SCHOTT

NEXTREMA®

Glass-ceramic engineered and designed for extreme conditions.





Turning ideas into reality

As a global material technology group, we empower our customers to stand out within their business segments and dare to think big. The highly skilled and dedicated people working at SCHOTT turn bold ideas into reality. We foster long-term partnerships and work hand in hand from the very beginning to develop forward-thinking solutions.



From bold ideas to demanding applications, SCHOTT NEXTREMA® helps turn visionary concepts into reliable solutions. As a high-performance glass-ceramic, it gives both engineers and designers the freedom to create components that perform where ordinary materials reach their limits.

With its exceptional technical properties – especially in high-temperature environments – NEXTREMA® opens new possibilities for innovation across a wide range of applications.

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High-tech & functional design material

In the development of technical applications, your main interests are physical and chemical properties, robustness under extreme temperature loads, and high chemical resistance.

With NEXTREMA®, we offer you a high-tech material with a variety of features. Particularly in high-temperature environments, where other materials such as plastic, conventional glass or metal show their limitations, NEXTREMA® is your alternative.

Colors and shapes are your world. You know that design is crucial for innovation and differentiation.

No NEXTREMA® is like another. We would like to supply you with glass-ceramic that corresponds to your requirements as precisely as possible. This is why NEXTREMA® is available in four types, different shapes, and appearances. This material will give your design a ground-breaking face.

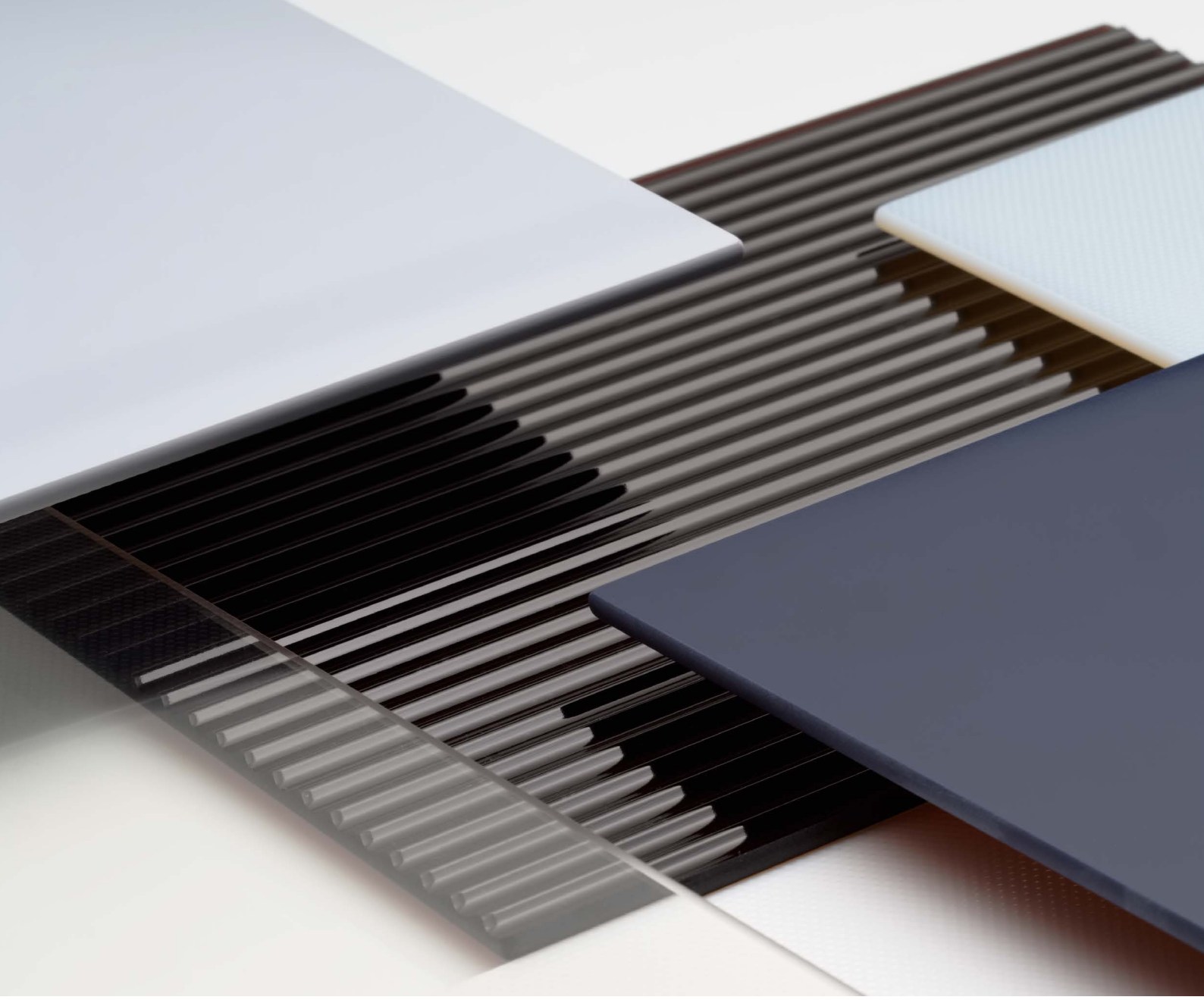
Are you ready for innovative developments? Then start thinking of solutions never seen before.






echnology


Design



Thermal shock resistance

Nothing shocks NEXTREMA®. Rapid temperature changes? Fire and ice? Thanks to the thermal shock resistance of NEXTREMA®, thermal material failure is a thing of the past.

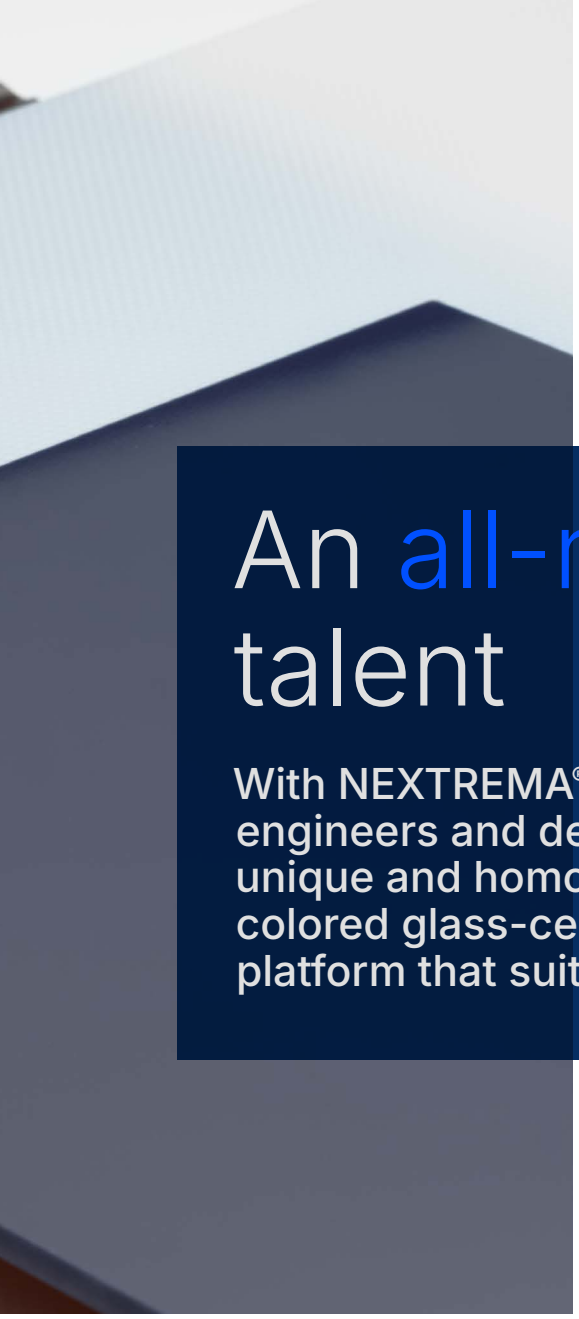
Operating temperature up to 950 °C[1] (1,742 °F)

