




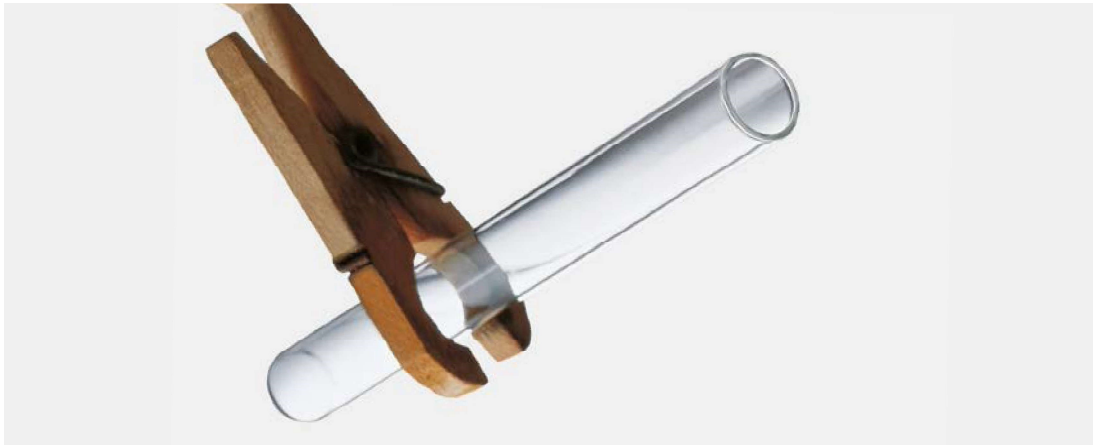





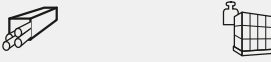
## Tubing

Outside Diameter (OD)	Wall Thickness (WT)	Weight per Tube Length approx. 1500 mm	Carton/		Pallet Load	
 mm	 mm	 g	 Number of Tubes	Weight approx. kg	 Weight approx. kg	
<b>4</b>	±0.09	<b>0.50</b> ±0.02	21	582	12.0	540.0
	±0.09	<b>0.70</b> ±0.03	27	551	15.0	540.0
	±0.12	<b>0.90</b> ±0.03	33	548	18.0	486.0
<b>5</b>	±0.09	<b>0.50</b> ±0.02	27	378	10.0	450.0
	±0.09	<b>0.70</b> ±0.03	36	367	13.0	468.0
	±0.12	<b>0.90</b> ±0.03	44	391	17.0	459.0
<b>6</b>	±0.10	<b>0.50</b> ±0.02	33	618	20.0	420.0
	±0.10	<b>0.70</b> ±0.03	44	252	11.0	495.0
	±0.10	<b>0.90</b> ±0.03	54	278	15.0	540.0
	±0.12	<b>1.10</b> ±0.03	64	252	16.0	432.0
<b>7</b>	±0.10	<b>0.50</b> ±0.02	38	418	16.0	448.0
	±0.10	<b>0.70</b> ±0.03	52	193	10.0	450.0
	±0.10	<b>0.90</b> ±0.03	65	186	12.0	540.0
	±0.12	<b>1.10</b> ±0.03	77	196	15.0	540.0
<b>8</b>	±0.10	<b>0.50</b> ±0.02	44	380	16.8	352.8
	±0.10	<b>0.70</b> ±0.03	60	342	20.6	432.6
	±0.10	<b>0.90</b> ±0.03	76	266	20.0	420.0
	±0.12	<b>1.10</b> ±0.03	90	234	20.9	438.9
<b>9</b>	±0.12	<b>0.50</b> ±0.02	50	340	17.0	357.0
	±0.12	<b>0.70</b> ±0.03	69	289	19.8	415.8
	±0.12	<b>0.90</b> ±0.03	86	238	20.4	428.4
	±0.14	<b>1.10</b> ±0.03	103	204	20.9	438.9








