

## TPU45SB2H

**TPU45SB2H** is a thermoplastic polyurethane elastomer compound exhibiting a Shore A hardness of 45, with a viscosity suitable for general purpose injection molding, including over-molding applications. A special surface lubricity additive has been incorporated into this compound to decrease both static and dynamic coefficient characteristics.

### TYPICAL PROPERTIES

<u>PROPERTY</u>	<u>ASTM TEST METHOD</u>	<u>ENGLISH</u>		<u>S.I.</u>	
		<u>UNITS</u>	<u>VALUE</u>	<u>UNITS</u>	<u>VALUE</u>
Specific Gravity	D792	-	1.21	-	1.21
Hardness, Shore A	D2240	-	45	-	-
Tensile Strength at Yield	D638	lbs/in <sup>2</sup>	2,500	MPa	17
Elongation at Break	D638	%	350	%	350

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. 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.

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## Processing Guidelines

### Drying

Thermoplastic polyurethane elastomer compounds from MDE are shipped in moisture-resistant packaging, and will not normally require drying.

Drying is required -- dehumidifying dryers can be used. If the dew point of the drying air stream is at -20°F or below, and the drying air is at a temperature sufficient to raise the pellet temperature to 175°F, then a residence time of 2-3 hours will be adequate to ensure that the material is dry enough to be processed.

### 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.

<u>Tool Surface Temperature (°F)</u>	<u>Melt Temperatures (°F)</u>			<u>Typical Cylinder Temperatures (°F)</u>			
	<u>Max.</u>	<u>Preferred</u>	<u>Min.</u>	<u>Nozzle</u>	<u>Front</u>	<u>Center</u>	<u>Rear</u>
60 to 110	420	400	380	400	385	380	375

- A tool temperature in the suggested range will help development of a matte surface of consistent appearance.
- Melt temperatures towards the higher end of the indicated range will assist flow in more complex, or long flow-path, tools.
- A medium-to-fast injection speed is recommended to ensure full part packing before the melt begins to freeze.

### Molding Machine and Tooling Design Considerations

Reciprocating screw machines of the following characteristics will be most suitable for processing TPE compounds:

- L/D ratio of preferably 20:1 or greater
- Screw compression ratio in the range 2.0:1.0 to 3.0:1.0
- Nozzle configuration should maximize flow, including a length as short as possible, with a large orifice diameter.

The following tool design recommendations will help optimize cycle time and part quality:

- Sprue diameter should be generous, to match the nozzle orifice
- Sprue length should also be short, with a taper of 3-6 degrees per side
- Full round runners of generous diameter are recommended to maximize flow -- "balancing" runners and gates is especially important for multi-cavity tool designs.
- Gate dimensions should be as large as practicable -- tab gates are preferred, where gate area should be at least 50% of the adjoining section.  
While pin gates, or sub-gates, are not preferred, they have been used successfully, even for larger parts, and in long flow-path designs, where a minimum gate vestige is required.
- Adequate venting is critical to allow fast fill without burning.

### Screw Forward Time

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

Lower back pressures -- nominal 50-150 psi gauge -- are normally sufficient to help development of a homogeneous melt, and to ensure consistent shot volume. Screw rotation should also be as slow as possible consistent with cycle time goals, usually 40-80 r.p.m.