Developmental Product Information

Polyester Elastomer PBTE 4520

PBTE 4525 is a thermoplastic polyester elastomer suitable for processing by injection molding. With a durometer hardness in the range of 45-50, this grade exhibits flexibility and creep resistance maintained over a wide temperature range. PBTE 4520 offers excellent resistance to the effects of exposure to a broad range of chemicals, fuels, oils and greases, and solvents.

This product processes easily and is used to produce a wide range of molded products. However, drying the material prior to processing to a moisture content of no more than 0.1% is essential. Please refer to the Processing Guidelines overleaf.

PRELIMINARY PROPERTIES

	ASTM	ENGLISH		S.I.	
PROPERTY	**TEST METHOD**	**UNITS**	**VALUE**	**UNITS**	**VALUE**
Melting Range	D790	°F	365-383	°C	185-195
Hardness, Durometer D	D2240	points	45-50	-	-
Specific Gravity	D792	-	1.20	-	1.20
Tensile Strength at Yield	D638	lbs/in^2	2,700	MPa	19
Elongation at Break	D638	%	350-550	%	350-550
Flexural Strength	D790	lbs/in^2	1,800	MPa	12
Flexural Modulus	D790	lbs/in^2	31,000	MPa	214
Izod Impact Strength (Notched, 1/8" specimen)	D256	ft. lbs/in of notch	no break	J/m	no break

All data generated using test specimens injection molded from black pigmented material. Inclusion of other additives may change some or all of these test results. Tests are conducted at 23°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.

PBTE 4520
Processing Guidelines

Drying

Although Polyester Elastomer compounds from MDE are shipped in moisture resistant packaging, drying before processing is essential to ensure full realization of part performance, especially toughness at low temperatures. PBTE resins absorb very little moisture from their 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 essential to ensure that both virgin material and regrind are properly dried. The dew point of the drying air stream should be no more than -20°F, 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	225°F
5-6 hours	190°F
8 hours - overnight	170°F

If equipment is available to analyze moisture content, the recommended maximum level immediately prior to processing is 0.1% with 0.05% preferred. PBTE can be processed at levels in excess 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 Temperature (°F)	Melt Temperatures (°F)			Typical Cylinder Temperatures (°F)		
	Max.	Preferred	Min.	Front	Center	Rear
60-100	500	450-470	430	470	460	450

- A conventional temperature profile as shown will help prevent unmelted pellets from sticking to the screw. PBTE resins have excellent melt stability, however, so that a "flat" or even a "reverse" profile can be used successfully to help overcome special situations. Higher melt temperatures can be used to fill thin sections or long flow path tools provided residence times are short.
- Lower mold temperatures can help to reduce cycle times, especially for thicker section parts; higher temperatures help flow and may improve surface appearance. With 80°F at the cavity surface, crystallization rate is maximized.
- It is suggested that injection speed should vary depending upon part wall section thickness. Thin-wall parts of less than 1/8 inch thickness generally require faster injection to ensure proper fill; parts of greater than 1/4 inch section may require slower speeds to minimize jetting and achieve best surface appearance. Good venting of cavities is essential to allow fill without burning.

Screw Forward Time

Adequate screw forward time under a follow-up pressure as high as possible without causing flashing 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 pressures of 50-75 p.s.i. gauge be used to help development of a homogeneous melt, and ensure a consistent shot volume. Screw rotation is generally maintained in the range of 50-100 rpm to maintain cycle time goals.

Part Ejection

Polyester elastomers are compressible in the tool, and the softer grades especially require generous draft (0.5°-2.0° per side) to help ejection. Large ejector pins, and the use of stripper plates wherever possible, are especially recommended. **Additional lubricant systems can be made available for parts that prove hard to eject.**