

SCHOTT
ROBAX®

IN FRONT

Glass-ceramic for fireplaces



SCHOTT
ROBAX®

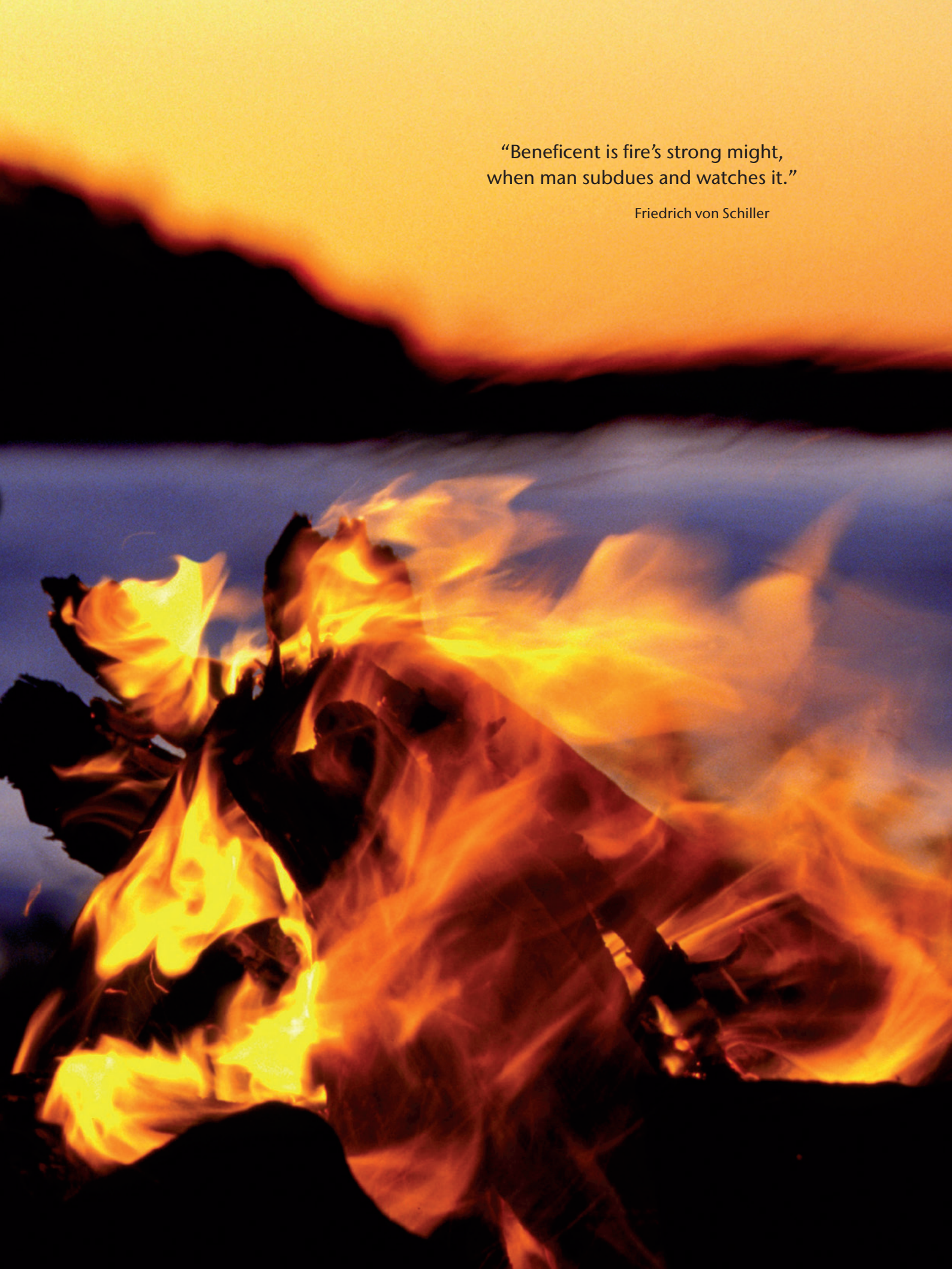


SCHOTT is a leading international technology group in the areas of specialty glass and glass-ceramics. With more than 130 years of outstanding development, materials and technology expertise we offer a broad portfolio of high-quality products and intelligent solutions that contribute to our customers' success.

SCHOTT ROBAX® is another SCHOTT brand that is on the road to success. Over 100 million ROBAX® fire-viewing panels have been sold more than 40 years and have made SCHOTT a leading manufacturer of heat-resistant, transparent materials. With our remarkable variety of products and services, we team up with fireplace manufacturers to take advantage of market opportunities. As a joint source of inspiration for product, market, sales and distribution ideas, SCHOTT fulfills end customer wishes. For more information about our value-added products please visit our website www.schott.com/robax.

“Beneficent is fire’s strong might,
when man subdues and watches it.”

Friedrich von Schiller



Contents

- 6** SCHOTT ROBAX® IN FRONT
- 8** Function | Flat ROBAX® panels
- 10** Coziness | ROBAX® 3D panels
- 12** Design | Decorative ROBAX® panels
- 14** Luxury | Exclusive ROBAX® panels
- 16** ROBAX® Service Experience
- 18** Technical information

SCHOTT ROBAX® IN FRONT

A blazing and crackling fire warms our hearts.

