mm	l_2	± 1.0 mm
l_1, l_3	side section length	60 mm	340 mm	l_1, l_3	± 2.0 mm
α	bendig angle	90°	160°	α	See slot gauge

Special sizes on request. All sizes are outer dimensions.

2.3.3 Angular bent, 1 angle



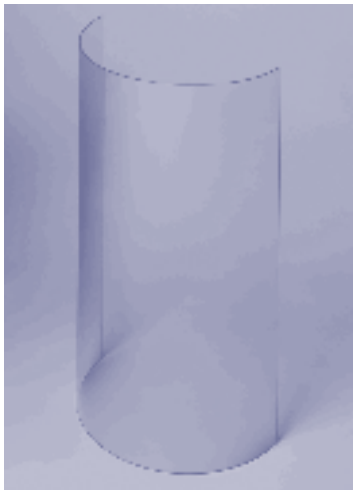
		Minimum	Maximum	Size	Tolerance
h	panel height	200 mm	600 mm	h ≤ 500 mm	± 1.0 mm
				500 mm < h ≤ 600 mm	± 1.5 mm
l_1	long side		860 mm	l_1	± 2.0 mm
l_2	short side	60 mm	500 mm	l_2	± 2.0 mm
α	bending angle	90°	160°	α	See slot gauge

Special sizes on request. All sizes are outer dimensions.

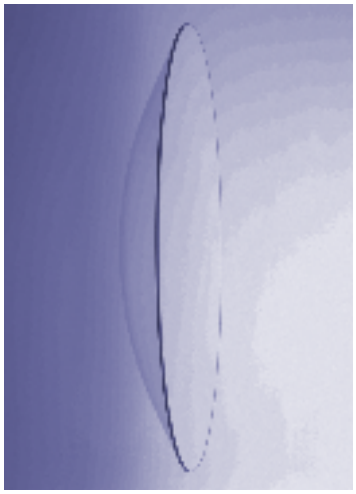
2.4 Complex shapes

Do you have something special in mind? We develop on request additional complex and innovative shapes in close cooperation with you.

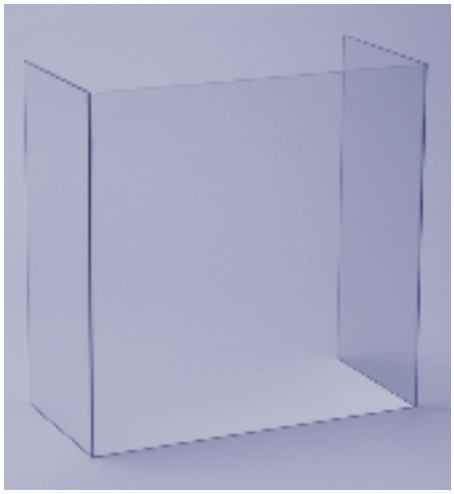
Here are a few examples of shapes already produced:



ROBAX® halfpipe



ROBAX® dome



ROBAX® 2 x 90° bent

2.5 Panel thicknesses

ROBAX® is available in the following standard thicknesses with corresponding permissible tolerances:

Thickness	Tolerance
3.00 mm	± 0.2 mm
4.00 mm	± 0.2 mm
5.00 mm	± 0.2 mm

2.6 Technical delivery specification

Additional technical information is available in the currently valid version of the Technical Delivery Specification.

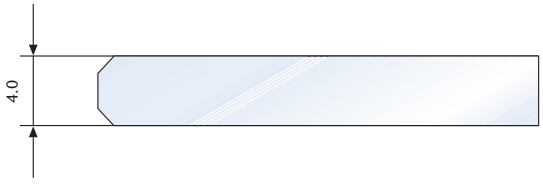
3. Processing and finishing – the finishing touches for optimum effect

Whether an attractive appearance or top functionality – a variety of processing types and finishes give ROBAX® the finishing touches. For a perfect product entirely in keeping with your wishes.

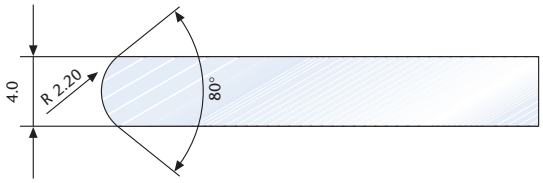
3.1 Edge and corner finish

The standard edge finish for glass-ceramic panels is oriented to DIN 1249.

Standard grinding in keeping with Type A is used for flat ROBAX® cut-to-size panels, Type B for curved ROBAX® panels.



Type A: custom-ground with chamfered edges



Type B: half-round custom-ground

3.2 Boreholes

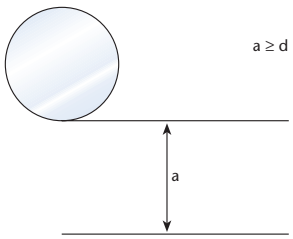
ROBAX® is available with boreholes on request.

Boreholes are available with a diameter of 4 mm or more. The position of the boreholes is subject to certain limitations in relation to the edges and corners of the panel as well as to the position of the boreholes to each other. This limitation is generally dependent on:

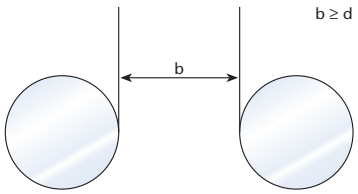
- the nominal thickness of the glass ceramic
- the panel dimensions
- the diameter of the borehole
- the shape of the panel

The limitations indicated here apply to panels with a maximum of four boreholes. If the panel has a different hole configuration, other limitations may apply. Details on request.

