

## MATERIAL DATA SHEET



ULTEM 1010 resin is the newest high-performance FDM<sup>®</sup> thermoplastic, offering excellent strength and thermal stability and the ability to withstand steam autoclaving. With food-contact and bio-compatibility certifications, ULTEM 1010 resin is perfect for specialized applications including food-production tools and custom medical devices. ULTEM 1010 resin offers the highest heat resistance, chemical resistance and tensile strength of any FDM thermoplastic and is ideal for an out-of-cabin aerospace applications and under-the-hood automotive applications.

MECHANICAL PROPERTIES	TEST METHOD	ENGLISH		METRIC	
		XZ AXIS	ZX AXIS	XZ AXIS	ZX AXIS
Tensile Strength, Yield [Type 1, 0.125", 0.2"/min]	ASTM D638	9,300 psi	6,100 psi	64 MPa	42 MPa
Tensile Strength, Ultimate [Type 1, 0.125", 0.2"/min]	ASTM D638	11,700 psi	5,400 psi	81 MPa	37 MPa
Tensile Modulus [Type 1, 0.125", 0.2"/min]	ASTM D638	402,000 psi	322,000 psi	2,770 MPa	2,200 MPa
Tensile Elongation at Break [Type 1, 0.125", 0.2"/min]	ASTM D638	3.3%	2.0%	3.3%	2.0%
Tensile Elongation at Yield [Type 1, 0.125", 0.2"/min]	ASTM D638	2.2%	1.5%	2.2%	1.5%
Flexural Strength [Method 1, 0.05"/min]	ASTM D790	21,000 psi	11,100 psi	114 MPa	77 MPa
Flexural Modulus [Method 1, 0.05"/min]	ASTM D790	409,000 psi	324,000 psi	2,820 MPa	2,230 MPa
Flexural Strain at Break [Method 1, 0.05"/min]	ASTM D790	No Break	3.5%	No Break	3.5%
IZOD impact - notched [Method A, 23 °C]	ASTM D256	0.8 ft-lb/in	0.4 ft-lb/in	41 J/m	24 J/m
IZOD impact - unnotched [Method A, 23 °C]	ASTM D256	6.1 ft-lb/in	2.6 ft-lb/in	326 J/m	138 J/m
Compressive Strength, Yield [Method 1, 0.05"/min]	ASTM D695	19,500 psi	15,100 psi	134 MPa	107 MPa
Compressive Strength, Ultimate [Method 1, 0.05"/min]	ASTM D695	No Break	15,500 psi	No Break	1,125 MPa
Compressive Modulus [Method 1, 0.05"/min]	ASTM D695	1,450,000 psi	305,000 psi	10,000 MPa	1,120 MPa

THERMAL PROPERTIES	TEST METHOD	ENGLISH	METRIC
Heat Deflection (HDT) @ 66 psi, 0.125" unannealed	ASTM D648	421 °F	216 °C
Heat Deflection (HDT) @ 264 psi, 0.125" unannealed	ASTM D648	415 °F	213 °C
Vicat Softening Temperature [Rate B/50]	ASTM D1525	416 °F	214 °C
Glass Transition Temperature [Tg]	DMA [SSYS]	419 °F	215 °C
Coefficient of Thermal Expansion	ASTM E831	26 x 10 <sup>-6</sup> in/in/° F	47 μm/(m·°C)
Coefficient of Thermal Expansion (xflow)	ASTM E831	25 x 10 <sup>-6</sup> in/in/° F	41 μm/(m·°C)
Melting Point	-----	Not Applicable	Not Applicable



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ELECTRICAL PROPERTIES	TEST METHOD	VALUE RANGE
Volume Resistivity	ASTM D257	1.0 x 10 <sup>14</sup> - 8.96 x 10 <sup>15</sup> ohm-cm
Dielectric Constant	ASTM D150-98	2.67
Dissipation Factor	ASTM D150-98	.001
Dielectric Strength	ASTM D149-09, Method A	240 V/mil

OTHER	TEST METHOD	VALUE
Specific Gravity	ASTM D792	1.27
Rockwell Hardness	ASTM D785	109
Flame Classification	UL94	VO [1.5 mm], VO, 5VA [3mm]
Oxygen Index	ASTM D2863	0.44
Vertical Burn	FAR 25.853 (Test a [60s], passes at)	4 seconds
OSU Total Heat Release [2 min test, .060" thick]	FAR 25.853	35.7 kW min/m <sup>2</sup>
UL File Number	-----	E345258
Food Safety Certification	NSF 51	Certified
Bio-compatibility Certification	ISO 10993/USP Class VI	Certified

Burn Testing

Horizontal Burn (15 sec)	14 CFR/FAR 25.853	Passed (.060" thick)
Vertical Burn (60 sec)	14 CFR/FAR 25.853	Passed (.060" thick)
Vertical Burn (12 sec)	14 CFR/FAR 25.853	Passed (.060" thick)
45° Ignition	14 CFR/FAR 25.853	Passed (.060" thick)
Heat Release	14 CFR/FAR 25.853	Passed (.060" thick)
NBS Smoke Density (flaming)	ASTM F814/E662	Passed (.060" thick)
NBS Smoke Density (non-flaming)	ASTM F814/E662	Passed (.060" thick)

