



PTH GROUP s.r.l. - Via Ticino 15 - 21043 Castiglione Olona (VA) - ITALY
Phone +39 0331 858378 - Fax +39 0331 824390 - E-mail: info@pth-group.com
Web site: www.pth-group.com

PLASTIC TUBES

POLYCARBONATE TUBES



POLYCARBONATE TUBES

Polycarbonate tubes are supplied with UV stabilized transparent or opal colour material, packed with adhesive polyethylene film, on request tubes are also produce in self-extinguishing polycarbonate V0 material, that can guarantee an high resistant flame grade and keeping the characteristics of normal polycarbonate material, such as transparency, ultraviolet light resistant and high impact resistance.

DIMENSIONS

From Inside Diameter 6 mm to Outside Diameter 38 mm – Minimum Quantity 1000 mt

From Inside Diameter 40 mm to Outside Diameter 68 mm – Minimum Quantity 500 mt

From Inside Diameter 70 mm to Outside Diameter 250 mm – Minimum Quantity 250 mt

TECHNICAL MATERIAL PROPERTIES

- Excellent light transmission values
 - UVstabilized
- Self-extinguishing according to the CE regulations, PC tubes do not allow flame spread
 - High impact resistance
 - High service temperature
 - Good chemical resistance

POLYCARBONATE UV STABILIZED – ANTISHOCK

Physical	Nominal Value Unit	Test Method
Density	1.20 g/cm ³	ISO 1183
Apparent Density	0.66 g/cm ³	ISO 60
Melt Mass-Flow Rate (MFR) (300°C/1.2 kg)	3.0 g/10 min	ISO 1133
Melt Volume-Flow Rate (MVR) (300°C/1.2 kg)	3.00 cm ³ /10min	ISO 1133
Molding Shrinkage		
Across Flow	0.60 to 0.80 %	ISO 2577
Flow	0.60 to 0.80 %	ISO 2577
Across Flow: 2.00 mm ²	0.75 %	ISO 294-4
Flow: 2.00 mm ²	0.70 %	ISO 294-4
Water Absorption		ISO 62
Saturation, 23°C	0.30 %	
Equilibrium, 23°C, 50% RH	0.12 %	
Mechanical	Nominal Value Unit	Test Method
Tensile Modulus (23°C)	2400 MPa	ISO 527-2/1
Tensile Stress		ISO 527-2/50
Yield, 23°C	67.0 MPa	
Break, 23°C	65.0 MPa	
Tensile Strain		ISO 527-2/50
Yield, 23°C	6.3 %	
Break, 23°C	100 %	
Nominal Tensile Strain at Break (23°C)	> 50 %	ISO 527-2/50
Tensile Creep Modulus		ISO 899-1
1 hr	2200 MPa	
1000 hr	1900 MPa	
Flexural Modulus ³ (23°C)	2400 MPa	ISO 178
Flexural Strength ³		ISO 178
3.5% Strain, 23°C	74.0 MPa	
23°C	100 MPa	
Flexural Strain at Flexural Strength		ISO 179
23°C, 2 mm/min	7.3 %	
Films	Nominal Value Unit	Test Method
Water Vapor Transmission Rate		ISO 15106-1
23°C, 100 µm, 85% RH	15 g/m ² /24 hr	
Carbon Dioxide Permeability		ISO 2556
25.4 µm	16900 cm ³ /m ² /bar/24 hr	
100.0 µm	4300 cm ³ /m ² /bar/24 hr	
Nitrogen Permeability		ISO 2556
25.4 µm	510 cm ³ /m ² /bar/24 hr	
100.0 µm	130 cm ³ /m ² /bar/24 hr	
Oxygen Permeability		ISO 2556
25.4 µm	2800 cm ³ /m ² /bar/24 hr	
100.0 µm	700 cm ³ /m ² /bar/24 hr	
Impact	Nominal Value Unit	Test Method
Charpy Notched Impact Strength ^{4, 5}		ISO 7391
-30°C, Complete Break	16 kJ/m ²	
23°C, Partial Break	70 kJ/m ²	
Charpy Unnotched Impact Strength		ISO 179/1eU
-60°C	No Break	
-30°C	No Break	
23°C	No Break	
Notched Izod Impact Strength ⁶		ISO 180/A
-30°C, Complete Break	14 kJ/m ²	
23°C, Partial Break	80 kJ/m ²	
Multi-Axial Instrumented Impact Energy		ISO 6603-2
-30°C	65.0 J	
23°C	60.0 J	
Multi-Axial Instrumented Impact Peak Force		ISO 6603-2
-30°C	6500 N	
23°C	5600 N	
Hardness	Nominal Value Unit	Test Method
Ball Indentation Hardness	115 MPa	ISO 2039-1

