

# Warm & safe

Transparent glass ceramic for fireplaces and stoves



SCHOTT  
ROBAX®

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## The magic of fire

When we look into a fire, we are captivated by its dancing flames full of imagery, passion and energy.

People have always been fascinated by the red embers and elemental force of fire. A couple lying together in front of a romantic fireplace fire. Telling interesting tales around a huge campfire. Or simply holding one's cold hands over the flames.

Whenever a fire is burning, hardly anything else really matters to us. We allow our minds to wander, give in to our dreams or talk about everything under the sun. A fireplace or stove brings that special feeling of a flickering and crackling campfire inside our own four walls. It radiates soothing warmth and primordial coziness.





## Warm ...

A blazing and flickering fire immediately warms our hearts.

No question: There is something very special about a blazing outdoor campfire. But, when it comes to our own four walls at home, safety, as well as thermo-technical and esthetic aspects, are extremely important.

Regardless of whether it's functionality, a sense of security, design or luxury you're looking for, the wide variety of transparent ROBAX® glass products that SCHOTT offers can easily keep up with the creative ideas of fireplace builders.

This is why ROBAX® has been representing the phrase warm & safe for over 30 years. It means that ROBAX® fireplace viewing panels guarantee genuine fire enjoyment and complete protection. They enable the best possible viewing and physical closeness to a fire, yet offer reliable protection from being hit by a spark.

"Beneficent is fire's strong might, when man subdues and watches it."

Friedrich von Schiller

## ... & safe

We all seek safety, when the sparks begin to fly.

ROBAX® glass ceramic is extremely heat resistant, robust, and features an incredibly low coefficient of thermal expansion. These panes even stand up to incredibly high temperatures of up to 760 °C (1400 °F) for a short time, as well as considerable shifts in temperature and shocks.

These exact characteristics, temperature stability, transparency, heat transmission and a long lifespan, are advantages that enable ROBAX® to offer the best possible protection from the dangers of a fire – especially compared to conventional flat glass.

The ROBAX® brand is the embodiment of futuristic fireplace viewing panels. Always processed with great care and engineered in Germany to be long lasting and offer the highest quality.



## The natural way to heat

Fireplaces have a rich history. And hold significant potential for the future.

Ensuring proper heating is a great way to start feeling comfortable at home all year. Because fossil fuels, like petroleum, gas and coal, are becoming increasingly scarce, there is a real need to look for alternatives. Alternatives that many people are already benefiting from. But also, inexpensive and efficient.

For this reason, more and more people are interested in having a fireplace or stove (we'll be referring to fireplaces as of here), in order to feel more comfortable at home. But, at the same time, to heat their homes in a more cost effective and environmentally conscious way.

# FUN TIONAL

"One must never allow the fire to go out in one's soul, but must keep it burning."

Vincent van Gogh



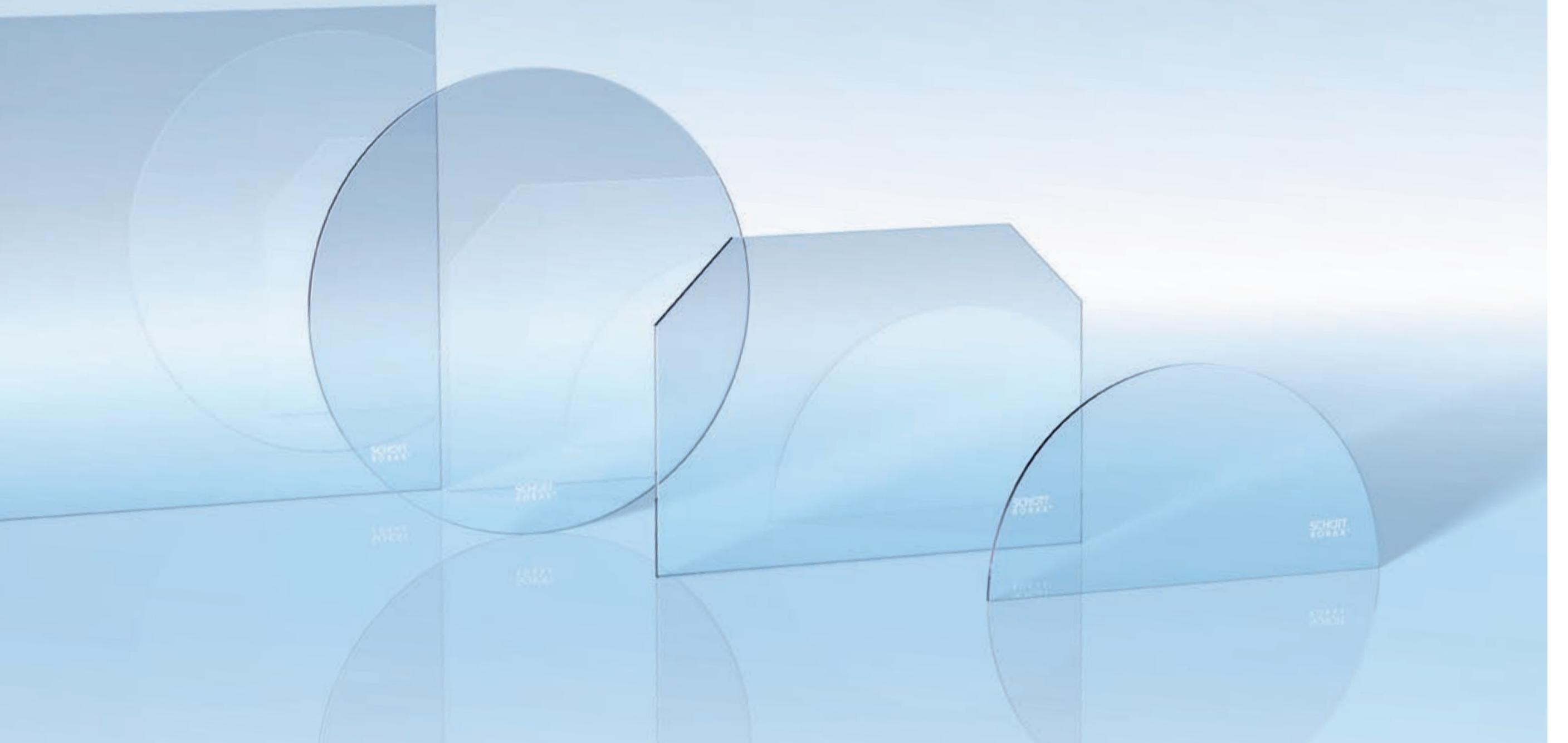
Wood is a renewable raw material.  
Heating with wood is less invasive to  
the environment.

A fireplace emits warmth – and saves  
energy.



By choosing to heat with wood, people make themselves independent of the increasing energy costs that the major oil and gas companies are charging. But, a closed stove is really what is needed to heat most effectively.

With a viewing panel made of SCHOTT ROBAX®, fireplaces look great and emit the maximum amount of radiated heat.



