



SCHOTT
glass made of ideas

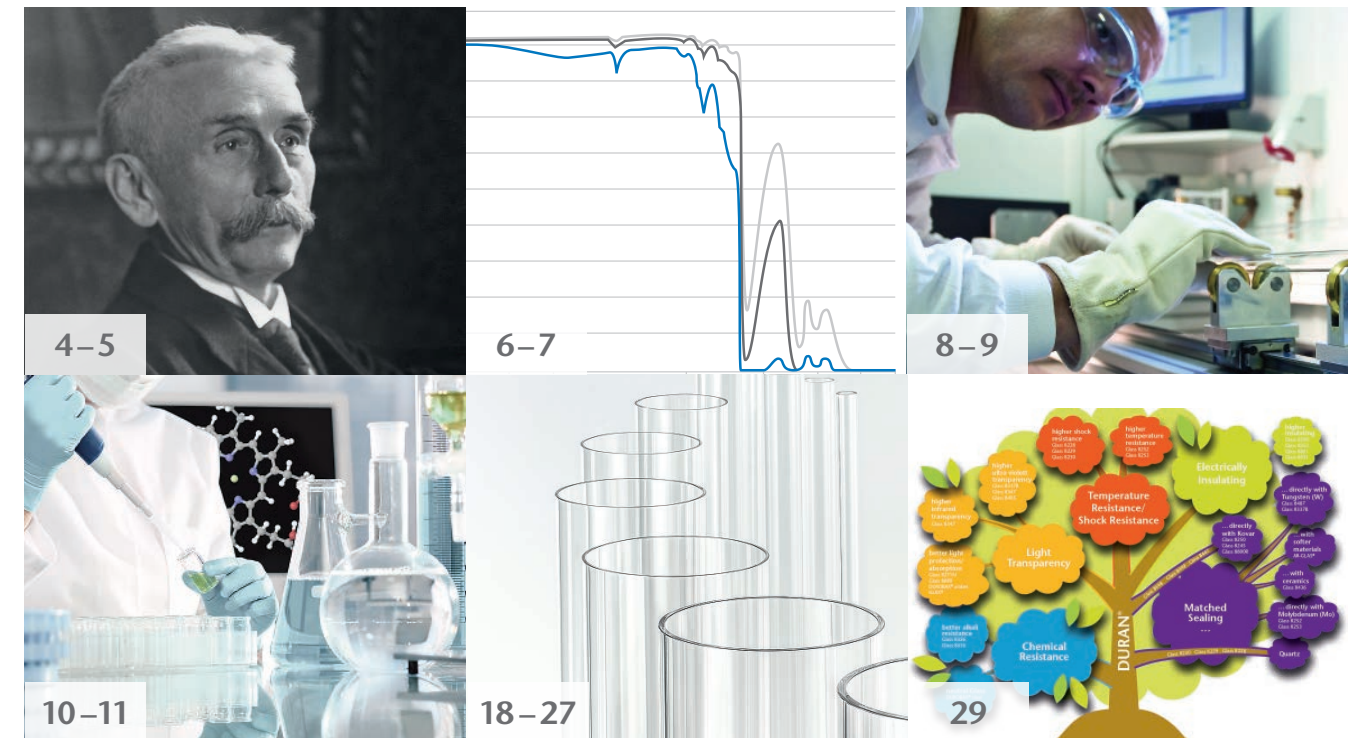
DURAN®

Tubing, rods and capillaries
made of borosilicate glass 3.3

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.

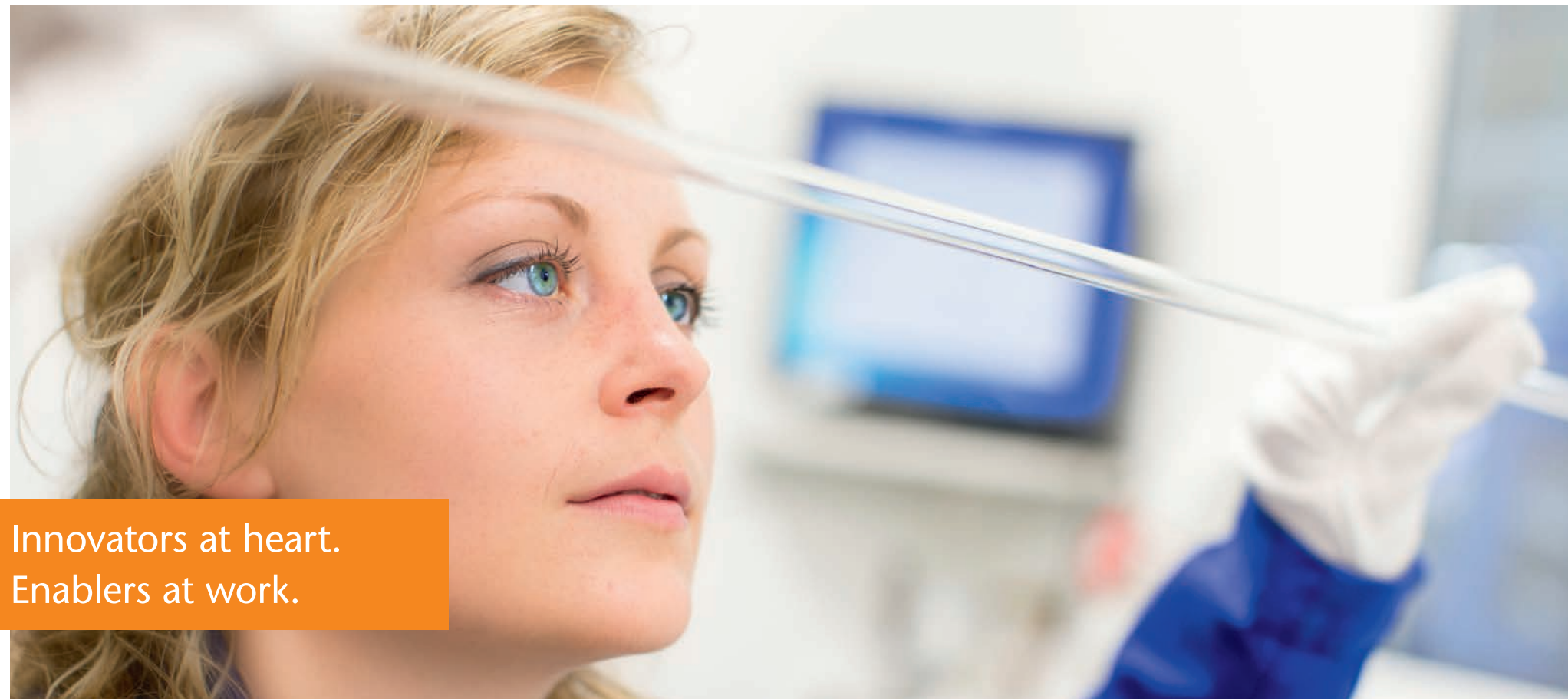
With a production capacity of more than 140,000 tons and production sites in Europe, South America and Asia, SCHOTT Tubing is one of the world's leading manufacturers of glass tubes, rods and profiles.

Approximately 60 glass types are produced in large external diameters and a variety of lengths based on site-overlapping strategies in development, production and quality assurance. SCHOTT Tubing provides customized products and services for international growth markets such as pharmaceuticals and electronics as well as industrial and environmental engineering.