Thermal	Nominal Value Unit	Test Method
Heat Deflection Temperature		
0.45 MPa, Unannealed	138 °C	ISO 75-2/B
1.8 MPa, Unannealed	127 °C	ISO 75-2/A
Glass Transition Temperature	145 °C	ISO 11357-2
Vicat Softening Temperature		
--	146 °C	ISO 306/B50
--	147 °C	ISO 306/B120
Ball Pressure Test (137°C)	Pass	IEC 60695-10-2
CLTE		ISO 11359-2
Flow: 23 to 55°C	0.000065 cm/cm/°C	
Transverse: 23 to 55°C	0.000065 cm/cm/°C	
Thermal Conductivity (23°C)	0.20 W/m/K	ISO 8302
Electrical	Nominal Value Unit	Test Method
Surface Resistivity	1.0E+16 ohms	IEC 60093
Volume Resistivity	1.0E+16 ohm-cm	IEC 60093
Relative Permittivity		IEC 60250
23°C, 100 Hz	3.10	
23°C, 1 MHz	3.00	
Dissipation Factor		IEC 60250
23°C, 100 Hz	0.00050	
23°C, 1 MHz	0.0090	
Comparative Tracking Index		IEC 60112
Solution A	250 V	
Solution B	100 V	
Electric Strength (23°C, 1.00 mm)	34 kV/mm	IEC 60243-1
Flammability	Nominal Value Unit	Test Method
Flame Rating - UL		UL 94
1.50 mm, CL, NC, WT	HB	
3.00 mm, WT	V-2	
6.00 mm, CL, NC, WT	V-0	
Glow Wire Flammability Index		IEC 60695-2-12
1.00 mm	850 °C	
1.50 mm	850 °C	
2.00 mm	850 °C	
3.00 mm	960 °C	
4.00 mm	960 °C	
Oxygen Index ⁷	27 %	ISO 4589-2
Burning Rate (> 1.00 mm, US-FMVSS)	Passed	ISO 3795
Flash Ignition Temperature	480 °C	ASTM D1929
Needle Flame Test		
1.50 mm, Method F	60.0 sec	
1.50 mm, Method K	5.0 sec	
2.00 mm, Method K	5.0 sec	
2.00 mm, Method F	60.0 sec	
3.00 mm, Method F	120.0 sec	
3.00 mm, Method K	10.0 sec	
Self Ignition Temperature	550 °C	ASTM D1929
UL 746	Nominal Value Unit	Test Method
RTI Str (1.50 mm)	125 °C	UL 746
RTI Imp (1.50 mm)	115 °C	UL 746
RTI Elec (1.50 mm)	125 °C	UL 746
Optical	Nominal Value Unit	Test Method
Refractive Index ⁸	1.587	ISO 489
Transmittance		ISO 13468-2
1.00 µm	89.0 %	
2000 µm	88.0 %	
3000 µm	88.0 %	
4000 µm	87.0 %	
Haze (3000 µm)	< 0.80 %	ISO 14782
Additional Information	Nominal Value Unit	Test Method
Electrolytical Corrosion	A1	IEC 60426
ISO Shortname	PC,ELS,(,)-05-9	ISO 7391

