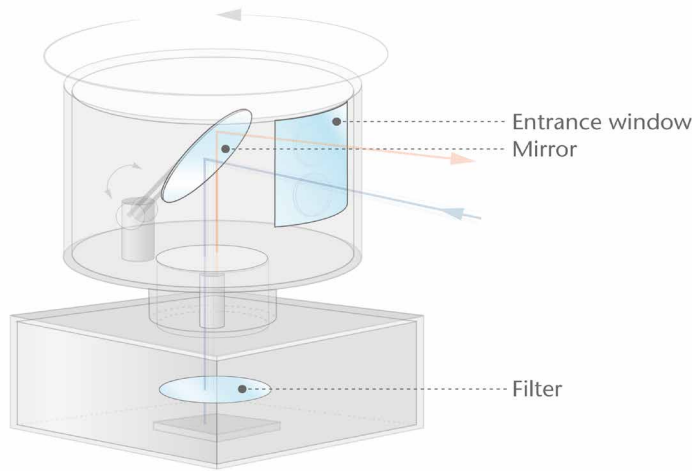


# LiDAR systems inspired by BOROFLOAT® 33

In touch with the future

The reliable and consistent quality of BOROFLOAT® 33, coupled with an outstanding versatility to address the demands of even the most sophisticated applications, make BOROFLOAT® 33 a perfect specialty glass solution also for LiDAR systems. It combines superior quality and excellent flatness with outstanding thermal, optical, chemical and mechanical features.

BOROFLOAT® 33 – The sum of its properties is what makes it unique!



3 components of a traditional LiDAR unit could be made of BOROFLOAT® 33 borosilicate glass.

## Entrance window

- Exceptionally high transparency
- High chemical durability
- Outstanding thermal resistance/ stability
  - Low thermal expansion even in lowest temperature ranges
- Excellent mechanical strength
  - Strong resistance to abrasion and scratches
  - High resistance to sharp impacts

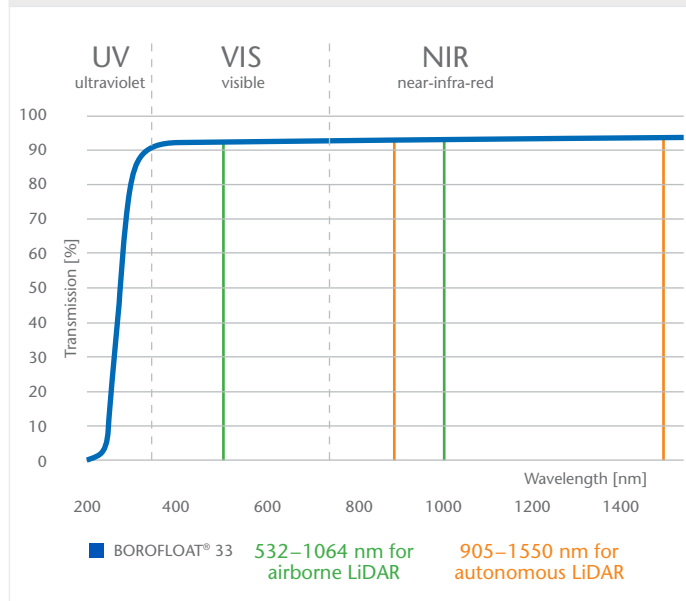
## Mirror (Beamsplitter)

- Very good temperature stability
- Excellent resistance to thermal shock

## Filter

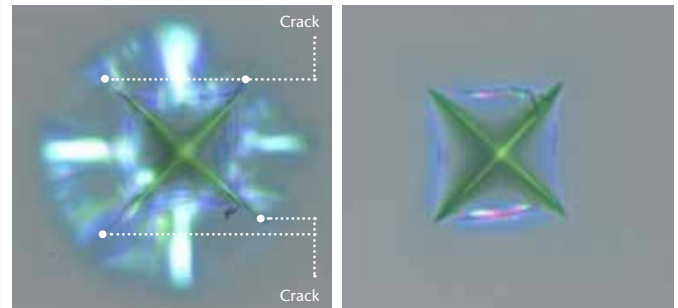
- Significantly increased transparency for colorless visual appearance
- Low color shift in VIS-Transmission
- Low Coefficient of Linear Thermal Expansion (C.T.E.  $3.25 \cdot 10^{-6} \text{ K}^{-1}$ )
- Excellent flatness due to unique Microfloat process

