

ROBAX®

General Description

ROBAX® is a highly transparent glass-ceramic having virtually zero thermal expansion and sufficient mechanical resistance required for all standard applications. It is produced in flat, rolled sheets.

As a result of its extremely low thermal expansion, ROBAX® can be subjected to extreme temperature differences. Even when used in high temperature conditions, ROBAX® maintains excellent stability of form. ROBAX® can be further processed mechanically using all of the normal methods of glass processing.

Applications

ROBAX® possesses a high degree of resistance against thermal stresses and chemical surface attacks. Its diverse range of applications include: chemical process sight glass, high temperature vision windows, heat insulators, commercial ovens/broilers, architectural and outdoor lighting, electronics and UV light wave blocking applications.

All of the following data are reference values (per DIN 55 350 Part 12, March 1989).

Dimensions

Flat Panels/Stock Size Sheets

Thickness	Sheet Size
mm (in)	Minimum usable area mm x mm ± 20 mm (in x in)
3.0 ± 0.2 (0.118 ± 0.008)	1580 x 800 (62.2 x 31.5)
5.0 ± 0.2 (0.197 ± 0.008)	1580 x 800 (62.2 x 31.5)

Flatness

Flatness is determined by laying a beveled straight edge diagonally across the horizontal panel and the deviation is read by means of a gauge.

Tolerance: ± 0.3% of edge length

Bending Strength/Mechanical

Recommended values with surfaces in practical use conditions (per DIN 52 292, Part 1):

For Normal Conditions 30 MPa (4300 psi)
For Safety Conditions 6 MPa (870 psi)

Thermal Data

Linear Thermal Coefficient of Expansion

$$\alpha_{(20 - 700^{\circ}\text{C})} = (0.0 \pm 0.3) \times 10^{-6} \text{K}^{-1}$$

Thermal Conductivity at 90°C (194°F)

$$k = 1.6 \text{ W}/(\text{m}^{\circ}\text{K})$$

Mean Specific Heat Capacity

$$C_P(20 - 100^{\circ}\text{C}) = 0.8 \text{ J}/\text{g}^{\circ}\text{K}$$

Resistance to Thermal Gradients (RTG)

The resistance to thermal gradients (RTG) characterizes the ability of a panel to withstand the temperature difference between the hot center of the panel (hot side) and the cold panel edge (room temperature). The RTG is determined by a standard method.

RTG is an empirical method measuring the difference in temperature °K (or °R) between the maximum at the center of the hot side surface of the panel and the minimum at the cold edge (room temperature) that when exceeded could lead to a breakage as a result of thermal stress.

Recommended values for the RTG are limited to applications where the risk of breakage is not a safety concern (surface in normal practical use conditions):

Short Term usage:

$$< 100 \text{ h: RTG} = \Delta T 700^{\circ}\text{K} (1260^{\circ}\text{R})$$

Long Term usage:

$$\geq 100 \text{ h: RTG} = \Delta T 650^{\circ}\text{K} (1170^{\circ}\text{R})$$

Temperature Shock Resistance (TSR)

The temperature shock resistance (TSR) of glass-ceramic characterizes the ability of a panel to withstand a temperature shock in which cold water is poured on to a hot panel.

As a result of the fact that the thermal linear expansion of ROBAX® is practically zero, the temperature shock caused by sudden cooling with cold water leads to only minor stresses. The shock resistance of ROBAX® is, therefore, normally only limited by the maximum operation temperature.

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Maximum Operation Temperatures

Short-term usage:
(total <100 h) $T_{\max} = 760^{\circ}\text{C}/1400^{\circ}\text{F}$

Long-term usage:
(total 100 h - 10,000 h) $T_{\max} = 680^{\circ}\text{C}/1256^{\circ}\text{F}$

The maximum application temperatures stated are only valid in conjunction with the RTG values specified.