Warm, warmer, hot: NEXTREMA® glass-ceramic shows its real strength under conditions of extreme temperatures. We have the right type of NEXTREMA® for the widest range of temperatures – up to 950 °C[1] (1,742 °F).

Wide transmission spectrum

Specific to the type and thickness of NEXTREMA®, there are different transmission ranges. These are important for certain technical applications.

[1]Applies to NEXTREMA® opaque white for 1 hour at 950 °C homoegenous heating. For inhomogeneous heating and other NEXTREMA® variants, the operating temperature may vary.



An all-round talent

With NEXTREMA® we offer engineers and designers a unique and homogeneously colored glass-ceramic material platform that suits your needs.

All NEXTREMA® types have the following material benefits in common:



Near zero thermal expansion

The innovative potential is expanded with NEXTREMA®, not the material itself. The intelligent microstructure of NEXTREMA® results in near zero thermal expansion, enabling the glass-ceramic to keep its shape in a high temperature environment.



Surface resistance and gas impermeability

Thanks to its unique surface finish, NEXTREMA® offers high resistance to acids and bases. This means it can be used in aggressive environments.



Process inert

NEXTREMA® is practically process inert. Even under extreme conditions, the material will not have negative interactions with the process environment. There are no interfering process factors such as gas emissions from organic components.



Robustness at high temperatures

Strong under heat: NEXTREMA® exceeds where other materials fail. This is why exceptionally high mechanical stability under high temperatures is important. It makes the crucial difference even with thin plates in large formats.

All materials at a glance

NEXTREMA® transparent

Thermal shock resistant, infrared-permeable, transparent: this glass all-rounder with clear through-vision has enormous potential in all areas of industrial and product design, and is the material of choice when processes need to be monitored or inner workings made visible – especially at high temperatures.



Material benefits

- Thermal shock resistance up to 820 °C[2]
- Near-zero linear thermal expansion coefficient
- Transmits shortwave light, with high transmission in the infrared spectrum

Exemplary fields of application

- Cover plates for radiant heating elements in industrial processes
- Support plates for high-temperature processes
- Substrates for transparent thin-layer heating elements
- Inspection windows for high-temperature processes

NEXTREMA® translucent white

NEXTREMA® translucent white offers the widest IR transmission range below 2,800 nm of all NEXTREMA® variants. It also provides high chemical resistance, making it suitable for demanding technical applications. Its attractive translucent appearance enables atmospheric lighting effects and sophisticated product designs.



Material benefits

- Reduction of visible light in combination with high infrared transmission
- Almost invincible in the face of acids and bases with outstanding chemical resistance

Exemplary fields of application

- Glare-reducing covers for radiant heaters
- Elegant cover plates for indoor and outdoor heaters
- Heat beds for 3D printers

[2] Tested by quenching a homogeneously heated NEXTREMA® transparent panel (820 °C) with room temperature water (20 °C).

NEXTREMA® opaque white

NEXTREMA® opaque white is a durable, non-porous glass-ceramic with temperature resistance up to 950 °C[3]. Its low visible and shortwave IR transmission provides excellent heat insulation, while its high chemical resistance ensures reliable performance in demanding environments. Its homogeneous white appearance also makes it suitable for sophisticated design and architectural applications.



Material benefits

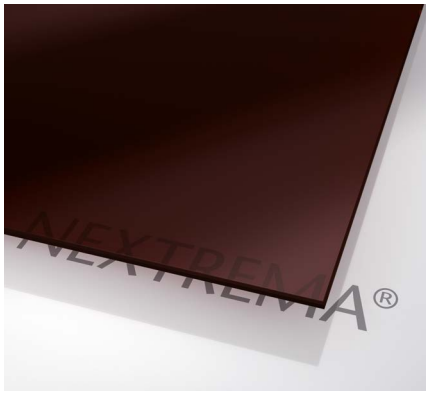
- Able to withstand temperatures of up to 950 °C[3]
- Excellent heat insulation thanks to low transmission in the shortwave IR spectrum
- Chemically resistant glass-ceramic, even in aggressive environments

Exemplary fields of application

- Inner lining for high-temperature cleanroom furnaces
- Carrier plate for high-temperature processes
- Easy-clean cover plates for magnetrons in microwave ovens

NEXTREMA® tinted

The tinted variant of SCHOTT NEXTREMA® combines high robustness and thermal shock resistance with an attractive appearance, good infrared transmission, and near-zero thermal expansion. This makes it well suited for indoor and outdoor heater applications in both domestic and industrial settings.



Different material types are available on request.

Material benefits

- High bending strength of up to 80 MPa (for 4 mm thick glass-ceramic)
- Reduces visible light while maintaining good infrared transmission
- Provides high thermal shock resistance thanks to near-zero linear thermal expansion

Exemplary fields of application

- Attractive, glare-reducing covers for infrared heaters
- Grill surfaces for BBQ applications, such as sizzle zones
- Decorative element for applications in the fields of architecture, furniture and the household appliance industry

In addition, each material type offers further specific benefits, giving engineers and designers alike access to a unique glass-ceramic material platform tailored to their individual needs.

[3] Applies to NEXTREMA® opaque white for 1 hour at 950 °C homogeneous heating. For inhomogeneous heating the operating temperature may vary.

