

SCHOTT
glass made of ideas



DURATAN[®]

Thermally prestressed
tubing of special glass



SCHOTT is a leading international technology group in the areas of specialty glass and glass-ceramics. With more than 130 years of outstanding development, materials and technology expertise we offer a broad portfolio of high-quality products and intelligent solutions that contribute to our customers' success.

With a production capacity of more than 140,000 tons and production sites in Europe, South America and Asia, SCHOTT Tubing is one of the world's leading manufacturers of glass tubes, rods and profiles. More than 60 different glass types are produced in a large variety of dimensional and cosmetic specifications based on a standardized production process and a global quality assurance system. SCHOTT Tubing provides customized products and services for international growth markets such as pharmaceuticals and electronics as well as industrial and environmental engineering.

The DURATAN® borosilicate glass tubes by SCHOTT have high impact strength and thermal shock resistance, scratch resistance and light transmission and are therefore a good choice for external use.





SCHOTT DURATAN® Prestressed Borosilicate Glass Tubing

Special glass tubing for use in extreme conditions

As one of the leading manufacturers of tubing, capillaries and rods, SCHOTT offers a prestressed, highly chemically resistant borosilicate glass with a low thermal coefficient of expansion: DURATAN®.

DURAN® with advanced properties

Using a thermal toughening process, the wall of the tubing can be prestressed which results in glass tubing with high resistance to tensile stress and mechanical impact. If a DURATAN® tube were to break, it will disintegrate into small blunt fragments, which minimizes the risk of injury. The base glass for DURATAN® is DURAN®. The toughening process enhances the properties. This means the specific features of DURAN®, such as the high chemical resistance and high resistance to UV radiation in external use, are maintained.

Advantages at a glance

... compared to non-toughened glass

- On average 2-3 times higher resistance to tensile stress and mechanical impact
- Fine break pattern, similar to tempered safety glass (ESG); the fine break pattern for OD < 100 mm is limited
- Increased bursting strength where there is internal overpressure

... compared to plastic

- Very high UV resistance
- Chemically resistant
- Scratch-resistant
- Can be used across a wide temperature range

Left: Detailed view of a DURATAN® glass tube following manual break (middle). To show the break pattern, adhesive film was wrapped around the tube.

Increased resistance to mechanical shock

Drop tests to determine mechanical impact strength

The mechanical impact strength of hard solid bodies, for example of glass, is determined by a drop test. DURATAN® is randomly tested using a ball drop test. A defined 1 kg test piece is dropped onto the glass tube from a height of 400 mm, which corresponds to energy of around 4 Joules (J). The tube at least has to resist this impact. The drop height in the test is then increased by 100 mm \approx 1 Joule until the damage occurs. Then the fine break pattern is examined.

Upon special customer request, strength tests on a statistical basis on defined tube dimensions can be offered.

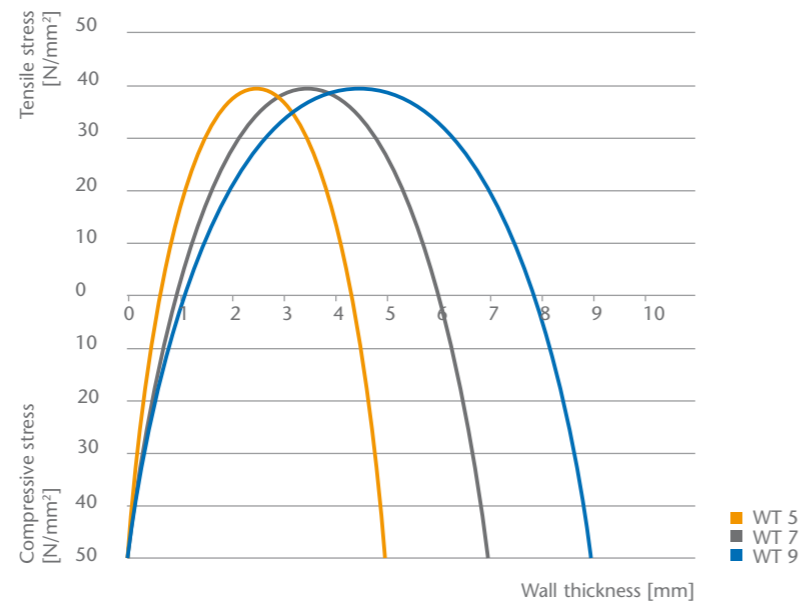
| Outer diameter [mm] | Wall thickness [mm] | Length [mm] | Weibull T value (characteristic fracture energy) DURATAN® prestressed [J] | Weibull T value (characteristic fracture energy) DURAN® not prestressed [J] |
|---------------------|---------------------|-------------|---|---|
| 120 | 5 | 290 | approx. 13 | approx. 4 |

