



**New**  
**Boroplate**  
*Floated Borosilicate*  
*Glass 3.3*



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## General Description

New Boroplate is a colorless, floated borosilicate glass 3.3.

It belongs to the world-wide acknowledged and internationally defined group of borosilicate glasses class 3.3 according to standard DIN ISO 3585 and is completely compatible with other glasses which comply with this standard.

The favourable price performance ratio and the good physical and chemical properties make New Boroplate to a general applicable material.

New Boroplate is corrosion-resistant, and even in combination with aggressive chemicals it is absolutely neutral. It is very resistant against water, acids, as well as halogens. The low thermal expansion and the high thermal resistance mark this kind of glass for operational areas where appear high temperatures and temperature differences. For this reason, New Boroplate is used for the following products:

- Cityscape for efficient luminaries with a high heat emission,
- For subsequent treatment,
- In the chemical industry,
- for glassblower applications in connection with Boroclear (tube and rod),
- etc.



## Order Information

| Thickness mm | Length mm | Width mm | Surface m <sup>2</sup> |
|--------------|-----------|----------|------------------------|
| 2 ± 0,25     | 1200±5,0  | 600±5,0  | 0,72                   |
| 3 ± 0,25     | 1200±5,0  | 600±5,0  | 0,72                   |
| 3,3 ± 0,25   | 1200±5,0  | 600±5,0  | 0,72                   |
| 4 ± 0,25     | 1200±5,0  | 600±5,0  | 0,72                   |
| 5 ± 0,25     | 1200±5,0  | 600±5,0  | 0,72                   |
| 6 ± 0,25     | 1200±5,0  | 600±5,0  | 0,72                   |
| 7 ± 0,35     | 1200±5,0  | 600±5,0  | 0,72                   |
| 8 ± 0,35     | 1200±5,0  | 600±5,0  | 0,72                   |

**Transport and Packing:** Pallet, Costs for packaging and transportation are charged at self-cost rates

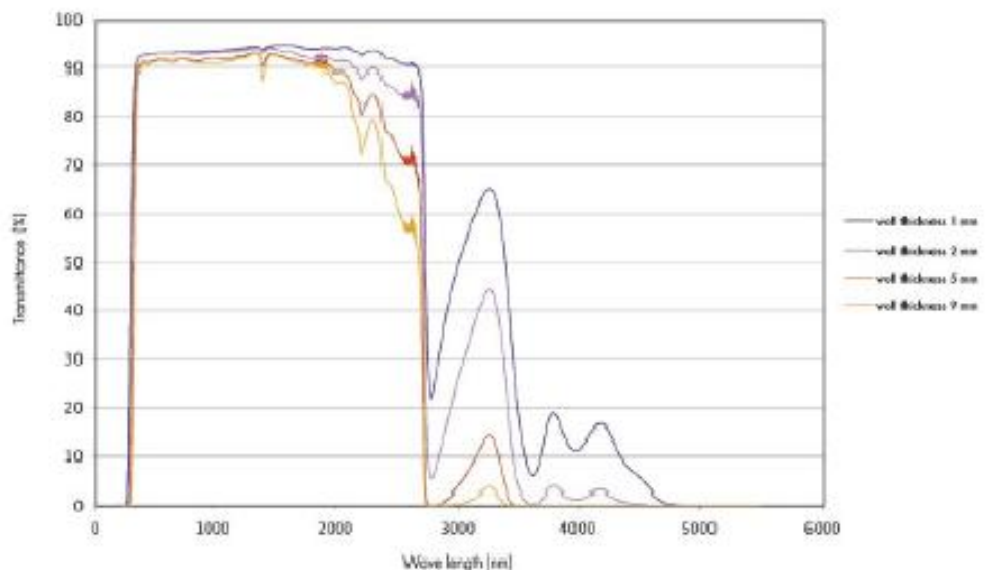
## Optical properties

New Boroplate is transparent and clear, it does not show substantial absorption within the visible spectrum. Due to the permeability of ultra-violet rays, these products can be used for photo-chemical reactions.

