

## PET - POLYETHYLENE TEREPHTHALATE

PET is a thermal unreinforced semi crystalline polyester, showing a dimensional stability similar to acetal resin and a wear resistance similar to Nylon. Suitable for precision mechanical parts with high loads and abrasive environments. The first commercial polyester, PET, was synthesized in 1945 and introduced to the market in the first half of '50s. The PET has an excellent **property-cost ratio** and, in particular, good mechanical properties, excellent electrical properties and resistance to solvents. The low tendency to absorb moisture, low thermal expansion, in combination with a high mechanical strength, creep resistance and wear resistance, good electrical insulation and chemical resistance, makes this the material most suitable for the construction and use of moving parts, even with wet applications. It does not absorb CO<sub>2</sub> and it has excellent aesthetic quality. PET (PETP in the past) is a partially crystalline thermoplastic polyester based on polyethylene terephthalate. The hot water resistance is low but has a better resistance to acids than nylon or acetal. The PET can work continuous at 100 °C, and its melting point is 70 °C higher than acetal resin. It retains significantly its original strength up to 85 °C more than nylon or POM. PET is FDA compliant in natural and black colouration, in conformation with **FDA regulation 21 CFR 177.1630 for food contact**. The compatibility of PET with food contact is enshrined in the **Directive 2002/72/EC of the European Commission, as amended (2004/19/EC)**, however you continue to make inquiries to verify any new risks to health in products used as food containers (beverage bottles in the first place).

Many components and machine parts in the food are made of PET - material that had easy access in the field of food processing for ease of cleaning with the most common cleaning products (previous material was aluminium). Its rigidity and apparent hygienic cleaning - as well as dimensional stability and resistance to hydrochloric acid - make PET an ideal choice for various components on equipment testing pharmaceuticals (previous material was Nylon, PEUHMW).

**PTFE + PET** is a PET admixed with a solid lubricant (PTFE), which provides a higher resistance of use and a lower friction coefficient. This material has an excellent dimensional stability and remains rigid at elevated temperatures. is FDA compliant.

### Fields of application

- **Mechanical:** This material particularly used for sliding bearings, slides, guides, etc. because it has a low coefficient of friction. The dimensional stability makes it irreplaceable for precision parts with tight tolerances, even in humid environments or in presence of heat source.
- **Alimentary:** It is physiologically inert and widely used in the industry of food machinery.
- **Electrical:** Used as insulators or for electrical applications because it has constant electrical characteristics.
- **Chemical:** Good resistance to acids and chlorinate.

#### Principal characteristics :

- Excellent dimensional stability
- High mechanical strength, hardness, stiffness
- Stability very good color
- Excellent wear resistance
- Good sliding properties
- Low water absorption
- Low thermal expansion
- Good electrical insulation properties
- Excellent stain
- Suitable for food contact
- Good workability

#### Defects :

- Material very hard
- Low impact resistance

#### Applications :

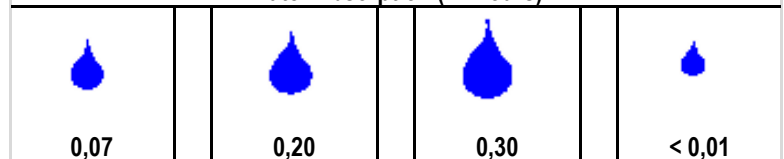
Sprockets, bushings, gears, cams, spindles, manifolds, power piston pumps, valves and valve bodies, tracks, electrical insulators, screws, components, fuel pump, plugs and rotors food system ... etc..



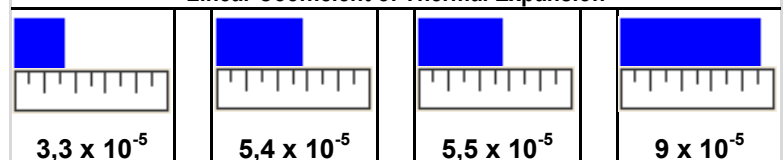
Table of the Stability plastics

PET (Arnite)	Acetalica POM	Nylon PA	Polietilene PEUHMW
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Water Absorption (24 hours)



