ULTEM 1010 Resin

High-Performance Thermoplastic for Fortus® 3D Production Systems

ULTEM 1010 resin is the newest high-performance FDM® 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[1]	Test Method	English		Metric	
		XZ Orientation	ZX Orientation	XZ Orientation	ZX Orientation
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	144 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, un-notched (Method A, 23°C)	ASTM D256	6.1 ft-lb f/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[2]	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)	DSC (SSYS)	419°F	215°C
Coefficient of Thermal Expansion	ASTM E831	$26x10^{-06}$ in/(in·°F)	47 µm/(m·°C)
Coefficient of Thermal Expansion (xflow)	ASTM E831	$25x10^{-06}$ in/(in·°F)	41 µm/(m·°C)
Melting Point	----------	Not Applicable[3]	Not Applicable[3]

Electrical Properties	Test Method	Value Range
Volume Resistivity	ASTM D257	$1.0 x10^{14}$ - $8.96x10^{15}$ 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

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Other[2]	Test Method	Value
Specific Gravity	ASTM D792	1.27
Rockwell Hardness	ASTM D785	109
Flame Classification	UL94	V0 (1.5 mm), V0, 5VA (3 mm)
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^2
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)

System Availability	Layer Thickness Capability	Support Structure	Available Colors
Fortus 900mc™	0.010 inch (0.254 mm) 0.013 inch (0.333 mm)	Breakaway	Natural

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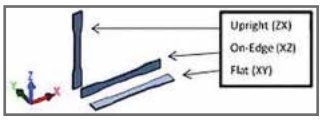
The performance characteristics of these materials may vary according to application, operating conditions, or end use. The information presented are typical values intended for reference and comparison purposes only. They should not be used for design specifications or quality control purposes. End-use material performance can be impacted (+/-) by, but not limited to, part design, end-use conditions, test conditions, etc. Actual values will vary with build conditions. Tested parts were built on Fortus 400mc @ 0.010" (0.254 mm) slice. Product specifications are subject to change without notice.

The performance characteristics of these materials may vary according to application, operating conditions, or end use. Each user is responsible for determining that the Stratasys material is safe, lawful, and technically suitable for the intended application, as well as for identifying the proper disposal (or recycling) method consistent with applicable environmental laws and regulations. Stratasys makes no warranties of any kind, express or implied, including, but not limited to, the warranties of merchantability, fitness for a particular use, or warranty against patent infringement.

[1]Build orientation is on side long edge.
[2]Literature value unless otherwise noted.
[3]Due to amorphous nature, material does not display a melting point.

Orientation: See Stratasys Testing white paper for more detailed description of build orien tations.

- *XZ = X or "on edge"*
- *XY = Y or "flat"*
- *ZX = or "upright"*



At the core: Advanced FDM technology

Fortus systems are based on FDM (fused deposition modeling) technology. FDM is the industry's leading additive manufacturing technology, and the only one that uses production-grade thermoplastics, enabling the most durable parts Fortus systems use a wide range of thermosplastics with advanced mechanical properties so your parts can endure high heat, caustic chemicals, sterilization and high-impact applications

No special facilities needed

You can install a Fortus 3D Production System just about anywhere. No special venting is required because Fortus systems don't produce noxious fumes, chemicals or waste.

No special skills needed

Fortus 3D Production Systems are easy to operate and maintain compared to other additive fabrication systems because there are no messy powders to handle and contain. They're so simple, an operator can be trained tooperate a Fortus system in less than 30 minutes.

Get your benchmark on the future of manufacturing

Fine details. Smooth surface finishes. Accuracy. Strength. The best way to seethe advantages of a Fortus 3D Production System is to have your own part built on a Fortus system. Get your free part at: stratasys.com.

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