## The intrinsic values are really what counts

A fireplace offers the greatest possible benefit when it heats up an entire room evenly and combustion can be regulated.

Fireplaces that feature SCHOTT ROBAX® allow for the heat radiation created in the combustion chamber to pass through so that it gradually fills the entire room with pleasant warmth.

Flat ROBAX® panels are also known for the many other advantages they offer. Thanks to their rigorous design, they serve as simple, yet impressive, barriers between the fire and the living room and allow for maximum freedom of design, thanks to the many possible shapes they come in.

High functionality is guaranteed, thanks to the use of special coatings – as in ROBAX® IR – which actually allows for the heat permeability of the fireplace to be reduced.

### Functional

- high heat permeability of the panels
- flat panels for increased functionality
- available in sizes of up to 1,954 x 1,100 mm
- thicknesses of either 4 or 5 mm
- a variety of different shapes
- heating with renewable raw materials



*Customized edge processing and bored holes*



## Comfort for every home

The feeling of being safe and secure all alone, or together with a loved one, is rather unique. The ways to achieve it are not.

**Feeling safe and secure. Protected and happy.** These objectives can be achieved more easily at home than anywhere else. And no place is more pleasant than sitting in front of a crackling fireplace fire. This is the place to spend romantic moments together, peacefully enjoy a glass of red wine or relax and exchange the latest stories and happenings with family and friends.

Especially when sitting in front of a fire together, having a clear panoramic view is extremely important. This is where SCHOTT ROBAX® sets new standards. Shaped fireplace panels invite people to sit close to the fireplace – and yet provide a clear view of the fire. A campfire feeling that lets people experience the flames even more. With all of their senses and full of emotions.

# COZINESS



*Simply lift up the foil to enjoy the fire from all sides!*



*An ideal design:  
Shaped glass ceramic  
panels made of ROBAX®  
that offer a panoramic  
view.*

**"We humans are always longing.  
And the main goal of our longing is to feel  
safe and secure."**

*Rainer Kaune*

## Shaped for coziness

SCHOTT ROBAX® turns a fire into a 3D experience – an all around pleasant feeling.

**Round or square. One-sided or more:** The various designs that ROBAX® 3D panels come in offer completely new views of a fire inside a closed fireplace.

ROBAX® 3D panels feature a variety of viewing elements that turn the fireplace into a real meeting point. From either the right or left, not to mention the front, everyone will be able to enjoy the view of the flames. Regardless of whether these elements are round or angular in shape, the broad selection of panel shapes makes the fireplace experience even more flexible.

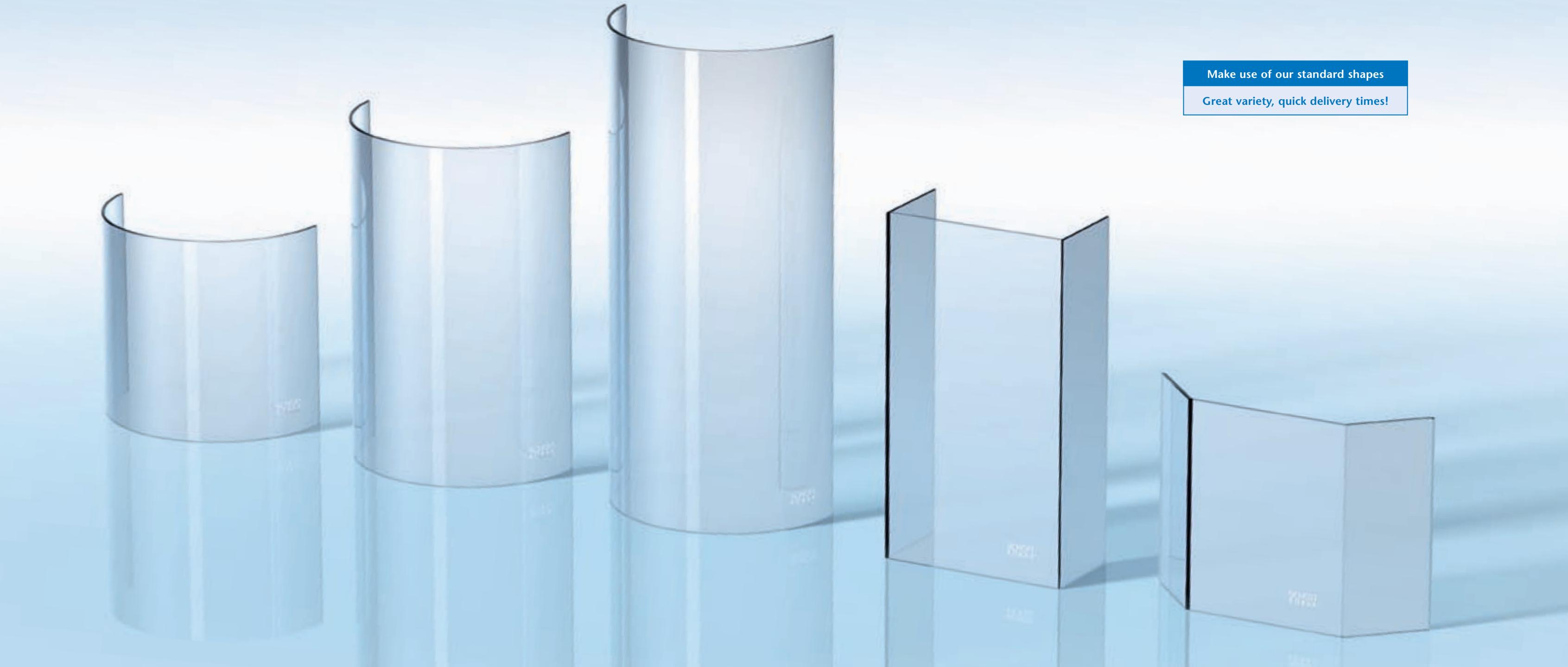
Nothing more will stand in your way, when it comes to experiencing the fire in a more emotional manner.

### Fire and flames for ROBAX® 3D panels

- great view of the fireplace from all sides
- round or angular in shape
- thickness of 4 or 5 mm
- singular or double bends
- many different bending angles possible



*Always a clear view  
of the fireplace:  
curved or shaped glass  
ceramic panels  
made of ROBAX®*



Make use of our standard shapes

Great variety, quick delivery times!



# DESIGN

## Fireplaces to match your lifestyle

Good design says more than words. And always shows itself from its best side.