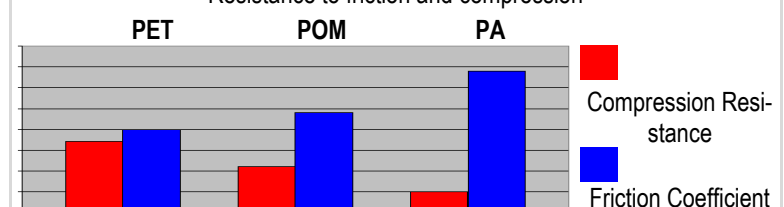
Linear Coefficient of Thermal Expansion



Very Stable

Few Stable

Resistance to friction and compression



PROPERTIES		Metodi di prove ISO / (IEC)	Unità Units	PET	PET + PTFE
Colour		-	-	Naturale Natural	Grigio perla Grey pearl
Density		1183	g/cm <sup>3</sup>	1,39	1,45
Water absorption:					
- after 24 / 96 h of immersion in water to 23 °C (1)		62	mg	6/13	5/11
		62	%	0,07/0,16	0,06/0,13
- to saturation in air at 23 °C / 50% UR		-	%	0,25	0,23
- to saturation in water at 23 °C		-	%	0,50	0,47
<b>Thermal property (2)</b>					
Melting point		-	°C	255	255
Temperature of glassy transition (3)		-	°C	-	-
Thermal conductivity to 23 °C		-	W/(K·m)	0,29	0,29
Coefficient of linear thermic expans. :					
- middle value between 23 and 60 °C		-	m/(m·K)	60·10 <sup>-6</sup>	65·10 <sup>-6</sup>
- middle value between 23 and 100 °C		-	m/(m·K)	80·10 <sup>-6</sup>	85·10 <sup>-6</sup>
Temperature of inflexion under load:					
- method A : 1,8 MPa		75	°C	75	75
Maximum temperature of use admitted in air :					
- for brief periods (4)		-	°C	160	160
- in continuous : for 5.000 / 20.000 h (5)		-	°C	115/100	115/100
Least temperature of use (6)					
				-20	-20
Inflammability (7):					
- index of oxygen		4589	%	-	-
- method UL 94 ( 3 / 6 mm sp)		-	-	HB/HB	HB/HB
<b>Mechanical property 23 °C (8)</b>					
Test of traction (9):					
- load of enervation / load of break (10)		+ 527	MPa	90/-	-76
		++ 527	MPa	90/-	-76
- Elongation at break (10)		+ 527	%	15	7
		++ 527	%	15	7
- Modulus of elasticity (11)		+ 527	MPa	3.700	3.450
		++ 527	MPa	3.700	3.450
Test of compression (12):					
- load to 1 / 2 / 5% of nominal deformation (11)		+ 604	MPa	26/51/103	24/47/95
Creep traction test (9):					
- load to get 1% of extension in 1.000 h ( s <sub>1/1000</sub> )		+ 899	MPa	26	23
		++ 899	MPa	26	23
Impact strenght Charpy - whitout notched (13)		+ 179/1eU	kJ/m <sup>2</sup>	≥ 50	≥ 30
Impact strenght Charpy - whit notched		+ 179/1eA	kJ/m <sup>2</sup>	2	2,5
Impact strenght Izod - whit notched		+ 180/2A	kJ/m <sup>2</sup>	2	2,5
		++ 180/2A	kJ/m <sup>2</sup>	2	2,5
Hardness with penetration of the sphere (14)		+ 2039-1	N/mm <sup>2</sup>	170	160
Hardness Rockwell (14)		+ 2039-2	-	M 96	M 94
<b>Electrical property to 23 °C</b>					
Dielectric rigidity (15)					
		+ (60243)	kV/mm	22	21
		++ (60243)	kV/mm	22	21
Volume Resistivity					
		+ (60093)	Ω·mm	> 10 <sup>15</sup>	> 10 <sup>15</sup>
		++ (60093)	Ω·mm	> 10 <sup>15</sup>	> 10 <sup>15</sup>
Surface resistivity					
		+ (60093)	Ω	> 10 <sup>14</sup>	> 10 <sup>14</sup>
		++ (60093)	Ω	> 10 <sup>14</sup>	> 10 <sup>14</sup>
Constant dielectric ε:					
- a 100 Hz		+ (60250)	-	3,4	3,4
		++ (60250)	-	3,4	3,4
- a 1 Hz		+ (60250)	-	3,2	3,2
		++ (60250)	-	3,2	3,2
Factor of dissipation to tan δ :					
- a 100 Hz		+ (60250)	-	0,001	0,001
		++ (60250)	-	0,001	0,001
- a 1 Hz		+ (60250)	-	0,014	0,014
		++ (60250)	-	0,014	0,014
Comparative index of the creeping tides (CTI)					
		+ (60112)	-	600	600
		++ (60112)	-	600	600
<b>Other Properties</b>					
Bondability					
				Y	Y
Food contact safety (FDA Compliance)					
		DM 21.3.73		Y	Y

