Certified ULTEM 9085

PRODUCTION-GRADE THERMOPLASTIC FOR FORTUS 3D PRINTERS

ULTEM™ 9085 resin is a flame-retardant high-performance thermoplastic for digital manufacturing and rapid prototyping. It is ideal for the transportation industry due to its high strength-to-weight ratio and its FST (flame, smoke and toxicity) rating. This unique material's certifications make it an excellent choice for the commercial transportation industry – specifically aerospace, marine and ground vehicles. Combined with a Fortus® 3D Printer, ULTEM 9085 resin allows design and manufacturing engineers to produce fully functional parts that are ideal for advanced functional prototypes or end use without the cost or lead time of traditional tooling.

Stratasys Certified ULTEM 9085 meets the extensive, more stringent test criteria and retains material traceability required by the aerospace industries and regulatory agencies.

- **A Certificate of Analysis** for both raw material and filament are supplied, documenting test results and identification to match filament manufacturing lot number to raw material batch number. This allows traceability from printed part back to raw material.
- **A Certificate of Conformance** confirms that the material is manufactured in compliance to approved Stratasys and Industry specifications.

MECHANICAL PROPERTIES[1]	TEST METHOD	ENGLISH				METRIC			
		XY	*XZ*	*ZX*	*ZX-45*	*XY*	*XZ*	*ZX*	*ZX-45*
Tensile Strength, Ultimate (Type 1, 0.130")	D638	9,700 psi	11,200 psi	8,500 psi	8,000 psi	67 MPa	77 MPa	59 MPa	55 MPa
Tensile Strength, 0.2% offset yield (Type 1, 0.130")	D638	5,500 psi	6,500 psi	5,500 psi	5,400 psi	38 MPa	45 MPa	38 MPa	37 MPa
Tensile Modulus (Type 1, 0.130")	D638	337,00 psi	377,000 psi	347,000 psi	341,000 psi	2,330 MPa	2,600 MPa	2,400 MPa	2,350 MPa
Tensile Elongation at Break (Type 1, 0.130")	D638	7.00%	6.21%	3.63%	3.16%	7.00%	6.21%	3.63%	3.16%
Flexural Strength	D790	16,700 psi	18,900 psi	12,100 psi	12,200 psi	115 MPa	130 MPa	83 MPa	84 MPa
Flexural Strength 0.2% Offset	D790	12,300 psi	14,200 psi	11,400 psi	10,900 psi	85 MPa	98 MPa	79 MPa	75 MPa
Flexural Modulus	D790	354,000 psi	380,500 psi	328,500 psi	314,000 psi	2,400 MPa	2,600 MPa	2,300 MPa	2,200 MPa
Compressive Strength Yield (modified type 6.7.2)	D695	7,800 psi	10,800 psi	8,300 psi	8,200 psi	54 MPa	75 MPa	57 MPa	56.5 MPa
Compressive Modulus (modified type 6.7.2)	D695	394,000 psi	448,000 psi	403,000 psi	384,000 psi	2,700 MPa	3,100 MPa	2,800 MPa	2,650 MPa
Shear Strength (V-notch In-Plane Shear)	D5379	7,200 psi	x	x	x	50 MPa	x	x	x
Shear Mod	D5379	131,000 psi	x	x	x	903 MPa	x	x	x
OHT	D5766	6,550 psi	8,900 psi	4,200 psi	5,000 psi	45 MPa	61 MPa	29 MPa	34.5 MPa
OHT Mod.	D5766	285,000 psi	343,000 psi	310,000 psi	300,000 psi	1,950 MPa	2,400 MPa	2,100 MPa	2,100 MPa
FHT Str.	D6742	7,500 psi	10,000 psi	7,300 psi	6,700 psi	52 MPa	69 MPa	50 MPa	46 MPa
FHT Mod	D6742	343,000 psi	411,000 psi	376,000 psi	343,000 psi	2,400 MPa	2,830 MPa	2,600 MPa	2,400 MPa
FHC Str.	D6742	6,500 psi	10,400 psi	9,100 psi	7,000 psi	45 MPa	72 MPa	63 MPa	48 MPa
FHC Mod.	D6742	346,000 psi	400,000 psi	370,000 psi	373,000 psi	2,400 MPa	2,800 MPa	2,550 MPa	2,600 MPa
Single Shear Bearing	D5961	29,600 psi	28,450 psi	27,350 psi	22,850 psi	204 MPa	196 MPa	189 MPa	158 MPa
IZOD Impact un-notched	D256	1.8 ft-lb/in	1.4 ft-lb/in	1.3 ft-lb/in	1.5 ft-lb/in	95 J/m	74 J/m	69 J/m	79 J/m

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At the core: Advanced FDM Technology

FDM® (fused deposition modeling) technology works with engineering-grade thermoplastics to build strong, long-lasting and dimensionally stable parts with the best accuracy and repeatability of any 3D printing technology. These parts are tough enough to be used as advanced conceptual models, functional prototypes, manufacturing tools and production parts.

Meet production demands

FDM systems are as versatile and durable as the parts they produce. Advanced FDM 3D Printers boast the largest build envelopes and material capacities in their class, delivering longer, uninterrupted build times, bigger parts and higher quantities than other additive manufacturing systems, delivering high throughput, duty cycles and utilization rates.