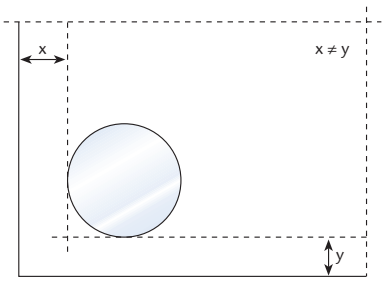
1. The distance **a** between the edge of the borehole and the edge of the glass ceramic should not be less than the thickness of the glass ceramic **d**.



2. The distance **b** between the edges of the various boreholes should also not be less than **d**.



3. The position of the boreholes in relation to the corner of the glass ceramic may necessitate that the distance to the two side edges be different. We will be glad to provide you with details on request.



4. The position of the borehole center may deviate by ±1.5 mm.

3.3 Decoration

Flat and bent ROBAX® can also be supplied decorated. You can choose from the following colors:

brocade

amber gold

carbon black

anthracite

lava black

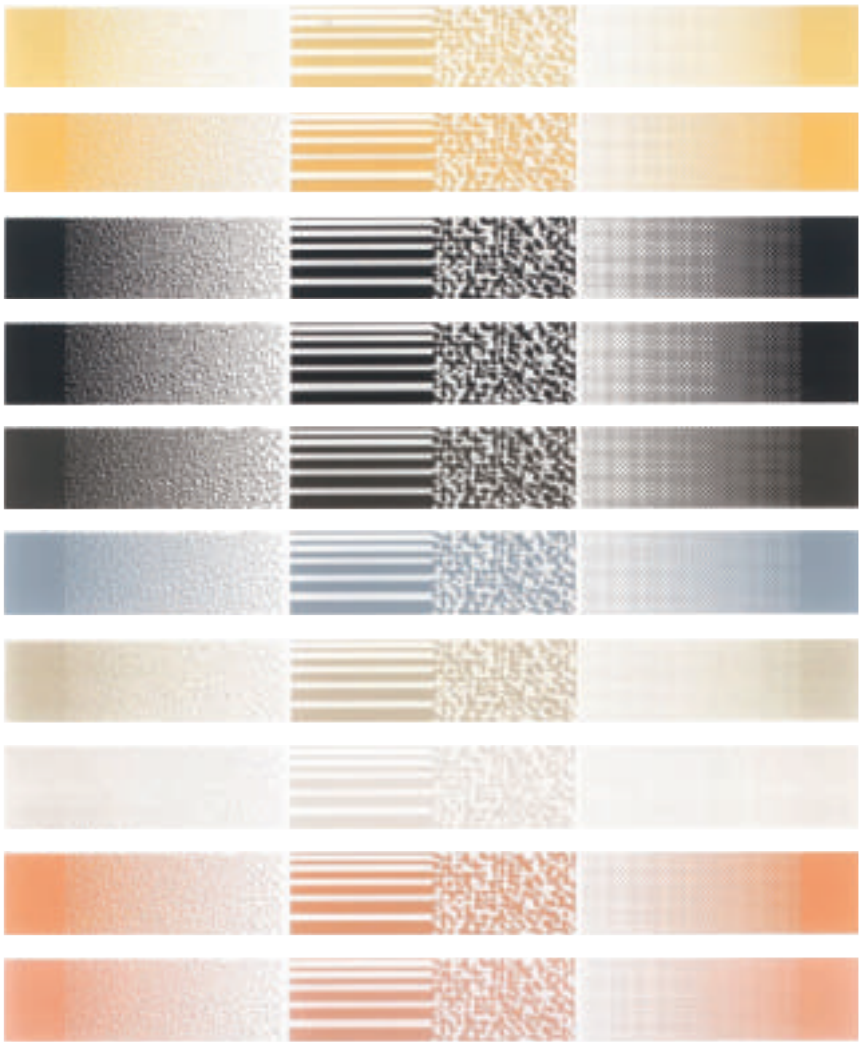
celtic gray

satin silver

polar white

gold topaz

copper



Logo decoration should always be located on the inside of curved ROBAX® panels or on the outside of the panel for angular bent panels.

The properties and durability of the decorations are adjusted to the practical usage requirements for ROBAX® vision windows in stoves and room heaters.

3.4 Coating/ROBAX® IR

ROBAX® IR is manufactured on the basis of flat ROBAX® panels. The application of oxydic, electrically conductive coatings to one side of the glass results in the infrared portion of the radiation (and thus the thermal radiation) being largely reflected. Light can penetrate the panel, while a protective shield is formed against excessive heat. As a material resistant to high temperatures, ROBAX® IR is also particularly well-suited for application areas in which good transparency and in particular reduced thermal radiation through the panel are required. And the coated glass ceramic offers other positive effects as well:

- In some stoves and room heaters, ROBAX® IR can contribute to reduction in the sooting of the panels by smoke and flue gases. In this case, the panel should be fitted with the coating on the outside (i.e. away from the heat source).

- Tests have shown that ROBAX® IR can also contribute to better combustion and therefore to reduced emission values. Here the panel can be fitted on both the fire side and the side away from the fire.

- The use of ROBAX® IR always makes heating with fire safer because as the panel transmits less heat, the floor temperature in the front of the room-heating appliance is lower as well. To maximize this effect, the coating should be fitted on the fire side.

The first two effects cited above depend very much on the design of the stove in question and the way it is used. They therefore cannot be guaranteed. Accordingly, we strongly recommend that ROBAX® IR be tested as regards the particular effect required before any serial production is undertaken.

3.4.1 Maximum operating temperatures

Unlike all other ROBAX® products (see point 4.3), ROBAX® IR exhibits lower operating temperatures as a result of the coating:

for short-term usage (total < 100 h):	T_{max} = 550 °C
for long-term usage (total 100 h to 10 000 h):	T_{max} = 500 °C

3.4.2 Reflection

See reflection curve on page 22, point 4.5.7

We will be glad to provide you with information on other coatings, such as mirror coatings or anti-reflective coatings, on request.

