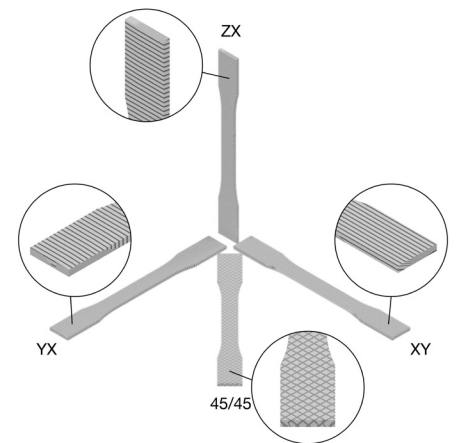


### ESSENTIUM TPU 90A FR

Essentium Flame Retardant TPU 90A has been engineered to have the perfect balance of elasticity and toughness. This filament exhibits excellent interlayer adhesion and high strain at break; the base resin is UL94 V0 certified for flame retardancy and printed samples pass FAA FAR 25.853(a) 12 and 60 second vertical flame tests for 1/16" and 1/4" thickness. Our TPU 90A FR filament is perfect for a print that needs inherent flame retardant properties with flexibility, grip, and abrasion resistance. Use this material to make flexible hinges, belts, plugs, gaskets, protective cases, overgrips, wheels, vibration dampeners, energy-absorbing lattices, and so much more.

Metric	Test Method	Molded Properties <sup>1</sup>	Method	Print Orientation <sup>2</sup>			
				45-45	XY	YX	ZX
Tensile Strength, MPa	DIN 53504-S2	25	ASTM D412	12	12	10	7
Strain at Break, %	DIN 53584-S2	550	ASTM D412	535	507	389	103

Metric	Method	Properties <sup>1</sup>
Shore Hardness, A	ISO 7619	90
Specific Gravity	ISO 1183/A	1.25
Flammability Rating	UL 94	V-0
Vertical Flame Test	IEC 60332-1	Pass
LOI	ISO 4589-1 / -2	24%
Halogen Content	IEC 60754-1	Halogen free



### RECOMMENDED PRINT SETTINGS

Extrusion Temperature, °C	220 – 240
Bed Temperature, °C	40 – 60
Enclosure Temperature, °C	Room Temperature
Print Speed, mm/s	15 – 30

1 Values taken from raw material TDS

2 Print settings: nozzle temp: 240°C, bed temp: 60°C, infill: 100%, speed: 30mm/s, layer height: 0.3mm, extrusion multiplie: 1.05, nozzle diameter: 1.0mm

Revision Date: 9/30/19