## Tubing








Outside Diameter (OD)	Wall Thickness (WT)	Weight per Tube Length approx. 1500mm	Carton/ Pallet Load			
 mm	 mm	 g	 Number of Tubes Weight approx. kg Weight approx. kg			
<b>10</b>	±0.12	<b>0.60</b> ±0.03	67	270	17.9	375.9
	±0.12	<b>0.80</b> ±0.03	87	240	20.8	436.8
	±0.14	<b>1.00</b> ±0.03	106	165	17.5	367.5
	±0.15	<b>1.20</b> ±0.04	125	165	20.5	430.5
<b>11</b>	±0.12	<b>0.60</b> ±0.03	74	256	18.8	451.2
	±0.12	<b>0.80</b> ±0.03	96	208	20.0	420.0
	±0.14	<b>1.00</b> ±0.03	118	169	19.9	417.9
	±0.15	<b>1.20</b> ±0.04	139	143	19.8	415.8
<b>12</b>	±0.12	<b>0.60</b> ±0.03	81	238	19.2	345.6
	±0.12	<b>0.80</b> ±0.03	106	196	20.7	372.6
	±0.14	<b>1.00</b> ±0.03	130	156	20.2	424.2
	±0.15	<b>1.20</b> ±0.04	153	126	19.2	345.6
<b>13</b>	±0.12	<b>0.60</b> ±0.03	88	208	18.2	436.8
	±0.12	<b>0.80</b> ±0.03	115	182	20.9	376.2
	±0.14	<b>1.00</b> ±0.03	142	143	20.2	363.6
	±0.15	<b>1.20</b> ±0.04	167	117	19.5	351.0
<b>14</b>	±0.12	<b>0.60</b> ±0.03	95	180	17.0	408.0
	±0.12	<b>0.80</b> ±0.03	125	168	20.9	376.2
	±0.14	<b>1.00</b> ±0.03	154	120	18.4	386.4
	±0.15	<b>1.20</b> ±0.04	181	110	19.9	417.9
<b>15</b>	±0.14	<b>0.60</b> ±0.03	102	154	15.7	376.8
	±0.14	<b>0.80</b> ±0.03	134	143	19.1	343.8
	±0.14	<b>1.00</b> ±0.04	165	121	19.9	358.2
	±0.18	<b>1.20</b> ±0.04	195	100	19.5	409.5

## Tubing



Outside Diameter (OD)	Wall Thickness (WT)	Weight per Tube Length approx. 1500mm	Carton/		Pallet Load
			Number of Tubes	Weight approx. kg	
 mm	 mm	 g			
16	0.60 ±0.03 0.80 ±0.03 1.00 ±0.04 1.20 ±0.04	109 144 177 210	143 132 110 99	15.6 18.9 19.4 20.7	374.4 453.6 349.2 434.7
17	0.80 ±0.03 1.00 ±0.04	153 189	120 100	18.3 18.8	439.2 451.2
18	0.80 ±0.03 1.00 ±0.04 1.20 ±0.04 1.50 ±0.05	163 201 238 292	110 99 81 72	17.8 19.8 19.2 21.0	427.2 356.4 345.6 441.0
19	0.80 ±0.03 1.00 ±0.04 1.50 ±0.05	172 212 310	99 90 63	17.0 19.1 19.5	408.0 343.8 351.0
20	0.80 ±0.04 1.00 ±0.04 1.20 ±0.05	181 224 266	64 72 72	11.6 16.1 19.1	417.6 386.4 343.8
21	0.80 ±0.04 1.00 ±0.04	191 236	80 80	15.2 18.8	364.8 451.2
22	0.80 ±0.04 1.00 ±0.04 1.20 ±0.05	200 248 294	72 72 64	14.4 17.8 18.8	432.0 427.2 451.2
23	0.80 ±0.04 1.00 ±0.04 1.50 ±0.05	209 260 380	63 63 49	13.2 16.3 18.6	316.8 391.2 446.4

## Tubing

Outside Diameter (OD)	Wall Thickness (WT)	Weight per Tube Length approx. 1500 mm	Carton/		Pallet Load	
			Number of Tubes	Weight approx. kg		
 mm	 mm	 g				
					Weight approx. kg	
<b>24</b>	±0.19	1.00 ±0.04	271	56	15.2	364.8
	±0.19	1.20 ±0.05	323	56	18.0	432.0
	±0.23	1.50 ±0.05	398	49	19.5	351.0
<b>25</b>	±0.19	0.80 ±0.04	228	56	12.8	307.2
	±0.24	1.50 ±0.05	416	42	17.4	365.4
<b>26</b>	±0.19	1.00 ±0.04	295	48	14.1	338.4
	±0.24	1.20 ±0.05	350	48	16.8	403.2
	±0.24	1.50 ±0.05	433	48	20.8	374.4
<b>28</b>	±0.19	1.00 ±0.04	318	42	13.4	402.0
	±0.24	1.20 ±0.05	379	42	15.9	381.6
	±0.24	1.50 ±0.05	468	42	19.7	354.6
<b>30</b>	±0.24	1.20 ±0.05	407	35	14.2	340.8
	±0.29	1.50 ±0.06	503	35	17.6	422.4
<b>32</b>	±0.24	1.20 ±0.05	435	30	13.1	393.0
	±0.29	1.50 ±0.06	539	30	16.2	388.8
<b>34</b>	±0.24	1.20 ±0.05	463	30	13.9	333.6
	±0.29	1.50 ±0.06	574	30	17.2	412.8
<b>36</b>	±0.40	1.20 ±0.06	492	20	9.8	343.0
	±0.40	1.50 ±0.07	609	20	12.2	427.0
<b>38</b>	±0.40	1.20 ±0.06	520	20	10.4	249.6
	±0.40	1.50 ±0.07	645	20	12.9	309.6
<b>40</b>	±0.50	1.20 ±0.07	549	20	11.0	264.0
	±0.50	1.50 ±0.07	680	20	13.6	326.4