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Innovators at heart.
Enablers at work.

made by SCHOTT

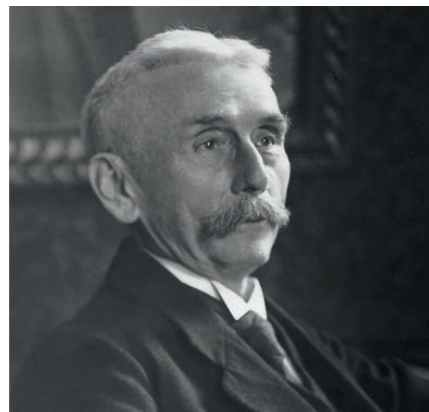
The invention from Otto Schott

Versatile, highly resistant, easily processed – its many features make DURAN® glass tubing the all-round talent among all technical glasses. Invented in 1897 by Otto Schott, this 3.3 expansion glass to this day in many ways positions SCHOTT as the leader in the borosilicate glass industry, boasting uniquely varied dimensions, very tight geometric tolerances and high optical quality.

Otto Schott

The inventor:

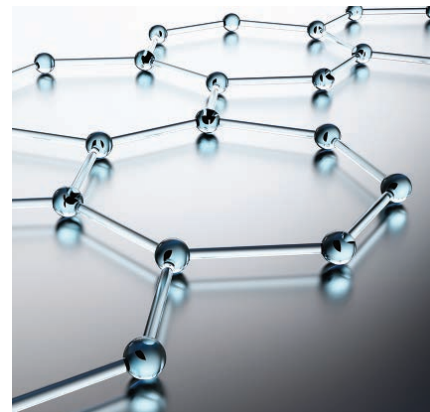
Scientist and company founder



1897

The invention:

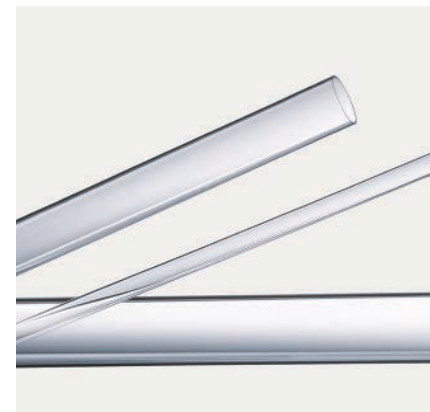
Borosilicate glass 3.3, resistant to chemicals, heat and thermal shock, was invented in 1897 by Otto Schott.



1938

Patented:

Registered for patent in 1938 under the trade name DURAN®.



1950

Industry standard:

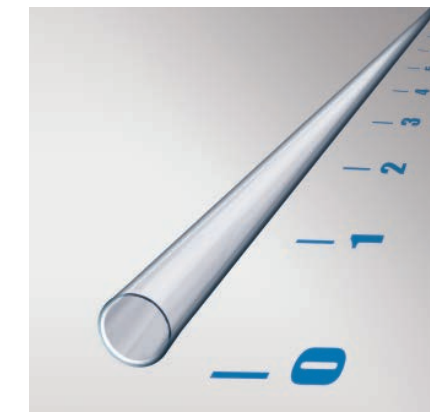
DURAN® borosilicate glass tubing has been the standard material in the production of laboratory glass items since the 1950s.



2011

A first: Glass tubing with a length of 10 meters!

SCHOTT in Mitterteich, Germany, was the first to produce DURAN® tubing in a length of 10 meters, making it the longest industrially produced glass tube.



2015

A first: Glass tubing with 460 mm outside diameter!

SCHOTT in Mitterteich has set a world record: It manufactured DURAN® tubing with an outside diameter of 460 mm, the largest-ever industrially produced glass tubing.



Properties

High chemical resistance

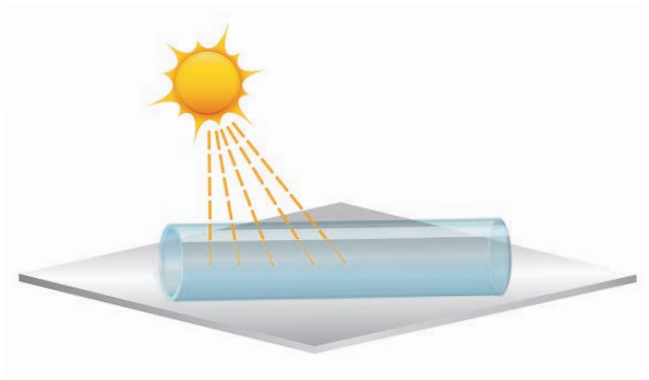


Durability in corrosive environments thanks to high chemical resistance of the material

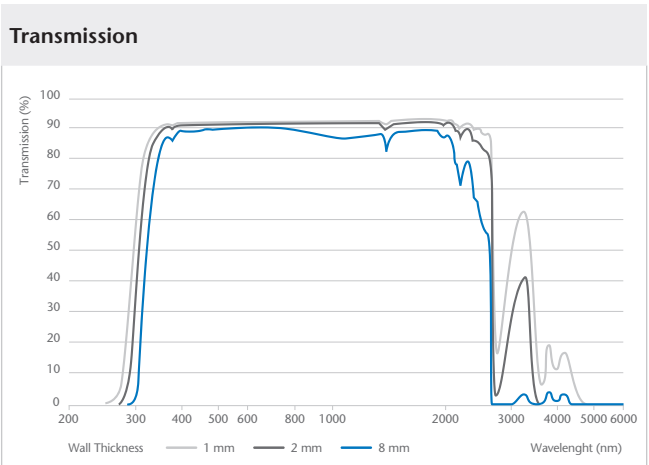
Hydrolytic resistance	
Hydrolytic resistance (DIN ISO 719)	Class HGB 1
Acid resistance (DIN 12116)	Class S 1
Alkali resistance (DIN ISO 695)	Class A 2

DURAN® borosilicate glass 3.3 is very resistant to water, neutral and acid solutions, strong acids and their compounds, as well as against chlorine, bromine, iodine and organic substances. Hydrofluoric acid, hot phosphoric acid, and alkaline solutions attack the glass surface depending on concentration and temperature, thus applications must be individually tested.

Outstanding transmission properties



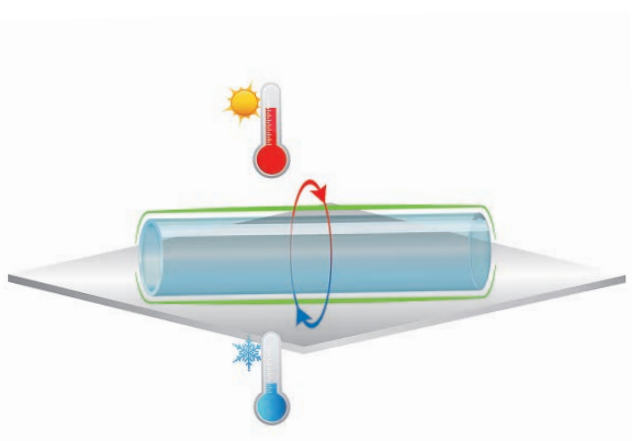
Ideal base material for transparent encapsulation, thanks to consistently stable transmission from UV-A into IR range



Index of refraction ($\lambda = 587.6\text{ nm}$) n_d 1.473

Other characteristics			
Density ρ at 25°C	2.23 g · cm ⁻³	Poisson number μ	0.20
Elasticity modulus E (Young's modulus)	63 · 10 ³ N · mm ⁻²	Stress-optical constant: (DIN 52 314) K	4.0 · 10 ⁻⁶ mm ² · N ⁻¹