4. Technical properties – quality in numbers, information and facts

In addition to an attractive appearance, ROBAX® is distinguished in particular by its "inner" values. Whether mechanical, thermal, chemical, or optical properties – the transparent glass ceramic meets even the highest requirements with a flourish.

4.1 General information

The following technical information is generally valid for ROBAX®. Unless otherwise indicated, the data provided are guide figures. Values for which no generally applicable measurement method exists or alternatively which are not defined in a generally applicable manner (for example by means of a standard), are specified and explained.

4.2 Mechanical properties

4.2.1 Density

ρ approx. 2.6 g/cm^3 (at 25 °C)

4.2.2 Modulus of elasticity/ Young's modulus

E approx. 93 x 10^3 MPa (at 25 °C)

The test is carried out in accordance with ASTM 1259-01. A tensile or compressive load is applied to a rod-shaped test piece to produce a change in length, the amount of which depends on the material and load. The modulus of elasticity describes the relationship between the tension and the material's change in length.

4.2.3 Poisson's ratio

μ approx. 0.25

The test is carried out in accordance with ASTM 1259-01. A mechanical stress applied longitudinally produces both an increase in length and lateral contraction. As the length changes, so do the dimensions of the piece at right angles to the load.

4.2.4 Bending strength

$\bar{\sigma}_{bB}$ 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.

4.2.5 Impact resistance

Comments on impact resistance are only possible with knowledge of the specific application. Of particular importance here are application-specific standards as regards strength requirements. Nominal value on request.

4.2.6 Comments on mechanical properties

Indications of the strength of glass and glass ceramic must take into account the special properties of these materials.

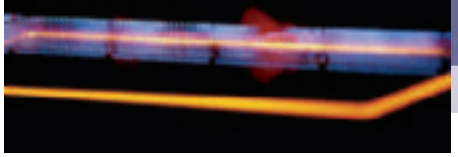
In the technical sense, glass and glass ceramic are "ideally elastic", brittle materials which exhibit no tendency to flow. When they come into contact with materials of the same hardness, this causes surface damage in the form of fine nicks and cracks. When glass and glass ceramic are subjected to a 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 such materials as metals.

The consequence of this behavior is that the structurally based high strength of glass and glass ceramic ($\geq 10^4$ N/mm^2) is irrelevant in practice. It is reduced by the effect of unavoidable surface defects (in the case of unprotected surfaces) to a practical value of approx. 20 to 200 N/mm^2 bending strength – depending on the surface state and test conditions.

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

- finish condition of the panel (incl. edge finish, boreholes, 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
- the type of panel in installation

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



4.3 Thermal properties

4.3.1 Coefficient of mean linear thermal expansion

$\alpha_{(20\text{-}700\ °C)}$ $(0 \pm 0.5) \times 10^{-6}/K$

4.3.2 Specific heat

$c_{p(20\text{-}100\ °C)}$ approx. 0.8×10^{3} J / (kg x K)

4.3.3 Thermal conductivity

$\lambda_{(90\ °C)}$ approx. 1.6 W / (m x K)

4.3.4 Resistance to thermal gradients (RTG)

The RTG value is a measure of how well a material can resist temperature differences on a restricted 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.

4.3.5 Resistance to thermal shock (RTS)

The RTS value is a measure of the panel's ability to withstand a sudden thermal shock.

No breakage caused by thermal stress occurs at a maximum temperature of $T_{max} \leq 700$ °C.

4.3.6 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 in the following table are relevant for the practical usage of glass ceramic as a vision window for stoves and room heaters.

The temperature values refer to the hottest points on the outside of the panel. It must be ensured that these temperature/time loading limits are not exceeded.

Taking resistance to thermal gradients and thermal shock into account, the following apply:

Usage temperature	Usage time
560 °C	5,000 h
610 °C	1,000 h
660 °C	100 h
710 °C	10 h
760 °C	5 h

4.4 Chemical properties

4.4.1 Chemical composition

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

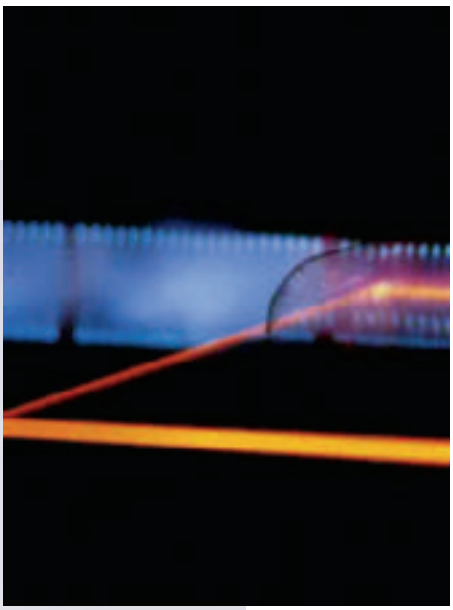
ROBAX® is made of ecologically safe raw materials. The glass can be reused through recycling of the material (see point 8).