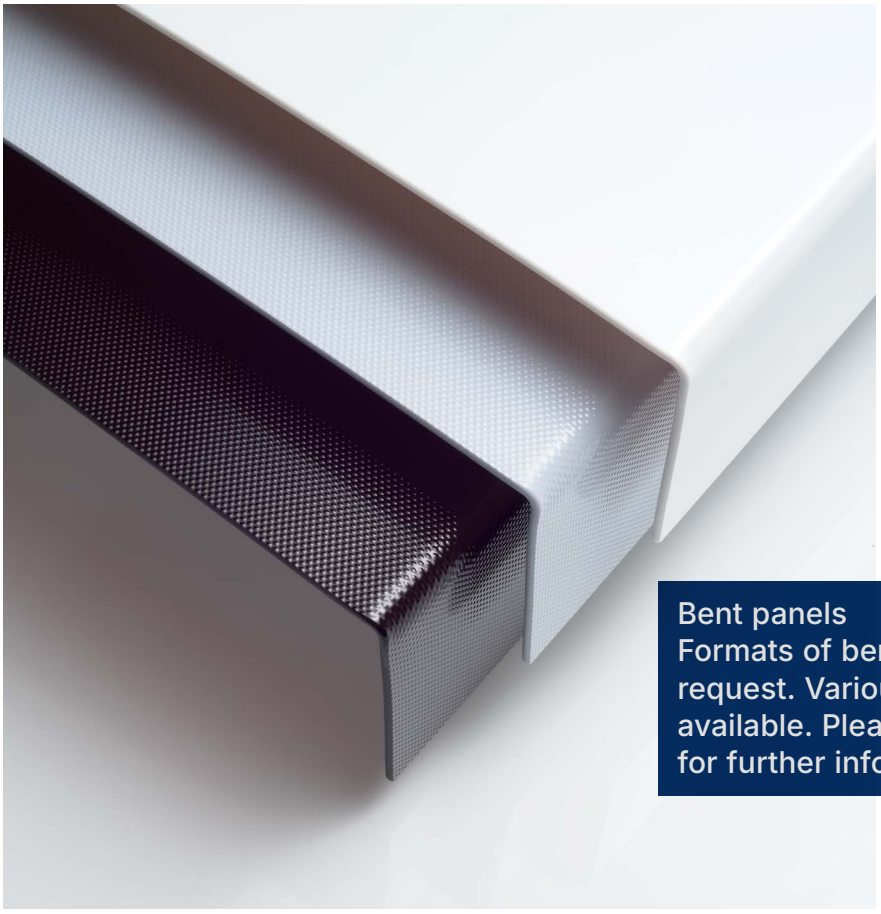


Standard form of delivery

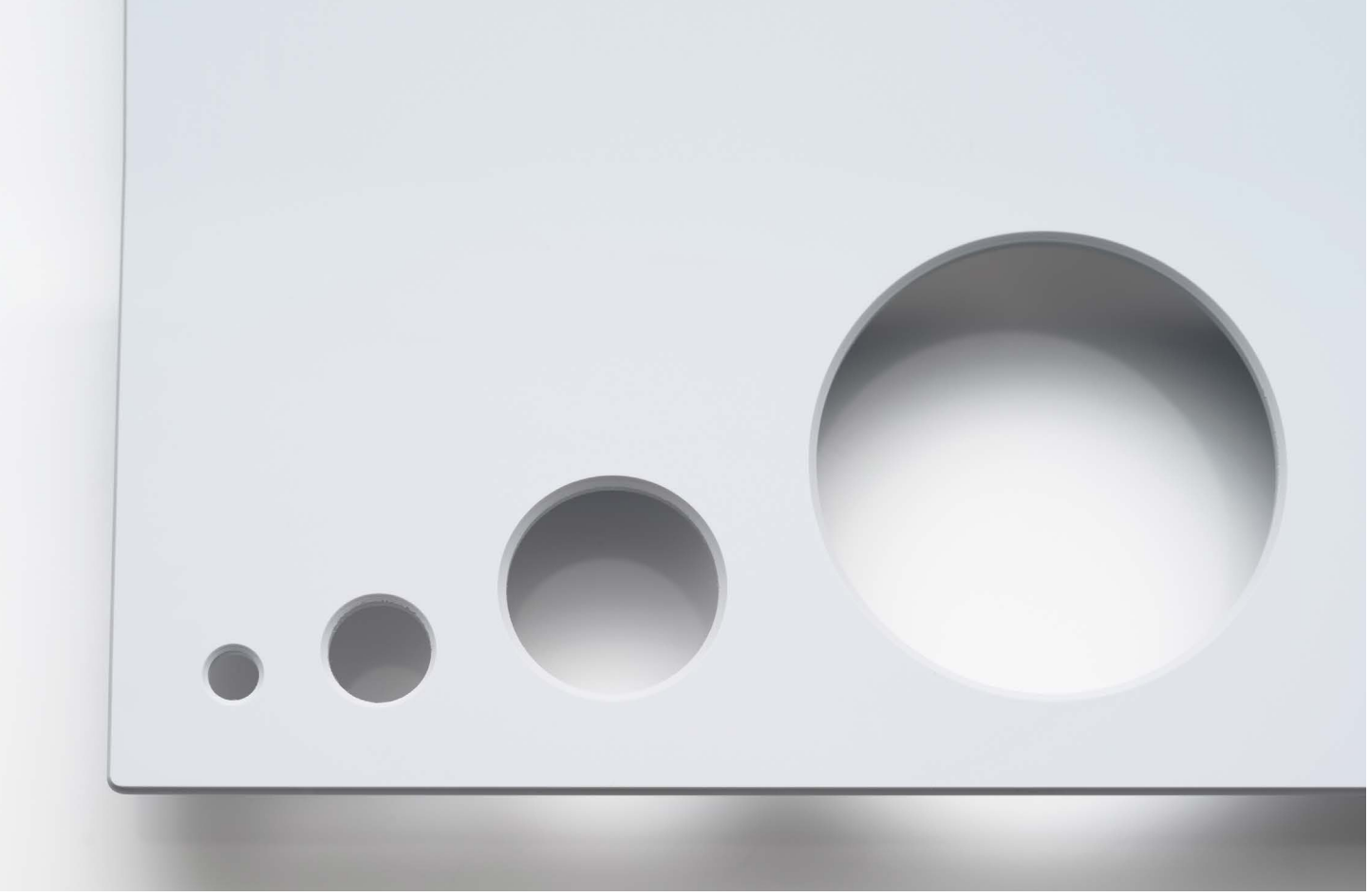
Current status of availability by material and form of delivery on request. Not all combinations are available. Other forms of delivery are available upon request.

Flat random sheets (without any edge treatment)	
Length	1,954 mm
Width	1,100 mm
Thickness	3, 4, 5 mm (standard) ≥ 6 mm (on request)

Flat cut-to-size panels	
Diameter	20 – 1,075 mm
Thickness	3 – 6 mm (standard) others on request
Standard length (min. – max.)	50 – 1,930 mm
Standard width (min. – max.)	50 – 1,075 mm



Bent panels
Formats of bent panels on request. Various shapes are available. Please contact us for further information.