Indeed, a flickering campfire in the wild is especially appealing. But when it comes to our own four walls, safety, visual and heating considerations stand front and center. The options for transparent glass-ceramics from SCHOTT are as varied as the ideas of fireplace manufacturers.

ROBAX® fire-viewing panels “engineered in Germany” ensure real enjoyment while providing full protection. They enable a close-up view and feel of the fire, with no danger from flying sparks.

ROBAX® glass-ceramic is extremely heat resistant, sturdy, and displays very low thermal expansion. For a short time the panels even withstand extreme temperatures of up to 760 °C (1,400 °F), as well as considerable shifts in temperature and thermal shocks. Precisely such features as temperature stability, transparency, heat transmission and long lifespan are what allows ROBAX® – especially in comparison to conventional flat glass – to guarantee perfect protection from fire hazards.

With our comprehensive knowledge of products, markets and consumers worldwide, we can provide you complete product development opportunities from concept ideation to development, to consumer launch, backed by exceptional customer service.

We see ourselves and our expertise in specialty glass as a joint source of inspiration for your product, market, sales and distribution ideas. We team up with you to develop product features and components even before they are needed by end customers.

For more information about our value-added products please visit our website www.schott.com/robax.

SCHOTT
ROBAX®

Fire-viewing panels
Life. In front.



Engineered in
Germany



Natural raw
materials



Temperature
resistant



Long life
time



Cleaning solution
available



Function

Flat ROBAX® panels

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.

SCHOTT ROBAX® IN FRONT

- Flat panels for increased functionality
- In sizes up to 1,954 x 1,100 mm
- Thicknesses of 4 and 5 mm
- In many different formats
- ROBAX® IR Max (also available with decoration) for pleasant warmth in the living room, no overheating*

* Please see also our datasheet: www.schott.com/robax



Coziness

ROBAX® 3D panels

Curved or angular bent. One or two angles: The various designs that ROBAX® 3D panels come in offer completely new views of the fire inside a closed fireplace.

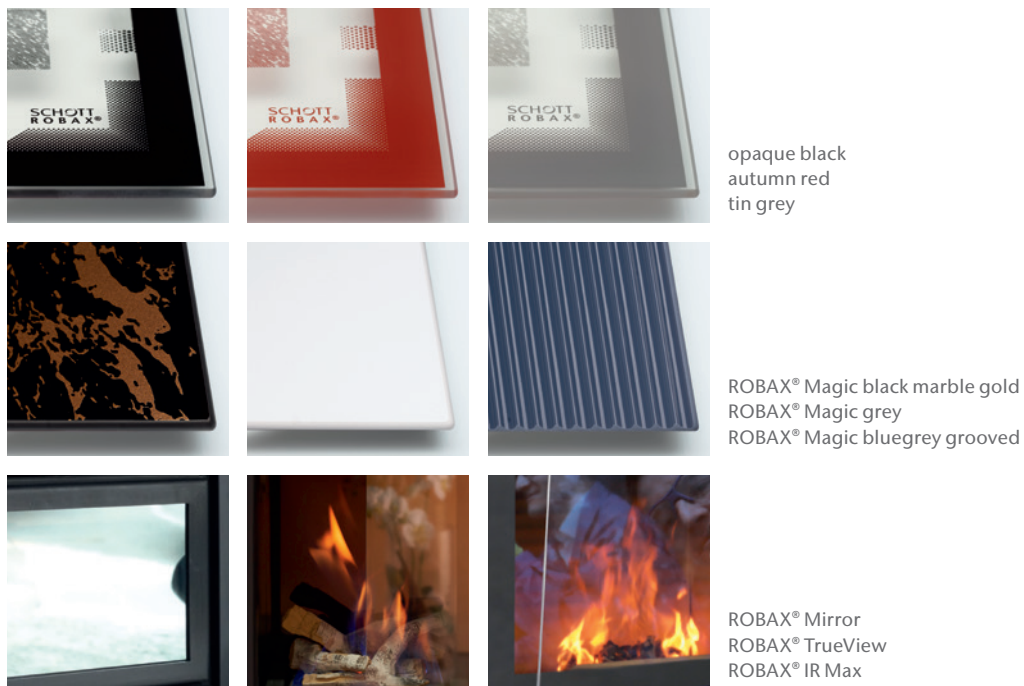
SCHOTT ROBAX® IN FRONT

- Round or angled shapes
- Singular or various bends
- Many different bending angles, radii and opening angles possible
- Good views of the fire from all sides









Design

Decorative ROBAX® panels

All flat and 3D panels are available in a variety of decorative designs according to your preference, either in black or one of many other colors.