4.4.2 Hydrolytic resistance

Glass grain hydrolytic resistance class according to ISO 719: **HGB 1**

2 g of glass grains are heated with 50 ml of water for one hour in a boiling water bath. Then the alkali (sodium, potassium) given off is titrated with hydrochloric acid (HCl). On the basis of the acid usage or alternatively alkali leached out, the glasses are classified into the five hydrolytic classes below:

Hydrolytic class	Possible description
HGB 1	high-resistance glass
HGB 2	resistance glass
HGB 3	medium-resistance glass
HGB 4	low-resistance glass
HGB 5	very low-resistance glass



4.4.3 Acid resistance

Acid resistance class according to DIN 12 116: **min. 3**

The glass surface to be tested is boiled for six hours in 20 % hydrochloric acid and the weight loss is determined in mg/100 cm^2. The glass is then classified into the following acid classes:

Acid class	Description
1	acid resistant
2	slight acid attack
3	moderate acid attack
4	high acid attack

4.4.4 Resistance to attack by alkaline solutions

Alkaline solution resistance class according to ISO 695: **A2**

To determine resistance to attack by alkaline solutions, glass surfaces are exposed for three hours to a boiling aqueous solution comprising equal quantities by volume of sodium hydroxide (NaOH) and sodium carbonate (Na_2CO_3), after which the weight loss is determined. The alkali classes are grouped as follows:

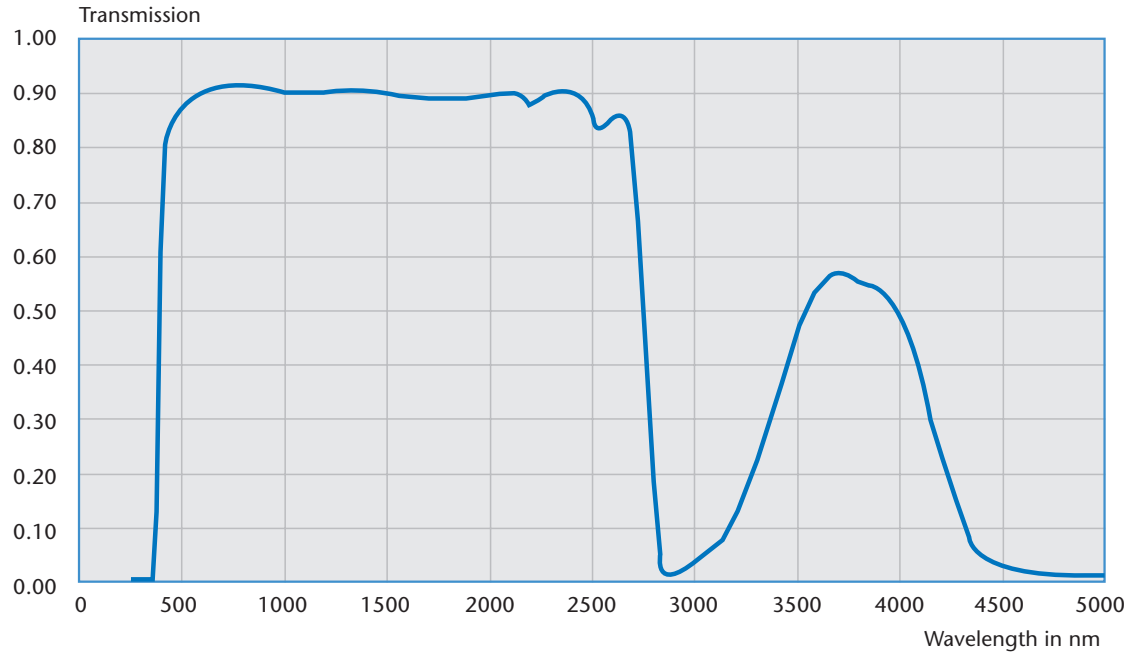
Alkali class	Description
A 1	slight alkali attack
A 2	moderate alkali attack
A 3	high alkali attack

4.4.5 Surface modifications occurring during use

ROBAX® has a high degree of resistance to surface attack. In individual cases, however, surface modifications may occur under critical conditions, e.g. corrosive combustion gases (formation of acid at high temperatures). Practical tests must be carried out before use in such applications.