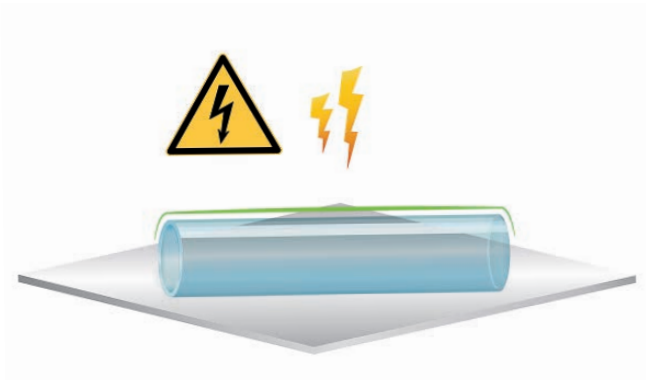
High thermal capacity and resistance to thermal shock



Ideal for applications in contact with fire or high temperatures due to high working temperatures and thermal shock

Temperature resistance and thermal expansion	
Coefficient of mean linear thermal expansion α (20°C; 300°C) as per DIN ISO 7991	3.3 · 10 ⁻⁶ K ⁻¹
Transformation temperature T _g	525 °C
Glass temperature at viscosity η in dPa · s:	
10 ¹³ (annealing point)	560 °C
10 ^{7,6} (softening point)	825 °C
10 ⁴ (working point)	1260 °C
Thermal conductivity λ_w at 90 °C	1.2 W · m ⁻¹ · K ⁻¹

Good electrical properties



Excellent for high-voltage applications, thanks to its good electrical insulating characteristics with high dielectric strength

Electrical properties		
Temperature for specific electrical resistance of 10 ⁸ Ω · cm (DIN 52 326) t _{k 100}		250 °C
Log of the electric volume resistivity (Ω · cm)	at 250 °C at 350 °C	8 6.5
Dielectric properties (1 MHz, 25°C)	dielectric constant ϵ dielectric loss factor tan δ	4.6 37 · 10 ⁻⁴

Versatile in size
and length



Range of dimensions

DURAN® tubing



Dimension range [mm]	
Outside diameter (OD)	3.00 to 465.00
Wall thickness (WT)	0.45 to 14.00
Length (L)	600 to 10,000

DURAN® rods



Dimension range [mm]	
Diameter (D)	> 2.00 to 42.00
Length (L)	1,200 to 3,000

DURAN® capillaries



Dimension range [mm]	
Outside diameter (OD)	4.00 to 9.00
Inside diameter (ID)	0.40 to 3.00
Length (L)	1,000 to 2,000

These dimensions cannot be selected in any combination of OD, WT, ID and L. Further dimensions available upon request.
Requirement: successful technical feasibility test

Shorter lengths are available with post-processing upon request.



Quality management

Ultra-modern manufacturing methods forge SCHOTT quality, 100 % measured, controlled, documented, and traceable all the way back to its origin.

Certified quality

DURAN® meets all significant standards for technical glass such as ISO 3585:1998 and ASTM E438 Type I. Good Manufacturing Practice (GMP) is a guideline for production processes and production environment (ISO 15378) and is an extension of the familiar standard ISO 9001. SCHOTT in Mitterteich, Germany, is the world's first glass tubing manufacturer to be certified under the applicable European standard ISO 15378.



Proven quality from SCHOTT

In addition to measuring done within the production lines, random samples are regularly taken during the production process. The in-house laboratory tests these samples chemically, physically and visually in order to verify and expand upon the automatic testing. Once the finished tubing is packaged and ready for shipment, all measuring results and packaging information is archived for any later access that may be required.

Wide range of applications

Do you know some of the many ways where DURAN® tubing is used?
Here are a few examples:

Laboratory



Laboratory devices: DURAN® tubing for high thermal-shock and corrosion resistance

Art & design, safety and more



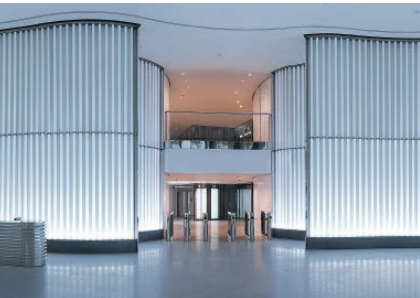
Product presentation: DURAN® tubing with high transparency and resistance to scratches



Giftware: DURAN® tubing as easily processed primary material



Explosion proof lighting: DURAN® tubing for durability in corrosive environments



Interior design: DURAN® tubing for modern and innovative design solutions



Sprinkler fuses: DURAN® tubing with consistently reliable thermal expansion



360-degree camera: enveloping DURAN® tubing as protection from scratches, environmental effects and reflections

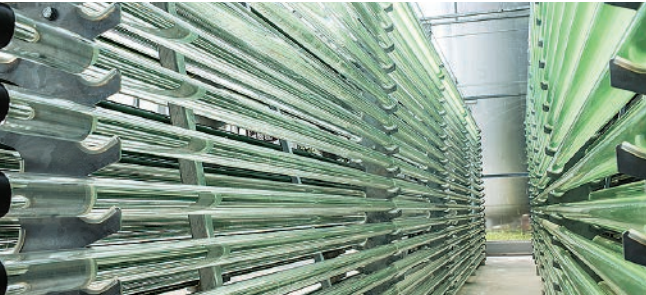
Process plant engineering



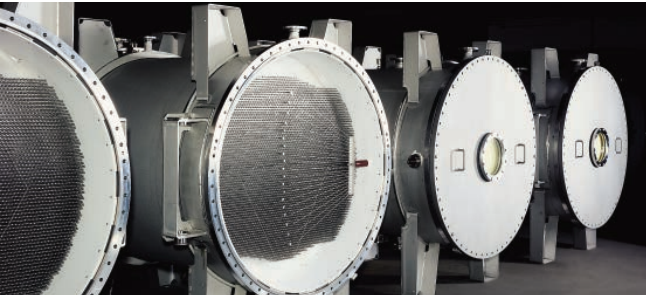
Chemical equipment: geometrically precise DURAN® tubing for commercial plants



