

# ProtoTherm™ 12120

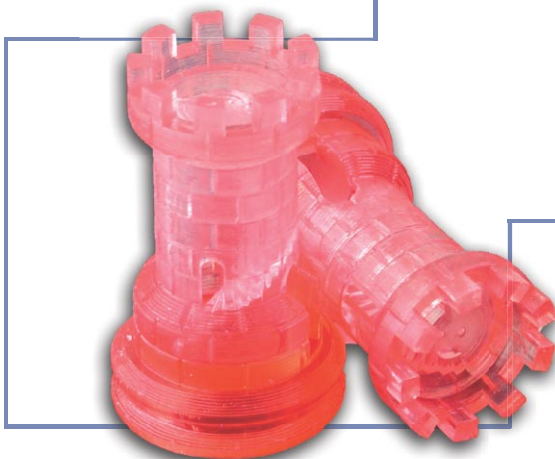
Strong, high-temperature, water-resistant resin for stereolithography  
For Solid State (355 nm) Laser Systems

## Description

DSM Somos® 12120 is a liquid photopolymer that produces strong, high temperature tolerant, water-resistant parts. Parts created with Somos® 12120 have a cherry-red appearance which turns to an orange-red color after thermal treatment.

## Application

Somos® 12120 differentiates itself from other high temperature stereolithography materials by increasing in tensile strength and maintaining decent elongation at break after thermal treatment. This makes the material ideal for many applications in the automotive and aerospace markets where strong parts that can resist high temperatures are needed.



## Physical Properties – Liquid

Viscosity ~550 cps at 30°C  
Density ~1.15 g/cm<sup>3</sup> at 25°C

## Optical Properties at 355 nm

$E_c$  11.8 mJ/cm<sup>2</sup>  
[critical exposure]  
 $D_p$  0.15 mm (~.0060 inch)  
[slope of cure-depth vs. ln(E) curve]  
 $E_{10}$  63 mJ/cm<sup>2</sup>  
[exposure that gives 0.254 mm (.010 inch) thickness]



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# Mechanical Properties (Metric)

ASTM Method	Description	12120 UV Postcure	10% Glass Filled Polycarbonate*	12120 Thermal Postcure
D638M	Tensile Strength	70.2 MPa	55 - 85 MPa	77.0 MPa
	Elongation at Break	4.00 %	2 - 14%	4.50 %
	Elongation at Yield	N/A	4%	N/A
	Modulus of Elasticity	3,520 MPa	3,102 - 5,302 MPa	3,250 MPa
D790M	Flexural Strength	109 MPa	93 - 124 MPa	103 MPa
	Flexural Modulus	3,320 MPa	2,300-5,300 MPa	3,060 MPa
D256A	Izod Impact-Notched	0.115 J/cm	0.5 - 3.0 J/cm	0.168 J/cm
D2240	Hardness (Shore D)	85.30	N/A	86.70
D570-98	Water Absorption	0.37 %	0.1 - 0.3%	0.24 %

\* <http://www.matweb.com>

N/A: Not Available

# Thermal & Electrical Properties (Metric)

ASTM Method	Description	12120 UV Postcure	10% Glass Filled Polycarbonate*	12120 Thermal Postcure
E831-00	C.T.E. -40°C – 0°C	58.1 $\mu\text{m}/\text{m}\cdot\text{°C}$	N/A	56.7 $\mu\text{m}/\text{m}\cdot\text{°C}$
	C.T.E. 0°C – 50°C	80.7 $\mu\text{m}/\text{m}\cdot\text{°C}$	N/A	66.3 $\mu\text{m}/\text{m}\cdot\text{°C}$
	C.T.E. 50°C – 100°C	111.4 $\mu\text{m}/\text{m}\cdot\text{°C}$	N/A	92.7 $\mu\text{m}/\text{m}\cdot\text{°C}$
	C.T.E. 100°C – 150°C	136.1 $\mu\text{m}/\text{m}\cdot\text{°C}$	N/A	158.7 $\mu\text{m}/\text{m}\cdot\text{°C}$
D150-98	Dielectric Constant 60Hz	4.14	N/A	3.89
	Dielectric Constant 1KHz	4.04	N/A	3.84
	Dielectric Constant 1MHz	3.81	N/A	3.53
D149-97a	Dielectric Strength	15.5 kV/mm	18.0 kV/mm	16.4 kV/mm
E1545-00	T <sub>g</sub>	74 °C	150 °C	111 °C
D648-98c	HDT @ 0.46 MPa	56.5 °C	128 - 146 °C	126.2 °C
	HDT @ 1.81 MPa	51.9 °C	110 - 143 °C	110.7 °C

\* <http://www.matweb.com>

N/A: Not Available

# Mechanical Properties (Imperial)

ASTM Method	Description	12120 UV Postcure	10% Glass Filled Polycarbonate*	12120 Thermal Postcure
D638M	Tensile Strength	10,200 psi	7,980 - 12,300 psi	11,200 psi
	Elongation at Break	4.0 %	2 - 14 %	4.5 %
	Elongation at Yield	N/A	4 %	N/A
	Modulus of Elasticity	511,000 psi	450,000 - 769,000 psi	471,000 psi
D790M	Flexural Strength	15,800 psi	13,500 - 18,000 psi	15,000 psi
	Flexural Modulus	482,000 psi	334,000 - 769,000 psi	444,000 psi
D256A	Izod Impact-Notched	0.215 ft lb/in	0.937 - 5.620 ft lb/in	0.315 ft lb/in
D2240	Hardness (Shore D)	85.3	N/A	86.7
D570-98	Water Absorption	0.37 %	0.1 - 0.3%	0.24 %

\* <http://www.matweb.com>

N/A: Not Available

# Thermal & Electrical Properties (Imperial)

ASTM Method	Description	12120 UV Postcure	10% Glass Filled Polycarbonate*	12120 Thermal Postcure
E831-00	C.T.E. -40°F – 32°F	32 $\mu$ in/in-°F	N/A	32 $\mu$ in/in-°F
	C.T.E. 32°F – 122°F	45 $\mu$ in/in-°F	N/A	37 $\mu$ in/in-°F
	C.T.E. 122°F – 212°F	62 $\mu$ in/in-°F	N/A	52 $\mu$ in/in-°F
	C.T.E. 212°F – 302°F	76 $\mu$ in/in-°F	N/A	88 $\mu$ in/in-°F
D150-98	Dielectric Constant 60Hz	4.14	N/A	3.89
	Dielectric Constant 1KHz	4.04	N/A	3.84
	Dielectric Constant 1MHz	3.81	N/A	3.53
D149-97a	Dielectric Strength	394 V/mil	457 V/mil	417 V/mil
E1545-00	T <sub>g</sub>	165 °F	302 °F	232 °F
D648-98c	HDT @ 66 psi	134 °F	255-300 °F	259 °F
	HDT @ 264 psi	125 °F	230-289 °F	231 °F

\* <http://www.matweb.com>

N/A: Not Available