

# Certified ULTEM 9085 Resin



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 resin 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	Test Method	XY Orientation	XZ Orientation	ZX Orientation	ZX-45 Orientation
Tensile Strength, Ultimate (Type 1, 0.130")	ASTM D638	67 MPa (9,700psi)	77 MPa (11,200 psi)	59 MPa (8,500 psi)	55 MPa (8,000 psi)
Tensile Strength, 0.2% offset yield (Type 1, 0.130")	ASTM D638	38 MPa (5,500 psi)	45 MPa (6,500 psi)	38 MPa (5,500 psi)	37 MPa (5,400 psi)
Tensile Modulus (Type 1, 0.130")	ASTM D638	2.32 GPa (337 ksi)	2.6 GPa (377 ksi)	2.4 GPa (347 ksi)	2.35 GPa (341 ksi)
Tensile Elongation at Break (Type 1, 0.130")	ASTM D638	7.00%	6.21%	3.63%	3.16%
Flexural Strength	ASTM D790	115 MPa (16,700 psi)	130 MPa (18,900 psi)	83 MPa (12,100 psi)	84 MPa (12,200 psi)
Flexural Strength 0.2% Offset	ASTM D790	85 MPa (12,300psi)	98 MPa (14,200psi)	79 MPa (11,400 psi)	75 MPa (10,900 psi)
Flexural Modulus	ASTM D790	2.4 GPa (354 ksi)	2.6 GPa (380.5 ksi)	2.3 GPa (328.5 ksi)	2.2 GPa (314 ksi)
Compressive Strength Yield (modified type 6.7.2)	ASTM D695	54 MPa (7,800 psi)	75 MPa (10,800 psi)	57 MPa (8,300 psi)	56.5 MPa (8,200 psi)
Compressive Modulus (modified type 6.7.2)	ASTM D695	2.7 GPa (394 ksi)	3.1 GPa (448 ksi)	2.8 GPa (403 ksi)	2.65 GPa (384 ksi)
Shear Strength (V-notch In-Plane Shear)	ASTM D5379	50 MPa (7,200 psi)			
Shear Modulus	ASTM D5379	0.9 GPa (131 ksi)			
OHT Strength	ASTM D5766	45 MPa (6,550 psi)	61 MPa (8,900 psi)	29 MPa (4,200 psi)	34.5 MPa (5,000 psi)
OHT Modulus	ASTM D5766	1.95 GPa (285 ksi)	2.4 GPa (343 ksi)	2.1 GPa (310 ksi)	2.1 GPa (300 ksi)
FHT Strength	ASTM D6742	52 MPa (7,500 psi)	69 MPa (10,000 psi)	50 MPa (7,300 psi)	46 MPa (6,700 psi)
FHT Modulus	ASTM D6742	2.4 GPa (343 ksi)	2.83 GPa (411 ksi)	2.6 GPa (376 ksi)	2.4 GPa (343 ksi)
FHC Strength	ASTM D6742	45 MPa (6,500 psi)	72 MPa (10,400 psi)	63 MPa (9,100 psi)	48 MPa (7,000 psi)
FHC Modulus	ASTM D6742	2.4 GPa (346 ksi)	2.8 GPa (400 ksi)	2.55 GPa (370 ksi)	2.6 GPa (373 ksi)
Single Shear Bearing	ASTM D5961	204 MPa (29,600 psi)	196 MPa (28,450 psi)	189 MPa (27,350 psi)	158 MPa (22,850 psi)
IZOD Impact un-notched	ASTM D256	95 J/m (1.8 ft-lb/in)	74 J/m (1.4 ft-lb/in)	69 J/m (1.3 ft-lb/in)	79 J/m (1.5 ft-lb/in)

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Thermal Properties	Test Method	Value
Heat Deflection (HDT) @ 264 psi, 0.125"	ASTM D648	153 °C (307 °F)
Glass Transition Temperature (Tg)	ASTM D7426-08	186 °C (367 °F)
Coefficient of Thermal Expansion	ASTM E831	65.27 µm/(m·°C) (36.7 µin/(in·°F))

Electrical Properties <sup>1</sup>	Test Method	Value Range
Volume Resistivity	ASTM D257	4.9 x10 <sup>15</sup> - 8.2x10 <sup>15</sup> ohm-cm
Dielectric Constant	ASTM D150-98	3.0 - 3.2
Dissipation Factor	ASTM D150-98	0.0026 - 0.0027
Dielectric Strength	ASTM D149-09, Method A	110 - 290 V/mil

Outgassing	Test Method	Value
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)

Burn Testing	Test Method	Value
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)
Fire Protection of Railway Vehicles <sup>2</sup>	EN-45545-2, R2	Certified, H1/H2/H3


Other	Test Method	Value
Specific Gravity	ASTM D792	1.34
Oxygen Index	ASTM D2863	0.49
OSU Total Heat Release (2 min test, .060" thick)	FAR 25.853	16 kW min/m <sup>2</sup>
Fungus Resistance	MIL-STD-810G; Method 508.6	Passed

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## Coefficient of Variance

	XY Orientation	ZX Orientation
Tensile Modulus	2.51%	1.84%
Ultimate Tensile Strength	3.37%	2.13%

System Availability	Layer Thickness Capability	Support Structure	Available Colors
Stratasys F900mc™	0.010 inch (0.254 mm)	Breakaway	 Tan (Natural)

Data contained in this data sheet only applies to certified ULTEM 9085 resin printed on an AICS Fortus 900mc or Fortus Pro 900 system using a T16A tip. Certified ULTEM 9085 resin 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 AICS Fortus 900mc @ 0.010" (0.254 mm) slice using NCAMP specification configured parameter. Product specifications are subject to change without notice.

<sup>1</sup>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.

<sup>2</sup> Only for Certified ULTEM 9085 resin Tan

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