Grinding profiles

C-shape



U-shape



V-shape



Mechanical treatment

Grinding profile	C-, U-, and V-shapes; seamed edges on request
Drilled boreholes	Ø 10 mm – Ø 200 mm
Polishing, sandblasting and printing	on request



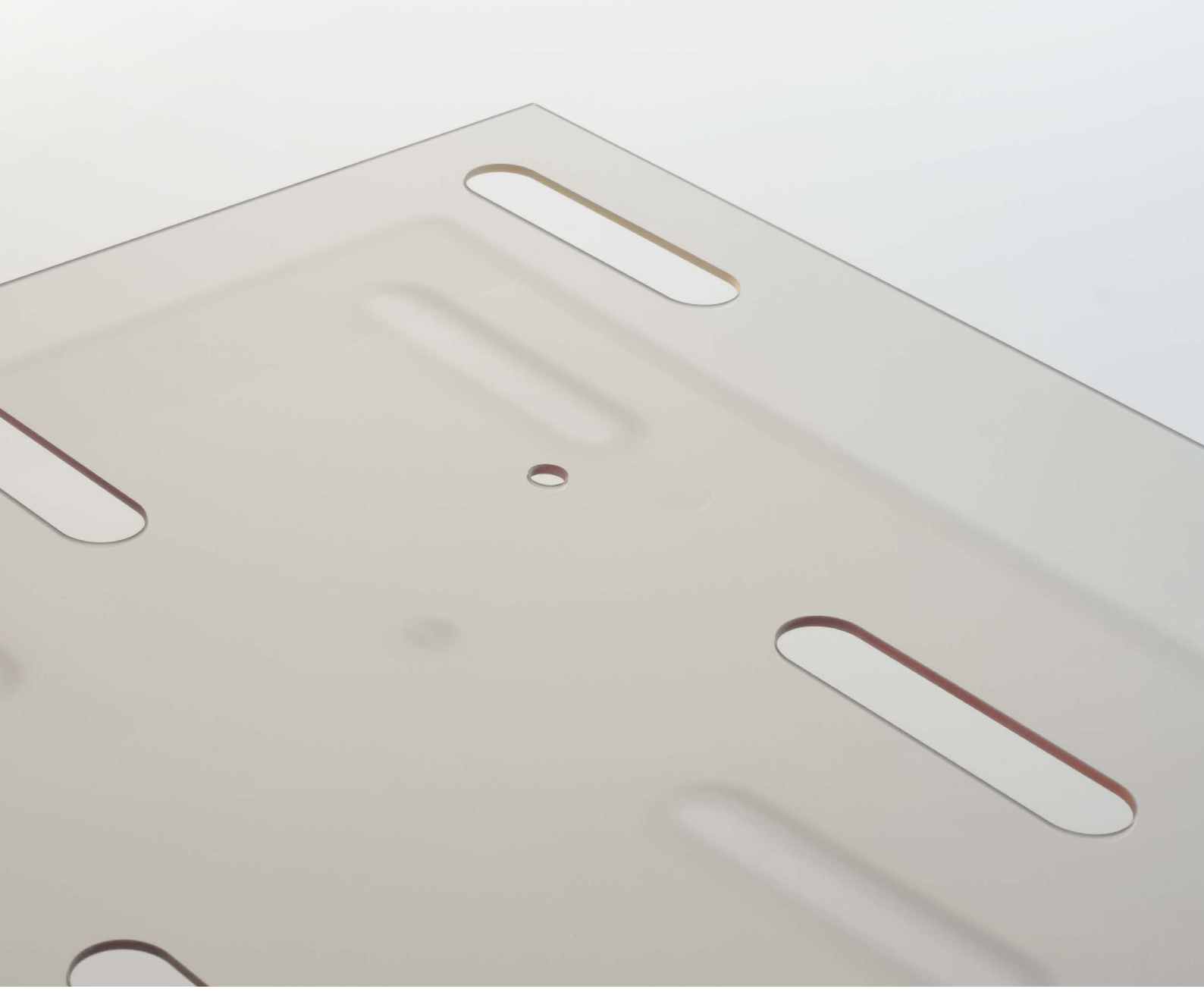
Dimensional tolerances and material defects

With regard to the specific format, all of the following characteristics refer to the net size, as agreed upon with the customer.



Flat cut-to-size

Characteristics / Areas / Location	Tolerance
Thickness t	
t = 3.0 / 4.0 / 5.0 mm	± 0.2 mm
t = 6.0 mm	± 0.3 mm
Edge length l	
l ≤ 500 mm	± 1.0 mm
l > 500 mm	± 1.5 mm
Flatness along the diagonal (D depending on edge length l)	
l > 300 mm	Max. 0.3% x D
l ≤ 300 mm	≤ 0.3 mm