SCHOTT ROBAX® IN FRONT

- Various decoration colors for pattern designs and logos
- ROBAX® Mirror: panels with reflective coating*
- ROBAX® TrueView: panels with anti-reflective coating*
- ROBAX® Magic with Signature Impressions: interior glass-ceramic panels for gas fireplaces and stoves*
- ROBAX® IR Max with decoration*
- ROBAX® NightView*

* Please see also our datasheet: www.schott.com/robax



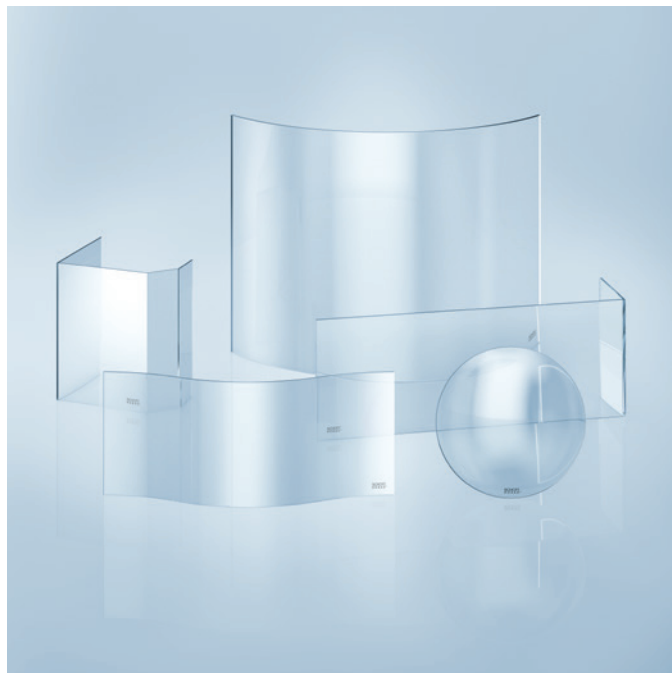
Luxury Exclusive ROBAX® panels

The luxury segment of SCHOTT ROBAX® helps make customized dreams come true.

SCHOTT ROBAX® IN FRONT

- Largest producible curved panel ROBAX® Giant
- Largest producible angular bent ROBAX® panel
- More than two bending edges (on request)
- ROBAX® Dome
- Wave shape
- Big bending radius*
- 1 x 90° ROBAX® with IDEAL Bending Edge*

* Please see also our datasheet: www.schott.com/robax



SCHOTT ROBAX® Service Experience: One of a kind.

Teaming up with SCHOTT ROBAX® makes for a very special service experience. With us, smooth collaboration is not just a desire, but lived out on a daily basis.

Research and development | Innovations are the impetus of our tech company. With trend-setting development partnerships, we ensure not only high-level technological progress in all areas, we also guarantee that you will soon look forward to the latest innovations from SCHOTT ROBAX®.

Quality | Steady series production since 1979 has yielded an impressive result: 100 million glass-ceramic panels sold. They are not only UL certified, but undergo thorough quality control.

Worldwide distribution | We hear our customers' requests – regardless of the language. In 34 countries, they benefit from sales staff who speaks their language and promptly and flexibly respond to every customer request. This major service advantage provides you with a permanent and dedicated contact person who has a direct line to the headquarter.

Logistics | Experience excellent delivery performance. SCHOTT ROBAX® boasts short delivery times and custom-tailored logistics concepts.

Application service | We deliver more than glass-ceramic. Our service package always includes more than 40 years of experience. As a competent partner with an applications lab and supporting tests, we help you save development costs and time.

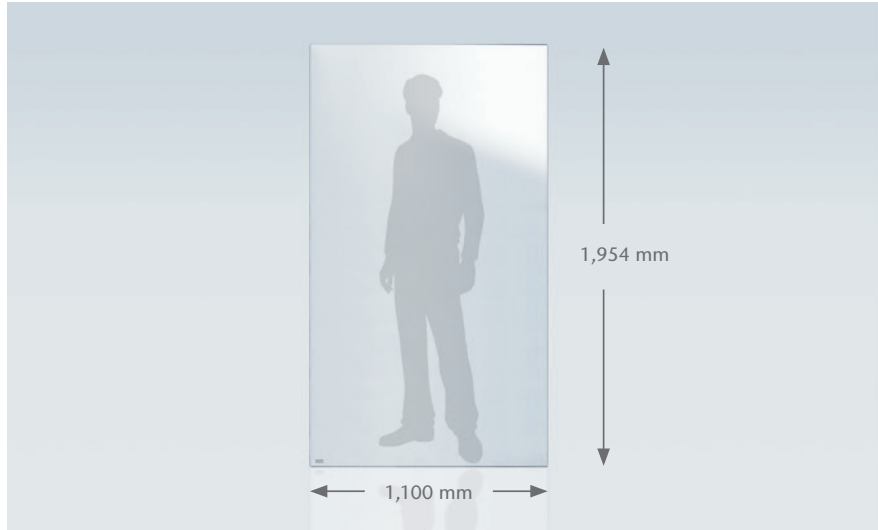
Marketing Service | Our comprehensive knowledge of end users and key markets around the world help you tap into new sales territories and further your success.

SCHOTT ROBAX® IN FRONT

- Rigorous research and development
- High quality
- Global presence
- Excellent logistics
- Professional applications engineering
- Comprehensive marketing activities



Technical information



Flat ROBAX® panels

Appearance

ROBAX® glass-ceramic is transparent and has very little natural coloring with respect to the material itself as a result of the manufacturing process. The smooth surface on both sides has a high-quality, silky matt appearance.

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 (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.

Jumbo formats are available in the following sizes:

Edge length	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

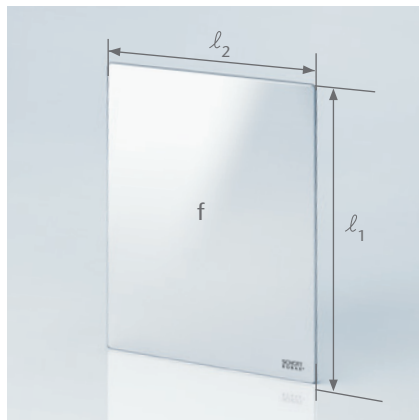
Flatness | Random sizes

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 edge lengths area of the respective panel.