POLYCARBONATE FLAME RETARDANT V0

Physical	Nominal Value Unit	Test Method
Density	1,25 g/cm ³	ISO 1183
Melt Volume-Flow Rate (MVR)		ISO 1133
300°C/1,2 kg	3,00 cm ³ /10min	
300°C/2,16 kg	5,50 cm ³ /10min	
Molding Shrinkage - Flow ²	0,40 to 0,60 %	Internal Method
Water Absorption		ISO 62
Saturation, 23°C	0,32 %	
Equilibrium, 23°C, 50% RH	0,13 %	
Mechanical	Nominal Value Unit	Test Method
Tensile Modulus	2350 MPa	ISO 527-2/1
Tensile Stress		ISO 527-2/50
Yield	65,0 MPa	
Break	70,0 MPa	
Tensile Strain		ISO 527-2/50
Yield	7,0 %	
Break	> 70 %	
Flexural Modulus ³	2350 MPa	ISO 178
Flexural Strength ^{3,4}	95,0 MPa	ISO 178
Taber Abrasion Resistance		Internal Method
1000 Cycles, 1000 g, CS-17 Wheel	9,00 mg	
Impact	Nominal Value Unit	Test Method
Charpy Notched Impact Strength ⁵		ISO 179/1eA
-30°C	10 kJ/m ²	
23°C	11 kJ/m ²	
Charpy Unnotched Impact Strength ⁵		ISO 179/1eU
-30°C	No Break	
23°C	No Break	
Notched Izod Impact Strength ⁶		ISO 180/1A
-30°C	10 kJ/m ²	
23°C	11 kJ/m ²	
Unnotched Izod Impact Strength ⁶		ISO 180/1U
-30°C	No Break	
23°C	No Break	
Hardness	Nominal Value Unit	Test Method
Ball Indentation Hardness (H 358/30)	95,0 MPa	ISO 2039-1
Thermal	Nominal Value Unit	Test Method
Heat Deflection Temperature ⁷		
0,45 MPa, Unannealed, 100 mm Span	148 °C	ISO 75-2/Be
1,8 MPa, Unannealed, 100 mm Span	135 °C	ISO 75-2/Ae
Vicat Softening Temperature		
-	155 °C	ISO 306/B50
-	156 °C	ISO 306/B120
Ball Pressure Test (125°C)	Pass	IEC 60695-10-2
CLTE - Flow (23 to 80°C)	0,000070 cm/cm/°C	ISO 11359-2
Thermal Conductivity	0,20 W/m/K	ISO 8302
Electrical	Nominal Value Unit	Test Method
Surface Resistivity	> 1,0E+15 ohms	IEC 60093
Volume Resistivity	> 1,0E+15 ohm-cm	IEC 60093
Relative Permittivity		IEC 60250
50 Hz	2,70	
60 Hz	2,70	
1 MHz	2,70	
Dissipation Factor		IEC 60250
50 Hz	0,0010	
60 Hz	0,0010	
1 MHz	0,010	
Electric Strength (3,20 mm, in Oil)	17 kV/mm	IEC 60243-1

Flammability	Nominal Value Unit	Test Method
Flame Rating - UL (1,50 mm)	V-0	UL 94
Glow Wire Flammability Index (1,00 mm)	850 °C 960	IEC 60695-2-12

Optical	Nominal Value Unit	Test Method
Refractive Index	1,586	ISO 489
Transmittance (2540 µm)	88,0 %	ASTM D1003
Haze (2540 µm)	< 0,80 %	ASTM D1003

Extrusion	Nominal Value Unit
Drying Temperature	120 °C
Drying Time	2,0 to 4,0 hr
Hopper Temperature	100 to 120 °C
Cylinder Zone 1 Temp.	260 to 300 °C
Cylinder Zone 2 Temp.	260 to 290 °C
Cylinder Zone 3 Temp.	260 to 290 °C
Adapter Temperature	240 to 280 °C
Melt Temperature	260 to 300 °C
Die Temperature	240 to 300 °C
Calibration Temp, First	50,0 to 100 °C

Notes

¹ Typical properties: these are not to be construed as specifications.