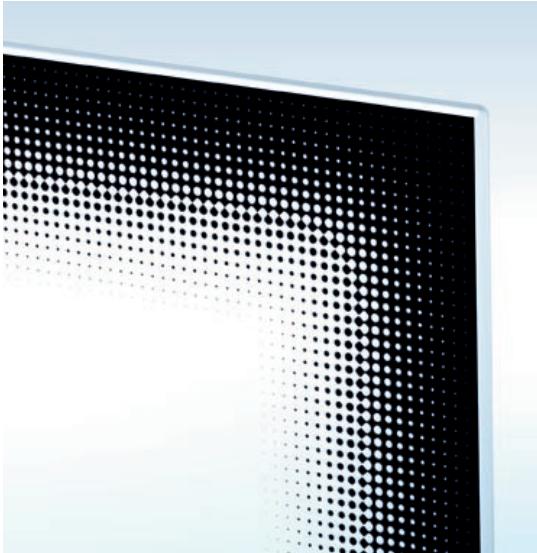
There are people who turn everyone's heads the moment that they enter the room. The reason is that they have that special something, their own personal style. Architectural elements can have this same effect by influencing the character of a home. By either fitting in perfectly with the surroundings or setting impressive accents.



Today, fireplaces offer much more than just the ability to light up a fire. They are part of the furnishings and underscore the love one has for a certain design. Whether traditional, rustic, austere or stylish: By using various decorative elements and coatings, SCHOTT ROBAX® gives a fireplace fire that special something.

*"One does not experience what one experiences, but rather how it was experienced."*

*Wilhelm Raabe*



*Individuality is what really counts – from the inscription on the glass ceramic panel to the decorative printing around the edges, to ROBAX® Magic. This panel is mounted inside the fireplace and allows for the fire to look even larger than it is, due to reflection.*

*The solutions that can be achieved with ROBAX® using special coatings are every bit as unique as the many different demands that glass ceramic panels must meet.*



## Decorative ROBAX® Panels

### Love at first sight

Tastes can differ. So do glass ceramic products made from SCHOTT ROBAX®.

Design-oriented and functional aspects, like the engraving of a logo or concealed mounting elements, clearly speak for decorative glass ceramic panels made of ROBAX®. In fact, ROBAX® always sets new decorative accents.

All flat and shaped panels are available in different patterns, depending on one's own design preferences. Even in popular black, for example.

Thanks to its unique transparency, ROBAX® Anti-reflective creates the impression that there isn't even a panel – and, thus, the illusion of an open fireplace.

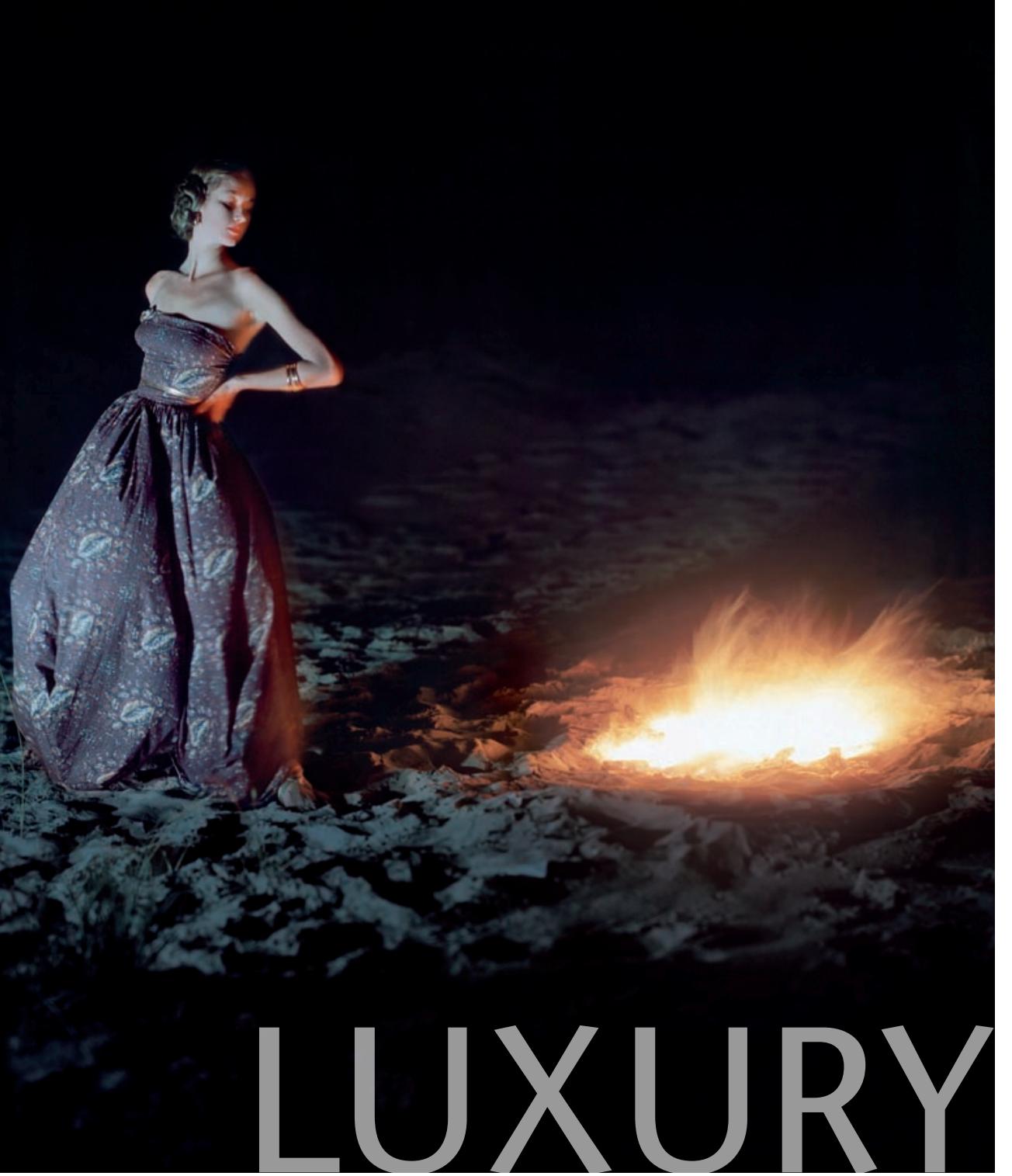
Completely the opposite happens with ROBAX® Mirror. Once the fire has burned down, the glass that was transparent suddenly becomes reflective. Ashes and soil can no longer be seen. Here, an uncoated, yet body-tinted material, like

ROBAX® Ambience, can be used as a resistant exterior panel, due to its thermal, physical and chemical material characteristics.

With ROBAX® Magic, an additional black pane is used on the inside of the fireplace that allows for the fire to appear larger by creating reflections.

#### Designed for individualists

- attractive colored patterns that perfectly match interiors
- customized inscriptions or designs possible
- processing of the edges possible by adding planar bevels
- accents can be set with bored holes
- upon request: view of the fire without reflections, mirror reflections to conceal the ashes or panels that project the image of the flames



## Longing for something very special

Granting special wishes calls for exclusive and customized design.

Lavishly granting one's own desires. And occasionally treating oneself to something very exclusive. Luxury takes on a different appearance for each of us. A fast car or expensive jewelry can qualify as luxury in the same way as good health and a happy family.

But one thing remains the same: Luxury feels good. On the outside, but also deep inside. Owning something very special – who could say no?