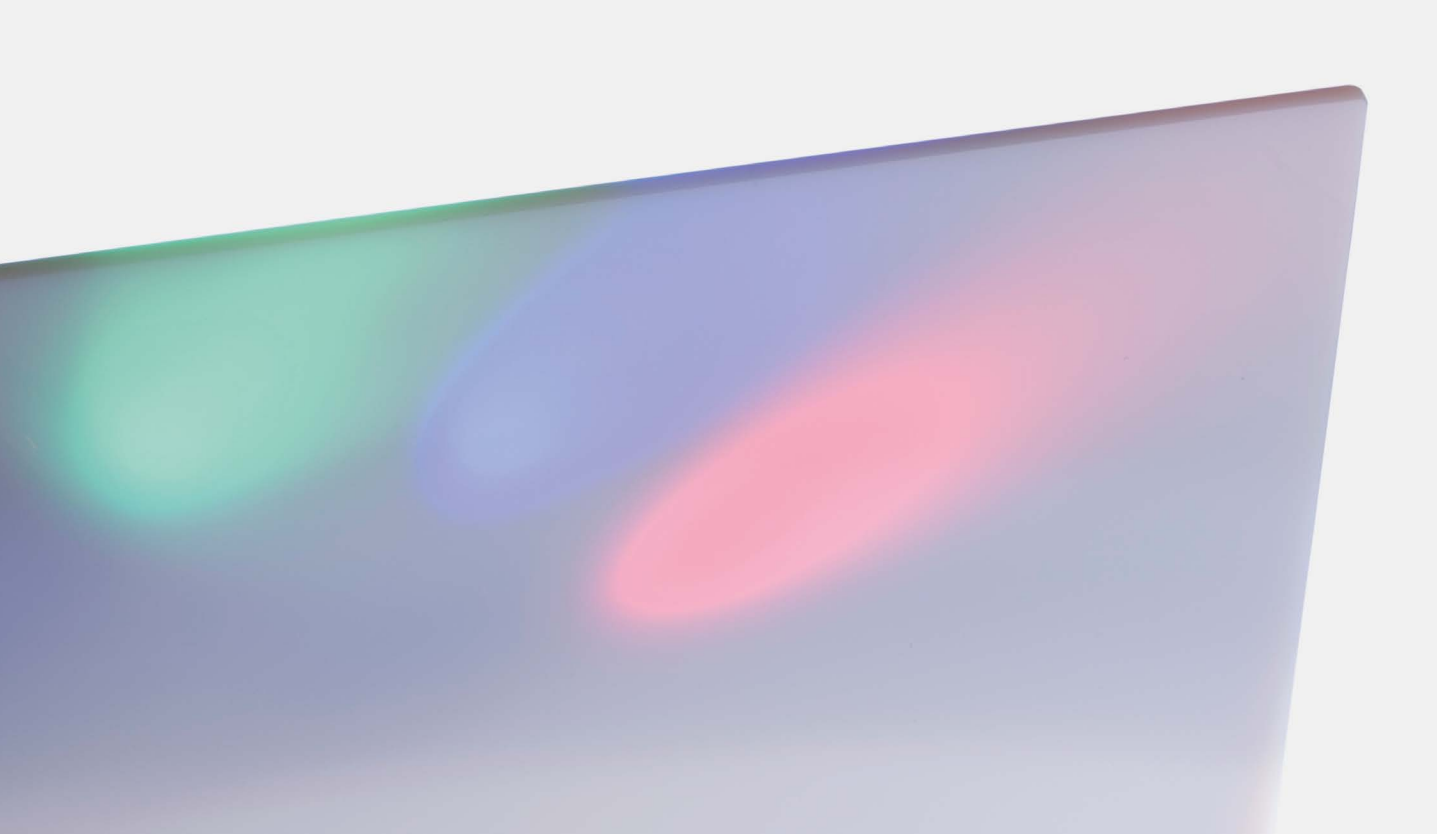


Technical features

All technical data presented in this product brochure must be understood as typical average values. Detailed information on the different material types is documented in separate material data sheets or will be provided upon request. Specifications are subject to change without prior notice.

Values for which no generally accepted measuring method exists, for example according to a technical standard, are specified and explained separately. Please contact us for detailed information.

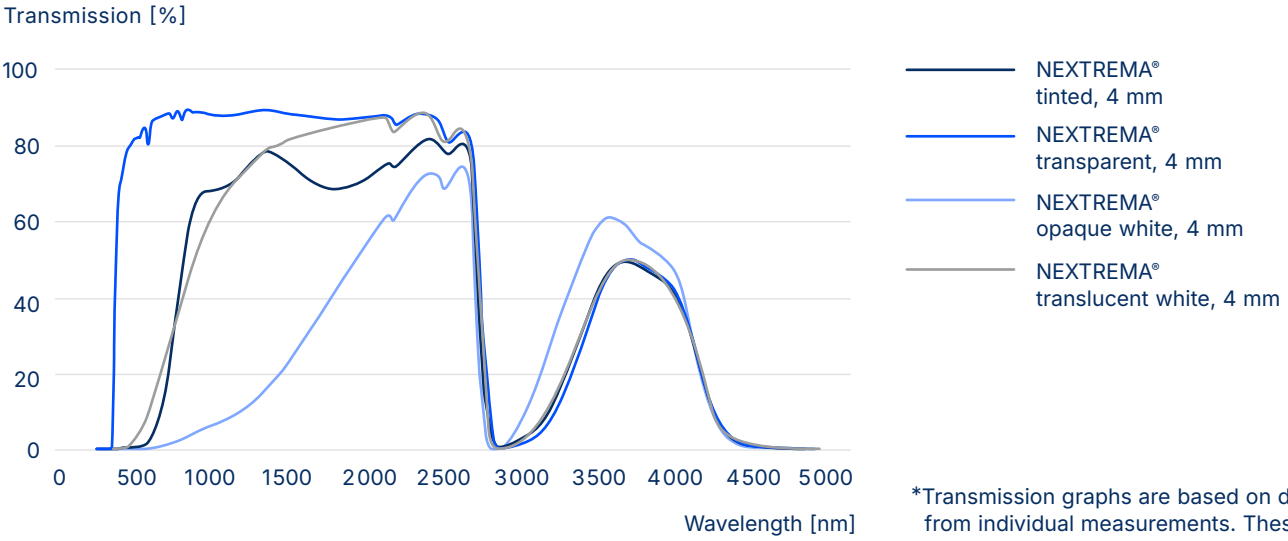
Other forms of delivery are available on request.



Optical characteristics

General appearance

Transparent, translucent white, opaque white and tinted. One side with nubs available on request.
Grooved surface for tinted on request.

