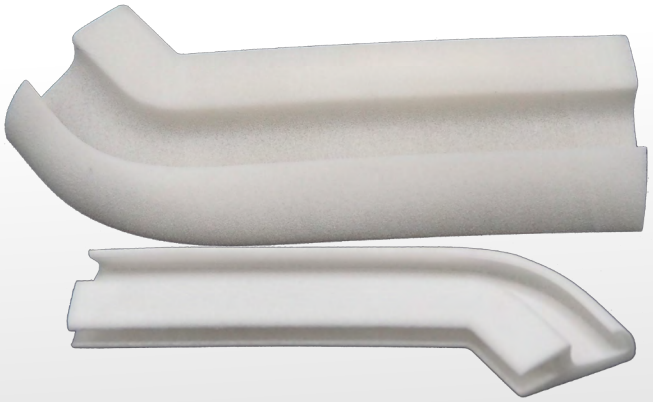

DuraForm® TPU 90

Tough Elastomer

Rubber-like flexible material with high rebound.

Selective Laser Sintering (SLS)

FLEXIBLE WITH OUTSTANDING TEAR STRENGTH AND WEAR RESISTANCE

DuraForm TPU 90A is a versatile material that has outstanding surface quality and detail. It offers a large rebound, enhanced stiffness, and a low printed part density for lightweight applications. This material also offers good rebound performance in addition to tear and fatigue resistance. DuraForm TPU 90A delivers outstanding long-term stability and hydrolysis resistance.

APPLICATIONS

- Footwear
- Personalized orthotics and prosthetics
- Sports protection equipment
- Flexible seals
- Gaskets
- Automotive interior components
- Pipework
- Gaitors (protective coverings)

BENEFITS

- Lightweight with high rebound and fatigue resistance
- Best tear resistance of AM low durometer parts
- Long-term stability with minimal change to elongation at break
- Excellent surface quality and feature detail
- Mechanical properties like common rubbers and silicones
- Easy to finish including smoothing, dying, and coating
- Path to orthotics without the need for CAD input to manipulate material properties

FEATURES

- Chemical resistant
- Biocompatible; ISO 10993-5 capable
- High recycling rate
- Ideally suited for industrial and medical applications

3D SYSTEMS

MATERIAL PROPERTIES

The full suite of mechanical properties are given per ASTM and ISO standards where applicable. In addition, properties such as flammability, dielectric properties, and 24 hour water absorption are provided. This allows for better understanding of the material capability to aid in design decisions for the material. All parts are conditioned per ASTM recommended standards for a minimum of 40 hours at 23 °C, 50% RH.

Solid material properties reported were printed along the vertical axis (ZY-orientation). Figure 4 material properties are relatively uniform across print orientations, as detailed in the following section on Isotropic Properties. Because of this, parts do not need to be oriented in a particular direction to exhibit these properties.

SOLID MATERIAL						
METRIC	**ASTM METHOD**	**METRIC**	**ENGLISH**	**ISO METHOD**	**METRIC**	**US**
PHYSICAL				**PHYSICAL**		
Solid Density	ASTM D792	0.93 g/cm³	0.033 lb/in³	ISO 1183	0.93 g/cm³	0.033 lb/in³
24 Hour Water Absorption	ASTM D570	2.71 %	2.71 %	ISO 62	2.71 %	2.71 %
MECHANICAL				**MECHANICAL**		
Tensile Strength Ultimate	ASTM D412 Type C	7 MPa	1000 psi	ISO 37	7 MPa	1000 psi
Tensile Modulus	ASTM D412 Type C	80 MPa	10 ksi	ISO 37	70 MPa	10 ksi
Elongation at Break	ASTM D412 Type C	101.6 %	101.6 %	ISO 37	91.6 %	91.6 %
Tensile Stress at 50% Elongation	ASTM D412 Type C	6.1 MPa	870 psi	ISO 37	6.1 MPa	870 psi
Tensile Stress at 100% Elongation	ASTM D412 Type C	7.1 MPa	1015 psi	ISO 37	6.7 MPa	870 psi
Shore Hardness	ASTM D2240	83 A	83 A	ISO 7619	83 A	83 A
Tear Strength	ASTM D624 Type C	52.1 kN/m	297 lbf/in	ISO 34	52.1 kN/m	297 lbf/in
Tear Strength	ASTM D624 Type T	9.3 kN/m	51 lbf/in	ISO 34	9.3 kN/m	51 lbf/in
Compression Set (%) 23°C	ASTM D395	6.6 %	6.6 %	ISO 815-B	6.6 %	6.6 %
Compression Set (%) 50°C	ASTM D395	12.7 %	12.7 %	ISO 815-B	12.7 %	12.7 %
Bayshore Rebound	ASTM D2632	55 %				
THERMAL				**THERMAL**		
Tg (DMA E")	ASTM E1640 (E"Peak)	-64 °C	-82 °F	ISO 6721-1/11 (E" Peak)	-64 °C	-82 °F
CTE -20 TO 30°C	ASTM E831	302 ppm/°C	168 ppm/°F	ISO 11359-2	302 ppm/°C	168 ppm/°F
CTE 50 TO 100°C	ASTM E831	97 ppm/°C	54 ppm/°F	ISO 11359-2	97 ppm/°C	54 ppm/°F

ISOTROPIC PROPERTIES

Selective laser sintering technology prints parts that are generally isotropic in mechanical properties meaning the parts printed along either the XYZ axis will give similar results. Parts do not need to be oriented to get good isotopic behavior in mechanical properties, further improving the degree of freedom for part orientation for mechanical properties.

SOLID MATERIAL					
METRIC	METHOD	METRIC			
MECHANICAL					
		ZY	XZ	XY	Z45
Tensile Strength Ultimate	ASTM D412 Type C	7 MPa	4 MPa	3 MPa	3 MPa
Tensile Modulus	ASTM D412 Type C	80 MPa	70 MPa	70 MPa	50 MPa
Elongation at Break	ASTM D412 Type C	101.6 %	27 %	18.2 %	18.2 %
Shore A Hardness	ASTM D2240	83 A	81 A	82 A	83 A
Tear Strength	ASTM D624 Type C	52.1 kN/m	25.4 kN/m	15.4 kN/m	17 kN/m