

BK7

Borosilicate

◆ Key Properties of Borosilicate (BK7)

- 🔬 **Excellent Thermal Resistance:** Low thermal expansion ($\sim 3.3 \times 10^{-6} \text{ K}^{-1}$) — ideal for high-temperature environments.
- 🌡️ **High Working Temperature:** Can withstand up to $\sim 500^\circ\text{C}$ continuously, short bursts $>600^\circ\text{C}$.
- 💎 **High Optical Clarity:** Good transmission from 300 nm to $\sim 2.5 \mu\text{m}$ (UV to NIR).
- 💧 **Chemically Resistant:** Stable against most acids, alkalis, and solvents.
- ⚖️ **Mechanically Stable:** High hardness and resistance to mechanical stress.
- 🌐 **Versatile Applications:** Used in optics, labware, lighting, solar, and display technologies.
- 🔄 **Low Refractive Index:** ~ 1.5168 @ 587.6 nm — reduces surface reflection and simplifies AR coating design.
- ♻️ **Cost-Effective:** Affordable, durable, and easy to process compared to fused silica.

Applications of Borosilicate Glass

Scientific & Laboratory Use

- Glassware: Beakers, flasks, test tubes, and microfluidic devices due to its thermal shock resistance and chemical durability.
- Viewports & Optical Cells: Transparent, heat-tolerant viewports for high-temperature or corrosive environments.

Optical & Display Systems

- Windows & Lenses: Used in visible and NIR systems (300 nm–2.5 μ m) for optical sensors, filters, and protective covers.
- Display Panels: Protective layers in touchscreen displays, lighting panels, and smart glass systems.

Solar & Environmental Tech

- Solar Panels: Front glass layers on PV modules for durability and thermal resistance.
- Concentrator Optics: Used in solar thermal collectors and heliostat systems.

Industrial & Consumer Use

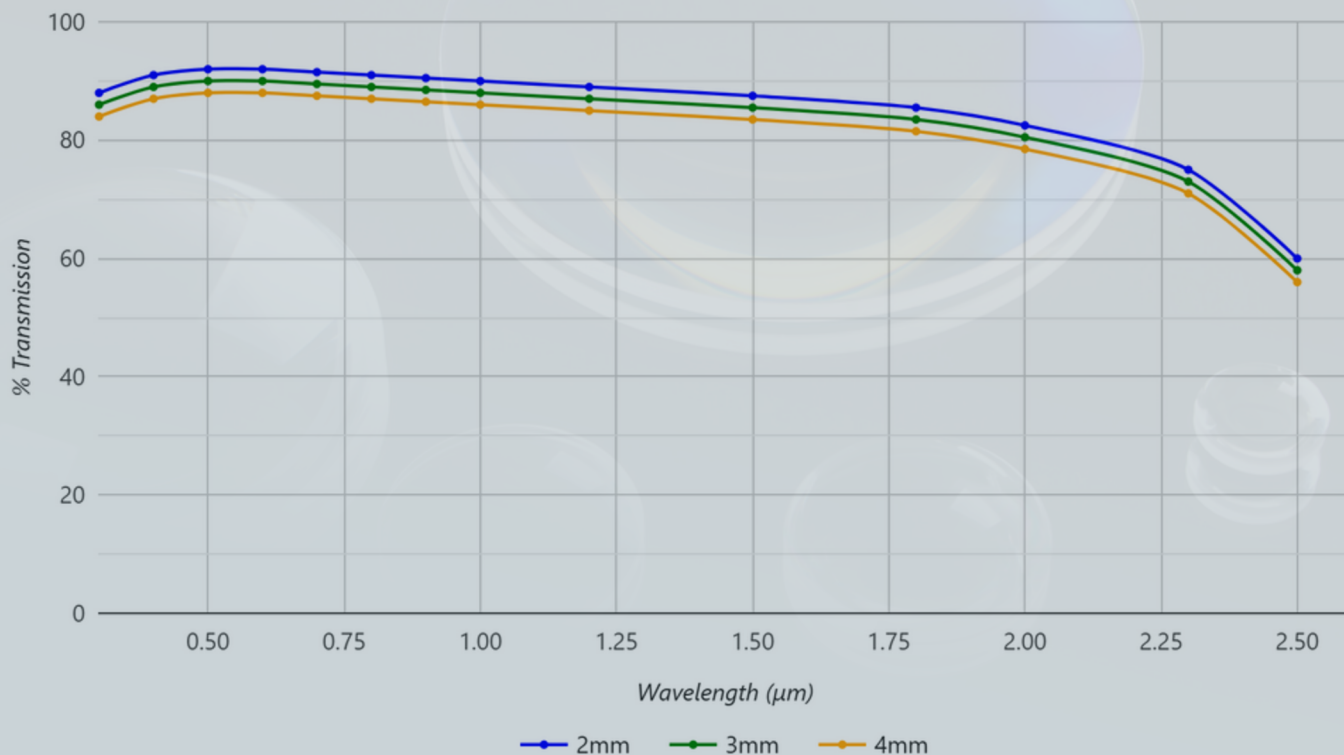
- Sight Glasses & Flow Indicators: Chemical-resistant windows in processing systems.
- Kitchenware & Lab-Ready Appliances: Oven doors, microwave plates, and measurement instruments.