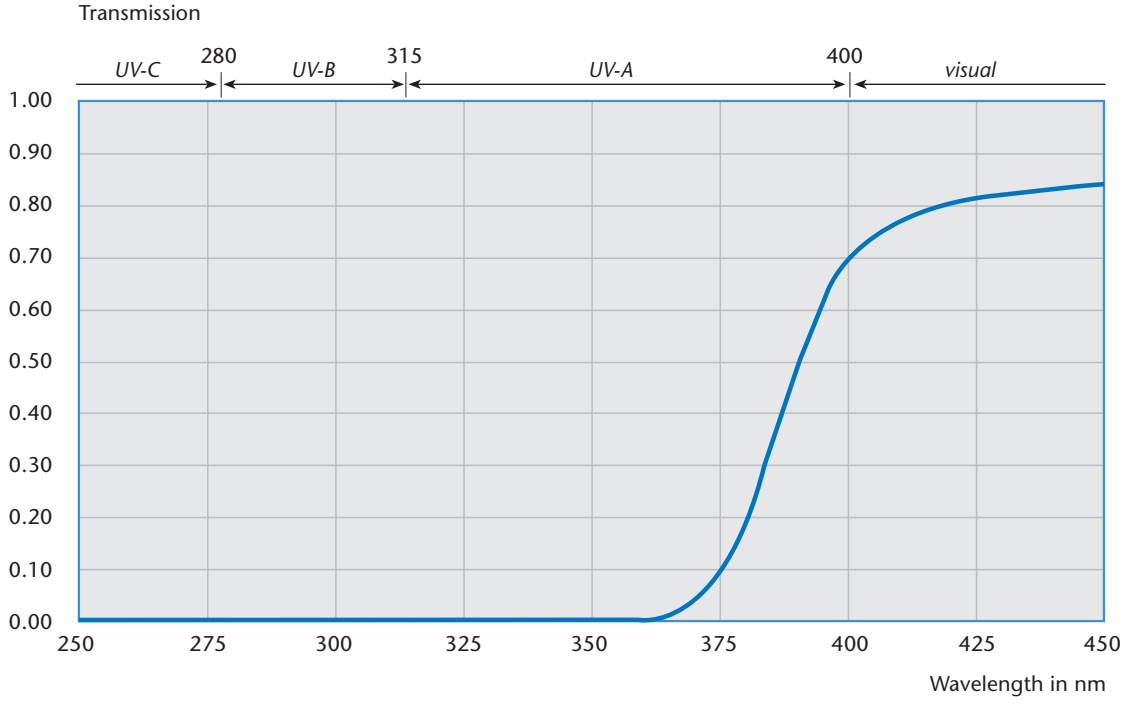
4.5 Optical properties

4.5.1 Transmission ROBAX®, 3 mm



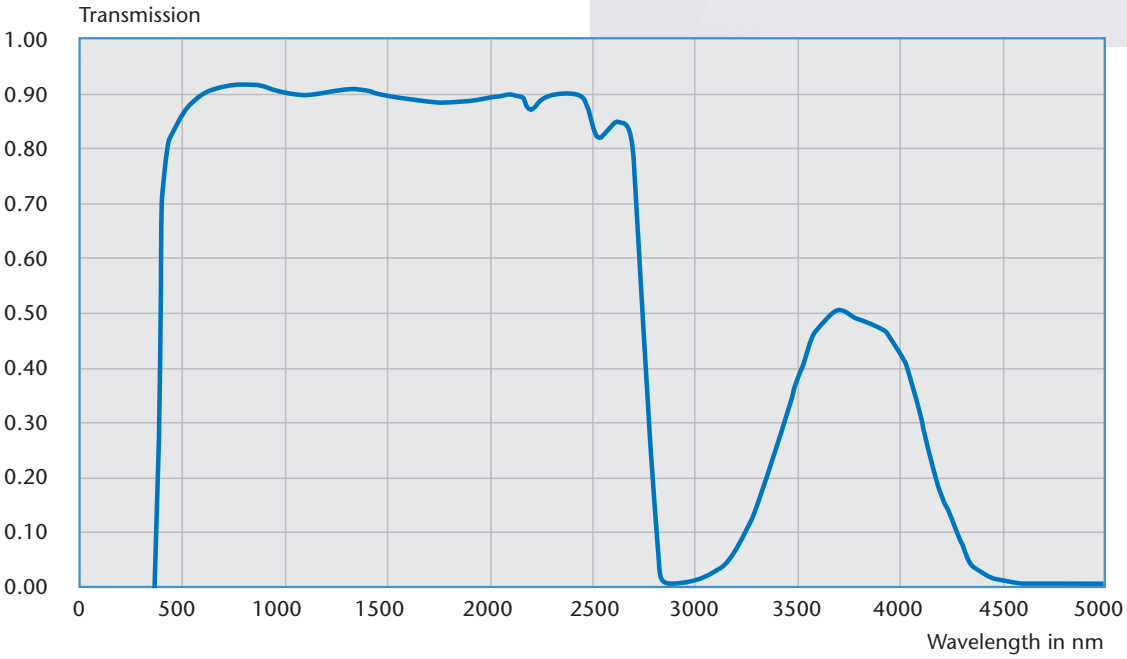
This graph is based on data from individual measurements. Deviations may result from manufacturing processes.

4.5.2 Transmission ROBAX®, 3 mm, in UV range



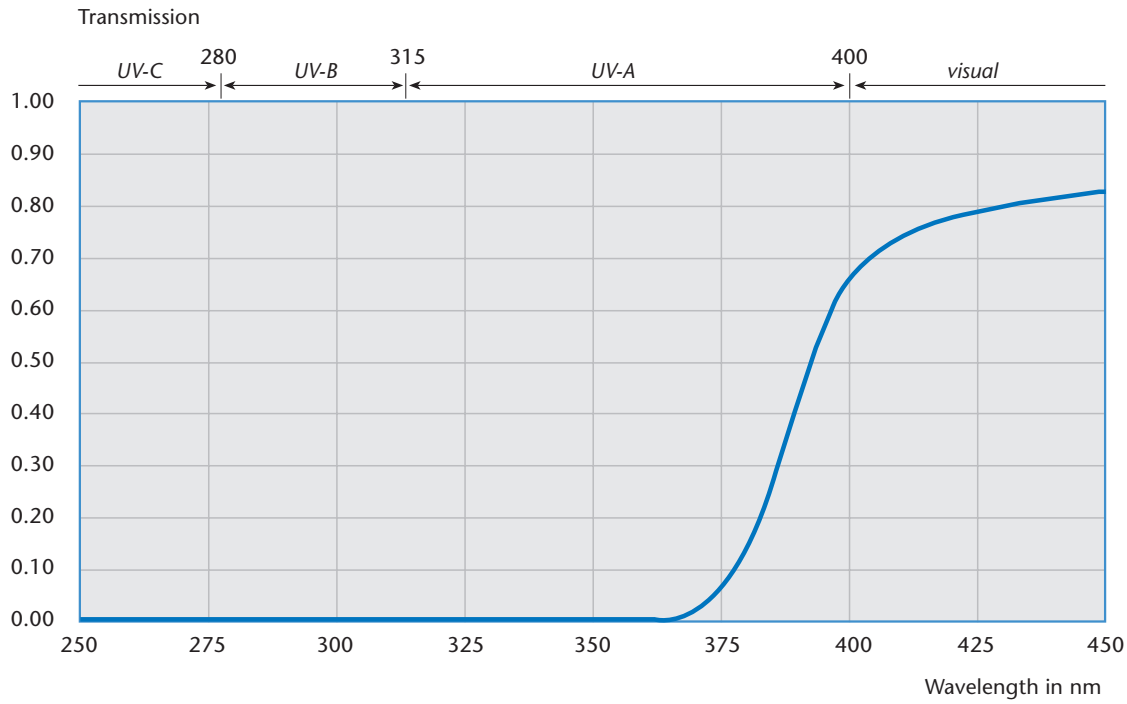
This graph is based on data from individual measurements. Deviations may result from manufacturing processes.

