

THERMOPLASTIC ELASTOMERIC

Definition:

Thermoplastic elastomers consist of thermoplastic end blocks and an elastic midblock, this arrangement allows the material to be repeatedly stretched without permanently deforming the shape of the part. Regards their structure and behaviour, they belong to a material class that is positioned between plastics (thermoplastics) and rubber (elastomer) and have gradually been developed into a material class of their own:-

TPU (Thermoplastic Polyurethane).

They behave like thermoset rubber but are processed like thermoplastics and unlike thermoset rubber, can be easily reprocessed and remoulded.

Polyether based Polyurethane: Provide enhanced hydroscopic resistance therefore suitable where water is a consideration.

Polyester based Polyurethane: Provide enhanced oil, hydrocarbon & abrasion resistance.

Rigid foams: Closed cell (skin) lightweight & mechanically strong

Flexible foams: Provides lightweight cushioning & packaging in any shape & firmness.

Typical Features:

- Can be recycled , reprocessed & remoulded
- Excellent flexural fatigue resistance
- Good tear & abrasion resistance
- High impact strength
- Good electrical properties
- Resistance to Low & High Temperatures from -30°C to +140°C

Additions of reinforcements & fillers:

- **Carbon Black:** Increases conductivity & accelerates cure time
- **Mica:** Increases in flexural, thermal & electrical properties.
- **Silica:** Improvement to mechanical properties such as tear strength.
- **Water:** Chemical blowing: reacts to form bubbles of Carbon Dioxide = cellular foam.
- **Pentane:** Physical blowing: exothermic reaction: air is trapped to form bubbles = cellular foam.

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DSM 3.6.6 POLYURETHANE

General:

This Polyurethane (TPU) is a versatile **Polyether** based Polyurethane thermoplastic elastomer; its mechanical properties can be manipulated through chemistry to create a broad range of performance characteristics from eraser soft to bowling ball hard.

Benefits:

Compared to **polyester** based Polyurethane:

Typically the harder urethanes (above 90A), polyether materials have better moisture resistance and dynamic properties than the polyester urethanes. They also have better low temperature properties.

- Performs very well when used in high flex fatigue applications. May distort under high loads but will return to its original shape.
- Very resistant to temperature extremes and chemicals.
- Polyurethane's material properties will remain stable (with minimal swelling) in water / oil / grease.
- Exhibits good electrical insulating properties. 10^{12} (Ohms/sq.)
- Bonds to a wide range of materials, such plastics & metals during the manufacturing process.

Limitations: (unmodified)

- Limited resistance to acids and alkaline solutions.
- Aromatics. (Benzene) will cause TPU to swell
- Yellows with exposure to UV radiation
- Less abrasion & tear (compared to Polyester TPU).

ASM (DEK) Applications:

- Ski Shutter element

These values are representative. For critical applications, refer to data-sheet.

MECHANICAL PROPERTIES					
	HARDNESS Shore A	TENSILE STRENGTH:	YOUNGS MODULUS:	POISSONS RATIO:	DENSITY:
TPU	55	44 MPa	0.17 GPa	0.5	1150 Kg/m³

GRADE	SUPPLIER	UL No.	RECYCLE CODE
Pellethane: 2103-55D + Master Batch Colour: Black	DOW PLASTICS	----	>TPU<

Alternatives:

Alternative polymers are allowed only with the express written permission of ASMPT. Please email details of your request to engineering_enquiries@asmpt.com

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