Whenever flickering flames blaze in such splendor, the fireplace transforms itself into a luxury item. SCHOTT ROBAX® offers just the right panels for custom designed fireplaces. And, thus, meets even the highest demands for unique shapes and sizes. Truly a luxury that one can kindle and enjoy every day.

"It is the possibility of realizing a dream that makes life interesting."

*Paulo Coelho*



*Exclusive living rooms call for exclusive solutions. ROBAX® sets standards based on glass ceramic solutions that are completely unique.*



*Showing personality:  
ROBAX® Giant and  
ROBAX® Dome are only  
two examples of our  
versatile product line.*

*Almost everything is possible:  
ROBAX® glass ceramic panels,  
like the shaped ROBAX® Elisse,  
for instance, fit in perfectly with  
exclusive design wishes.*



## A taste of something very unique

We not only see that something is quite special.  
We also sense and feel it.

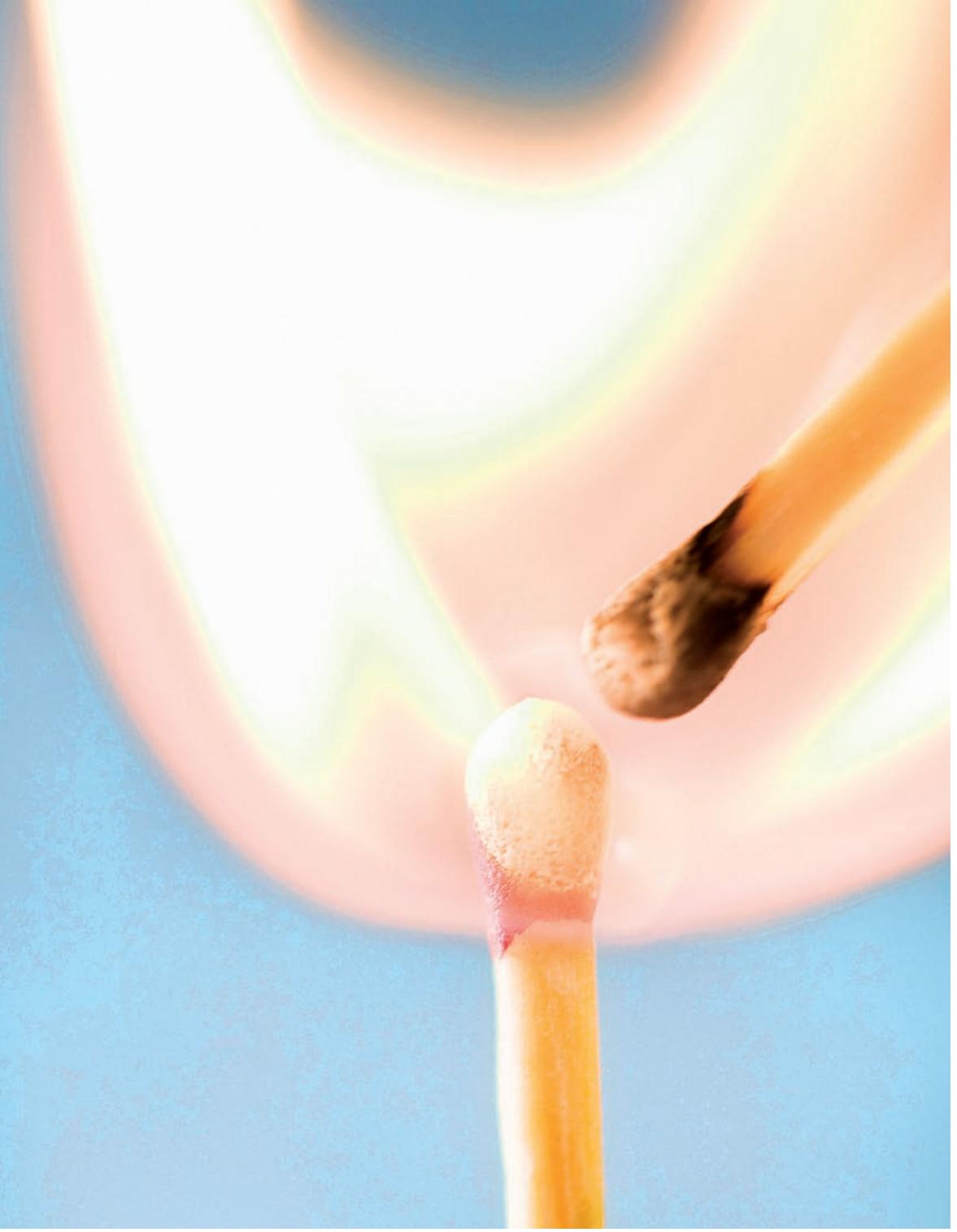
**Whether custom manufactured, factory made or limited edition:** The luxury segment of SCHOTT ROBAX® helps make customized dreams come true. In order to grant even the most unconventional of wishes, the ROBAX® product line also features panels you'll find very convincing, thanks to their innovative shapes and exclusive functionalities.

Like the panoramic glass ceramic ROBAX® Giant that spans across a wall, or the three-dimensional, dome-like enclosure ROBAX® Dome, or ROBAX® Elisse, a product that not only presents fires in a very attractive way, but is also certain to be a great eye-catcher.

Whatever luxury might mean to an individual, custom manufactured ROBAX® panels allow for even the most exclusive fireplace wishes to come true.

### Uniquely different

- innovative shapes and designs
- the highest standard, even for non-standardized shapes
- exclusive specialties for every taste
- exquisite quality from filigree to filling entire spaces



Your customers are just burning  
for this: the new customer magazine  
"atmosfire" promotes ROBAX®.



## A pleasure to work with you

Technology always heads to the future. However, when it comes to service, we often prefer to do things the old-fashioned way.

**Logistics** | Regardless of whether it's e-commerce or a customized approach to logistics: SCHOTT ROBAX® always provides top delivery performances.

**Application technology** | ROBAX® will answer all of your technical questions and also sponsors specialized expert workshops to professionally train you and your employees.

**Marketing** | For us, effective marketing begins with a qualified study – and then goes much further. By founding the "Club of atmosfire", for instance, a European Initiative for the Promotion and Penetration of Fireplaces and Stoves in Households, we proved our point. As a registered brand for quality that is engineered in Germany, the SCHOTT ROBAX® seal of approval speaks for itself.

**Quality** | We subject our products to regular quality assurance tests. The result: ISO Certification according to Germany's DIN 9001, as well as complete fulfillment of REACH requirements. And if anything should ever go wrong, we'll take care of your claim immediately.

**Global Presence** | Together means one is never alone. And a lot stronger. Our long-term business partnerships make it possible for us to react quickly and flexibly to customer requests.

**Research and Development** | For us as a technology company, innovation is the cornerstone of our everyday work. Futuristic development partnerships ensure the highest technological advances in all areas.

## 125 years of experience

Since the company was founded in 1884, SCHOTT has remained highly committed to glass.