In addition to the dimensions above, different lengths and outside diameters up to 70 mm are available upon request.

Standard length: 1500 mm

Special sizes of tubing between 1200 and 4000 mm long and with an outside diameter range of 18 to 38 mm are available upon request.

Tubing with outside diameters between 5–30 mm can be additionally coated to protect from scratches (minimum quantity is 2 tons).

## Rod

Outside Diameter	Carton Contents	Pallet
 mm	 Number of Rods Weight approx. kg	 Weight approx. kg
<b>3</b> ±0.10	510 13.5	445.5
<b>4</b> ±0.15	308 14.5	478.5
<b>5</b> ±0.15	217 16.0	528.0
<b>6</b> ±0.15	142 15.0	495.0
<b>7</b> ±0.20	104 15.0	495.0
<b>8</b> ±0.20	80 15.0	495.0
<b>9</b> ±0.20	60 14.3	471.9
<b>10</b> ±0.25	49 14.4	475.2
<b>12</b> ±0.25	33 14.0	462.0
<b>14</b> ±0.30	24 13.8	455.4
<b>16</b> ±0.35	20 15.1	543.6
<b>20</b> ±0.50	16 18.8	507.6
<b>25</b> ±0.70	9 16.6	448.2



Rod with an outside diameter of up to 30 mm is available upon request.

Standard length: 1500 mm

All tubing and rod dimensions shown in this brochure are available on short notice. All carton contents and weights are approximate.

## Physical and Chemical Properties

Physical Properties		
Coefficient of mean linear thermal expansion $\alpha$ (20°C; 300°C) acc. to DIN ISO 7991		$9.1 \cdot 10^{-6} \text{ K}^{-1}$
Transformation temperature $T_g$		525°C
Temperature of the glass at viscosity $\eta$ in dPa · s:	$10^{13}$ (annealing point) $10^{7.6}$ (softening point) $10^4$ (working point)	530°C 720°C 1040°C
Density $\rho$ at 25°C		$2.50 \text{ g} \cdot \text{cm}^{-3}$
Modulus of elasticity E (Young's modulus)		$73 \cdot 10^3 \text{ N} \cdot \text{mm}^{-2}$
Poisson's ratio $\mu$		0,22
Thermal Conductivity $\lambda_w$ at 90°C		$1.1 \text{ W} \cdot \text{m}^{-1} \cdot \text{K}^{-1}$
Temperature for the specific electrical resistance of $10^8 \Omega \cdot \text{cm}$ (DIN 52 326) $t_{k100}$		200°C
Logarithm of the electric volume resistivity ( $\Omega \cdot \text{cm}$ )	at 250°C at 350°C	7.1 5.7
Dielectric properties (1 MHz, 25°C)	Dielectric constant (permittivity) $\epsilon$ Dielectric loss factor (dissipation factor) $\tan \delta$	7.2 $70 \cdot 10^{-4}$
Refractive index ( $\lambda = 587.6 \text{ nm}$ ) $n_d$		1.514
Stress-optical coefficient (DIN 52 314) K		$2.7 \cdot 10^{-6} \text{ mm}^2 \cdot \text{N}^{-1}$

Chemical Composition							
SiO <sub>2</sub>	B <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	Al <sub>2</sub> O <sub>3</sub>	Na <sub>2</sub> O	BaO	CaO	MgO
69	1	3	4	13	2	5	3

main components in approx. weight %

## Physical and Chemical Properties

### Chemical Resistance

Hydrolytic Class (DIN ISO 719)	HGB 3
Acid Class (DIN 12116)	Class S 1
Alkali Class (DIN ISO 695)	Class A 2

### Transmission