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

Edge length l_1, l_2	Tolerance
≤ 500 mm	± 1.0 mm
> 500 mm	± 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, ≤ 2.5 mm maximum

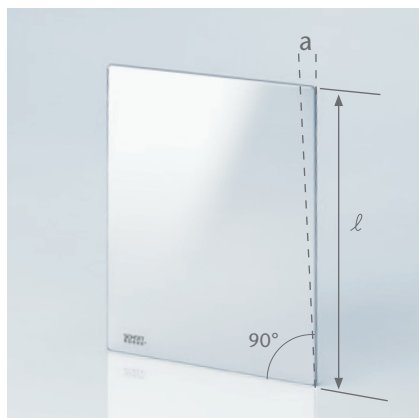
Rectangularity

The limits shown in the sketch on the right 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
≤ 500 mm	$a \leq 1.0$ mm
> 500 mm	$a \leq 1.5$ mm



ROBAX® 3D panels

Appearance

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

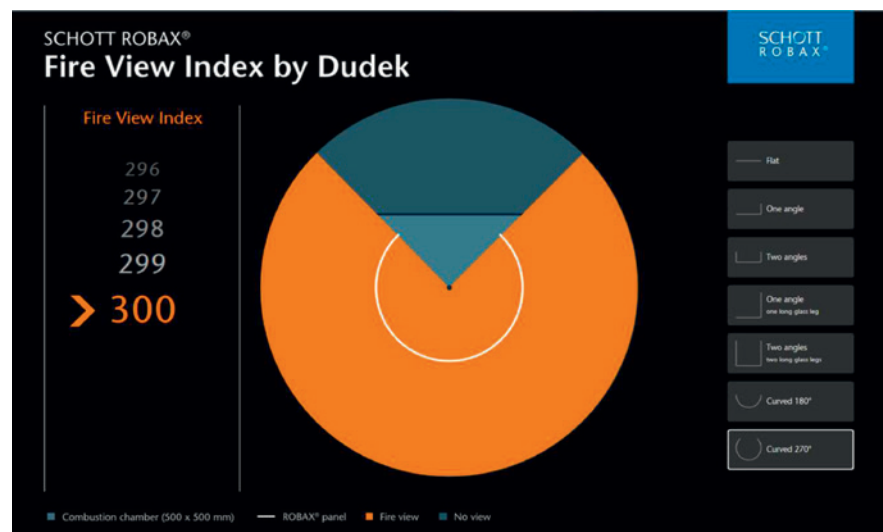
If you require a custom-tailored solution, please inquire early about our available models and shapes. This helps us reduce delivery times and costs. For curved panels, we recommend selecting panels from the standard product line (please see page 21).

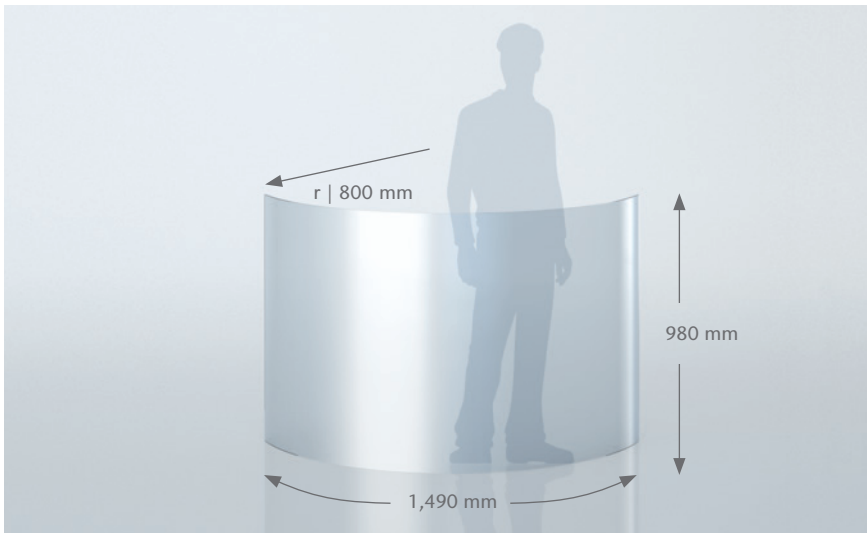
All geometric tolerances are tested using a two-dimensional slot gauge. This is a plastic gauge with a defined slot. The glass-ceramic panel must fit easily into the gauge.

SCHOTT ROBAX® Fire View Index by Dudek

Do you already know our SCHOTT ROBAX® Fire View Index by Dudek? With this tool, we can now calculate the view of the fire.

Shaped glass-ceramic panels enlarge the view of the fire. With the Fire View Index by Dudek (FVI), SCHOTT ROBAX® is now able to show how much more of the fire is viewable through a shaped panel compared to a flat one.





ROBAX® Giant – the largest producible curved ROBAX® panel

Curved

Available shapes

Curved ROBAX® glass-ceramic panels are available in a number of different versions. Geometries outside the product range mentioned below upon request.