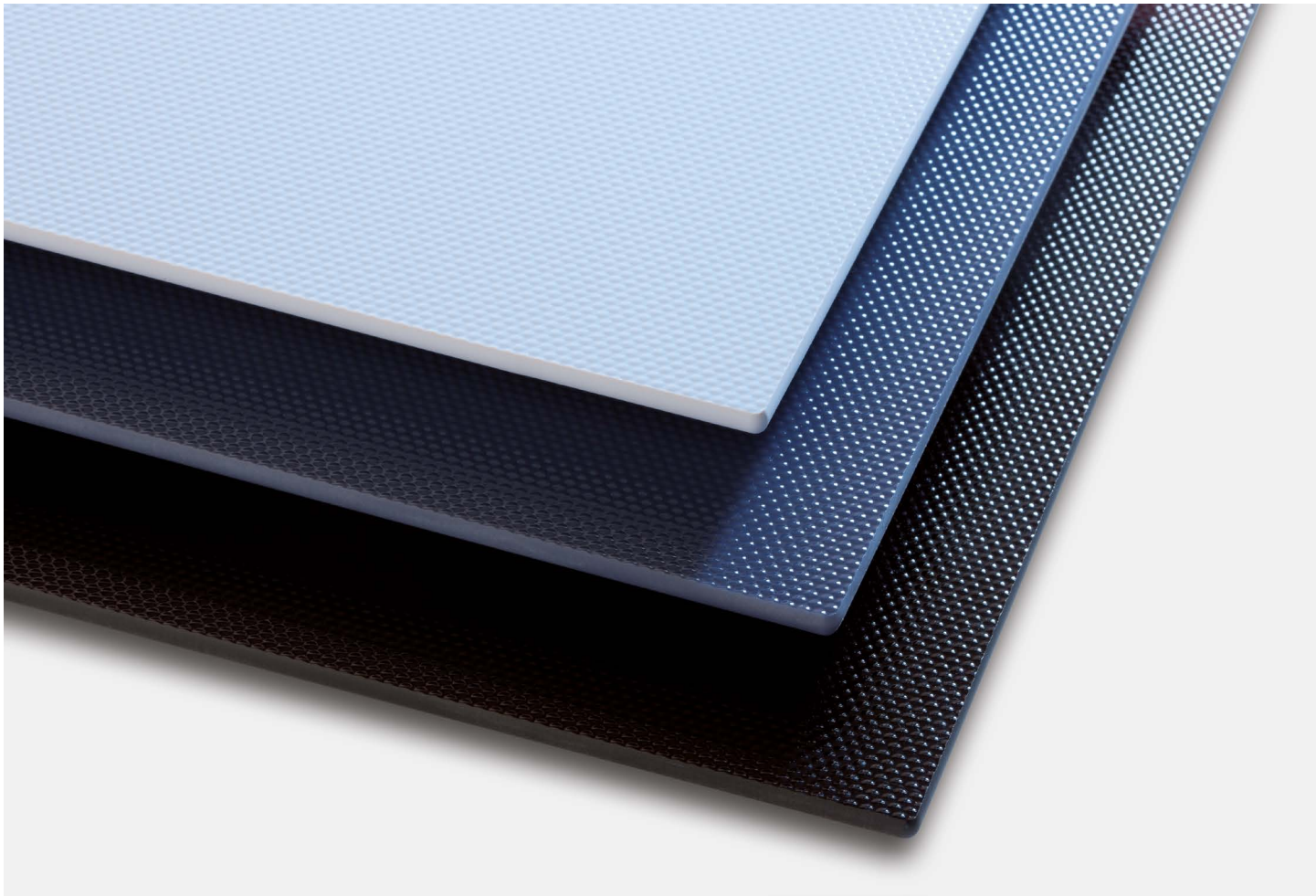


*Transmission graphs are based on data from individual measurements. These specified transmission values refer to glass-ceramic material, both sides flat and polished. Deviations may result from the manufacturing process.

Mechanical characteristics

Mechanical characteristics (at room temperature)

Density	ρ approx. 2.5 – 2.6 g/cm³
Modulus of elasticity (ASTM C-1259)	E approx. 84 – 95 x 10³ MPa
Poisson's ratio (ASTM C-1259)	μ approx. 0.25 – 0.26
Knoop hardness (ISO 9385)	HK 0.1 / 20 approx. 570 – 600
Average bending strength (DIN EN 1288, Part 5, R45)	$\bar{\sigma}_{dB} \geq 80$ MPa
Impact resistance	The impact resistance of NEXTREMA® depends on the kind of installation, size, thickness, and geometry of the panel, type of impact and especially on drilled holes and their position in the material. Therefore, information regarding impact resistance can only be given with knowledge of the respective and defined application (especially in combination with the technical standards regarding impact resistance that have to be met for some applications). The quality of the grinding profile has an important influence on the impact resistance.



Thermal characteristics



Excellent temperature and thermal shock resistance

NEXTREMA® performs even when exposed to high temperatures or rapid temperature changes. Due to its excellent resistance to temperatures of up to 950 °C (1,742 °F)[4] and thermal shocks, NEXTREMA® is the ideal solution for high temperature applications where glass properties are beneficial.

Coefficient of linear thermal expansion (DIN ISO 51045-1, DIN ISO 7991)

In certain applications, the coefficient of mean linear thermal expansion and, therefore, the total change of length of a NEXTREMA® part within a specified temperature range is important to its function. The following mean coefficient values and the graph on the right show the temperature dependency.

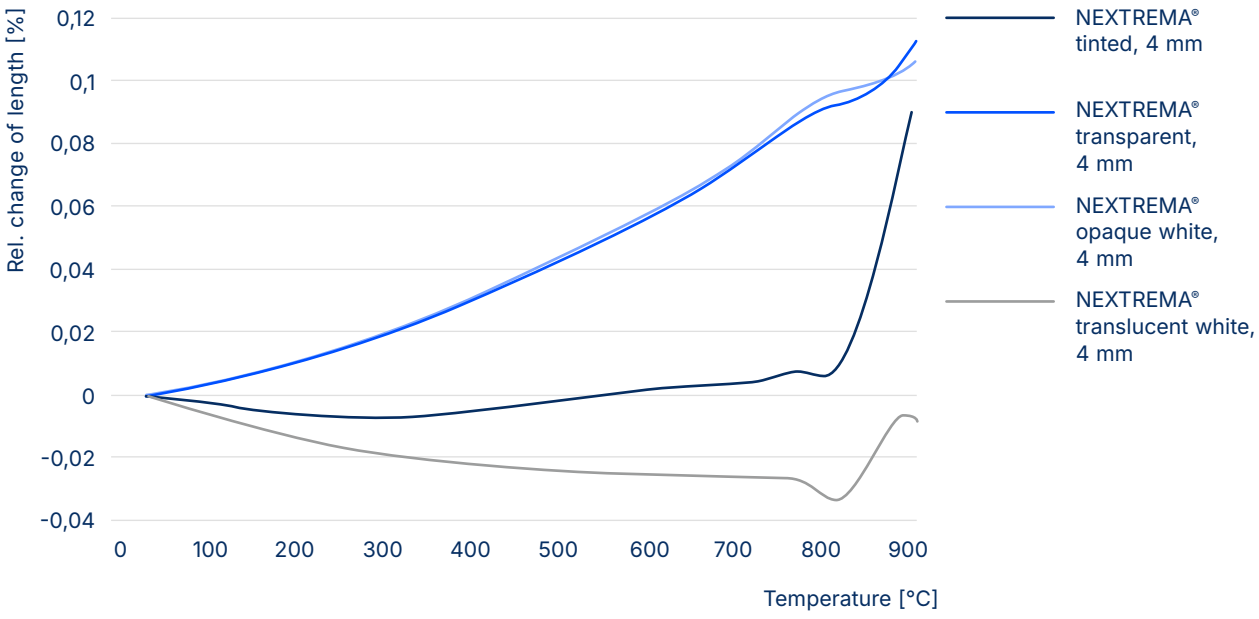
NEXTREMA® has a near-zero thermal expansion

The typical values are between -0.5 x 10^{-6} K^{-1} and 1.0 x 10^{-6} K^{-1} depending on the temperature range and material variant.

[4] Applies to NEXTREMA® opaque white for 1 hour at 950 °C homogeneous heating. For inhomogeneous heating and other NEXTREMA® variants, the operating temperature may vary.

Specific heat capacity	Approx. $C_{p\,(20-100\,°C)}$ 0.80 J / (g · K)
Thermal conductivity (DIN 51936, ASTM E 1461-01)	Approx. $\lambda_{(100\,°C)}$ 1.6 – 1.8 W / (m · K)
Thermal shock resistance (TSR)	TSR up to 820 °C (1,508 °F)[5] Resistance of the material to thermal shock when the hot material is splashed with cold water at room temperature, without cracking due to thermal stress.
Temperature / time load capacity (TTLC)	The temperature / time load capacity specifies the maximum permissible temperatures for load times of the material, below which no cracking should occur due to thermal stress. The temperature / time load data for uneven and even temperature distributions (e.g. homogeneous heating conditions) within the material are different.
Inhomogeneous heating of the material	TTLC / Short term load (10h) [°C] 500 – 600 / [°F] 932 – 1,112 TTLC / Continuous load (5,000 h) [°C] 580 – 700 / [°F] 1,076 – 1,292 Temperature/time load capacity for nonuniformly heated glass-ceramic panel. Temperature/time load capacity is higher for homogeneous heating. Operating temperature for NEXTREMA® opaque white for 1 hour homogeneous heating is up to 950 °C. For other NEXTREMA® variants, the operating temperature may vary.