## Significantly increased transparency



## Resistance to crack initiation

Crack initiation at 2 N load



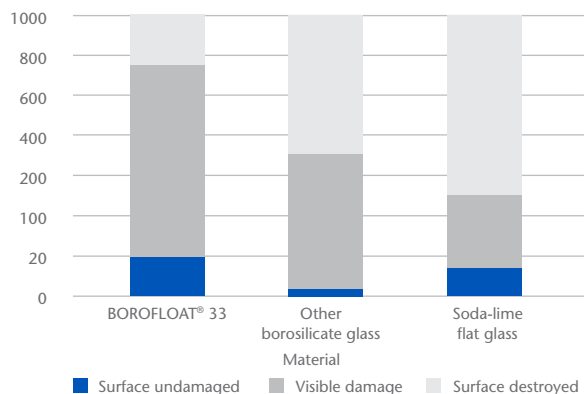
Soda lime glass

BOROFLOAT® 33

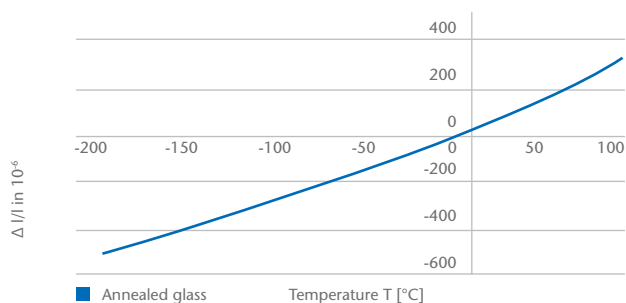
BOROFLOAT® 33 is less brittle than other protective glasses and more resistant to sharp impacts e.g. from stones.

**SCHOTT**  
glass made of ideas

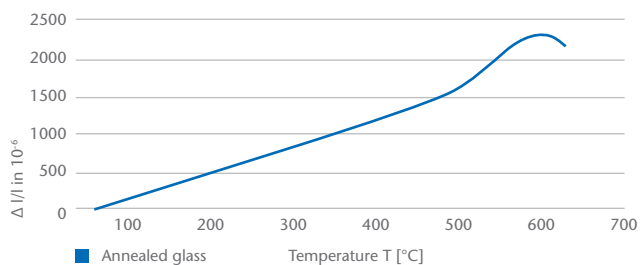
### Resistance to abrasion and scratches



### Expansion behavior in lowest temperature range



### Thermal expansion



### Thermal properties

Coefficient of Linear Thermal Expansion $\alpha$ (20–300 °C)	3.25 x 10 <sup>-6</sup> K <sup>-1</sup>
Specific heat capacity $c_p$ (20–100 °C)	0.83 kJ/(kg·K)
Thermal conductivity $\lambda$ (90 °C)	1.2 W/(m·K)

### Maximum operating temperatures

For short-term usage (< 10 h)	500 °C
For long-term usage (≥ 10 h)	450 °C

### Viscosity of BOROFLOAT® 33

Working Point (104 dPas)	1270 °C
LITTLETON-temperatur / Softening point (107,6 dPas)	820 °C
Annealing Point (1013 dPas)	560 °C
Strain Point (1014,5 dPas)	518 °C
Transformation temperatur (T <sub>g</sub> )	525 °C

### Chemical durability

Hydrolytic resistance (according to ISO 719 / DIN 12 111)	HGB 1
(according to ISO 720)	HGA 1
Acid resistance (according to ISO 1776 / DIN 12 116)	1
Alkali resistance (according to ISO 695 / DIN 52 322)	A 2

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