Refraction index (at 589,3 nm) 1,472

Photo-elastic constant B  $3,6 \cdot 10^{-6} \text{ MPa}^{-1}$

The light permeability of New Boroplate is illustrated in the following diagram





## Thermal, physical, mechanical, and electric properties

The physical properties of this glass are specified with standard ISO 3585 and are exactly evaluated with international standard testing methods.

| Item  | Value                              | Unit                              |
|---|------------------------------------|-----------------------------------|
| Average linear expansion coefficient (20 - 300 °C acc. ISO 7991, DIN 52328) | $3,3 \cdot 10^{-6}$                | K <sup>-1</sup>                   |
| Transformation température Tg (ISO 7884-8)                                  | 516                                | °C                                |
| <b>Viscosity temperatures:</b>  |                                    |                                   |
| 10 <sup>14,7</sup> dPa s (lower cooling temperature, ISO 7884-7)            | 510                                | °C                                |
| 10 <sup>13,2</sup> dPa s (upper cooling point, ISO 7884-7)                  | 560                                | °C                                |
| 10 <sup>7,5</sup> dPa s (softening <b>temperature</b> , ISO 7884-2, 7884-6) | 820                                | °C                                |
| 10 <sup>4</sup> dPa s (processing temperature, ISO 7884-2, 7884-5)          | 1252                               | °C                                |
| Max. Working temperature, recommended for short use                         | 500                                | °C                                |
| Density at (20°)  | 2,23                               | g/cm <sup>3</sup>                 |
| Elasticity module   | $64 \cdot 10^3$                    | MPa                               |
| Passion - number  | 0,20                               |                                   |
| Thermal conductivity (20 - 100 °C)  | 1,2                                | W m <sup>-1</sup> K <sup>-1</sup> |
| Thermal capacity (20 - 100 °C)  | 0,98                               | J kg K <sup>-1</sup>              |
| Spec. electric resistance in damp-proof medium (20 °C)                      | 10 <sup>13</sup> -10 <sup>15</sup> | Ohm cm                            |
| Permittivity (20 °C, 1 MHz)   | 4,6                                |                                   |
| Loss angle  | $4,9 \cdot 10^{-3}$                |                                   |

## Chemical properties

Boroclear is resistant against water and acids and their compound as well as against chlorine, iodine, and bromine. Even after a long period chemical resistance is better than those of most metals and many other materials.

At higher temperatures and concentration, hydrofluoric acid, hot phosphate acids as well as alkali solutions attack the surface.

water resistance (according ISO 719)  
acid resistance (according ISO 1776)  
lye resistance (according ISO 695)

type 1  
acid class 1-2  
lye class2



## Chemical composition

|                                      |                             |
|--------------------------------------|-----------------------------|
| SiO <sub>2</sub>                     | app. 80,4 weight percentage |
| B <sub>2</sub> O <sub>3</sub>        | app. 13,0 weight percentage |
| Al <sub>2</sub> O <sub>3</sub>       | app. 2,4 weight percentage  |
| Na <sub>2</sub> O + K <sub>2</sub> O | app. 4,0 weight percentage  |

## How to cool the glass after annealing temperature

To avoid permanent stresses during processing New Boroplate is soaked well on transformation temperature. The time is dependent on the wall thickness of the parts. We recommend the following values for heating, holding the temperature, and cooling the glass:

| wall thickness (mm) | Heating auf T <sub>g</sub> | Holding time bei T <sub>g</sub> | Cooling                 |              |             |
|---------------------|----------------------------|---------------------------------|-------------------------|--------------|-------------|
|                     |                            |                                 | T <sub>g</sub> - 490 °C | 490 - 440 °C | 440 - Rt °C |
| 3                   | 140 °C/min                 | 5 min                           | 14 °C/min               | 28 °C/min    | 140 °C/min  |
| 6                   | 30 °C/min                  | 10 min                          | 3 °C/min                | 6 °C/min     | 30 °C/min   |
| 9                   | 15 °C/min                  | 18 min                          | 1,5 °C/min              | 3 °C/min     | 15 °C/min   |
| 12                  | 8 °C/min                   | 30 min                          | 0,6 °C/min              | 1,6 °C/min   | 8 °C/min    |

Taking into account the chemical resistance of the glass, the annealing time should be as short as possible. If for one article several annealings should become necessary during the production process, the total time of all annealings at T<sub>g</sub> should not be exceed two hours.

## Heat stability

The heat stability of New Boroplate depends on the wall thickness, the form, the size of parts, the areas which are warmed up, the status of the surface, the final treatment and the existing stresses. The following values are recommended:

| wall thickness mm | heat stability app. °C |
|-------------------|------------------------|
| < 4,0             | 175                    |
| 4,0 – 5,5         | 160                    |