Thermal expansion in dependence on the temperature (for selected NEXTREMA® variants)



[5] Applies to NEXTREMA® transparent. Tested by quenching a homogeneously heated NEXTREMA® transparent panel (820 °C) with room temperature water (20 °C). Values may differ for other NEXTREMA® variants.

Chemical characteristics

Principal constituents (reference: DIN EN 1748-2-1)

The principal constituents of all the ceramic materials are as follows:

Component	Symbol	Percentage by mass
Silicon dioxide	SiO_2	50 % – 80 %
Aluminium oxide	Al_2O_3	15 % – 27 %
Lithium oxide	Li_2O	0 % – 5 %
Zinc oxide	ZnO	0 % – 5 %
Titanium oxide	TiO_2	0 % – 5 %
Zirconium oxide	ZrO_2	0 % – 5 %
Magnesium oxide	MgO	0 % – 8 %
Calcium oxide	CaO	0 % – 8 %
Barium oxide	BaO	0 % – 8 %
Sodium oxide	Na_2O	0 % – 2 %
Potassium oxide	K_2O	0 % – 2 %
Other (trace content on request)		0 % – 5 %

The materials do not contain any harmful substances according to the European directive 2011/65/EU “Hazardous Substances in electrical and electronically Equipment” and fulfil the terms of RoHS(II).

NEXTREMA® glass-ceramics consist of 100% UVCB substance glass. According to REACH, this kind of glass is not classified as a hazardous substance. When used within the limitation of the according material specification, NEXTREMA® glass-ceramics do not release any hazardous substances throughout the entire life cycle (including the disposal), that would violate existing legal limits.

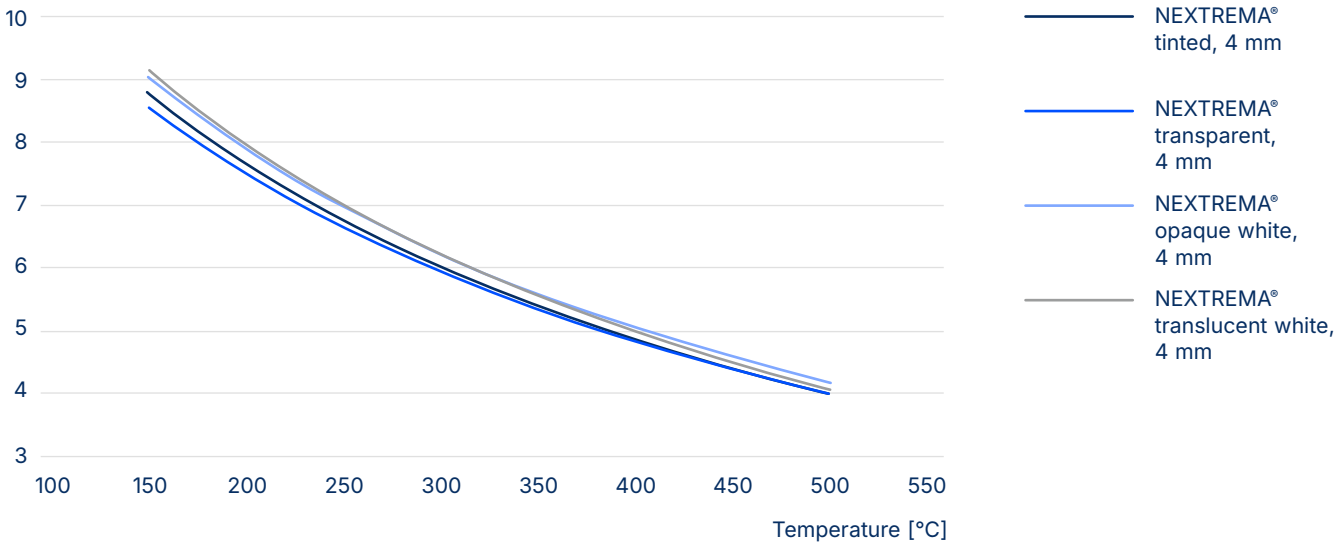
Chemical resistance

The chemical resistance of NEXTREMA® is more extensive than that of most other comparable materials.

Acid resistance (DIN 12116)	S	1 – 3
Alkaline resistance (ISO 695)	A	1 – 2
Hydrolytic class (DIN ISO 719)	HGB	1

1: high resistance / low solubility | 2: medium resistance / medium solubility
3: low resistance / high solubility

Specific electrical volume resistance at different temperatures for selected NEXTREMA® types (log ρ [Ω · cm]), shown as representative curves.