² Tensile Bar

³ 2,0 mm/min

⁴ Yield

⁵ 80*10*3 sp=62mm

⁶ 80*10*3

⁷ 120*10*4 mm

PMMA TUBES



PMMA TUBES

PMMA tubes are extruded in transparent and opal material.

DIMENSIONS

From Inside Diameter 6 mm to Outside Diameter 38 mm – Minimum Quantity 1000 mt

From Inside Diameter 40 mm to Outside Diameter 68 mm – Minimum Quantity 500 mt

From Inside Diameter 70 mm to Outside Diameter 250 mm – Minimum Quantity 250 mt

TECHNICAL MATERIAL PROPERTIES

- Perfectly clear and colourless
- Excellent light transmission
 - High quality surface
 - High light diffusion
 - Very good brilliancy

PMMA TRANSPARENT

Physical	Nominal Value Unit	Test Method
Density	1,18 g/cm ³	ISO 1183
Melt Mass-Flow Rate (MFR)	2,2 g/10 min	ISO 1133
Molding Shrinkage	0,40 to 0,70 %	ISO 294-4
Water Absorption (Equilibrium, 23°C, 50% RH)	0,30 %	ISO 62
Mechanical	Nominal Value Unit	Test Method
Tensile Stress (Yield)	83,0 MPa	ISO 527-2
Tensile Strain (Yield)	5,0 %	ISO 527-2
Flexural Modulus	3200 MPa	ISO 178
Flexural Strength	115 MPa	ISO 178
Impact	Nominal Value Unit	Test Method
Charpy Notched Impact Strength	2,0 kJ/m ²	ISO 179/1eA
Charpy Unnotched Impact Strength	20 kJ/m ²	ISO 179/1eU
Notched Izod Impact Strength	2,0 kJ/m ²	ISO 180/1A
Hardness	Nominal Value Unit	Test Method
Rockwell Hardness (M-Scale)	98	ISO 2039-2
Ball Indentation Hardness (H 961/30)	185 MPa	ISO 2039-1
Thermal	Nominal Value Unit	Test Method
Heat Deflection Temperature 0,45 MPa, Unannealed	105 °C	ISO 75-2/B
1,8 MPa, Unannealed	102 °C	ISO 75-2/A
Vicat Softening Temperature -	117 °C	ISO 306/A
-	109 °C	ISO 306/B
CLTE - Flow	0,000071 cm/cm/°C	ASTM E831
Flammability	Nominal Value Unit	Test Method
Flame Rating - UL	HB	UL 94
Glow Wire Flammability Index	650 °C	IEC 60695-2-12
Optical	Nominal Value Unit	Test Method
Refractive Index	1,490	ISO 489
Transmittance	92,0 %	ASTM D1003
Haze	0,40 %	ASTM D1003

PMMA SATIN TUBES



SATIN TUBES

PMMA Satin Tubes are suitable to create a diffused light effect with the presence of an internal lighting. An innovative material that fits particularly for the lighting industry applications.

DIMENSIONS

From Inside Diameter 6 mm to Outside Diameter 38 mm – Minimum Quantity 1000 mt

From Inside Diameter 40 mm to Outside Diameter 68 mm – Minimum Quantity 500 mt

From Inside Diameter 70 mm to Outside Diameter 250 mm – Minimum Quantity 250 mt

TECHNICAL MATERIAL PROPERTIES

- Elegant and attractive surface
- High light transmission
- Low inner reflection
- Impact resistant
- Diffused light spread
- Hiding light source power