4.5.3 Transmission ROBAX®, 4 mm



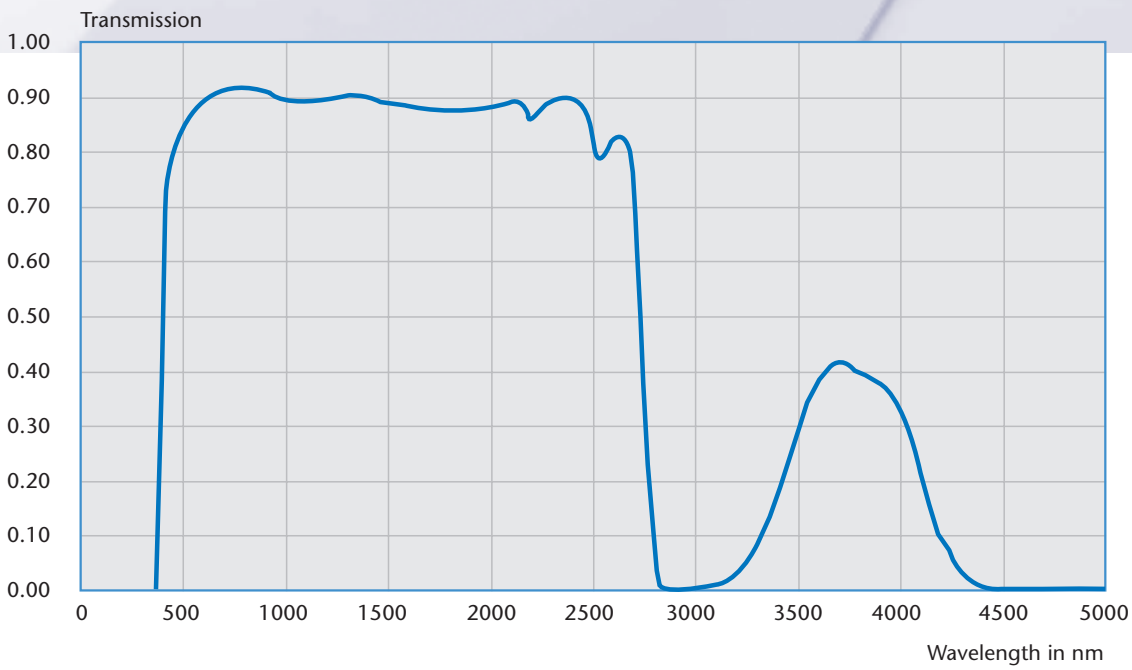
This graph is based on data from individual measurements. Deviations may result from manufacturing processes.

4.5.4 Transmission ROBAX®, 4 mm, in UV range



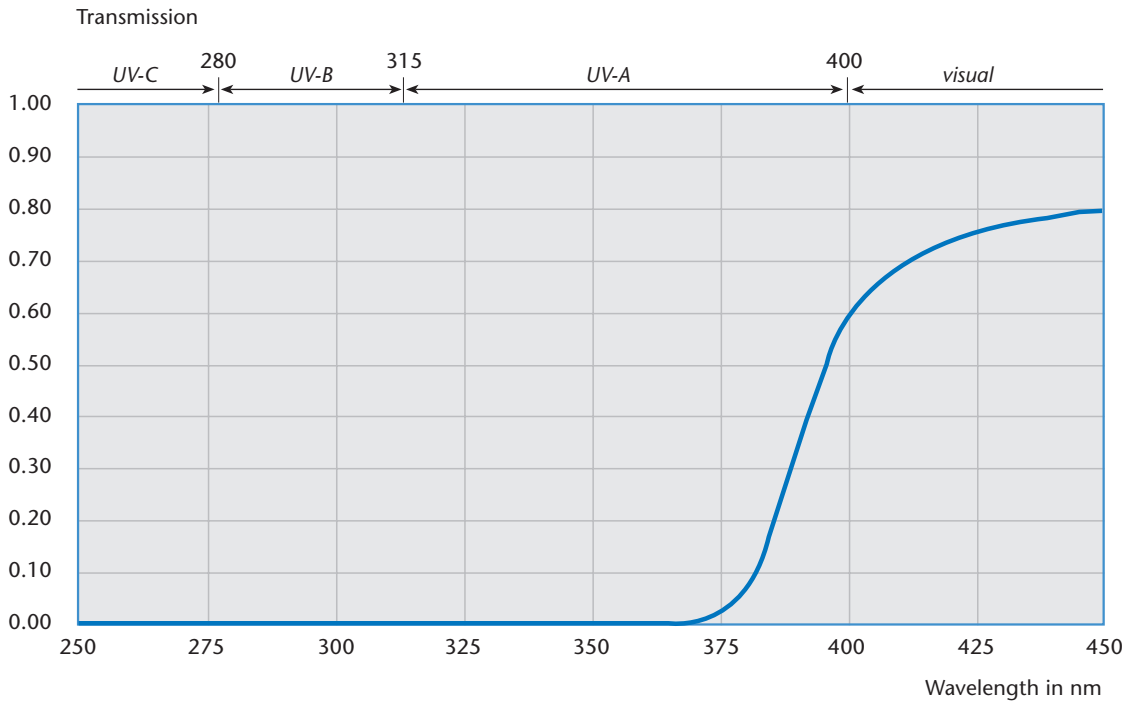
This graph is based on data from individual measurements. Deviations may result from manufacturing processes.