	Product range
h panel height	100 – 800
l_A arc length	210 – 1,100
r bending radius	225 – ∞

All dimensions in mm | All dimensions are exterior dimensions
Tolerances according to technical delivery specifications





ROBAX® 3D panels

Available shapes

Angular bent, 1 angle

Geometries outside the product range mentioned below upon request.

	Product range
h panel height	230 – 815
l_1 long side section	220 – 1,100
l_2 short side section	60 – 590
α bending angle	90° – 160°

All dimensions in mm | All dimensions are exterior dimensions
Tolerances according to technical delivery specifications





Angular bent, 2 angles

Geometries outside the product range mentioned below upon request.

	Product range
h panel height	230 – 815
l_2 center section length	170 – 900
l_1, l_3 side section length	60 – 420
α bending angle	90° – 160°

All dimensions in mm | All dimensions are exterior dimensions
Tolerances according to technical delivery specifications



Perhaps you have something special in mind? Upon request, we are able to develop additional, innovative shapes in cooperation with you. You'll find examples on page 15.



Decorative ROBAX® panels

Processing and finishing

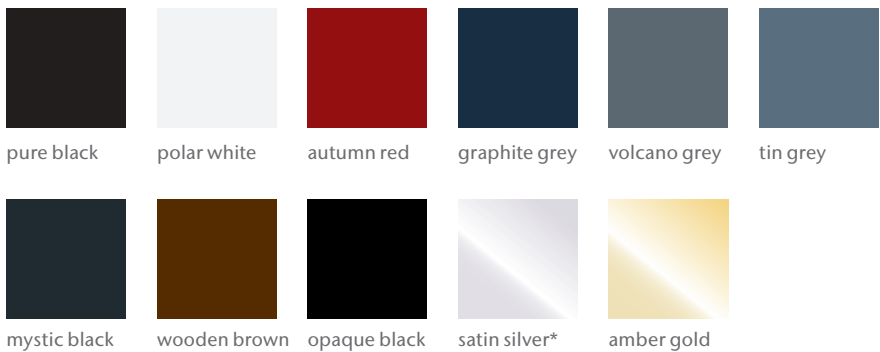
Decoration

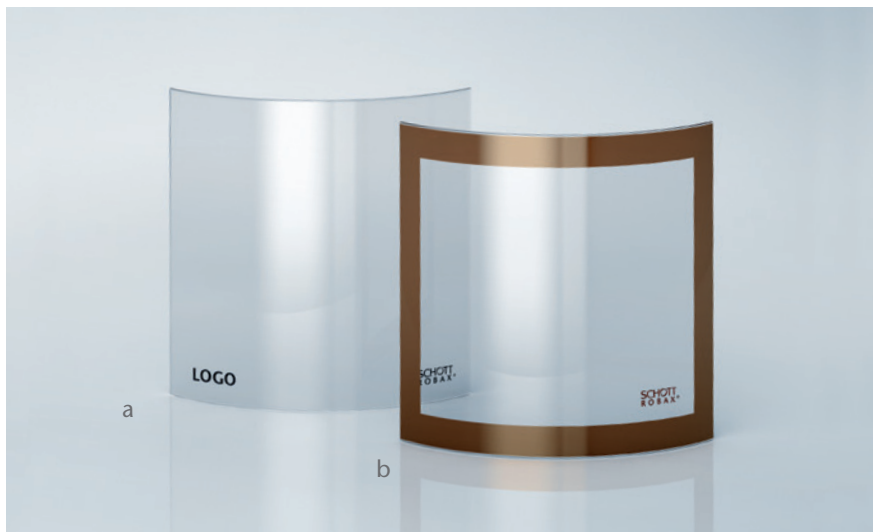
Flat and shaped ROBAX® panels with decoration are available upon request. The decoration can serve a functional as well as decorative purpose. The colors below are available. "Amber gold" and "satin silver" are very transparent colors with a glitter effect, the other colors are opaque.

For area coverage larger than 70 %, the glass-ceramic requires a thickness of 5 mm. (50 % for opaque black).

The depicted color impressions are not authoritative. We will be glad to send you an original color sample upon request.

* only for logo





a | ROBAX® with an individual logo

b | ROBAX® with decoration in wooden brown

On request we can supply a glass-ceramic panel with a personalised logo.

METALLIC Design Effects

Individual decorations with finely crafted floral elements and puristic linear forms with METALLIC effect create a unique atmosphere. The decorative effect of a 3D-panel is now upgraded by the color and design options and flat panels get a perspective elegance.

Following METALLIC Design Effects are available:

- METALLIC anthracite and mystic black
- METALLIC ochre and mystic black
- METALLIC red and mystic black

In addition the matte color combinations “matte stone grey and mystic black” and “matte stone grey and opaque black” can be delivered. The latter is only released for logos.



Technical properties of transparent ROBAX® glass-ceramic panels

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 always shows confident appearance. 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.