PMMA SATIN

Physical	Nominal Value Unit	Test Method
Density	1,15 g/cm ³	ISO 1183
Melt Mass-Flow Rate (MFR) (230°C/3.8 kg)	0.80 g/10 min	ISO 1133
Molding Shrinkage - Flow	0.20 to 0.80 %	ASTM D955
Water Absorption (Equilibrium, 23°C, 50% RH)	0.36 %	ISO 62
Mechanical	Nominal Value Unit	Test Method
Tensile Stress (Yield, 23°C)	38,0 MPa	ISO 527-2
Tensile Strain (Break, 23°C)	40 %	ISO 527-2
Flexural Modulus (23°C)	1700 MPa	ISO 178
Flexural Strength (23°C)	62,0 MPa	ISO 178
Compressive Stress (23°C)	45,0 MPa	ISO 604
Impact	Nominal Value Unit	Test Method
Charpy Notched Impact Strength (23°C)	7,0 kJ/m ²	ISO 179/2C
Charpy Unnotched Impact Strength (23°C)	60 kJ/m ²	ISO 179/2U
Notched Izod Impact Strength (23°C)	6,3 kJ/m ²	ISO 180/1A
Hardness	Nominal Value Unit	Test Method
Rockwell Hardness (M-Scale)	46	ASTM D785
Thermal	Nominal Value Unit	Test Method
Heat Deflection Temperature		
0,45 MPa, Unannealed	93,0 °C	ISO 75-2/B
1,8 MPa, Unannealed	88,0 °C	ISO 75-2/A
Vicat Softening Temperature	100 °C	ISO 306/B
CLTE - Flow (-30 to 23°C)	0,00010 cm/cm/°C	ASTM D696
Specific Heat	2090 J/kg/°C	
Electrical	Nominal Value Unit	Test Method
Surface Resistivity	> 1,0E+14 ohms	ASTM D257
Volume Resistivity	> 1,0E+15 ohm-cm	ASTM D257
Dielectric Strength	15 kV/mm	ASTM D149
Dielectric Constant (60 Hz)	3,90	ASTM D150
Dissipation Factor (1 MHz)	0,040	ASTM D150
Flammability	Nominal Value Unit	Test Method
Flame Rating - UL	HB	UL 94
Optical	Nominal Value Unit	Test Method
Refractive Index ²	1,490	ISO 489
Transmittance	90,0 %	ASTM D1003
Haze	2,0 %	ASTM D1003

The values quoted are the average of results obtained under laboratory conditions and are given only as an indication to enable customers to make best use of semi-finished products.

TECHNICAL TUBES SPECIFICATIONS

Tolerances for roundness (in % of outer diameter) :

$\text{Ø } 6 \text{ mm to } \text{Ø } 148 \text{ mm} = \pm 1,0 \%$
 $\text{Ø } 150 \text{ mm to } \text{Ø } 250 \text{ mm} = \pm 1,5 \%$

Tolerances for wall thickness (in %) :

$\text{Ø } 6 \text{ mm to } \text{Ø } 98 \text{ mm} = \pm 5,0 \%$
 $\text{Ø } 100 \text{ mm to } \text{Ø } 250 \text{ mm} = \pm 10,0 \%$

Tolerances for length (in mm) :

Production lengths up to 6.000 mm \pm 30,0 mm

Separate cutting service (manual cuts) for lengths (L)

L 1.000 mm \pm 1 mm
1.000 < L 2.000 mm \pm 1,5 mm
L > 2.000 mm upon demand

A small recess of 0.3 mm may occur at the cut edges

Tolerances for straightness :

Maximum deviation: 3.0 mm on 1.000 mm chord length

Optical properties :

Extrusion marks and Optical rings are unavoidable due to the extrusion process

Tolerances for PC and PMMA Tubes :

The above manufacturing tolerances apply at a reference temperature of 20 °C

DISCLAIMER

The above information and data sheet have been provided by the raw material manufacturer.

The values quoted are the average of results obtained under laboratory conditions and are given only as an indication to enable customers to make best use of semi-finished products.

PTH GROUP does not take any responsibility for the accuracy of the statements made by the raw material manufacturer.

PTH GROUP accepts only responsibility for the quality of it's products in accordance with it's own standard terms and conditions.