4.5.5 Transmission ROBAX®, 5 mm



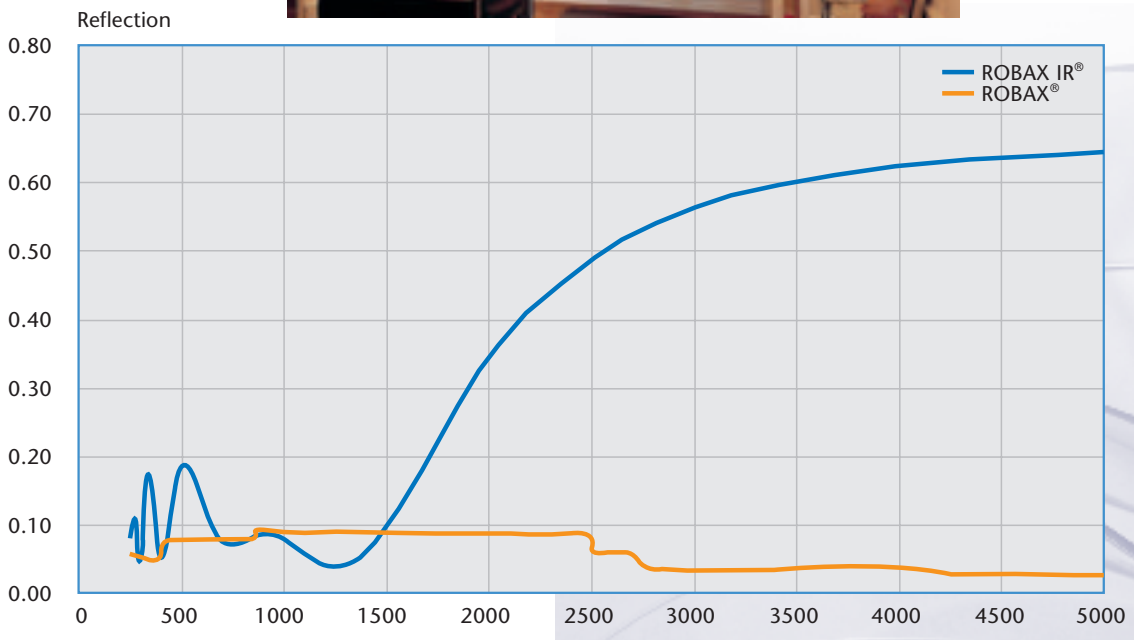
This graph is based on data from individual measurements. Deviations may result from manufacturing processes.

4.5.6 Transmission ROBAX®, 5 mm, in UV range



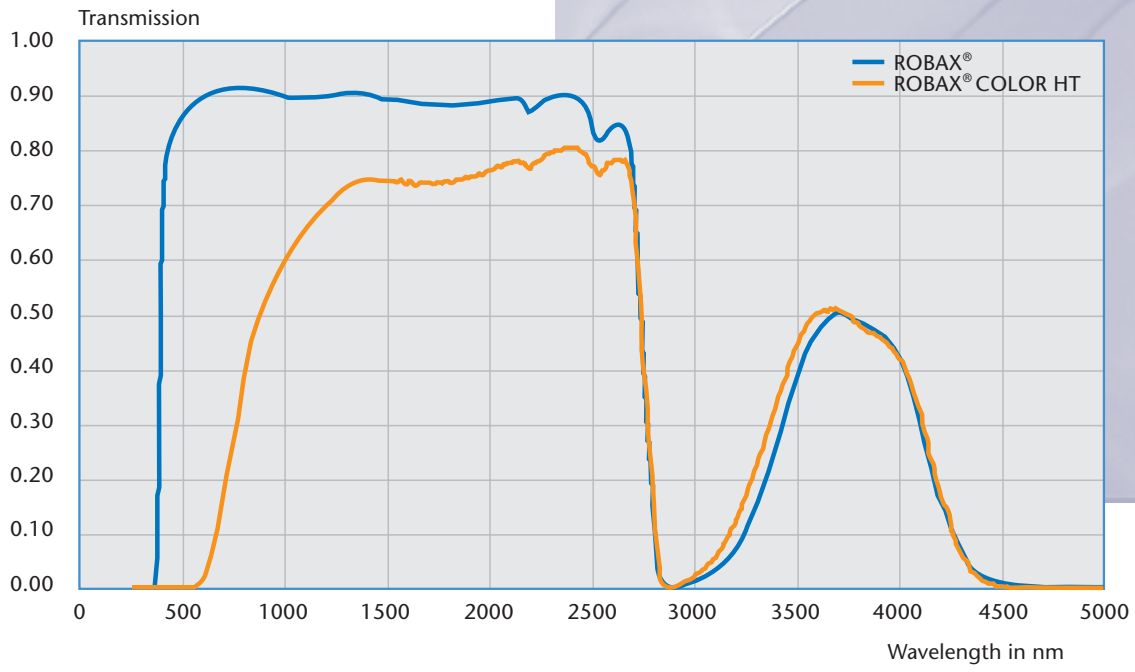
This graph is based on data from individual measurements. Deviations may result from manufacturing processes.

4.5.7 Reflection ROBAX® and ROBAX IR®, 4 mm, in comparison



This graph is based on data from individual measurements. Deviations may result from manufacturing processes.

4.5.8 Transmission ROBAX® and ROBAX® COLOR HT, 4 mm, in comparison



This graph is based on data from individual measurements. Deviations may result from manufacturing processes.

5. ROBAX® COLOR HT – sophisticated special variant in black

With a surface that appears black in color, ROBAX® COLOR HT offers you an elegant look for additional areas of application. Let yourself be inspired ...