At SCHOTT, glass is the main focus. But not only for the stove and fireplace industry, but also the fields of household appliances, pharmaceuticals, electronics and the solar energy, optical and automotive industries.

SCHOTT is an international technology company with annual sales of over 2.0 billion euros. Approximately 17,500 employees work for the company worldwide.

As a SCHOTT brand, ROBAX® remains on the road to success. Over 30 million ROBAX® fireplace panels sold make SCHOTT the market leader in the area of transparent, heat resistant materials. Today, the ROBAX® brand stands for innovative quality and is on its way to becoming a synonym for a warm and safe fireplace feeling.

ROBAX® fireplace panels guarantee genuine fire enjoyment. They make it possible to watch and experience the fire as closely as possible, yet protect you from being hit by a flying spark. ROBAX® gives you that "warm & safe" feeling every day.

### Trust in strong values

- excellent logistics
- professional application technology
- comprehensive marketing activities
- high quality
- global presence
- ongoing research and development



Our promise:  
warm & safe.

SCHOTT  
ROBAX®

ENGINEERED IN GERMANY

## Appearance

ROBAX® glass ceramic is transparent and has very little natural coloring with respect to the material itself or as a result of the manufacturing process. The surface is smooth on both sides, but has a slight texture.

## Quality

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

## Available shapes | Random sizes

Random sheets, i.e. stock sizes and jumbo formats are large-format glass ceramic sheets that have not yet been processed, especially with respect to the edges. These serve as the base material for cut-to-size panels.

**Stock sizes are available as follows:**

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

\*Other thicknesses upon request.

## Flatness | Random sizes

Flatness ( $f$ ) describes the maximum deviation from flatness for stock sizes. This is tested using a straightedge and a feeler gauge. The following applies to random sizes:

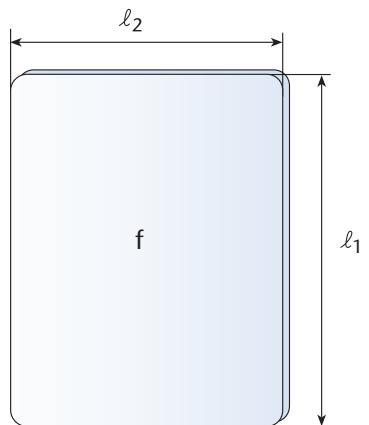
Flatness  $\leq 0.3\% \times$  measured length. Measured length at least 500 mm

ROBAX® can be cut to size within the standard dimensions to meet your specific demands. We would be happy to supply you with the minimum dimensions of cut-to-size panels upon request. The maximum dimensions of cut-to-size panels are equivalent to the minimum usable area of the respective panel.

## Available shapes | Flat cut-to-size panels

### Standard length tolerance cut-to-size panels, standard shape cut-to-size panels

Edge length $\ell_1$ $\ell_2$	Tolerance
$\leq 500$ mm	$\pm 1.0$ mm
$> 500$ mm	$\pm 1.5$ mm

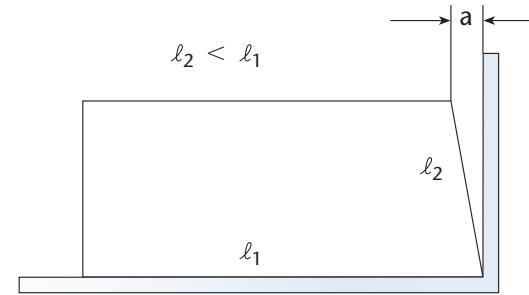


### Flatness | Flat cut-to-size panels

Flatness ( $f$ ) describes the maximum deviation from flatness and is tested using a straightedge and a feeler gauge. Maximum deflection for cut-to-size panels:  
Flatness  $\leq 0.3\% \times$  diagonal of the cut-to-size panel

### Rectangularity

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



The tolerance range  $a$  is the range within which the actual dimensions of the panel may vary.

### Rectangularity tolerance

Edge length	Tolerance
$\leq 500$ mm	$a \leq 1.0$ mm
$> 500$ mm	$a \leq 1.5$ mm

## Available shapes

### Shaped glass ceramic panels

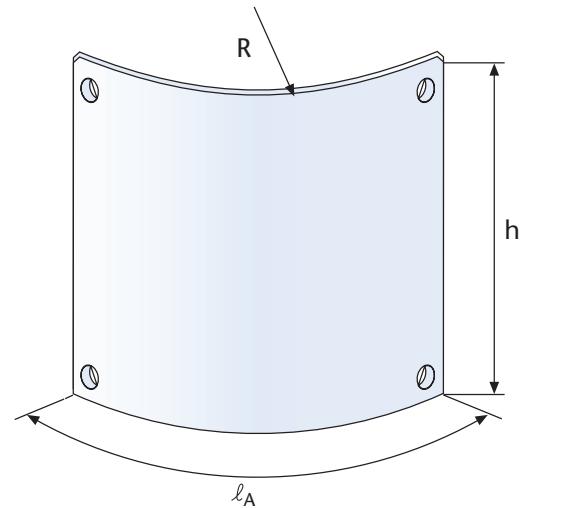
ROBAX® curved and angular bent panels are available in various versions in thicknesses of 3, 4 and 5 mm.

If you require a custom-tailored solution, please inquire early about our available models and shapes. This helps us reduce delivery times and costs. For curved panels, we recommend selecting panels from the standard product line. The delivery times for these are shorter.

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 into the gauge.

#### Curved

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



Minimum bending radius ( $R$ ) = 200 mm

**Make use of our standard shapes**

**Great variety, quick delivery times!**

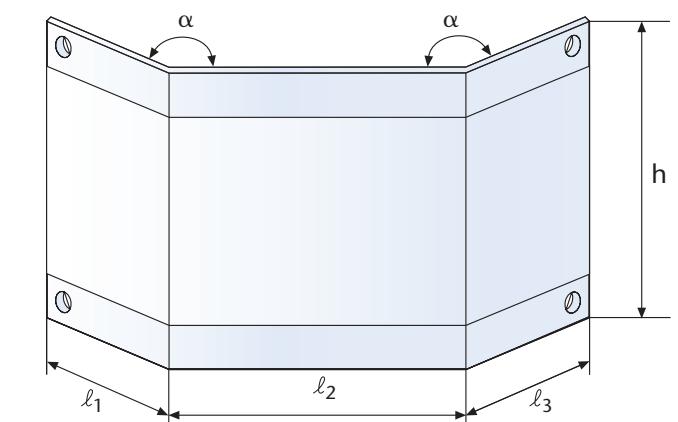
	Standard*	Maximum	Size	Tolerance
h panel height	200–600 mm	800 mm	$h \leq 500$ mm	$\pm 1.0$ mm
			$500 \text{ mm} < h \leq 600$ mm	$\pm 1.5$ mm
			$h > 600$ mm	Determined after first sample
$l_A$ bow length	300–700 mm	1,000 mm	$l_A \leq 500$ mm	$\pm 1.5$ mm
			$l_A > 500$ mm	$\pm 2.0$ mm

Special shapes upon request.