Technical properties

Panel thicknesses

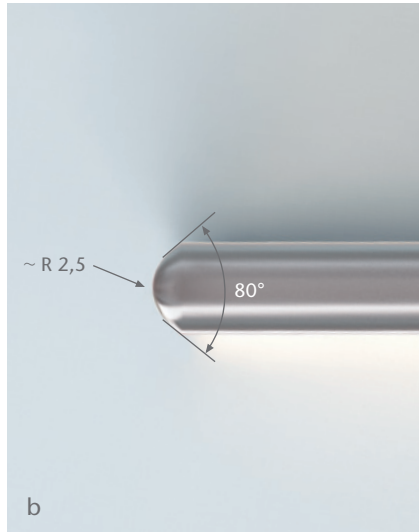
ROBAX® is available in the following standard thicknesses with corresponding admissible tolerances:

Thickness	Tolerance
4,0 mm	± 0.2 mm
5,0 mm	± 0.2 mm

Further thicknesses upon request

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.



a | Custom ground U-shaped profile. Specially rounded edges can be produced on customer request.

b | Edges are round as standard with round corners.

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 sketch above.

Drilled holes

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

These holes are available with diameters of 7 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:

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

Further details available upon request

Mechanical properties

Density ρ	approx. 2.6 g/cm ³ (at 25 °C / 77 °F)
Bending strength σ_{bB}	approx. 35MPa*

* The test is carried out in accordance with DIN EN 1288 part 5, 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.

Comments on mechanical properties

Values presented regarding 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 ($\geq 10,000$ N/mm²) 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 to 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, 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
- 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 $\alpha_{(20-700\text{ °C}/68-1,292\text{ °F})} (0 \pm 0.5) \times 10^{-6}/\text{K}$

Resistance to temperature differences (RTD)

The RTD 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 $T_{\text{max}} \leq 700\text{ °C}$ (1,292 °F).

Resistance to thermal shock (RTS)

The RTS value measures a hot panel's ability to withstand a sudden thermal shock by cold water (15 °C/ 59 °F). No breakage caused by thermal stress occurs at a maximum temperature of $T_{\text{max}} \leq 700\text{ °C}$ (1,292 °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 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 (please see table on the right).

Temperature/time load capacity

610 °C/1,130 °F	1,000 hours
660 °C/1,220 °F	100 hours

Valid for inhomogeneous heating

Chemical properties

Chemical composition

The chemical composition of SCHOTT ROBAX® complies with the requirements for a glass-ceramic in accordance with EN 1748 part 2. The special glass is produced of natural raw materials and can therefore be used as raw material for the glass-ceramic production.

