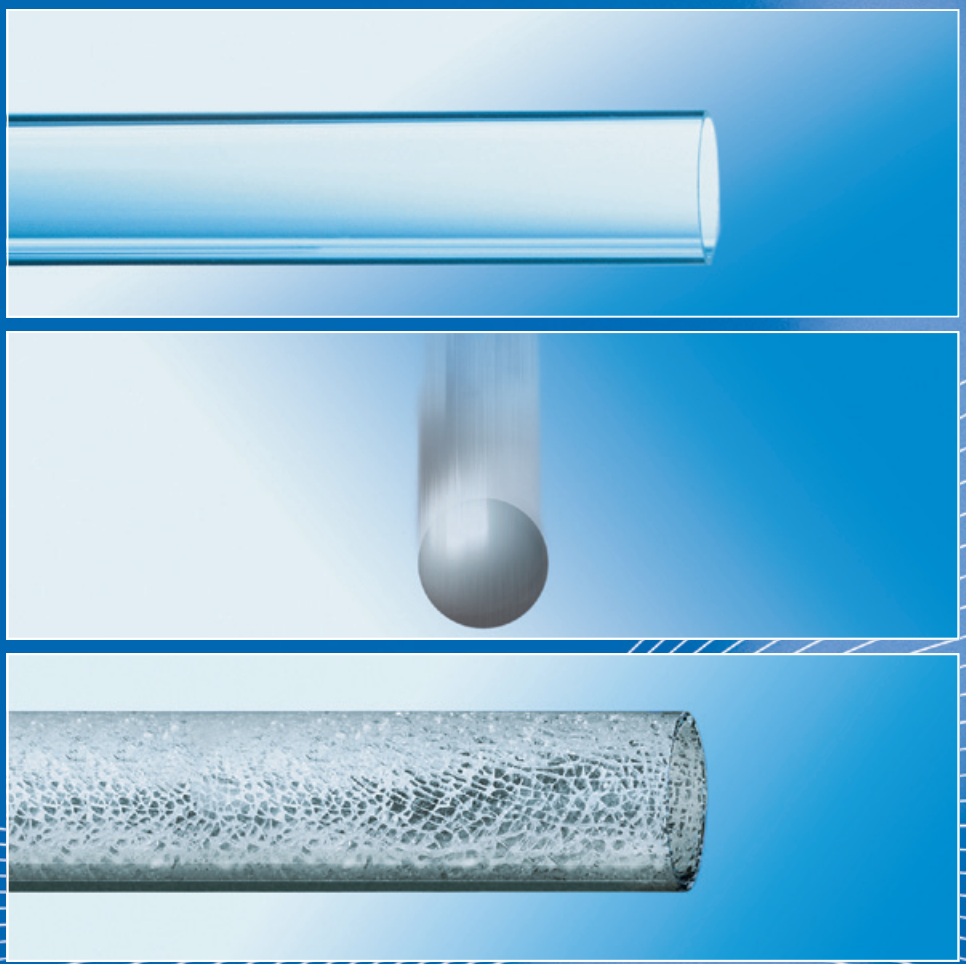
SCHOTT DURATAN®

Thermally prestressed tubing of special glass



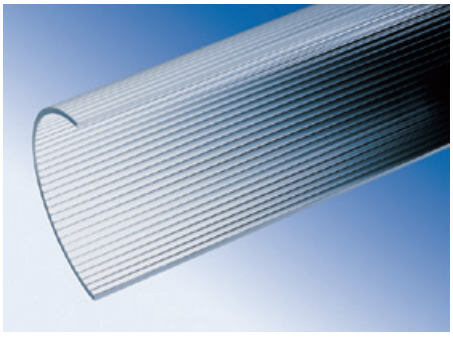
SCHOTT
glass made of ideas

DURATAN® – prestressed borosilicate Glass Tubing

As a leading manufacturer of tubing, capillary and rod SCHOTT offers a **prestressed** and chemically highly resistant borosilicate glass with low thermal coefficient of expansion:
DURATAN®.
Using a thermal toughening process, the wall of the tubing can be prestressed which results in glass tubing with high resistance to tension and mechanical shock and with still higher resistance to thermal shock. The familiar high-quality physical and chemical properties of borosilicate glass are thus not changed but complemented.

Advantages at a Glance:

- pressure load at the surface 40 – 70 N/mm²
- 2 – 3 times higher resistance to tension and mechanical shock compared with glass which is not prestressed
- resistant to temperature shock
- continuous working temperature 350 °C
- chemically highly resistant
- scratch resistant
- light-proof
- break-resistant: the glass disintegrates into a meshwork of little blunt-edged pieces which minimizes the risk of injury
- weight reduction of construction elements by reduced wall thickness



Some tubing from our product line CONTURAX® can also be prestressed (more details upon request).