#### Angular bent, 2 angles

	Standard*	Minimum	Maximum	Size	Tolerance
h panel height	250–500 mm	170 mm	650 mm	$h \leq 500$ mm	$\pm 1.0$ mm
				$500 < h \leq 600$	$\pm 1.5$ mm
$l_2$ center section length	200–400 mm	170 mm	650 mm	$l_2$	$\pm 1.0$ mm
$l_1, l_3$ side section length	100–210 mm	60 mm	340 mm	$l_1, l_3$	$\pm 2.0$ mm
$\alpha$ bending angle	135°	90°	160°	$\alpha$	see slot gauge

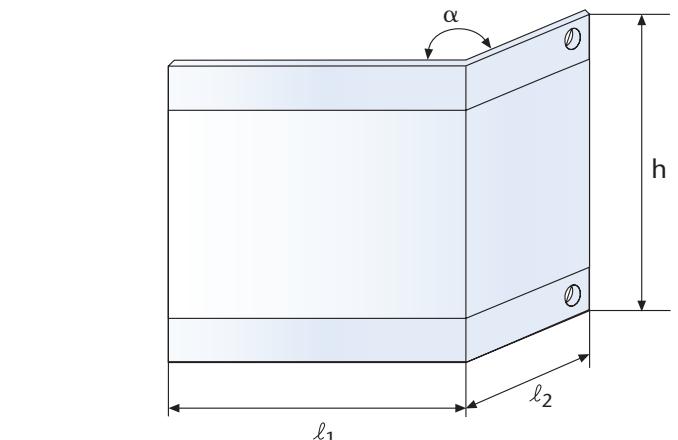
Special sizes upon request | all sizes are outer dimensions.



#### Angular bent, 1 angle

	Standard*	Minimum	Maximum	Size	Tolerance
h panel height	350–500 mm	170 mm	600 mm	$h \leq 500$ mm	$\pm 1.0$ mm
				$500 < h \leq 600$	$\pm 1.5$ mm
$l_1$ long side	400–800 mm	60 mm	860 mm	$l_1$	$\pm 2.0$ mm
$l_2$ short side	100–500 mm	60 mm	500 mm	$l_2$	$\pm 2.0$ mm
$\alpha$ bending angle	135°	90°	160°	$\alpha$	see slot gauge

Special sizes upon request | all sizes are outer dimensions.



#### Complex shapes

Perhaps you have something special in mind? Upon request, we are able to develop additional complex and innovative shapes in cooperation with you. You'll find examples on pages 20 to 21.

#### Panel thicknesses

Thickness	Tolerance
4 mm	$\pm 0.2$ mm
5 mm	$\pm 0.2$ mm

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

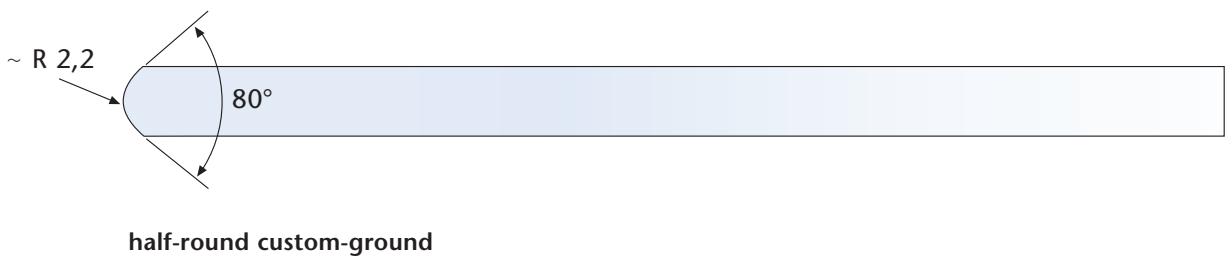
Other thicknesses upon request.

\*The standard range includes other specific shapes and exact dimensions.

## Processing and finishing

### Fine grinding for that perfect effect

Regardless of whether attractive appearance or top functionality is what interests you most, a variety of different types of processing and finishes give ROBAX® the finishing touch. You'll receive a perfect product that meets your needs.



### Edge and corner finishing

The standard edge finish for glass ceramic panels is based on DIN 1249. Standard grinding is used for flat and curved ROBAX® panels as in the following sketch:

### Bored holes

Upon request, ROBAX® is available with holes bored into it.

These holes are available with diameters of 4 mm or more. The position of the holes is subject to certain limitations with respect to the edges and corners of the panel, as well as the position of these holes in relationship to each other.

This limitation generally depends on:

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

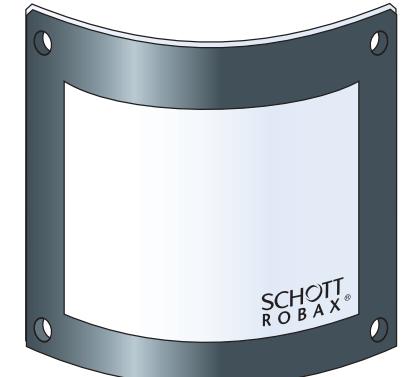
Further details available upon request.

## Processing and finishing

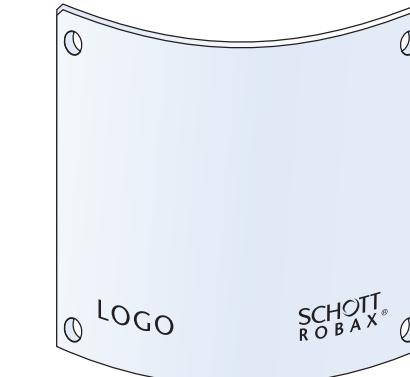
### Decorative patterns

Upon request, flat and bent ROBAX® can also be supplied with decorative patterns. These can fulfill either a functional or a decorative purpose. The decorative color black is available on a standard basis. Other decorative colors possible upon request.

Upon request, we can also supply the glass ceramic panel with your own logo.



ROBAX® in decorative black



ROBAX® with an individual logo

## Processing and finishing

### Coatings | ROBAX® IR

#### Processing and finishing

ROBAX® IR is available as a flat panel. The application of oxidic, electrically conductive coatings to one side of the glass results in a large share of the infrared portion of the radiation (and, thus the thermal radiation) being reflected. While light can easily pass through the panel, a protective shield is formed against excessive heat.

As a material that is highly resistant to high temperatures, ROBAX® IR is also particularly well-suited for applications in which good transparency and, particularly, reduced thermal radiation through the panel are required. And the coated glass ceramic offers other positive effects, as well:

- In some stoves and fireplaces, ROBAX® IR can contribute to a reduction in the soiling of the panels as a result of 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 towards better combustion and, therefore, lower emission values. Here, the panel can be fitted on either the fire side or the side facing away from the fire.
- The use of ROBAX® IR always makes heating with fire much safer. Because the panel transmits less heat, the floor temperature in front of the heating appliance also remains lower. To maximize this effect, the coating should be applied to the fire side.