5.1. Description

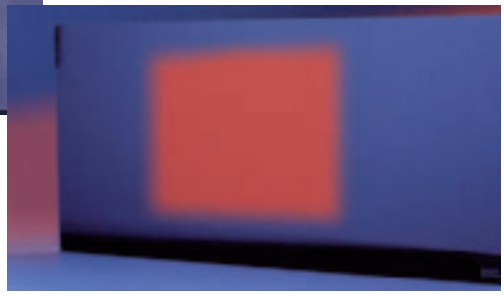
ROBAX® COLOR HT is a dark, body-tinted, transparent glass ceramic, which is black in appearance. Its rolled surface is smooth on one side and nubbed on the other.

All panels have a „SCHOTT ROBAX® COLOR HT“ logo printed on them.

5.2 Forms available

- flat and curved
- one side smooth, one side nubbed
- drilled
- edge and corner worked

5.3 Dimensions



ROBAX® COLOR HT is supplied in 4.0 mm and 6.0 mm thicknesses.
Permitted deviation ± 0.2 mm.

ROBAX® COLOR HT is supplied as cut-to-size panels.

The smallest possible dimensions of cut-to-size panels will be supplied on request.

The maximum dimensions of cut-to-size panels are 970 mm x 640 mm.

5.4 Transmission

For the transmission of ROBAX® COLOR HT, see point 4.5.8

6. Fitting

Perfection is a question of more than just materials and design. Correct handling is important as well. Make sure you are always on the safe side by complying with the appropriate guidelines.

6.1 General information

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

- The different thermal expansion of ROBAX® and the various frame materials, together with possible manufacturing tolerances, must be taken into account when sizing frame and panels.
- If it is necessary to use compression fixing of the panel in the frame for design reasons, the pressure must be applied uniformly (never unevenly or at individual points) around the periphery of the panel.
- 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 being transmitted to the glass ceramic panel.
- Direct contact between glass and metal (or other hard construction elements) must be avoided. We recommend permanently elastic heat-resistant materials such as mineral fiber materials as an insert between the glass ceramic and the metal.

6.2 Frameless fitting

In essence, the use of ROBAX® as frameless doors poses the danger of mechanical stress (bending stress, impact, shock, etc.). If using ROBAX® for such an application, please comply with the following basic points (the general information under point 6.1 naturally applies as well):

- The weight of the panel should be distributed across rails of a sufficient size. Stress on specific points, e.g. caused by the weight of the panel "resting" on the screws/bushings, should be avoided. The pressure forces transferred to the glass by the rails must be absorbed with a suitable material that is both temperature-stable and flexible (e.g. glass-fiber cord between hinge/handle and panel).

- Contact pressure on the panel which could lead to it bending under force is to be avoided. This can be accomplished with the restriction of torque or a mechanical stop limiting the screw penetration, for example.

- The closing of the door should not cause any additional pressure (leverage) on the side of the panel mounted with a hinge.

- The hinges should not jam during closing, as the corresponding resistance forces could be transferred to the glass during opening or closing of the door.

An overview of ROBAX®

Photo credits:

P. 3, Picture 1: Model Piu: Spartherm Feuerungstechnik GmbH, Melle/Germany

Picture 2: Model Filiofocus: FOCUS, Viols-le-Fort/France

Picture 3: Model Diva: Spartherm Feuerungstechnik GmbH

P. 4, Picture 1: Model Messina Tower: Messina Metalldesign AG, Triesen/Liechtenstein

Picture 2: Heating radiator model CeraTherm: David & Baader GmbH, Kandel/Germany

Picture 3: Reflector model Xeno: Zumtobel Staff, Dornbirn/Austria

Picture 4: Döner kebab grill: Inoksan, Bursa/Turkey

P. 8, Picture 1: Model 720-4: Rüegg Cheminée AG, Zumikon/Switzerland

P. 9, Picture 1: Model Varia Eh: Spartherm Feuerungstechnik GmbH

P. 11, Picture 1: Model SONAT Aapricot: Rika Metallwarengesellschaft mbH & Co. KG, Micheldorf/Austria

P. 16, Picture1: Model Memo Alu: Rika Metallwarengesellschaft mbH & Co. KG

P. 17, Picture 1: Model Scan 46: Krog Iversen & Co. A/S, Vissenbjerk/Denmark

Picture 2: Model Scan 37: Krog Iversen & Co. A/S

P. 20, Picture 1: Model Elisse: Spartherm Feuerungstechnik GmbH

P. 22, Picture 1: Model Klee: Rüegg Cheminée AG

P. 25, Picture 1: Model Pictofocus 860: FOCUS

P. 26, Picture 1: Innovation tower: SCHOTT AG, Mainz/Germany

P. 27, Picture 1: Model Signum Agentur: Rika Metallwarengesellschaft mbH & Co. KG

- Bending forces are exerted on the corners of the glass panel during locking. They are dependent, among other things, on the position of the boreholes for the locking mechanism (see point 3.2) and the pressure which the user must exert for locking. There is no cause for concern regarding strength as long as the pressure force applied to the panel for this purpose does not exceed 40 N. No design limitations with regard to size and position of the boreholes are necessary as long as the standard recommendations for our product information are adhered to.

- Closing the doors one after the other should not lead to excessive bending tension in the panel. If one lock has already been closed, the panel still open should not “stand out” very far, as complete closing is then only possible with torsion stronger than that allowed. Pressure of up to 40 N is permissible in this case as well.

- The diameter of the boreholes (see point 3.2) must be chosen in such a manner that expansion of the metallic components (bushings, mounting rails, etc.) as a result of temperature can take place (play). In addition, the edges of the boreholes must be of sufficient quality and have a chamfered edge on both sides. The edges of the panel should be ground.

7. Easy to care for

You can clean ROBAX® panels with conventional glass cleaners as well as tested and approved glass-ceramic cleaners.

Note: Under no circumstances use abrasive sponges, scouring powder, or abrasive cleaners, as these may cause damage to the surface.

8. Easy to dispose of

ROBAX® fragments can be disposed of as normal household waste – not in the glass recycling container.

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