Technical Parameters of Borosilicate Glass (BK7)

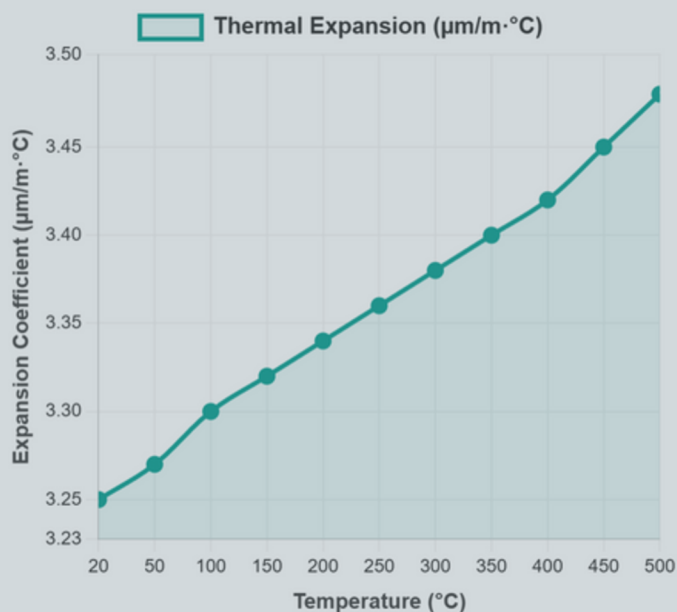
Property	Typical Value
Transmission Range	300 nm to 2.5 μ m
Refractive Index	~1.47 at 589 nm
Thermal Expansion Coefficient	$\sim 3.3 \times 10^{-6}$ /K
Softening Point	821 $^{\circ}$ C
Strain Point	514 $^{\circ}$ C
Annealing Point	560 $^{\circ}$ C
Max Continuous Working Temp	~ 500 $^{\circ}$ C
Thermal Conductivity	1.2 W/m \cdot K at 100 $^{\circ}$ C
Specific Heat Capacity	0.83 J/g \cdot K
Density	2.23 g/cm ³

Young's Modulus (E)	64 GPa
Shear Modulus (G)	25 GPa
Bulk Modulus (K)	53 GPa
Poisson's Ratio	0.2
Hardness (Knoop)	~ 480 kg/mm ²
Dielectric Constant	4.6 at 1 MHz
Chemical Durability	Excellent – resistant to acids, alkalis, and solvents
Molecular Composition	Mainly SiO ₂ , B ₂ O ₃ , Na ₂ O, Al ₂ O ₃
Structure / Form	Amorphous glass

Borosilicate Glass – Estimated Transmission vs. Wavelength



This graph displays realistic estimated values based on typical borosilicate performance. Actual measurement data will be uploaded soon.



Transmission:

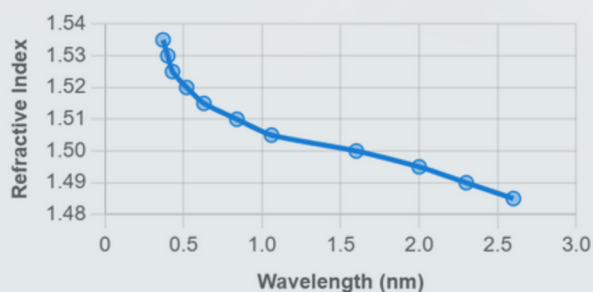
BK7 provides excellent transmission from the visible to near-infrared range, maintaining over 90% up to around $2.5\ \mu\text{m}$. It is ideal for general optical applications where clarity and low absorption are required.

Thermal Expansion:

The coefficient increases steadily from $\sim 7\ \mu\text{m}/\text{m}\cdot^{\circ}\text{C}$ at room temperature to $\sim 9\ \mu\text{m}/\text{m}\cdot^{\circ}\text{C}$ at $800\ ^{\circ}\text{C}$, offering good thermal stability for precision optics.

FAQ

Refractive Index of Borosilicate Glass vs. Wavelength



Real-world measurement data (CSV loaded dynamically)

Wavelength	Refractive Index
0.37	1.535
0.4	1.53
0.43	1.525
0.52	1.52
0.63	1.515
0.84	1.51
1.06	1.505
1.6	1.5
2	1.495
2.3	1.49
2.6	1.485

Q: What is Borosilicate Glass used for?

A: Borosilicate is used in laboratory optics, precision lenses, lighting systems, cookware, and glassware. It offers excellent thermal shock resistance and chemical durability.

Q: Is Borosilicate Glass suitable for high-temperature applications?

A: Yes, borosilicate can withstand temperatures up to $\sim 500^{\circ}\text{C}$ and has a low thermal expansion ($\sim 3.3 \times 10^{-6}/^{\circ}\text{C}$), making it ideal for labware and optical components.

Q: Does Borosilicate resist chemical corrosion?

A: Yes, it is highly resistant to most acids, alkalis, and solvents, making it suitable for harsh chemical environments.

Q: Is Borosilicate optically transparent?

A: Absolutely. It has excellent optical clarity in the visible range (roughly 300–2500 nm) and is commonly used in optics and lighting.