The first two effects cited above depend to a large extent on the design of the stove in question and how it is used. Therefore, they cannot be guaranteed. For this reason, we strongly recommend that ROBAX® IR be tested for whether it produces the required effect before any serial production is undertaken.

#### Technical data

Glass thicknesses	4 and 5 mm
Maximum usable area	1,900 mm x 1,050 mm
Long-term temperature resistance	500 °C (932 °F)
Effect of the coating on the side facing away from the fire	Reduced soiling on the panel from soot and fumes*
Effect of the coating on the side facing the fire	Better combustion, lower emission values, safer heating*

\* These effects depend to a large degree on how the respective stove is built. Therefore, they cannot be guaranteed.

### Coatings | ROBAX® Mirror

This reflective layer is only offered for flat ROBAX® fireplace viewing panels. When no fire is burning, the reflective pane prevents the inside of the fireplace from being viewed to a large extent. When a fire is burning, however, viewing is excellent. The reflective layer is found on the side that faces away from the fire. To provide assistance with installation, the uncoated side is labeled accordingly.

#### Technical data

Glass thicknesses	4 and 5 mm
Maximum usable area	1,070 mm x 890 mm*
Long-term temperature resistance	up to 600 °C (1112 °F)
Mean visual reflection	approx. 50 %

\* Other dimensions upon request

### Coatings | ROBAX® Anti-reflective

The anti-reflective coating applied on both sides of the glass is available for flat ROBAX® fireplace viewing panels. It helps to avoid reflections from the area surrounding the fireplace and, thus, facilitates the best possible view of the heart of the fireplace. We recommend using ROBAX® AR only with gas devices.

#### Technical data

Glass thicknesses	4 and 5 mm
Maximum usable area	1,070 mm x 890 mm*
Long-term temperature resistance	up to 600 °C (1112 °F)
Reflection (at a wavelength of 550 nm)	approx. 1 %

\* Other dimensions upon request

If you have any questions, we would be happy to assist you.

## Processing and finishing

## Processing and finishing

## Tinted Panels | ROBAX® Magic

Thanks to their thermal, physical and chemical material properties, ROBAX® Magic glass ceramic panels are designed for use as highly resistant interior linings for stoves and fireplaces for heating private homes (electric, wood, oil or gas fireplaces and cassettes). Prolonged contact with flames or embers should be avoided. ROBAX® Magic opens up new design options for improving the appearance of room-heating devices that require low thermal expansion and high temperature stability. The impression of additional reflections created by the dancing flames and the ease with which glass ceramic panels can be cleaned make ROBAX® Magic a real alternative to the conventional materials used inside combustion chambers.

ROBAX® Magic is available in two different colors:

Material colors	
ROBAX® Magic Black	Black
ROBAX® Magic Grey	Dark Gray

The surfaces of ROBAX® Magic have dimples on one side and are smooth on the other.

## Temperature/time loading

Stress temperature	
560 °C/1040 °F	5,000 hours
660 °C/1040 °F	100 hours

## Technical data

Panel thickness	4 mm
Version	flat   boring of holes possible
Minimum size	100 mm x 100 mm
Maximum size	1,180 mm x 590 mm
Edge processing	C-grind
Corner radii	2 mm
Shape	Square with corner radius

Other dimensions and customized sizes upon request.

## Tinted Panels | ROBAX® Ambience

Thanks to their thermal, physical and chemical material properties, ROBAX® Ambience glass ceramic panels are designed for use as highly resistant exterior linings for stoves and fireplaces that are used to heat private homes (electric, wood, oil or gas fireplaces and cassettes). ROBAX® Ambience opens up new large-format design options for enhancing the appearances of room-heating devices that perhaps require low thermal expansion and high temperature resistance.

ROBAX® Ambience can be decorated on a customer-specific basis to include a broad range of ceramic colors. ROBAX® Ambience is available in two different colors on a standard basis:

Material colors	
ROBAX® Ambience Black	Black
ROBAX® Ambience Grey	Dark gray

The surfaces of ROBAX® Ambience have dimples on one side and are smooth on the other.

## Temperature/time loading

No thermally-induced heat stress breakage occurs with ROBAX® Ambience at temperatures of up to 500 °C (932 °F).

## Technical data

Panel thickness	4 mm
Version	flat   boring of holes possible
Minimum size	100 mm x 100 mm
Maximum size	1,180 mm x 590 mm
Edge processing	C-grind
Corner radii	2 mm
Shape	Square with corner radius
Color patterns (screen printing)	Several different colored patterns available Logo printing not obligatory

Other dimensions and customized sizes upon request.

## Processing and finishing

## Technical properties facts and figures

### General information

In addition to its attractive appearance, 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	$\rho$ approx. 2.6 g/cm <sup>3</sup> (at 25 °C / 77 °F)
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.

### 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 ( $\geq 10^4$  N/mm<sup>2</sup>) is practically irrelevant. It is reduced by the effect of unavoidable surface defects (in the case of unprotected surfaces) to a practical value of approx. 20 bis 200 N/mm<sup>2</sup> 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  $\alpha_{(20-700^\circ\text{C})}$  (0 ± 0.5)  $\times 10^{-6}/\text{K}$

### 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  $T_{\max} \leq 700^\circ\text{C}$  (1292 °F).

### Resistance to thermal shock (RTS)

The RTS value measures the panel's ability to withstand a sudden thermal shock. No breakage caused by thermal stress occurs at a maximum temperature of  $T_{\max} \leq 700^\circ\text{C}$  (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:

Usage temperature	Usage time
560 °C / 1040 °F	5,000 hours
660 °C / 1220 °F	100 hours

## Technical properties facts and figures

### Chemical properties

#### Chemical composition

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

The glass can be reused by recycling the material.