Water resistance

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

Alkali resistance

In line with ISO 695: **min. Class A1**

Acid resistance

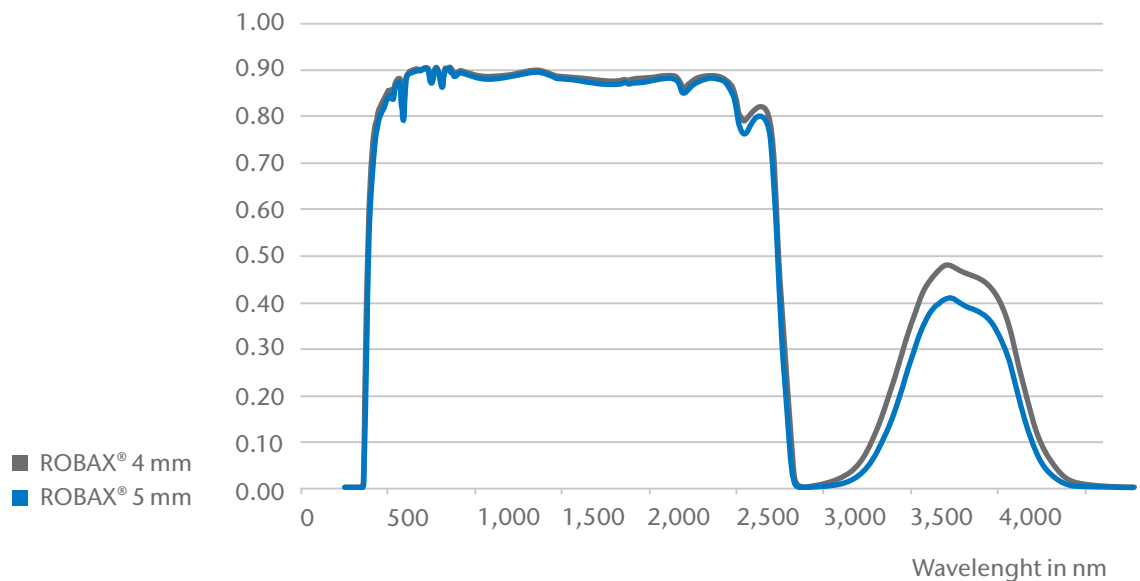
DIN 12116: **min. Class S2**

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 and 5 mm thickness

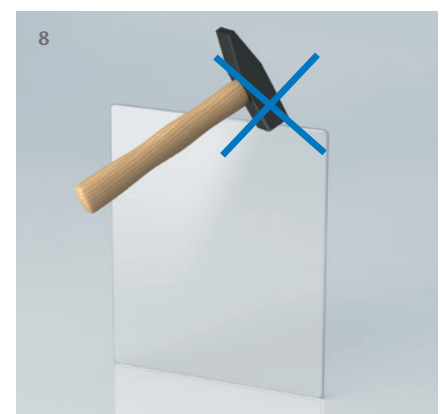
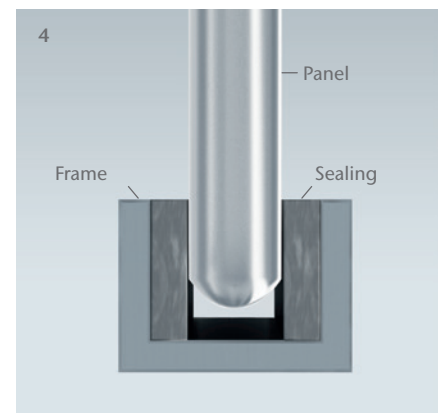
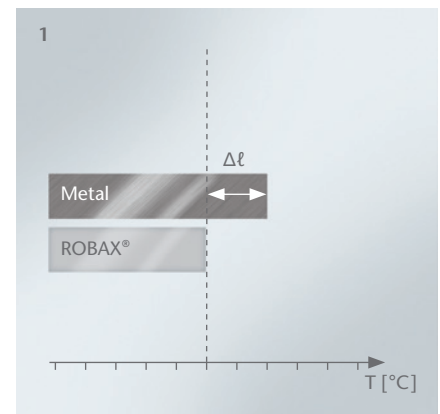


These are typical transmission curves for the material thicknesses mentioned that are based on individual measurements.

General information

1. Even under thermal load, ROBAX® glass-ceramic panels show near-zero thermal expansion. For this reason, the different thermal expansion of the various framing materials in relation to the ROBAX® fire-viewing panel must be taken into consideration for the design of the entire fireplace.
2. Additionally, the possible manufacturing tolerances of the frame and the glass-ceramic panel have to be considered.
3. Contact pressure which leads to bending stress on the panel must be eliminated. This can be achieved, for example, by limiting torque or with a limiter which limits screw-in depth.
4. As a marginal torsion of the frame construction cannot be excluded it must be prevented that this torsion is transmitted onto the ROBAX® panel by using a thermally stable, permanently elastic sealing (e.g. fiberglass or mineral fiber fabrics).
5. If – due to constructive reasons – the pressing of the fire-viewing panel in the frame is inevitable, then the contact pressure must be evenly distributed (never at single points) over the circumference of the panel.
6. The panel must not come into direct contact with metal frame parts. Also here, it is recommended to use a thermally stable, permanently elastic seal.
7. Additionally, the instructions of the seal manufacturers must also be followed, in particular with regard to contact pressure of materials.
8. During installation, it is essential to protect the glass-ceramic panel, especially the edge areas from potential damage (impacts, bumps and scratches).
9. Generally, SCHOTT advises against gluing the fire-viewing panel. Nevertheless, if a high-temperature-resistant silicone is applied circumferentially on the panel, the elastic limit of the silicone must be considered. Due to the excellent bonding properties of glass to silicone, exceeding the elastic limit can lead to cracked or broken glass-ceramic panels. Punctual gluing with high-temperature resistant silicone is possible for sealing purposes.

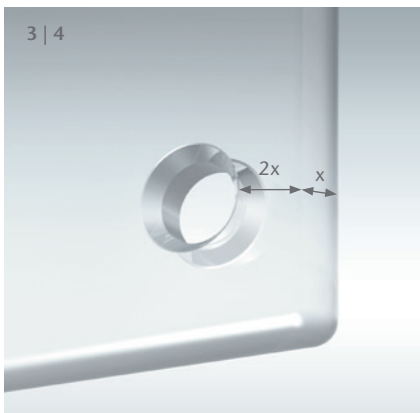
Installation



Frameless Installation

A frameless design is characterized by a concealed substructure, onto which the ROBAX® fire-viewing panel is mounted and which is therefore not visible when the fireplace door is closed. Thus, the panel edges are not enclosed by a protective frame and may be exposed to additional mechanical stress (impacts, bumps etc.). Therefore, the following aspects have to be taken into consideration when designing a frameless door – in addition to the general information:

1. The weight of the glass-ceramic panel is held either by a supporting bar or completely by screws. For every contact between fire-viewing panel and metal (frame construction behind the panel, supporting bar and/or screw lead-throughs) a suitable and thermally stable material that is also flexible (e.g. fiberglass or mineral fiber fabrics) must be used as an intermediate layer.
2. Punctual strains, caused for example by the weight of the ROBAX® fire-viewing panel „resting“ on the screws or screw lead-throughs, should be kept to a minimum, e.g. by using screw sleeves which at the same time prevent unacceptable glass-ceramic-metal contact.
3. The drilled hole diameter in the fire-viewing panel must allow for thermally-induced expansion of metal components (lead-throughs, supporting bars, etc.). During assembly please pay attention that the quality of the edges of the drilled holes is flawless.
4. The minimum distance between drilled hole edge and outer edge of the panel has to be at least twice the thickness (x) of the fire-viewing panel. Detailed information regarding the configuration of drilled holes is only possible with knowledge of the specific frame design.
5. Bending forces, which are exerted when the panel is latched, depend largely on the position of the drilled holes for the latching mechanism and the amount of manual pressure exerted by the user needed for latching. Mechanical strength is not an issue, providing that the required pressure exerted on the panel does not exceed 40 N.



