Thermoplastic Polyester PBT500G30L

PBT500G30L combines excellent strength and rigidity with outstanding dimensional stability, resistance to a wide range of chemicals, oils, and solvents, and exceptional electrical insulation characteristics. It is used extensively in the automotive, electrical/electronics, and communications industries where this combination of properties combined with easy mold fill characteristics are required.

TYPICAL PROPERTIES

	ASTM	ENGLISH		S.I.	
PROPERTY	**TEST METHOD**	**UNITS**	**VALUE**	**UNITS**	**VALUE**
Melting Range	D789	ºF	442	ºC	228
Specific Gravity	D792	-	1.54	-	1.54
Water Absorption (24 hrs. Immersion at 23ºC/73ºF)	D570	%	0.07	%	0.07
Heat Deflection Temperature at 264 lbs/in^2 (1.82 MPa)	D648	ºF	401	ºC	205
Mold Shrinkage Guideline* (Flow/Transverse Direction)	1/8" section	%	0.4 / 0.7	%	0.4 / 0.7
Tensile Strength at Break	D638	lbs/in^2	19,000	MPa	131
Elongation at Break	D638	%	2-3	%	2-3
Flexural Strength	D790	lbs/in^2	28,500	MPa	197
Flexural Modulus	D790	lbs/in^2	1,250,000	MPa	6,821
Izod Impact Strength (Notched, 1/8" specimen)	D256	ft.lbs/in of notch	1.7	J/m	91
Rockwell Hardness	D785	M scale	90	-	-
Arc Resistance	D495	secs.	125		
Comparative Tracking Index	-	volts	500		
High Volt Track Rate	-	in/min.	0.5		
Dielectric Strength	D149	volts/.001"	560		

*** Please review shrinkage projections for specific applications with an MDE Technical Representative.**

All data generated using test specimens injection molded from natural color material. Inclusion of color pigments or other additives may change some or all of these test results. Test are conducted at 23^{o}C and 50% relative humidity unless otherwise stated.

These mechanical property test data have been developed using injection molded specimens tested under standardized conditions; furthermore, many of the mechanical properties of thermoplastic materials can be influenced by changes in processing conditions, environmental factors such as temperature and humidity, and rate of application of stress. Therefore, these test results, which characterize typical production material, should not be used either to establish specification limits or alone as the basis for engineering design.

PBT500G30L - Processing Guidelines

Drying

Although Thermoplastic Polyester (PBT) compounds from MDE are shipped in moisture resistant packaging, drying before processing is strongly recommended to ensure full realization of part performance, especially toughness. PBT absorbs very little moisture from its surrounding environment, but hydrolysis of the polymer when melted in the molding machine is rapid, causing breakdown of the polymer structure and loss of mechanical properties. Further, unlike other moisture sensitive engineering thermoplastics, such as nylon and polycarbonate, there may be no visible evidence (such as splay marking) of unacceptably high moisture levels.

The use of dehumidifying hopper dryers is therefore strongly recommended to ensure that both virgin material and regrind are properly dried. The dew point of the drying air stream should be no more than -20ºF, and preferably lower. The drying air temperature required varies with residence time of the material in the hopper at the drying temperature.

Residence Time	Temperature
2-3 hours	260-280ºF (Max)
5-6 hours	230-240ºF
8 hours-overnight	215ºF

If equipment is available to analyze moisture content, the maximum recommended level is 0.05%. PBT can be processed without difficulty at levels of 0.1%, but some loss of mechanical properties and part performance will occur.

Temperature Guidelines

The following temperature guidelines are suggested for general use **if a machine can be selected where shot size is 40-70% of nominal machine capacity.**

Tool Surface	Melt Temperatures (ºF)			Typical Cylinder Temperatures (ºF)		
Temperature (ºF)	Max.	Preferred	Min.	Front	Center	Rear
170-200	520	480-490	460	470	480	490

- A "reverse" temperature profile helps ensure a homogeneous melt, improves screw recovery and by accelerating the transition from solid pellets to a melt significantly reduces abrasive wear on screw and barrel surfaces.
- A mold surface temperature in the suggested range improves surface appearance, helps consistency of mold fill and therefore consistency of dimensions, minimizes the effect of weld lines and also helps realize best molded part performance.
- A fast injection speed maximizes weld line strength, minimizes molded in stress, and also assures achievement of best surface gloss. Good venting of cavities is essential to allow fast fill without burning.

Screw Forward Time

Although PBT compounds “set up" very rapidly, adequate screw forward time under follow-up pressure is important to ensure proper packing before gate freeze, during which time it is essential to maintain a "cushion" of 1/8" - 1/4". Optimum screw forward time can be judged by a part weight vs. forward time plot. Avoid overpacking, which can generate molded-in stresses.

Screw Recovery

It is recommended that back pressure be applied to the screw to help development of a homogenous melt, and to ensure consistent shot volume. For this reinforced grade, limiting back pressure to about 50 psi gauge will minimize the risk of mechanical damage to the glass fibers with consequent loss of part performance. Screw rotation should also be as slow as possible consistent with cycle time goals, usually 40-80 r.p.m.

Mold Shrinkage

Standard ASTM test specimens are used to develop shrinkage guidelines. Test specimens are end-gated, 1/8 inch thickness, and molded at conditions recommended for this formulation. **Actual shrinkage in molded parts will depend on several variables, including processing conditions, part configuration and gate location, both of which influence material flow direction, and wall section thickness.**