

TPU - 68D

HIGH HARDNESS ELASTOMER FOR TOUGH FLEXIBLE FUNCTIONAL PARTS

TPU - 68D is a high-hardness thermoplastic polyurethane that combines flexibility, durability, and strong impact performance with a Shore hardness of 68D. It is suited to functional parts that require greater rigidity than soft TPU while retaining high elongation and energy absorption.

Design Advantages

- High Shore hardness for semi-rigid parts that still require flexibility and recovery
- Published X/Y elongation greater than 650% for highly deformable designs
- Strong impact performance for protective, energy-absorbing, and wear-resistant components
- Fast processing capability with reduced stringing compared with many softer TPU grades

Material Specifications

ITEM	PUBLISHED VALUE
Material family	Thermoplastic polyurethane
Shore hardness	68D
Filament diameter	1.75 mm
Published density	1.26 g/cm ³
Water solubility	Insoluble
Appearance and odor	Solid filament; odorless under normal handling

Recommended Processing Window

SETTING	RECOMMENDED RANGE
Drying before printing	Forced-air drying oven at 70 C for 8 h
Printing and storage humidity	Below 20% RH sealed with desiccant
Nozzle size	0.4, 0.6, or 0.8 mm
Nozzle temperature	220 to 240 C
Build surface	Textured PEI or smooth PEI with glue
Bed temperature	30 to 35 C
Cooling	Part-cooling fan on
Printing speed	Below 250 mm/s
Retraction	0.8 to 1.4 mm at 20 to 40 mm/s
Chamber temperature	25 to 45 C
Overhang and bridging	Approximately 70 degree maximum overhang; 20 mm maximum bridge
Supports	Enable where required by geometry

Physical and Thermal Properties

PROPERTY	TEST METHOD	PUBLISHED VALUE
Density	ISO 1183	1.26 g/cm ³
Melt index	210 C at 2.16 kg	21.8 +/- 0.3 g/10 min
Melting temperature	DSC at 10 C/min	183 C
Glass transition temperature	DSC at 10 C/min	Not reported
Crystallization temperature	DSC at 10 C/min	Not reported
Vicat softening temperature	ISO 306 and GB/T 1633	Not reported
Heat deflection at 1.8 MPa	ISO 75	Not reported
Heat deflection at 0.45 MPa	ISO 75	Not reported
Saturated water absorption	25 C and 55% RH	1.20%

Mechanical Properties

PROPERTY	TEST METHOD	PUBLISHED VALUE
Young's modulus X Y	ISO 527 and GB/T 1040	1,190 +/- 0.4 MPa
Young's modulus Z	ISO 527 and GB/T 1040	600 +/- 0.5 MPa
Tensile strength X Y	ISO 527 and GB/T 1040	22.4 +/- 0.6 MPa
Tensile strength Z	ISO 527 and GB/T 1040	11.2 +/- 0.5 MPa
Elongation at break X Y	ISO 527 and GB/T 1040	>650%
Elongation at break Z	ISO 527 and GB/T 1040	31%
Flexural modulus X Y	ISO 178 and GB/T 9341	Not reported
Flexural modulus Z	ISO 178 and GB/T 9341	Not reported
Flexural strength X Y	ISO 178 and GB/T 9341	Not reported
Flexural strength Z	ISO 178 and GB/T 9341	Not reported
Impact strength X Y	ISO 179 and GB/T 1043	124.3 kJ/m ²
Impact strength Z	ISO 179 and GB/T 1043	9.6 +/- 0.3 kJ/m ²

Representative values from standardized specimens. Actual part performance depends on geometry, orientation, wall thickness, processing parameters, conditioning, and service conditions.

Chemical and Handling Characteristics

CHARACTERISTIC	PUBLISHED INFORMATION
Composition	Thermoplastic polyurethane
Odor and skin hazards	Odorless; source documentation reports no skin hazard
Chemical stability	Stable under normal storage and handling conditions
Water solubility	Insoluble
Acid and alkali resistance	Not resistant
Organic solvent resistance	Not resistant to some organic solvents
Oil and grease resistance	Resistant to most kinds of oil and grease
Flammability	Flammable
Combustion products	Water, carbon oxides, and nitrogen oxides; pungent odor

Representative Specimen Conditions

PARAMETER	SOURCE CONDITION
Nozzle temperature	230 C
Bed temperature	35 C
Printing speed	130 mm/s
Infill density	100%
Pre-test conditioning	Annealed and dried at 70 C for 12 h

Design and Validation Considerations

- Account for strong anisotropy: published tensile strength is 22.4 MPa in X/Y and 11.2 MPa in Z, while elongation is greater than 650% in X/Y and 31% in Z.
- Use X/Y-oriented load paths where high elongation, toughness, and impact performance are critical.
- Dry and store material below 20% RH with desiccant to support consistent extrusion and mechanical performance.
- Do not assume chemical compatibility from the generic resistance statements; validate the actual fluid, concentration, temperature, exposure time, and stress state.
- Annealing is generally not recommended because complex parts may deform. Do not use a microwave or household kitchen oven for drying or heat treatment.

Published Data and Qualification

The values in this sheet are based on standardized specimen testing documented by the material source and are provided for design reference and material comparison. Lucent Additive has not independently generated every published value. Final-part performance can differ substantially from standardized specimens because of geometry, orientation, process settings, conditioning, and service environment.

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Start an Application Review

Send Lucent Additive your CAD model, quantity, load conditions, flexibility requirements, inspection needs, chemical exposure, and target schedule. Our team can review material fit, build orientation, production strategy, and validation needs before quoting.

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