Opening the way for new possibilities

FDM 3D Printers streamline processes from design through manufacturing, reducing costs and eliminating traditional barriers along the way. Industries can cut lead times and costs, products turn out better and get to market faster.

No special facilities needed

FDM 3D Printers are easy to operate and maintain compared to other additive fabrication systems because there are no messy powders or resins to handle and contain, and no special venting is required because FDM systems don't produce noxious fumes, chemicals or waste.

THERMAL PROPERTIES[2]	TEST METHOD	ENGLISH	METRIC
Heat Deflection (HDT) @ 264 psi, 0.125" unannealed	ASTM D648	307 °F	153 °C
Glass Transition Temperature (Tg)	DSC (SSYS)	367 °F	186 °C
Coefficient of Thermal Expansion	ASTM E831	3.67×10^{-05} in/(in·°F)	65.27 µm/(m·°C)
Melting Point	----------	Not Applicable[3]	Not Applicable[3]

ELECTRICAL PROPERTIES	TEST METHOD	VALUE RANGE
Volume Resistivity	ASTM D257	4.9×10^{15} - 8.2×10^{15} ohm-cm
Dielectric Constant	ASTM D150-98	3 - 3.2
Dissipation Factor	ASTM D150-98	.0026 - .0027
Dielectric Strength	ASTM D149-09, Method A	110 - 290 V/mil

OTHER[2]	TEST METHOD	VALUE
Specific Gravity	ASTM D792	1.34
Rockwell Hardness	ASTM D785	---
Oxygen Index	ASTM D2863	0.49
OSU Total Heat Release (2 min test, .060" thick)	FAR 25.853	16 kW min/m²
Outgassing		
Total Mass Loss (TML)	ASTM E595	0.41% (1.00% maximum)
Collected Volatile Condensable Material (CVCM)	ASTM E595	0.1% (0.10% maximum)
Water Vapor Recovered (WVR)	ASTM E595	0.37% (report)
Fungus Resistance (Method 508.6)	MIL-STD-810G	Passed
Burn Testing		
Horizontal Burn (15 sec)	14 CFR/FAR 25.853	Passed (0.060" thick)
Vertical Burn (60 sec)	14 CFR/FAR 25.853	Passed (0.060" thick)
Vertical Burn (12 sec)	14 CFR/FAR 25.853	Passed (0.060" thick)
45° Ignition	14 CFR/FAR 25.853	Passed (0.060" thick)
Heat Release	14 CFR/FAR 25.853	Passed (0.060" thick)
NBS Smoke Density (flaming)	ASTM F814/E662	Passed (0.060" thick)
NBS Smoke Density (non-flaming)	ASTM F814/E662	Passed (0.060" thick)

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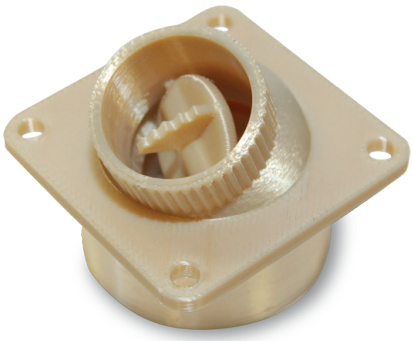


Coefficient of Variance

TENSILE MODULUS	ULTIMATE TENSILE STRENGTH	TENSILE MODULUS	ULTIMATE TENSILE STRENGTH
XY Orientation		*ZX Orientation*	
2.51%	3.37%	1.84%	2.13%

SYSTEM AVAILABILITY	LAYER THICKNESS CAPABILITY	SUPPORT STRUCTURE	AVAILABLE COLORS
Fortus 900mc™	0.010 inch (0.254 mm)	Breakaway	Tan (Natural)

Certified ULTEM 9085 is supported by an extensive set of multi batch (3), multi-location (5), and multi-machine (2) mechanical and physical property databases. Data is available from Stratasys upon request.

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.

The information presented in this document 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, color, etc. Actual values will vary with build conditions. Test specimens were built on the Fortus 900mc @ 0.010" (0.254 mm) slice using NCAMP specification configured parameter. Product specifications are subject to change without notice.

[1]Build orientation is on side long edge.

[2]Literature value unless otherwise noted.

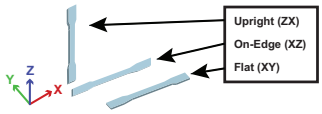
[3]Due to amorphous nature, material does not display a melting point.

[4]All Electrical Property values were generated from the average of test plaques built with default part density (solid). Test plaques were 4.0 x 4.0 x 0.1 inches (102 x 102 x 2.5 mm) and were built both in the flat and vertical orientation. The range of values is mostly the result of the difference in properties of test plaques built in the flat vs. vertical orientation.

XZ = X or "on edge"

XY = Y or "flat"

ZX = or "upright"



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HEADQUARTERS

7665 Commerce Way, Eden Prairie, MN 55344
+1 888 480-3548 (US Toll Free)
+1 952 937-3000 (Intl)
+1 952 937-0070 (Fax)

1 Holtzman St., Science Park, PO Box 2496
Rehovot 76124, Israel
+972 74 745-4000
+972 74 745-5000 (Fax)