Installation of angular bent fire-viewing panels

In the following description, there are some valuable and important hints for the assembly of angular bent fire-viewing panels (especially fire-viewing panels with one or two 90° angles) with regard to the construction of the doorframe:

1. For angular bent ROBAX® panels, an optimal frame construction, especially in the bending edge area, is characterized by the following criteria (see figure 1):

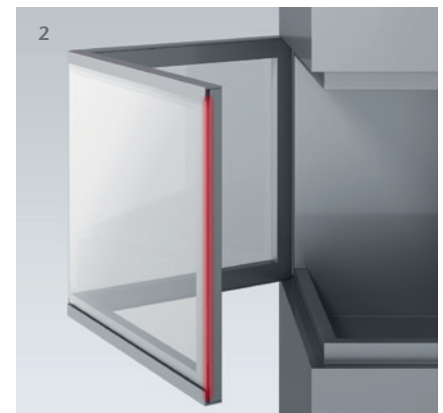
- No frame profile (1) in the bending edge area of the glass-ceramic panel (P)
- Separate frame profile strips in the bending edge area (2) in order to avoid transmission of thermal expansion from the edge area of the frame onto the fire-viewing panel
- Recommendation of additional slits (3) in the frame profiles close to the bending edge for better compensation of thermally induced torsions of the frame and absorption of deviations of frame or panel geometry due to tolerances
- Long holes in the frame profile (4) to avoid tensile stress in the edge area of the ROBAX® panel
- Rounded or chamfered corner geometry (5) of the supporting/inner frame
- Suitable sealings (6) between the door frame and the inner side of the glass-ceramic panel as well as between the frame profile and the outer side of the panel



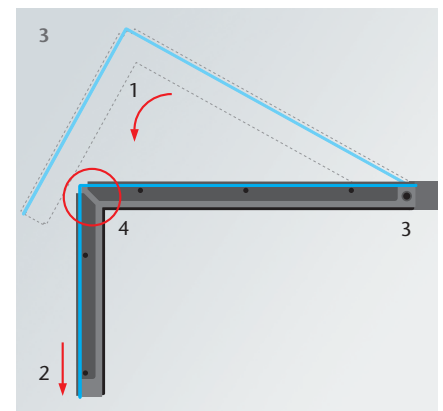
2. In addition it is important to ensure that the vertical edge of the panel (see red area in figure 2) is also supported by a frame bar.

3. If, on the other hand, the vertical panel edge remains free, it may come to mechanical overloading of the panel in the event of a dynamic load (e.g. when the fireplace door is slammed). That would result in the following scenario (figure 3 shows a top view of the installed fire-viewing panel):

- Closing movement of the hinged door in the stated direction of rotation (1)
- When the frame is engaged or stopped, the panel receives an impulse in the indicated direction (2)
- The long leg of the ROBAX® panel is held back by its fixation in the door frame (3); but the short leg can, in principle, move in the direction of movement if there is no vertical frame bar as a counter bearing
- Consequence: Increased risk of fracture due to occurring tensile stresses at position (4)



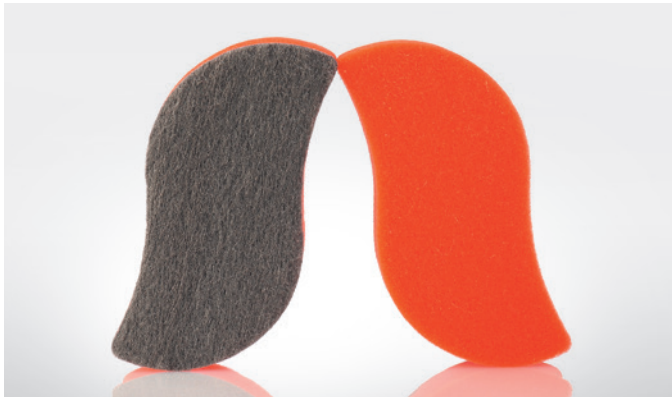
4. This scenario is avoidable with a suitable frame construction. The vertical edge of the glass-ceramic panel should always be protected, at least in the corner area of the panel.



Uncoated panels

Cleaning

SCHOTT highly recommends the „SCHOTT ROBAX® Dry Wiper“ to wipe uncoated fire-viewing panel surfaces. In case you are using conventional glass cleaning products, remove any soil, dirt or grime according to the instructions and ensuring the glass-ceramic's surface is cold. Remove any remaining cleaning residue to avoid a chemical reaction when ROBAX® panels are exposed to heat.



Coated panels

Note: **DO NOT** use scouring pads, abrasive cleaners or scouring agents as they damage the glass-ceramic's surface.

Clean the coated side of the products ROBAX® Mirror and ROBAX® IR Max and both sides of ROBAX® TrueView with a soft cloth and standard window glass cleaner only.



For more information about our value-added products and innovations please visit our website www.schott.com/robax

Delivery times

Delivery times, after samples have been released by the customer, depend on demand and capacity. They are understood as after receipt of series order and ex works. Individual logistics agreements are available upon request.

Undecorated flat ROBAX® panels	approx. 2 weeks
ROBAX® 3D panels	approx. 6 weeks
Exclusive ROBAX® panels	up to 3 month

Disposal

Should you need to replace a SCHOTT ROBAX® fire-viewing panel, it should be disposed of as normal domestic waste – not in the glass recycling bin.

Photo credits

SCHOTT AG | F1online | Getty Images | fotolia
Brunner GmbH (page 22) | Wodtke GmbH (page 23)
Spartherm Feuerungstechnik GmbH (page 32)

SCHOTT AG

Hattenbergstrasse 10

55122 Mainz

Germany

Phone +49 (0)6131/66-25431

info.robax@schott.com

www.schott.com/robax