Sight glasses: DURAN® tubing for consistently stable clarity



Photobioreactors: DURAN® tubing with high transmission for ideal algae growth



Ozone generators: DURAN® tubing as insulator



Heat exchangers: DURAN® tubing for high corrosion resistance



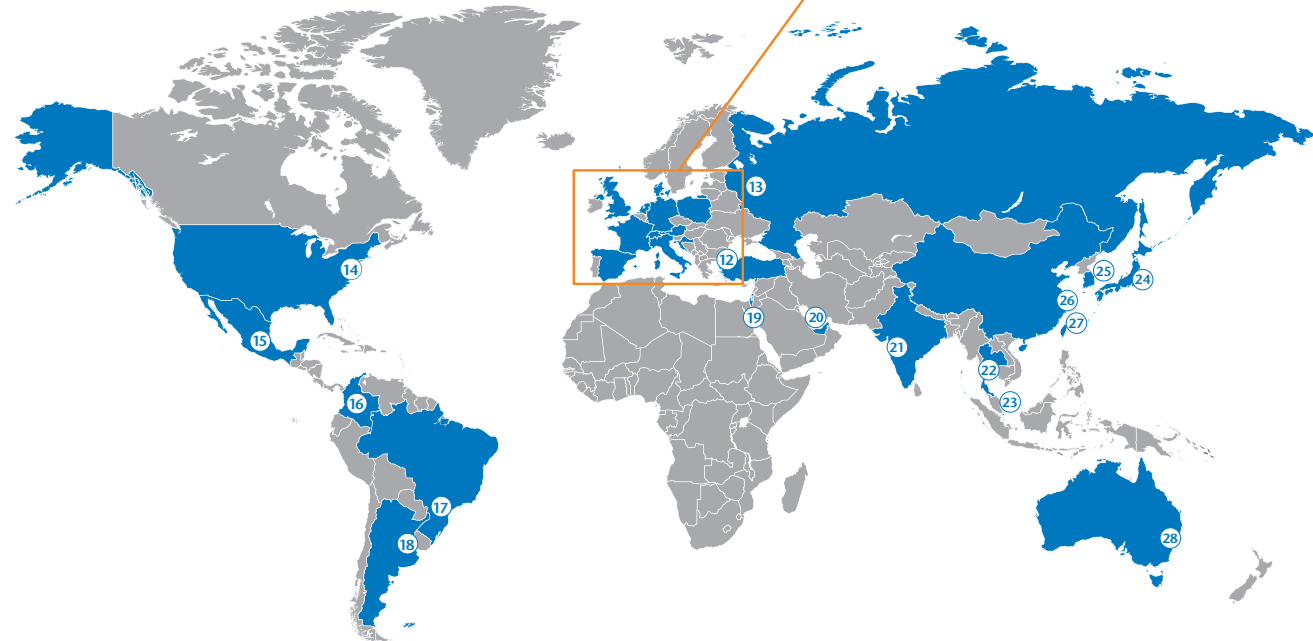
Ventilation systems: DURAN® tubing for optimum effect and long life

The worldwide sales offices of SCHOTT Technical Tubing: International and close to customers

Europe

- ① DENMARK | Lyngby
- ② ENGLAND | Stafford
- ③ NETHERLANDS | Tiel
- ④ GERMANY | Mitterteich -
Production site
- ⑤ FRANCE | Colombes
- ⑥ SWITZERLAND | St. Gallen

- ⑦ AUSTRIA | Vienna
- ⑧ SPAIN | Barcelona
- ⑨ ITALY | Genova
- ⑩ CROATIA | Zagreb
- ⑪ POLAND | Warsaw
- ⑫ TURKEY | Istanbul
- ⑬ RUSSIA | Moscow



North America

- ⑭ USA | Elmsford, NY
- ⑮ MEXICO | Mexico City

South America

- ⑯ COLUMBIA | Bogotá
- ⑰ BRASIL | Itupeva
- ⑱ ARGENTINA | Buenos Aires

Near East

- ⑲ ISRAEL | Tel Aviv
- ⑳ UNITED ARAB. EMIRATES | Dubai

Asia

- ㉑ INDIA | Mumbai
- ㉒ THAILAND | Bangkok
- ㉓ SINGAPORE | Singapore
- ㉔ JAPAN | Tokyo
- ㉕ KOREA | Seoul
- ㉖ CHINA | Shanghai
- ㉗ TAIWAN | Taipei
- ㉘ AUSTRALIA | Frenchs Forest

Services

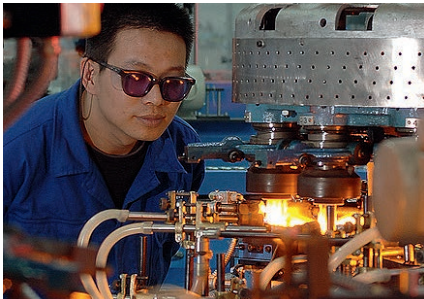
Know-how and consulting

Glass specialists from SCHOTT Technical Tubing provide support for all issues of production, processing and application of glass tubing, rods, and capillaries. Our qualified experts have in-depth knowledge of glass and its properties and processes. We provide custom-tailored advice and services, from material selection to support for technical feasibility studies, up to product development.

Scientific Services

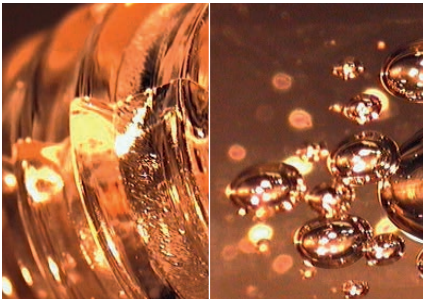
- Nonconformity analysis during glass processing
- Application-specific technical advice
- Know-how transfer via training and lectures

Technical consulting



Benefit from our expertise in materials, product features and processing.

Analysis of glass defects



Our experts improve the quality and efficiency of your production throughout the entire process chain.

Innovation



We are happy to partner up with you to develop optimum solutions for your product idea.

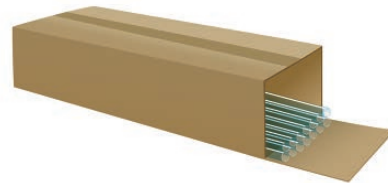
Lectures



We will share our comprehensive expertise with you.

Logistics services

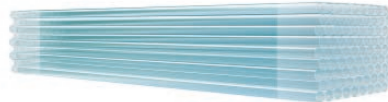
Standard packaging solutions



Carton

Individual packaging solutions

More custom packaging is available as per individual needs and customer request.



DENSOPACK®

Tight packaging plus
shrunk-on foil
= effective transport protection

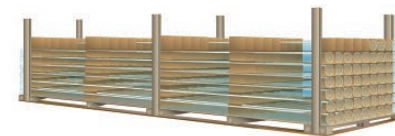
- Up to exterior diameter of 50 mm
- Standard length 1,500 mm
- Can be custom made



Large carton box



Wooden box



Bulk pallet

Round-the-clock ordering



All dimensions indicated in this brochure
can be ordered online:
www.schott.com/tubing/ecom

DURAN® is easily ordered 24/7 and online. Stock lists, price transparency, and anticipated delivery date are only a few of the practical functions. Comprehensive, log-in-protected functions facilitate ordering:
www.schott.com/tubing/ecom

For further information and individual log-in details
call +49 (0) 9633/80-100 or contact customerservice.tubing@schott.com.

Processing notes



Strength

Glass is a brittle material.

Theoretically calculated strength is meaningless in the practical application of glass. The strength of glass is not determined by material property but rather by surface property. The surface of glass always contains microscopic defects. Packaging, transport and especially processing determine strength, because this is when microscopic to macroscopic damage occurs to the surface. The strength of glass components is thus researched experimentally and not theoretically.

Experimental tests of the strength of glass indicate the distribution of failure frequency under certain loads. Statistical assessment of this distribution allows for calculating the probability of fracture. The probability of fracture, in turn, allows for dimensioning of the glass component or assessment of its use for a specific application, if required.

The following theoretical considerations can help in laying out applications or defining operating conditions, yet do not replace practical strength tests when necessary. These must be performed on the final product and are thus the responsibility of the end-product manufacturer.