#### Hydrolytic resistance

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

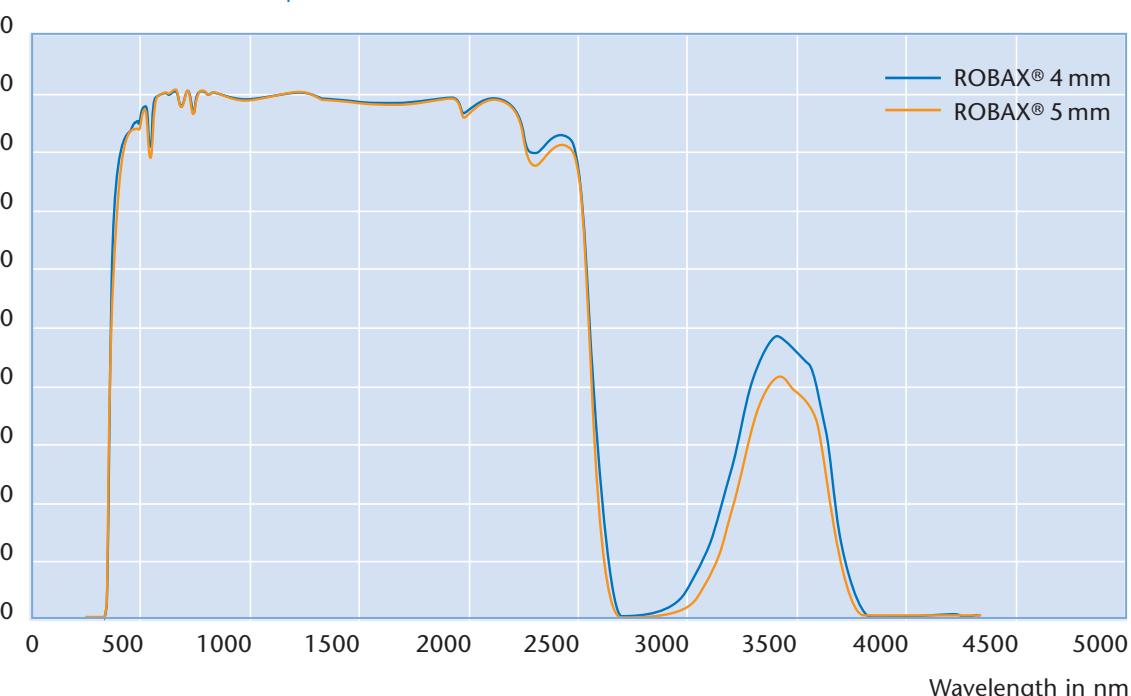
Hydrolytic class	Possible description
HGB 1	high-resistance glass
HGB 2	resistance glass
HGB 3	medium-resistance glass
HGB 4	low-resistance glass
HGB 5	very low-resistance glass

#### Surface modifications caused by use

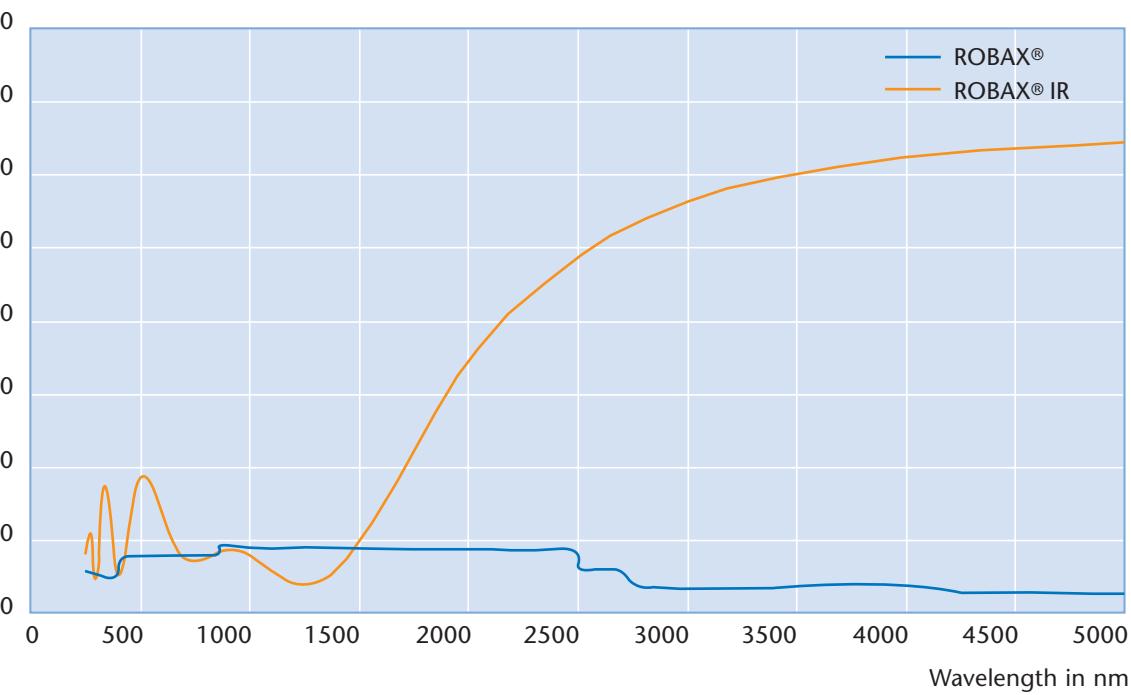
ROBAX® has a high degree of resistance to surface attacks. In individual cases, however, surfaces can experience changes under critical conditions, e.g. corrosive combustion gases (formation of acid at high temperatures). In such cases, practical tests should be conducted before using ROBAX®.

### Optical properties

#### Transmission ROBAX® | 4 mm and 5 mm thicknesses



#### Reflection ROBAX® and ROBAX® IR | 4 mm | in comparison



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

## Technical properties facts and figures

## Installation

### 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 ROBAX®:

- When determining the sizes of the frame and panel, the differences in thermal expansion behavior of 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 recommend permanently elastic heat-resistant materials, such as mineral fiber materials, as an insert between the glass ceramic and the metal.

### Frameless fitting

When ROBAX® is used in frameless doors, there is a danger of mechanical stress (bending stress, impact, shock, etc.). In such cases, please pay close attention to the following basic points. Of course, the general information 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 by a suitable material that is both stable in temperature and flexible (e.g. glass-fiber cord between hinge/handle and panel).
- Contact pressure on the panel that could cause it to bend under force must be avoided. This can be accomplished by restricting the torque or using a mechanical stop that limits the screw penetration, for example.

- Closing the door should not cause any additional pressure (or leverage) on the side of the panel that is mounted with a hinge.
- The hinges should not jam during closing, as the corresponding resistance forces could be transferred to the glass when the door is opened or closed.
- Bending forces are exerted on the corners of the glass panel during locking. These depend, among other things, on the position of the holes drilled for the locking mechanism and the pressure that the user needs to exert to lock the door. There is no cause for concern regarding strength, as long as the pressure force that is applied to the panel does not exceed 40 N. No design limitations are necessary with respect to the size and position of the holes drilled, as long as the standard recommendations for our product information are followed.
- The diameter of the holes that are drilled must be selected in such a way that expansion of the metallic components (bushings, mounting rails, etc.) as a result of temperature is still able to take place (play). In addition, the edges of the holes must be of sufficient quality and have a chamfered edge on both sides. The edges of the panel should be ground.

### Delivery times

Undecorated flat ROBAX® panels	approx. 2 weeks
Standard ROBAX® 3D panels	approx. 4 weeks
Non Standard ROBAX® 3D panels	approx. 6 weeks
Decorative flat ROBAX® panels	approx. 3 weeks
Decorative ROBAX® 3D panels	approx. 6 weeks
Exclusive ROBAX® panels	up to 3 months

Delivery time calculated as of the time the order is received; ex works.

Concrete standard dimensions on request

### Care

ROBAX® panels can be cleaned using conventional glass cleaners. Note: Please by no means use abrasive sponges, scouring agents or abrasive cleaning agents, as damages can occur to the surface.

ROBAX® fragments are to be disposed of as normal household waste, not in the glass recycling container.

## Installation | Other

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We look forward to working with you

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