TONDI PIENI ESTRUSI RODS (extruded qualities)			PET	PET+PTFE
			Naturale - Natural Nero - Black	Grigio perla Grey pearl
	Tolleranza	Max. Lunghezza	Peso approssim.	Peso approssim.
Dia	Tolerance	Max Lenght	Weight appr.	Weight appr.
mm	mm	mm	kg/m	kg/m
6	+0,1/+0,4	3000	0,042	0,044
8	+0,1/+0,5	3000	0,072	0,08
10	+0,1/+0,5	3000	0,118	0,124
12	+0,2/+0,7	3000	0,173	0,175
15	+0,2/+0,7	3000	0,266	0,270
16	+0,2/+0,7	3000	0,293	0,302
18	+0,2/+0,7	3000	0,380	0,306
20	+0,2/+0,7	3000	0,467	0,473
22	+0,2/+0,9	3000	0,570	0,575
25	+0,2/+0,9	3000	0,730	0,738
28	+0,2/+0,9	3000	0,91*	0,922*
30	+0,2/+0,9	3000	1,040	1,060
32	+0,2/+1,1	3000	1,200	1,250
35	+0,2/+1,1	3000	1,500	1,560
40	+0,2/+1,1	3000	1,840	1,870
45	+0,3/+1,3	3000	2,340	2,370
50	+0,3/+1,3	3000	2,880	2,920
55	+0,3/+1,3	3000	3,600	3,650
60	+0,3/+1,6	3000	4,150	4,200
65	+0,3/+1,6	3000	4,850	4,920
70	+0,3/+1,6	3000	5,620	5,690
75	+0,3/+1,6	3000	6,480	6,570
80	+0,4/+2,0	3000	7,360	7,570
85	+0,4/+2,0	3000	8,320	8,450
90	+0,5/+2,2	3000	9,310	9,560
95	+0,5/+2,2	3000	10,470	10,620
100	+0,6/+2,5	3000	11,500	11,820
110	+0,7/+3,0	3000	13,950	14,380
120	+0,8/+3,5	3000	16,650	17,160
125	+0,8/+3,5	3000	17,400	18,280
130	+0,8/+3,5	3000	19,550	20,050
135	+0,8/+3,5	3000	21,27*	21,58*
140	+0,9/+3,8	3000	22,930	23,260
150	+0,9/+3,8	3000	26,230	26,610
160	+1,1/+5,5	3000	29,600	30,320
170	+1,1/+5,5	3000	33,450	33,980
175	+1,1/+5,5	3000		
180	+1,2/+6,0	3000	37,450	38,050
190	+1,2/+6,0	3000		
200	+1,2/+6,0	3000	46,810	47,450

LASTRE ESTRUSE EXTRUDED SHEETS		PET	PET+PTFE
		Naturale - Natural Nero - Black	Grigio perla Grey pearl
Spessore Thickness mm	Tolleranza Tolerance mm	Peso appross. Weight appr. kg/lastra kg/sheet	Peso appross. Weight appr. kg/lastra kg/sheet
		Dim. 1.000x2.000	Dim. 1.000x2.000
8	+0,2/+0,9	25,58	26,01
10	+0,3/+1,5	31,35	31,92
12	+0,3/+1,5	39,01	39,60
15	+0,3/+1,5	47,75	48,32
20	+0,3/+1,5	62,50	63,00
25	+0,3/+1,5	76,50	77,60
30	+0,3/+2,5	91,02	92,30
35	+0,5/+2,5	108,70	109,20
40	+0,5/+2,5	123,03	124,40
50	+0,5/+2,5	151,50	153,80
60	+0,5/+3,5	183,90	186,00
70	+0,5/+3,5	212,95	213,98
80	+0,5/+3,5	241,52	242,60
90	+0,5/+3,5	272,60	273,55
100	+0,5/+3,5	304,30	305,45

Disponibilità — Availability

Tondi : Ø 10-200 mm - Lastre: Spessore 8-100 mm  
Tubi: O.D. 25-200 mm

Rods: Ø 10-200 mm - Sheets/Plates: Thicknesses 8-100 mm  
Tubes: O.D. 25-200 mm

Lunghezze standard : 1.000 — 3.000  
Standard length : 1.000 — 3.000



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