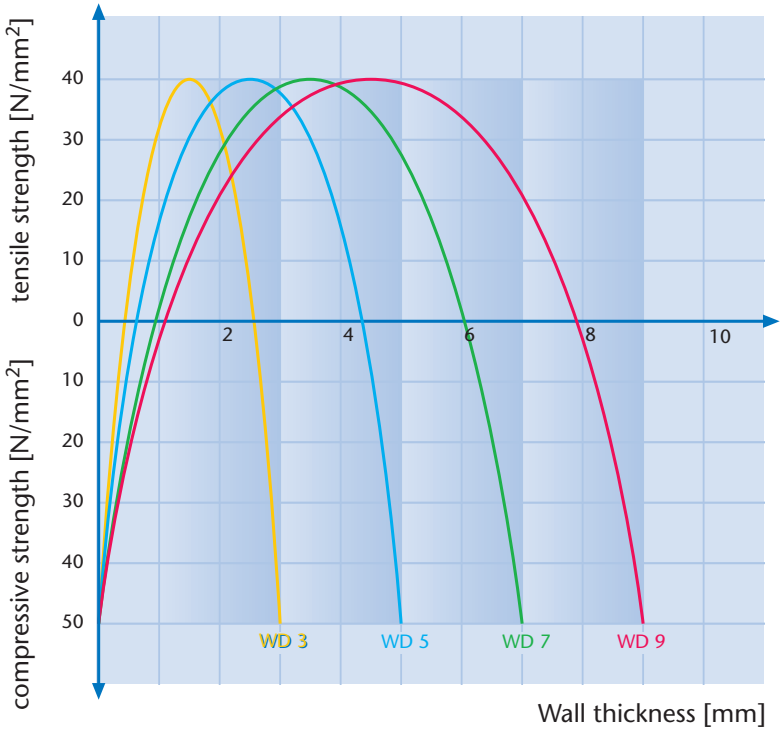
Physical and Chemical Data

Coefficient of mean linear thermal expansion α (20 °C; 300 °C) acc. to DIN ISO 7991	$3.3 \cdot 10^{-6} K^{-1}$
Density ρ at 25 °C	$2.23\ g \cdot cm^{-3}$
Modulus of elasticity E (Young's modulus)	$64 \cdot 10^{3}\ N \cdot mm^{-2}$
Poisson's ratio μ	0.20
Thermal conductivity λ_w at 90 °C	$1.2\ W \cdot m^{-1} \cdot K^{-1}$
Temperature for the specific electrical resistance of $10^8\ \Omega \cdot cm$ (DIN 52 326) $t_{k\,100}$	250 °C
Dielectric properties (1 MHz, 25 °C)	
Dielectric constant ε	4.6
Dielectric loss factor (dissipation factor) tan δ	$37 \cdot 10^{-4}$
Refractive index (λ = 587.6 nm) n_d	1.473
Hydrolytic Class (ISO 719)	HGB 1
Acid Class (DIN 12 116)	Class S 1
Alkali Class (ISO 695)	Class A 2

Mechanical Impact Strength

The mechanical impact strength of hard solid bodies, for example of glass, is determined by a drop test. In the case of luminaires exposed to explosion risk, for example, a ball drop test is carried out on the finished lamp. Based on this standard, SCHOTT is able to carry out ball drop tests on the required tubing dimension and provide corresponding results at any time.
The following table shows examples of this kind of result for one tubing diameter with two different wall thicknesses.
Other measuring data upon request.

prestressed	Outside	Wall	not prestressed
120 mm	5 mm	min. 2 J max. 6 J } $\bar{x}$ ~ 4 J	min. 8 J max.14 J } $\bar{x}$ ~ 13 J
120 mm	7 mm	min. 1 J max. 4 J } $\bar{x}$ ~ 3 J	min. 9 J max.14 J } $\bar{x}$ ~ 13 J

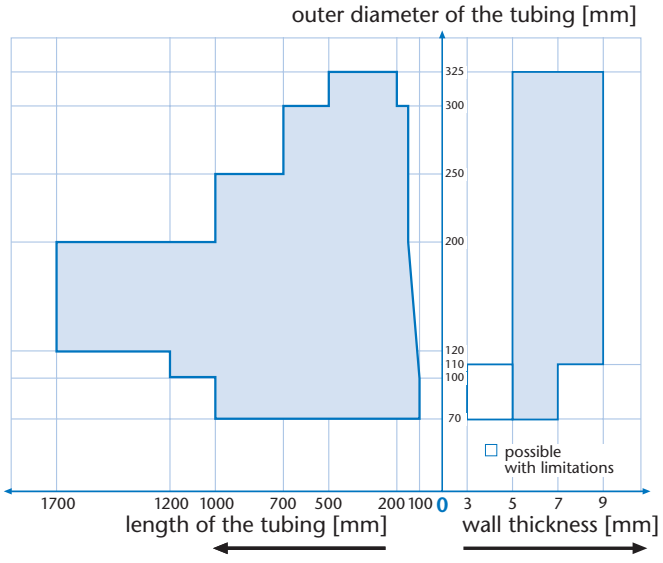


Resulting tension profiles in the tubing wall for outer diameter 120 mm with various wall thicknesses.

During the prestressing process the surface layers are subjected to compressive stress, whilst the inside of the tubing is under the influence of tensile stress. Breakage is only triggered off by a force of external impact exceeding this pressure load of up to 50 N/mm² on the surface. The tubing disintegrates into a meshwork of fine little pieces.

Examples of Applications:

- Flame-proof lighting
- Luminaires with half-shell protection covers
- Tunnel illumination
- Sight glasses in pipeline construction
- Outdoor lighting
- Architecture
- Decoration



Dimensions for DURATAN®

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