Processing notes

Compressive strength of DURAN® borosilicate glass 3.3 tubing

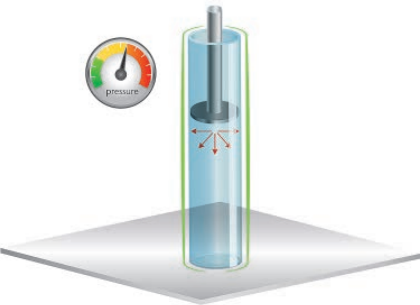
The following formula applies to stress-free tubing and hollow cylindrical bodies with rounded profile, consistent wall thickness and open ends, free of thermal loads under positive interior and negative exterior pressure.

Calculating resistance to pressure (p)
$$p = \frac{WT \cdot 140 \text{ bar}}{OD - WT}$$

Calculating wall thickness (WT)
$$WT = \frac{OD \cdot p}{140 \text{ bar} + p}$$

OD = outside diameter in mm
WT = wall thickness in mm
p = pressure in bar

The formula stems from the AD 2000 specifications N4, Issue 2000-10: Pressure vessels of glass with Annex 1, Issue 2000-10: Assessment of errors in pressure vessel walls of glass and B1, Issue 2000-10: Cylinder and spherical shells under excess interior pressure, whereby approved strain under DIN EN 1595: Pressure equipment made from borosilicate glass 3.3 – General rules for design, manufacture and testing of 7N/mm² were established.
Under DIN EN 1595: Pressure equipment of borosilicate glass 3.3 – General rules for design, manufacture and testing, DURAN® is an approved material and can be used in the manufacture of pressure equipment.



Thermal-shock resistance

The thermal-shock resistance of glass tubing can be estimated with, for example, a GIT publication (data and process sheets, Process sheet GIT 6 [1962] booklet 12 [Dec.]). Thermal-shock resistance refers to the mechanical resistance of glass tubing against cracking or breaking under extreme thermal shock. The values in this publication are based on theoretical research and practical experience and should show temperature differences which the glass bodies can withstand in practice. Breakage is thereby not expected until temperature differences are 1.2 to 2 times higher.

Processing notes

The table below gives two maximum temperature differences each for some dimensions. The publication for glass tubing distinguishes between two types of temperature change.

1. Temperature change to the tubing occurs only from the outside, without direct influence on the interior atmosphere.
2. Temperature change occurs simultaneously from the outside and on the inside of the tubing. This case is less critical and represents the higher value of the table.

Tubing	Rod
OD 50.5/WT 5.00 mm: 100/140 °C	OD 24.0 mm: 75 °C
OD 133.0/WT 7.00 mm: 90/120 °C	
OD 120.0/WT 8.00 mm: 85/110 °C	

The thermal-shock resistance of tubing, capillaries and rods depends on wall thickness, shape and size of the quenched surface, surface condition, existing stresses and end finish. It is recommended not to exceed a temperature difference of 120 °C.

Stress-free cooling

To remove temporary stresses arising from processing, glass is heated to a maximum of 550 °C and kept at this temperature for no more than 30 minutes; for lower thickness a fraction of this time is normally needed. For subsequent cooling the following table contains standard values for recommended cooling rate:

Wall thickness in mm	Temperature range		
	550 to 480 °C	480 to 400 °C	400 to 20 °C
3	~12 °C/min	~24 °C/min	to ~480 °C/min
6	~3 °C/min	~6 °C/min	to ~120 °C/min
12	~0.8 °C/min	~1.6 °C/min	to ~32 °C/min

If an item needs to be cooled several times, the sum of all relaxation times at 550 °C should not exceed two hours.



Outside diameter
of 3 - 465 mm

Standard product range
Tubing

Outer diameter	Wall thickness	Tube weight Length approx. 1,500 mm	Carton contents		Pallet load	
 mm	 mm	 g	 Number of tubes	 Weight approx. kg	 Number of cartons	 Weight approx. kg
3 ±0.13	0.7 ±0.03	17	941	16.0	27	432.0
4 ±0.13	0.8 ±0.03	27	555	15.0	36	540.0
5 ±0.13	0.8 ±0.03	35	343	12.0	45	540.0
6 ±0.13	1.0 ±0.04	53	245	13.0	36	468.0
	1.5 ±0.07	71	211	15.0	36	540.0
7 ±0.13	1.0 ±0.04	63	190	12.0	45	540.0
	1.5 ±0.07	87	172	15.0	36	540.0
8 ±0.13	1.0 ±0.04	74	149	11.0	45	495.0
	1.5 ±0.07	102	147	15.0	36	540.0
9 ±0.13	1.0 ±0.04	84	119	10.0	45	450.0
	1.5 ±0.07	118	119	14.0	36	504.0
10 ±0.13	1.0 ±0.04	95	95	9.0	45	405.0
	1.5 ±0.07	134	90	12.0	45	540.0
	2.2 ±0.11	180	56	10.0	45	450.0
11 ±0.16	1.0 ±0.04	105	86	9.0	45	405.0
	1.5 ±0.07	150	73	11.0	45	495.0
	2.2 ±0.11	203	42	8.5	45	382.5
12 ±0.16	1.0 ±0.04	116	130	15.0	35	525.0
	1.5 ±0.07	165	67	11.0	45	495.0
	2.2 ±0.11	226	42	9.5	45	427.5
13 ±0.16	1.0 ±0.04	126	119	15.0	35	525.0
	1.5 ±0.07	181	55	10.0	45	450.0
	2.2 ±0.11	250	36	9.0	45	405.0
14 ±0.16	1.0 ±0.04	137	110	15.0	35	525.0
	1.5 ±0.07	197	46	9.0	45	405.0
	2.2 ±0.11	273	30	8.2	45	369.0
15 ±0.16	1.2 ±0.05	174	86	15.0	35	525.0
	1.8 ±0.08	250	56	14.0	35	490.0
	2.5 ±0.12	328	25	8.2	45	369.0
16 ±0.16	1.2 ±0.05	187	81	15.0	35	525.0
	1.8 ±0.08	268	49	13.1	35	458.5
	2.5 ±0.12	354	25	8.8	45	396.0

Standard product range

Tubing

Outer diameter	Wall thickness	Tube weight Length approx. 1,500 mm	Carton contents		Pallet load	
 mm	 mm	 g	 Number of tubes	Weight approx. kg	 Number of cartons	Weight approx. kg
17 ±0.16	1.2 ±0.05	199	75	15.0	35	525.0
	1.8 ±0.08	287	49	14.0	35	490.0
	2.5 ±0.12	381	25	9.5	45	427.5
18 ±0.16	1.2 ±0.05	212	66	14.0	35	490.0
	1.8 ±0.08	306	49	15.0	35	525.0
	2.5 ±0.12	407	20	8.1	45	364.5
19 ±0.16	1.2 ±0.05	224	63	14.0	35	490.0
	1.8 ±0.08	325	42	13.7	35	479.5
	2.5 ±0.12	433	36	15.6	35	546.0
20 ±0.23	1.2 ±0.05	237	55	13.0	35	455.0
	1.8 ±0.08	344	36	12.4	35	434.0
	2.5 ±0.12	460	20	9.2	45	414.0
22 ±0.23	1.2 ±0.05	262	42	11.0	35	385.0
	1.8 ±0.08	382	30	11.5	35	402.5
	2.5 ±0.12	512	30	15.4	35	539.0
24 ±0.23	1.2 ±0.05	287	36	10.3	35	360.5
	1.8 ±0.08	420	25	10.5	35	367.5
	2.5 ±0.12	565	25	14.0	45	490.0
26 ±0.24	1.4 ±0.05	362	30	10.9	35	381.5
	2.0 ±0.09	504	25	12.6	35	441.0
	2.8 ±0.14	682	20	13.6	35	476.0
28 ±0.24	1.4 ±0.05	391	25	9.8	35	343.0
	2.0 ±0.09	546	20	11.0	35	385.0
	2.8 ±0.14	741	20	14.8	35	518.0
30 ±0.30	1.4 ±0.07	421	36	15.2	20	304.0
	2.0 ±0.09	588	16	9.4	35	329.0
	2.8 ±0.14	800	16	12.8	35	448.0
32 ±0.30	1.4 ±0.07	450	25	11.3	20	226.0
	2.0 ±0.09	630	16	10.1	35	353.5
	2.8 ±0.14	859	16	13.8	35	483.0
33 ±0.30	2.0 ±0.09	651	25	16.2	20	324.0
34 ±0.30	1.4 ±0.07	479	25	12.1	20	242.0
	2.0 ±0.09	672	16	10.8	35	378.0
	2.8 ±0.14	918	16	14.8	35	518.0