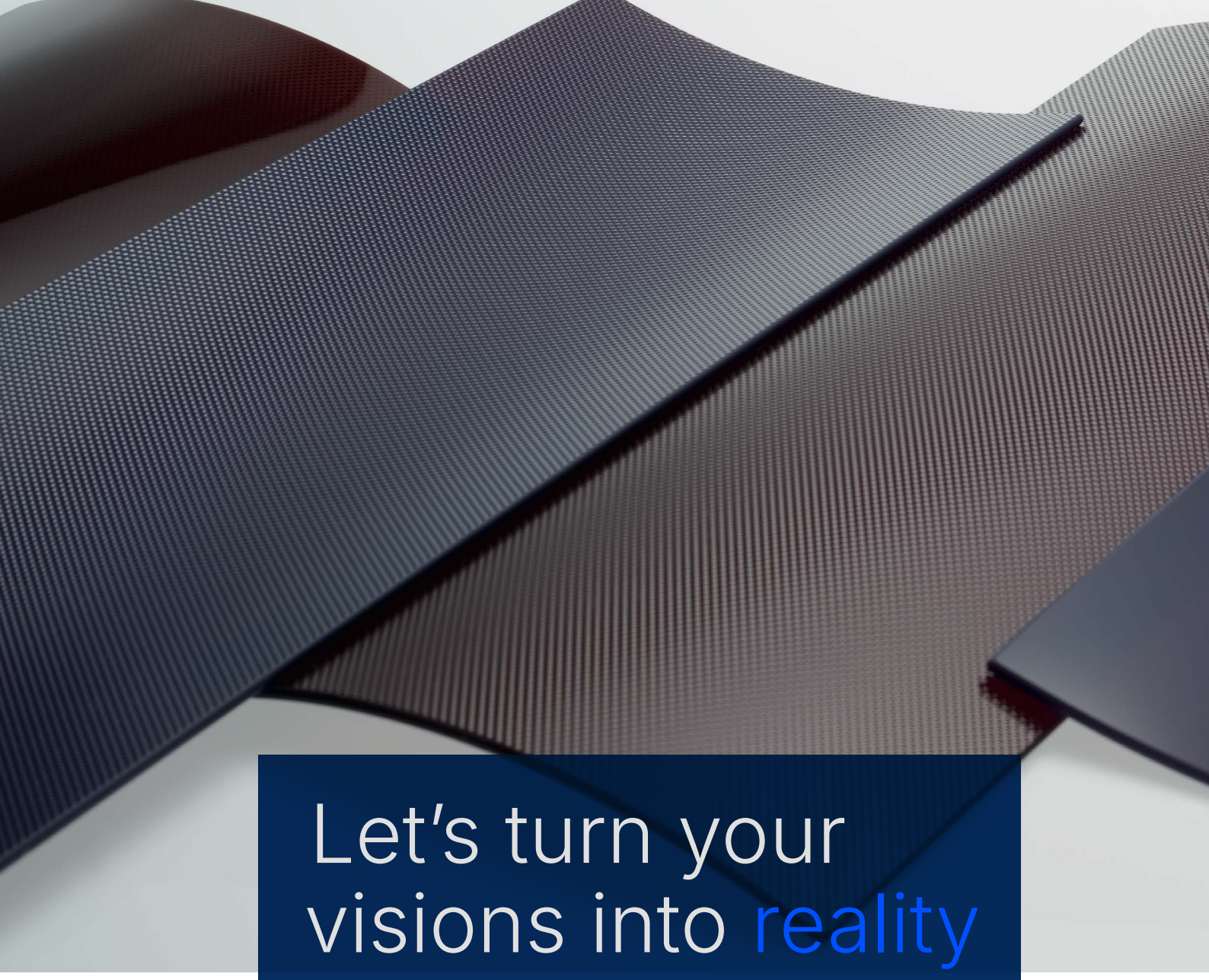


Electrical characteristics

Specific electrical volume resistance (DIN 52326)		
log $\rho_{(250\ °C)}$	Ω · cm	6.6 – 6.9
log $\rho_{(350\ °C)}$	Ω · cm	5.2 – 5.5
t_{K100}	°C	170 – 190

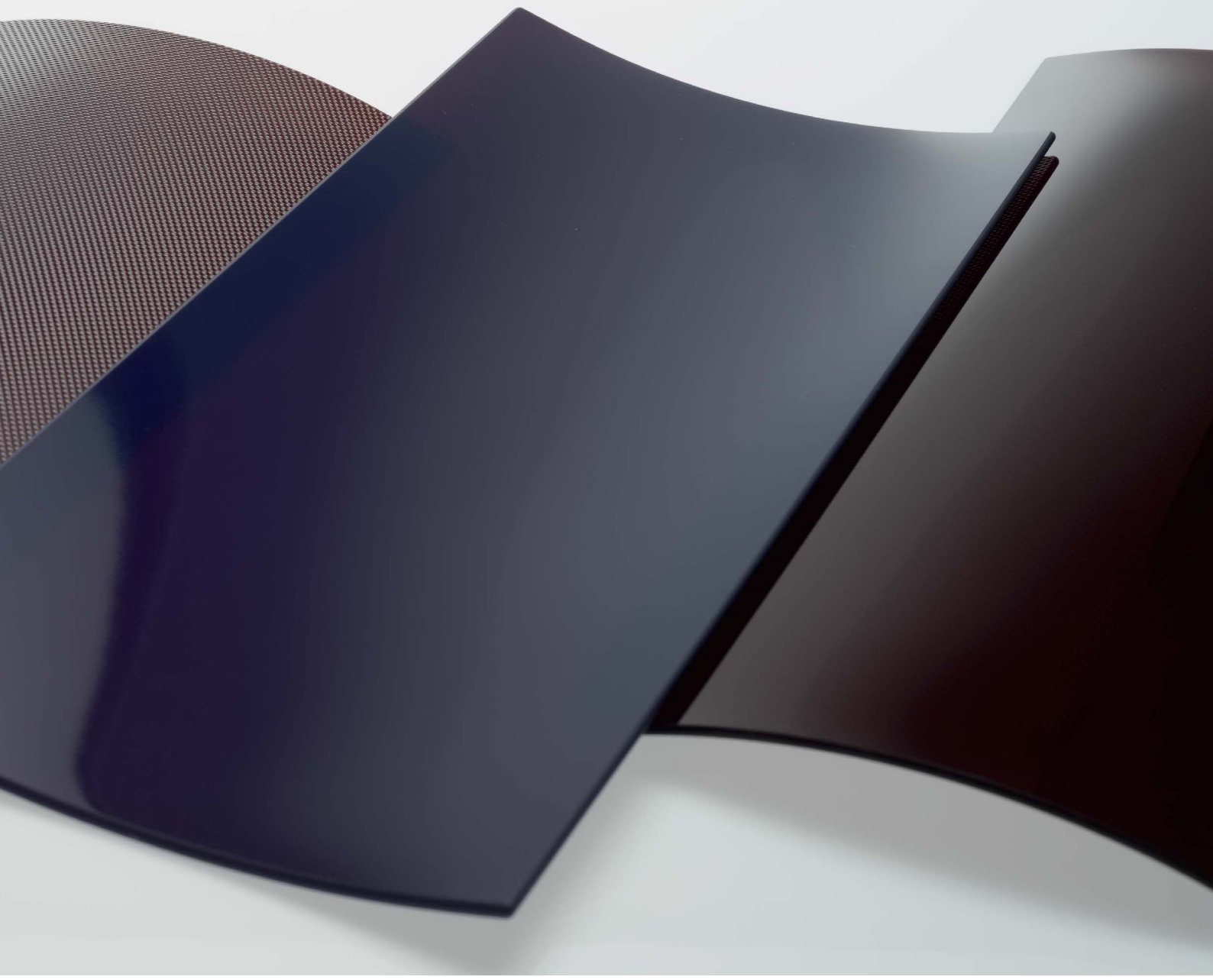
Dielectric constant (DIN 53483)	
$\varepsilon_{R\ (1\ MHz,\ 25\ °C)}$	6.4 – 7.8

Dielectric loss tangent (DIN 53483)	
tan $\delta_{(1\ MHz,\ 25\ °C)}$	0.003 – 0.02



Let’s turn your visions into reality

Are you currently encountering a challenge and seeking an innovative material solution for your development project?



Then do not hesitate to contact us for further technical evaluation and consultancy.

We will gladly be of assistance:

info.nextrema@schott.com
schott.com/nextrema

The data provided in this document show a range and refer to different material variants. The provided range does not apply to one specific NEXTREMA® variant.

It is the sole responsibility of the customer to evaluate and determine whether NEXTREMA®, in particular its quality and product characteristics (e.g. the thickness), is fit for the intended use and application as envisaged by the customer. All product descriptions and technical information provided by SCHOTT AG do not release the customer from its responsibility to check the suitability for the intended use, including, without limitation, the processing and combination with other materials, and application. Use, installation and application are beyond the control of SCHOTT and the sole responsibility of the customer. SCHOTT AG strongly recommends that customers perform usability tests during the application design and development phase of the customer's final product.



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