Mechanical Data

Density at $25^{\circ}\text{C} = 2.56 \text{ g/cm}^3 / 0.092 \text{ lb/in}^3$

Young's Modulus = $92 \text{ GPa}/13.3 \text{ Msi}$

Poisson's Ratio = 0.25

Electrical Data

Specific Volume Resistivity

$\log \rho$ at $250^{\circ}\text{C} \geq 6.8 \Omega \text{ cm}$

$\log \rho$ at $350^{\circ}\text{C} \geq 5.4 \Omega \text{ cm}$

Temperature at $10^8 \Omega \text{ cm} \quad t_{k100} = 175^{\circ}\text{C}$

Dielectric Constant $\epsilon_r = 7.8$

Dielectric Loss $\tan \delta = 0.019$

Chemical Data

Hydrolytic resistance: ISO 719-HGB Class 1
ISO 720-HGA Class 1

Acid resistance: ISO 1776 Class 2

Alkali resistance: ISO 695-A Class 2

Installation Instructions

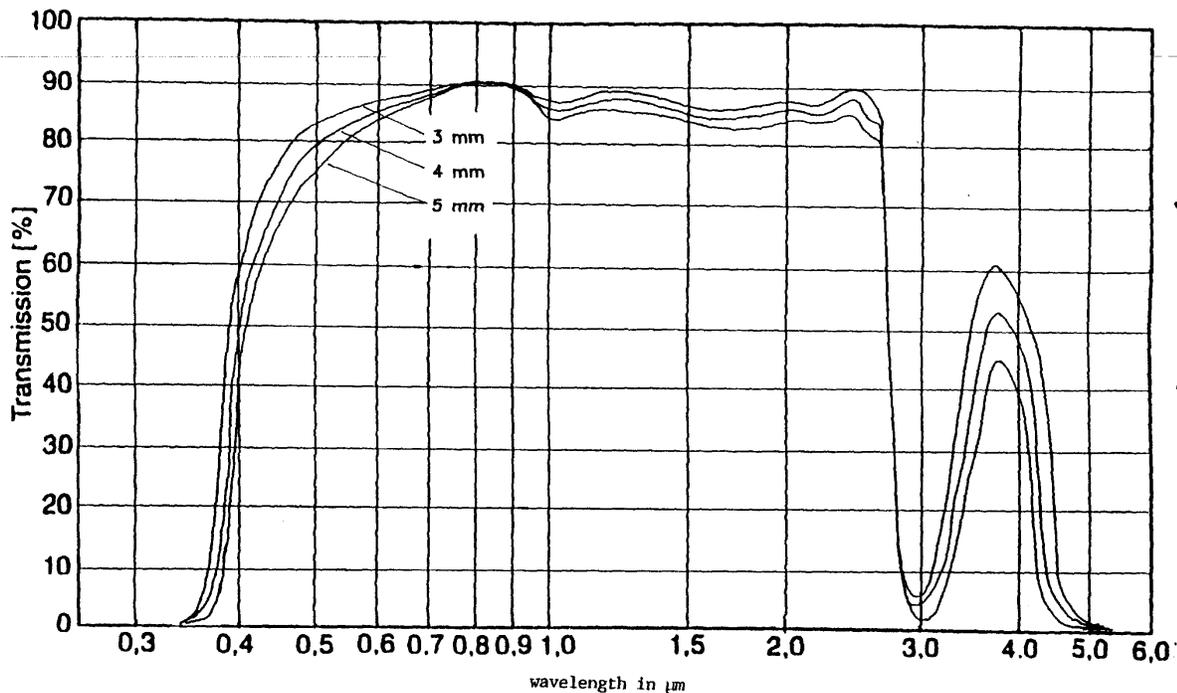
The basic guidelines for glass or glass-ceramic products apply also for the installation and handling of ROBAX®.

The differing thermal expansions and possible production tolerances of ROBAX® and the various frame materials must also be taken into consideration when determining the dimensions of the frames and the panels.

Installation should be made in a distortion-free frame.

Direct contact between the glass-ceramic and metal must be avoided. It is highly recommended to use a permanently flexible, heat resistant material as an intermediate layer.

Optical Data



ROBAX® is a registered trademark of Schott Glaswerke, Mainz, Germany