Drop test results for a dimension with Weibull analysis of 50 tubes each (DURAN® and DURATAN®)

Compressive and tensile stress

During the prestressing process, the surface layers are subjected to compressive stress, while the inside of the tubing is under the influence of tensile stress.

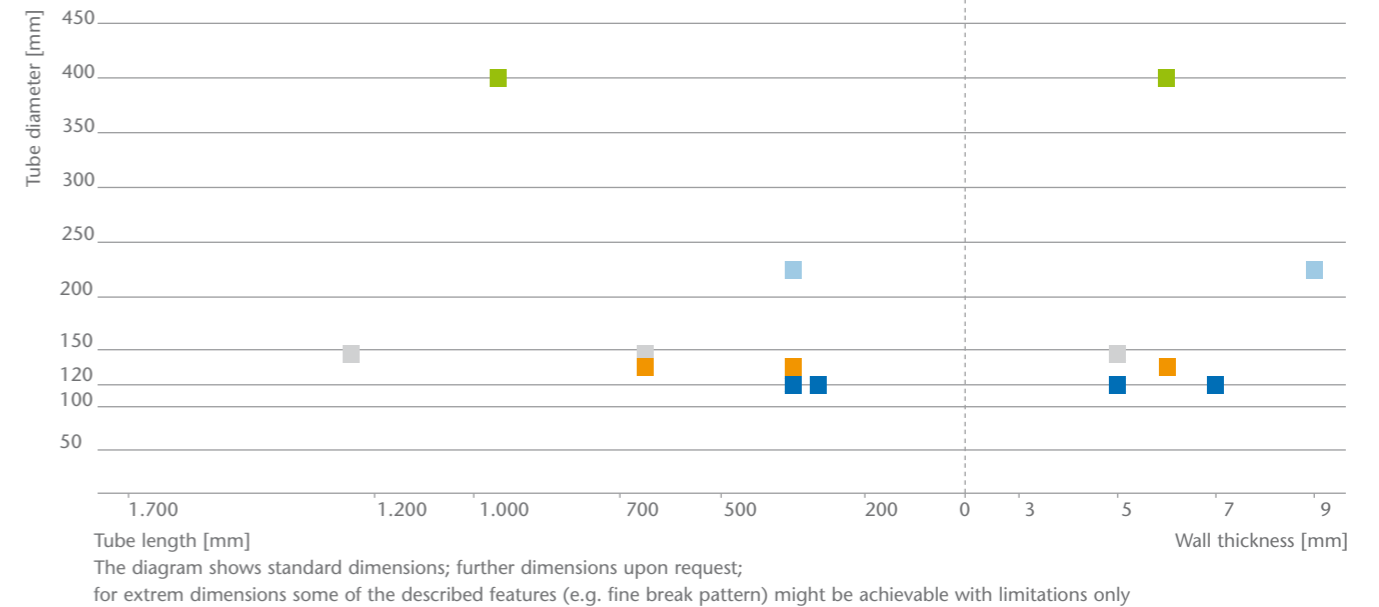
Breakage is only triggered by a force of external impact exceeding this compressive stress of up to 50 N/mm² on the surface.



Resulting stress profile in the tubing wall, for various wall thicknesses, such as the tube diameter 120 mm.

Dimensions for DURATAN®

Please note that the physical features of DURATAN® vary depending on dimensions, storage conditions and technical design of the final product. It is the customer's responsibility to ensure that the chosen dimensions fit for the envisaged purpose and fulfill all applicable industry standards.



The diagram shows standard dimensions; further dimensions upon request; for extrem dimensions some of the described features (e.g. fine break pattern) might be achievable with limitations only

Examples of applications

- Safety lights in explosive atmospheres
- Sight glasses and display cylinders for product presentations
- Sight glasses in pipeline construction
- Tunnel lighting
- Outdoor lighting
- Interior and exterior architecture
- Decoration



Explosion-proof lamps



Product presentation: Qela Store, Qatar

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