Standard product range

Tubing

Outer diameter	Wall thickness	Tube weight Length approx. 1,500 mm	Carton contents		Pallet load	
 mm	 mm	 g	 Number of tubes	Weight approx. kg	 Number of cartons	Weight approx. kg
36 ±0.35	1.4 ±0.07	509	25	12.6	20	252.0
	2.0 ±0.09	714	25	18.0	20	360.0
	2.8 ±0.14	976	12	11.7	35	409.5
38 ±0.35	1.4 ±0.07	538	20	10.8	20	216.0
	2.0 ±0.09	756	20	15.0	20	300.0
	2.8 ±0.14	1 035	9	9.4	35	329.0
40 ±0.50	1.6 ±0.08	645	16	10.2	20	204.0
	2.3 ±0.11	911	16	14.6	20	292.0
	3.2 ±0.18	1 237	9	11.2	35	392.0
	5.0 ±0.30	1 838	9	16.5	28	462.0
42 ±0.50	1.6 ±0.08	679	16	10.9	20	218.0
	2.3 ±0.11	959	16	15.3	20	306.0
	3.2 ±0.18	1 304	9	11.7	35	409.5
44 ±0.50	1.6 ±0.08	713	16	11.4	20	228.0
	2.3 ±0.11	1 007	16	16.0	20	320.0
	3.2 ±0.18	1 371	9	12.4	35	434.0
45 ±0.60	5.0 ±0.30	2 101	9	18.9	28	529.2
46 ±0.60	1.6 ±0.08	746	16	11.9	20	238.0
	2.3 ±0.11	1 056	9	9.5	35	332.5
	3.2 ±0.18	1 439	9	13.0	35	455.0
48 ±0.60	1.6 ±0.08	780	16	12.4	20	248.0
	2.3 ±0.11	1 104	16	17.6	20	352.0
	3.2 ±0.18	1 506	6	9.0	35	315.0
50 ±0.65	1.8 ±0.11	911	12	10.9	20	218.0
	2.5 ±0.14	1 247	12	15.0	20	300.0
	3.5 ±0.22	1 709	12	20.5	20	410.0
	5.0 ±0.30	2 363	6	14.1	35	493.5
	7.0 ±0.45	3 161	6	19.0	28	532.0
52 ±0.65	9.0 ±0.60	3 876	6	23.2	21	487.2
	1.8 ±0.11	949	9	8.5	20	170.0
	2.5 ±0.14	1 300	9	11.7	20	234.0
	3.5 ±0.22	1 783	9	16.0	20	320.0
54 ±0.65	1.8 ±0.11	987	9	8.9	20	178.0
	2.5 ±0.14	1 352	9	12.2	20	244.0
	3.5 ±0.22	1 856	9	16.7	20	334.0
55 ±0.65	5.0 ±0.30	2 626	4	10.5	35	367.5

Standard product range

Tubing

Outer diameter	Wall thickness	Tube weight Length approx. 1,500 mm	Carton contents		Pallet load	
 mm	 mm	 g	 Number of tubes	Weight approx. kg	 Number of cartons	Weight approx. kg
56	±0.65	1.8 ±0.11	9	9.2	20	184.0
		2.5 ±0.14		12.6		252.0
		3.5 ±0.22		17.5		350.0
58	±0.65	1.8 ±0.11	9	9.6	20	192.0
		2.5 ±0.14		13.1		262.0
		3.5 ±0.22		18.0		360.0
60	±0.75	2.2 ±0.16	9	12.0	20	240.0
		3.2 ±0.18		17.2		344.0
		4.2 ±0.25	4	9.8	35	343.0
		5.0 ±0.30		11.5		402.5
		7.0 ±0.45		15.6		546.0
65	±0.75	9.0 ±0.60	4	19.3	28	540.4
		2.2 ±0.16		11.7		234.0
		3.2 ±0.18		8.3		290.5
		4.2 ±0.25		10.7		374.5
70	±0.85	5.0 ±0.30	4	12.6	35	441.0
		2.2 ±0.16		12.5		187.5
		3.2 ±0.18		9.0		315.0
		4.2 ±0.25		11.6		406.0
		5.0 ±0.30		13.6		476.0
75	±0.85	7.0 ±0.45	4	18.5	35	647.5
		9.0 ±0.60		23.1		485.1
		2.2 ±0.16		13.5		202.5
		3.2 ±0.18		9.7		194.0
80	±1.10	4.2 ±0.25	4	12.5	20	250.0
		5.0 ±0.30		14.7		294.0
		2.5 ±0.16		8.2		164.0
		3.5 ±0.22		11.3		226.0
85	±1.10	5.0 ±0.35	4	15.8	20	316.0
		9.0 ±0.65		26.8		536.0
		2.5 ±0.16		8.7		174.0
85	±1.10	3.5 ±0.22	4	12.0	20	240.0
		5.0 ±0.35		16.8		336.0
		2.5 ±0.16		8.7		174.0

Standard product range

Tubing

Outer diameter	Wall thickness	Tube weight Length approx. 1,500 mm	Carton contents		Pallet load	
 mm	 mm	 g	 Number of tubes	Weight approx. kg	 Number of cartons	Weight approx. kg
90	±1.10	2.5 ±0.16	4	9.2	20	184.0
		3.5 ±0.22		12.7		254.0
		5.0 ±0.35		17.9		358.0
		7.0 ±0.45		18.3		274.5
		9.0 ±0.65		23.0		345.0
95	±1.30	2.5 ±0.16	4	9.7	20	194.0
		3.5 ±0.22		13.4		268.0
		5.0 ±0.35		18.9		378.0
100	±1.30	2.5 ±0.16	4	10.3	20	206.0
		3.0 ±0.18		12.1		108.9
		3.5 ±0.22		10.7		128.4
		5.0 ±0.35		15.0		180.0
		7.0 ±0.45		20.5		246.0
		9.0 ±0.65		25.8		309.6
105	±1.40	3.0 ±0.18	3	9.6	12	115.2
		5.0 ±0.40		15.8		189.6
110	±1.40	3.0 ±0.25	3	10.1	12	121.2
		5.0 ±0.45		16.5		198.0
		7.0 ±0.60		22.7		272.4
115	±1.40	3.0 ±0.25	4	14.1	9	126.9
		5.0 ±0.45		11.6		174.0
		7.0 ±0.60		15.9		238.5
120	±1.40	3.0 ±0.25	4	14.7	9	132.3
		5.0 ±0.45		12.1		181.5
		7.0 ±0.60		16.6		249.0
		9.0 ±0.80		21.0		315.0
125	±1.40	5.0 ±0.45	2	12.6	15	189.0
		9.0 ±0.80		21.9		328.5
130	±1.50	3.0 ±0.25	4	16.0	9	144.0
		5.0 ±0.45		13.1		196.5
		7.0 ±0.60		18.1		271.5
		9.0 ±0.80		22.9		343.5
135	±1.50	5.0 ±0.45	2	13.7	15	205.5
		7.0 ±0.60		18.8		282.0
140	±1.60	3.0 ±0.25	4	17.3	9	155.7
		5.0 ±0.45		14.2		213.0
		7.0 ±0.60		19.6		294.0

