ESTANE® 3D TPU M95A-545 OR UV

Technical Data Sheet

Type: Polyether Thermoplastic Polyurethane (TPU)

Uses: HP Multi-Jet Fusion (MJF)

Base Resin Information:

Physical Properties	Value (Metric)	Unit	Test Method
Specific Gravity	1.17		ASTM D-792
Melting Temperature (by DSC)	200	°C	Lubrizol DSC

- Testing samples were injection molded to 80 mils or 2 mm thickness.
- Prior to testing, samples were conditioned at 23°C for 48 hours.
- Listed values are "typical (average) values" and should not/cannot be applied for specification purposes and do not constitute any agreed contractual specification/quality of ESTANE® 3D TPU M95A-545 OR UV.

Multi-Jet Fusion Printed Part Information:

- ESTANE® 3D TPU M95A is certified for skin sensitization and cytotoxicity.

Physical Properties	Value (Metric)	Unit	Test Method
Vicat Softening Temperature	161	°C	ASTM D-1525 (10N)
Ross Flex Test at 23°C	No Crack		60° for 150,000 cycles
Ross Flex Test at -6°C	No Crack		60° for 150,000 cycles

Mechanical Properties	Full Print Bed Build	Half Print Bed Build	Unit	Test Method
	100% Fresh Powder (Generation 5)			
Specific Gravity	1.10 - 1.15			ASTM D-792
Properties in X				
Hardness (5 sec)	93 ± 3		Shore A	ASTM D-2240
Abrasion Volume Loss	100 (140)	80 (100)	mm^3	DIN-53516 / ISO-4649
Tensile Strength	17 (11)	18 (14)	MPa	DIN-53504 / ISO-37
Elongation at Break	400 (180)	430 (340)	%	DIN-53504 / ISO-37
Tear Strength (Die C)	80 (80)	95 (96)	KN/m	ASTM D-624
Flexural Modulus	85		MPa	ASTM D-790
Properties in Z				
Hardness (5 sec)	93 ± 3		Shore A	ASTM D-2240
Abrasion Volume Loss	90 (120)	80 (100)	mm^3	DIN-53516 / ISO-4649
Tensile Strength	8 (5)	8 (6)	MPa	DIN-53504 / ISO-37
Elongation at Break	90 (30)	110 (70)	%	DIN-53504 / ISO-37
Tear Strength (Die C)	35 (33)	45 (44)	KN/m	ASTM D-624

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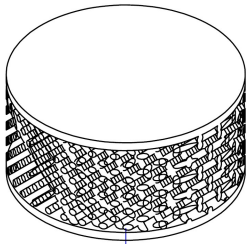
Dimensional Properties			
Dimensional Accuracy in XY	+/- 1.0	mm	

- Skin sensitization and cytotoxicity of printed parts were certified as per ISO10993-5 and -10
- Listed values are "typical (average) values" and should not/cannot be applied for specification purposes and do not constitute any agreed contractual specification/quality of ESTANE® 3D TPU M95A-545 OR UV.
- Listed values were printed with using HP 4200 Multi-Jet Fusion printer and print bed density was approximately 7 %.
- Generation 5 values were obtained when 80% recycled and 20% fresh powder blend was used in full bed and half bed printing cycles with 7% print bed density.
- Tensile specimens were printed in Type 2 per ISO-37 or S2 per DIN-53504.
- Dimensional properties were measured with the dimensions ranged from 3 to 100 mm.

Application Example: MJF Printed Lattice Structure

Design Characteristics	Value	Unit
Outside Diameter	50	mm
Lattice element diameter	1.5	mm
Center to Center distance	4	mm
Solid plate thickness	2	mm



- This geometry is designed to provide physical properties of general lattice structure (as shown).

Physical Properties of Printed Part	80% Reclaimed / 20% Virgin Powder Blend		Test Method
	Value	Unit	
Properties in XY			
Vertical Resiliency	52	%	ASTM D-2632
Swing-arm Resiliency	55	%	DIN-53512
Compression Set at Room Temp	18	%	50% Deflection for 6 hrs
Compression Set at 50 °C	30	%	50% Deflection for 6 hrs
Properties in Z			
Vertical Resiliency	53	%	ASTM D-2632
Swing-arm Resiliency	57	%	DIN 53512
Compression Set at Room Temp	17	%	50% Deflection for 6 hrs
Compression Set at 50 °C	19	%	50% Deflection for 6 hrs

- Properties of lattice parts may vary depending on part design.
- These values should only be taken as exemplary properties of lattice structure printed by ESTANE® 3D TPU M95A-545 OR UV, should not/cannot be applied for specification purposes and do not constitute any agreed contractual specification/quality of ESTANE® 3D TPU M95A-545 OR UV.

Reclaimed Powder Information:

- Standard refresh rate of ESTANE® 3D TPU M95A-545 OR UV is 80% reclaimed and 20% virgin.
- As the powder blend is reclaimed for more printing cycles, the yellowness of the powder blend increases.
- The print mode assumes a high reclaim rate as the blend has been tested up to 10th generation.

- Powder yellowness values can vary significantly depending on measurement location, print bed density and part types.

Powder Caking Information:

• ESTANE® 3D TPU M95A-545 OR UV is specially developed to provide EASY and COLD unpacking.
• This feature may provide decreased stress to an operator during powder cleaning and unpacking process.
• The powder caking properties are shown below.

Powder Caking Properties	ESTANE® M95A	Test Method
Maximum Stress at Break	9.14 kPa	Lubrizol
Strain at Break	4.4 mm	Lubrizol

- Samples were oven aged at 140°C for 18.5 hours and cooled down to 23°C prior to testing.
- Listed values were measured according to Lubrizol's internal test method.
- Listed values are "typical (average) values" and should not/cannot be applied for specification purposes and do not constitute any agreed contractual specification/quality of ESTANE® 3D TPU M95A-545 OR UV.

Supply Form and Standard Packaging

• **ESTANE® 3D TPU M95A-545 OR UV** is supplied in powder form and packaged in 30 liter/300 liter HP certified packaging and 480 kg Lubrizol packaging.