Standard product range

Tubing

Outer diameter		Wall thickness		Tube weight Length approx. 1,500 mm		Carton contents		Pallet load	
 mm		 mm		 g		 Number of tubes Weight approx. kg		 Number of cartons Weight approx. kg	
145	±1.60	5.0	±0.45	7 352		2	14.7	15	220.5
		3.0	±0.25	4 632		2	9.3	12	111.6
150	±1.70	5.0	±0.45	7 615		2	15.2	12	182.4
		7.0	±0.60	10 514		2	21.0	12	252.0
		9.0	±0.80	13 329		2	26.7	12	320.4
155	±1.75	5.0	±0.45	7 877		2	15.8	12	189.6
160	±1.75	5.0	±0.45	8 140		2	16.3	12	195.6
		7.0	±0.70	11 249		2	22.5	12	270.0
165	±1.75	5.0	±0.45	8 403		2	16.8	12	201.6
		7.0	±0.70	11 617		2	23.2	12	278.4
170	±1.75	5.0	±0.45	8 665		2	17.3	12	207.6
		7.0	±0.70	11 984		2	24.0	12	288.0
		9.0	±0.90	15 219		1	15.2	20	304.0
180	±1.95	5.0	±0.45	9 190		1	9.2	20	184.0
		7.0	±0.70	12 720		1	12.7	20	254.0
		9.0	±0.90	16 165		1	16.2	20	324.0
190	±2.05	5.0	±0.45	9 716		1	9.7	20	194.0
		7.0	±0.70	13 455		1	13.5	20	270.0
200	±2.30	5.0	±0.70	10 241		1	10.2	20	204.0
		7.0	±0.80	14 190		1	14.2	20	284.0
		9.0	±1.00	18 055		1	18.1	20	362.0
215	±2.40	5.0	±0.70	11 029		1	11.0	9	99.0
		7.0	±0.80	15 293		1	15.3	9	137.7
		9.0	±1.00	19 473		1	19.5	9	175.5
225	±2.60	7.0	±0.80	16 028		1	16.0	9	144.0
		9.0	±1.10	20 418		1	20.4	9	183.6
240	±2.80	9.0	±1.10	21 836		1	21.8	9	196.2
250	±2.90	5.0	±0.70	12 867		1	12.9	9	116.1
		7.0	±0.90	17 866		1	17.9	9	161.1
		9.0	±1.10	22 782		1	22.8	9	205.2
270	±2.90	5.0	±0.70	13 917		1	13.9	9	125.1
		7.0	±0.90	19 337		1	19.3	9	173.7
		9.0	±1.10	24 672		1	24.7	9	222.3

Standard product range

Tubing

Outer diameter		Wall thickness		Tube weight Length approx. 1,500 mm		Carton contents		Pallet load	
 mm		 mm		 g		 Number of tubes Weight approx. kg		 Number of cartons Weight approx. kg	
300	±3.70	5.0	±0.70	15 492		1	15.5	9	139.5
		7.0	±1.10	21 542		1	21.5	9	193.5
		9.0	±1.40	27 508		1	27.5	9	247.5
315	±3.80	7.0	±1.10	22 645		1	22.6	9	203.4
		9.0	±1.40	28 926		1	28.9	9	260.1
325	±4.00	9.0	±1.40	29 871		1	29.9	4	119.6
		10.0	±1.40	33 085		1	33.0	9	297.0
350	±4.00	5.0	±0.80	18 118		1	18.1	4	72.4
365	±4.50	7.0	±1.40	26 321		1	26.3	4	105.2
400	±5.00	6.0	±1.50	24 829		1	24.8	4	99.2
415	±5.00	7.0	±1.50	29 997		1	30.0	4	120.0
420	±5.00	9.5	±1.50	40 960		1	41.0	4	164.0
430	±5.00	6.0	±1.00	26 720		1	26.7	4	106.8
440	±5.00	7.0	±1.00	31 836		1	31.8	4	127.2
		7.0	±1.00	32 571		1	32.6	4	130.4
450	±5.00	8.0	±1.00	37 140		1	37.1	4	148.4
		8.5	±1.20	40 309		1	40.3	4	161.2
460	±5.50	8.5	±1.20	40 309		1	40.3	4	161.2
465	±6.00	7.0	±1.00	33 674		1	33.7	4	134.8

Standard length: approx. 1,500 mm

Standard product range
Rod



Diameter		Rod weight Length approx. 1,500 mm	Carton contents		Pallet load	
	 mm		 g	 Number of rods Weight approx. kg	 Number of boxes Weight approx. kg	
3	±0.13	24	529	12.5	44	550.0
4	±0.13	42	298	12.5	44	550.0
5	±0.13	66	183	12.0	44	528.0
6	±0.13	95	140	13.2	44	580.8
7	±0.13	129	98	12.6	44	554.4
8	±0.18	168	80	13.4	44	589.6
9	±0.18	213	63	13.4	44	589.6
10	±0.18	263	45	11.8	44	519.2
12	±0.18	378	35	13.2	44	580.8
14	±0.26	515	24	12.4	44	545.6
16	±0.26	672	20	13.4	36	482.4
18	±0.36	851	20	17.0	27	459.0
20	±0.36	1 050	16	16.8	27	453.6
22	±0.40	1 271	12	15.3	36	550.8
24	±0.40	1 512	12	18.2	27	491.4
26	±0.50	1 775	9	16.0	27	432.0
28	±0.70	2 059	9	18.5	27	499.5
30	±0.70	2 363	6	14.2	36	511.2

Standard length: approx. 1,500 mm

Standard product range
Capillaries



Outer diameter		Inside diameter		Tube weight Length approx. 1,500 mm	Carton contents	
	 mm		 mm		 Number of tubes Weight approx. kg	
4	±0.16	0.8	±0.08	40	250	10.0
5	±0.16	0.4	±0.08	65	154	10.0
		0.6	±0.08	65	154	10.0
		0.8	±0.08	64	156	10.0
		1.2	±0.08	62	161	10.0
6	±0.16	0.4	±0.08	94	104	10.0
		0.8	±0.08	93	108	10.0
		1.2	±0.08	91	110	10.0
		1.7	±0.10	87	115	10.0
		2.2	±0.10	82	122	10.0
		2.7	±0.10	75	133	10.0
7	±0.18	0.8	±0.08	127	79	10.0
		1.2	±0.08	125	80	10.0
		1.7	±0.10	121	83	10.0
		2.2	±0.10	116	86	10.0
		2.7	±0.10	110	91	10.0
		3.0	±0.10	105	95	10.0
8	±0.18	0.8	±0.08	166	60	10.0
		1.2	±0.08	164	61	10.0
		1.7	±0.10	160	63	10.0
		2.2	±0.10	155	65	10.0
		2.7	±0.10	149	67	10.0
		3.0	±0.10	144	69	10.0
9	±0.18	0.8	±0.08	211	47	10.0
		1.2	±0.08	209	48	10.0
		1.7	±0.10	205	49	10.0
		2.2	±0.10	200	50	10.0
		2.7	±0.10	194	52	10.0
		3.0	±0.10	189	53	10.0

 Pallet loading capillaries:
Number of cartons: 55
weight: approx. 550.0 kg

Standard length: approx. 1,500 mm

Related products



CONTURAX® and CONTURAX® Pro

DURAN® tubing and rods with cross-sections that have not been rounded but rather contoured are distributed under the brand names CONTURAX® and CONTURAX® Pro. The chemical and physical glass properties of these products are identical to those of DURAN®. With CONTURAX® and CONTURAX® Pro, SCHOTT offers a comprehensive variety of shapes. We will be glad to look into the feasibility of your particular product idea and advise you to that effect.

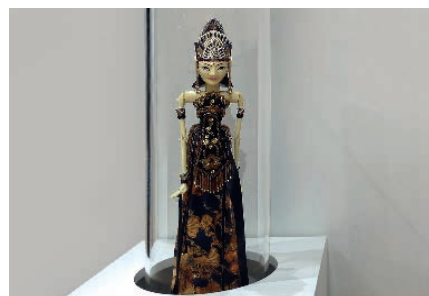
You can find out more about CONTURAX® and CONTURAX® Pro from your SCHOTT contact person.



DURATAN®

The mechanical strength of DURAN® tubing can be noticeably improved by a hardening process. This thermally prestressed (hardened) DURAN® is distributed under the brand name DURATAN®. The typical chemical and physical features of DURAN® are entirely maintained. We will gladly provide information on standards and assess the ability to harden the dimensions you request.

Find out more about DURATAN® from your SCHOTT contact person.



DURAN® with coating

DURAN® tubing can also be coated to gain other special features. SCHOTT has developed a special anti-reflective and anti-fingerprint coating for DURAN® tubing. This oleophobic coating prevents smudging from fingerprints, while the anti-reflective properties maximize transparency, making the glass tubing almost invisible.

Find out more about DURAN® from your SCHOTT contact person.



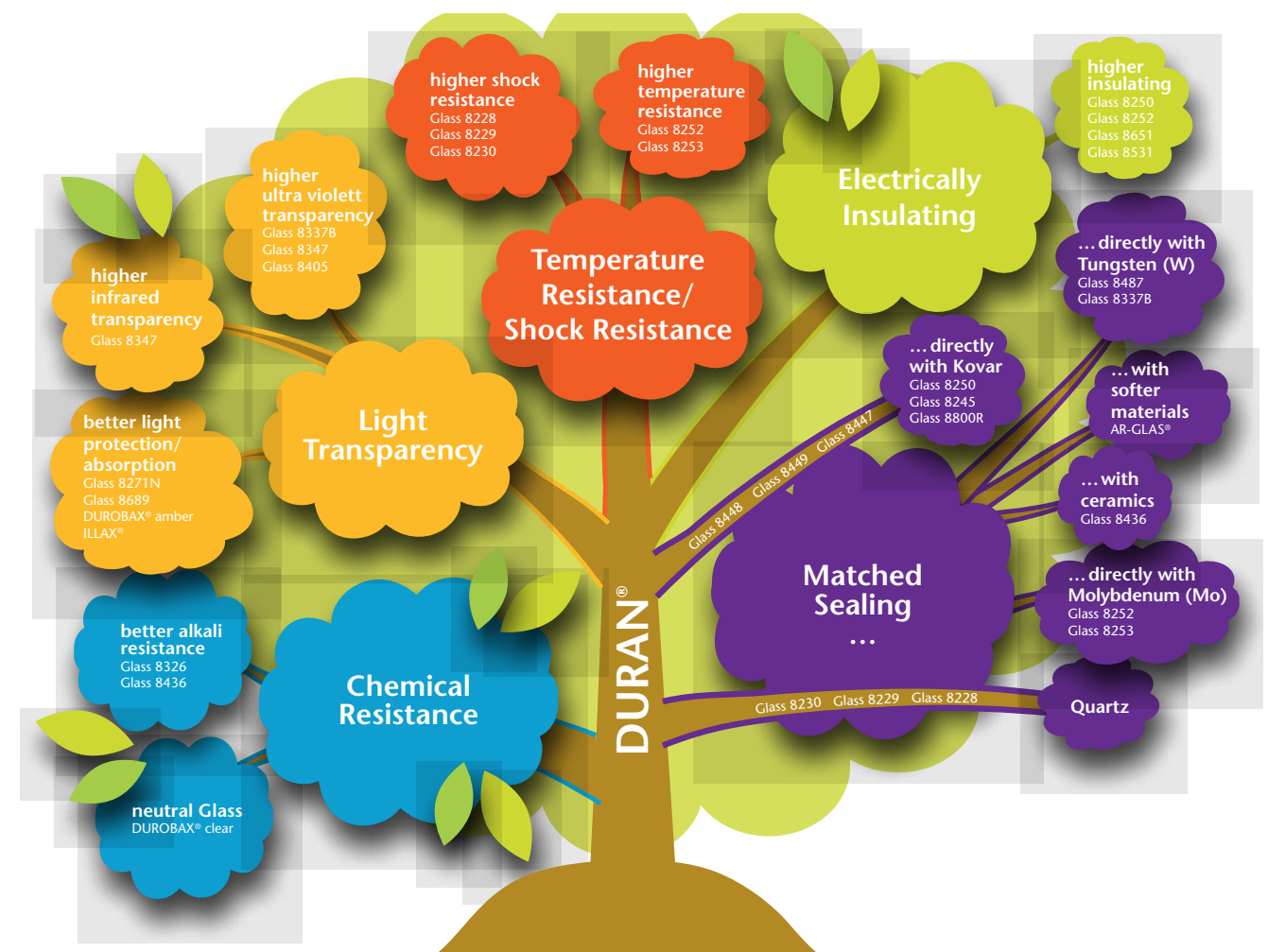
BOROFLOAT® 33

For applications which require the flat-glass features of DURAN®, SCHOTT's BOROFLOAT® 33 provides the first floated borosilicate flat glass in the world. Its planarity and one-of-a-kind quality, as well as outstanding thermal, optical, chemical and mechanical characteristics, are impressive.

Find out more about BOROFLOAT® 33 at www.schott.com/borofloat.

Other glass types for technical applications

DURAN® is a very versatile glass. In addition to its chemical resistance, transparency, high thermal endurance and high electric and dielectric insulating features, it can also be fused with metals, for example, by using intermediate glasses. Yet these basic features are not always sufficient for specific demands. For such cases, the SCHOTT portfolio of technical tubing includes specialty glasses which surpass and expand upon certain DURAN® features. The "glass tree" below illustrates these specialty glass types, arranged by their distinguishing features.



Are you interested in the technical data of a specialty glass in our portfolio? Your contact person will be glad to guide you.

**DURAN® – tested in the
harshest applications**



Appendix

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Note

Detailed information on acceptable errors, definition of errors, testing methods and testing units are available upon request.

Tighter tolerances are also available upon request.

Basis for claims are the respectively applicable "Technical Terms of Supply" or any written contractual provisions.

We reserve the right to technical modifications.

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