

# WaterClear™ 10100

Optically Clear, Rigid, Durable Epoxy Resin For Stereolithography  
For Argon ion (351 nm) Laser Systems

*The Somos® WaterClear™ series of resins have allowed us to increase the quality and range of projects we can offer our clients. The aesthetic appeal of the parts as well as the excellent mechanical properties make it a favorite among our customers.*

*Mike Durham,  
General Manager,  
Accelerated Technologies Inc.*

## Description

DSM Somos® 10100 is a high-speed liquid photo polymer that produces strong, rigid, and durable parts with optical clarity using stereolithography machines. This material is especially useful in applications requiring optical clarity such as fluid flow analysis, stress analysis and light pipes. Other applications include those that require a strong and durable product without the brittleness normally associated with a rigid stereolithography resin.

## Application

Somos® 10100 Photopolymer is used in the solid imaging process to build three-dimensional parts. Somos® 10100 requires a minimal post-cure by UV fluorescent light. Prolonged exposure to UV light will create a yellow tinge to the parts.



## Physical Properties – Liquid

Appearance      Optically clear  
Viscosity              ~130 cps at 30°C  
Density                ~1.12 g/cm<sup>3</sup> at 25°C

## Optical Properties at 351 nm

$E_c$               8.1 mJ/cm<sup>2</sup>  
                    [critical exposure]  
 $D_p$               0.14 mm (0.0055 inch)  
                    [slope of cure-depth vs. ln(E) curve]  
 $E_{10}$              50 mJ/cm<sup>2</sup>  
                    [exposure that gives 0.254 mm (.010 inch) thickness]

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# Mechanical Properties (Metric)

ASTM Method	Description	WaterClear™ 10100	ABS* (transparent)	Polycarbonate* (optical grade)	Nylon 66*
D638M	Tensile Strength	35 MPa	45.7 MPa	62.5 MPa	63.6 MPa
	Elongation at Break	23 %	41.6 %	110 %	82.8 %
	Elongation at Yield	4.1 %	N/A	6 %	10.7 %
	Modulus of Elasticity	1,960 MPa	2,000 MPa	2,300 MPa	2,100 MPa
D790M	Flexural Strength	70.5 MPa	73.5 MPa	94.2 MPa	88.4 MPa
	Flexural Modulus	2,250 MPa	2,300 MPa	2,300 MPa	2,400 MPa
D256A	Izod Impact-Notched	0.345 J/cm	1.6 J/cm	7.1 J/cm	1.5 J/cm
D542	Index of Refraction	1.51	1.52	1.59	NA
D2240	Hardness (Shore D)	81	N/A	N/A	N/A
D1004	Graves Tear	349 kg	N/A	N/A	N/A
D570-98	Water Absorption	0.85 %	0.20 – 0.45 %	0.17 %	2.3 %
D638M	Poisson's Ratio	0.42			

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

N/A: Not Available

# Thermal & Electrical Properties (Metric)

ASTM Method	Description	WaterClear™ 10100	ABS* (transparent)	Polycarbonate* (optical grade)	Nylon 66*
E831-00	C.T.E. -40°C – 0°C	72 µm/m-°C			
	C.T.E. 0°C – 50°C	101 µm/m-°C	60 – 130 µm/m-°C (no temp range given)	66 µm/m-°C (no temp range given)	80 µm/m-°C (no temp range given)
	C.T.E. 50°C – 100°C	148 µm/m-°C			
	C.T.E. 100°C – 150°C	179 µm/m-°C			
D150-98	Dielectric Constant 60Hz	4.1			
	Dielectric Constant 1KHz	3.9			
	Dielectric Constant 1MHz	3.6	3.7	3	3.5 – 3.8
D149-97a	Dielectric Strength	14.8 kV/mm	13.8 – 19.7 kV/mm	26.4 kV/mm	95.7 kV/mm
E1545-00	Tg	37 °C		150 °C	
D648-98c	HDT @ 0.455 MPa	52.9 °C	94 – 207 °C	130 °C	210 °C
	HDT @ 1.82 MPa	45.7 °C	86.4 – 194 °C	130 °C	80.5 °C

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

N/A: Not Available

# Mechanical Properties (Imperial)

ASTM Method	Description	WaterClear™ 10100	ABS* (transparent)	Polycarbonate* (optical grade)	Nylon 66*
D638M	Tensile Strength	5,076 psi	6,628 psi	9,065 psi	9,224 psi
	Elongation at Break	32 %	41.6 %	110 %	82.8 %
	Elongation at Yield	4.2 %	N/A	6 %	10.7 %
	Modulus of Elasticity	284,274 psi	290,000 psi	334,000 psi	305,000 psi
D790M	Flexural Strength	10,225 psi	10,660 psi	13,663 psi	12,821 psi
	Flexural Modulus	326,336 psi	334,000 psi	334,000 psi	348,000 psi
D256A	Izod Impact-Notched	0.648 ft-lb/in	1.5 – 2.0 ft-lb/in	13 ft-lb/in	2.8 ft-lb/in
D542	Index of Refraction	1.51	1.52	1.59	N/A
D2240	Hardness (Shore D)	81	N/A	N/A	N/A
D1004	Graves Tear	769 lb	N/A	N/A	N/A
D570-98	Water Absorption	0.85 %	0.20 – 0.45 %	0.17 %	2.3 %
D638M	Poisson's Ratio	0.42			

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

N/A: Not Available

# Thermal & Electrical Properties (Imperial)

ASTM Method	Description	WaterClear™ 10100	ABS (transparent)	Polycarbonate (optical grade)	Nylon 66*
E831-00	C.T.E. -40°F – 32°F	40 $\mu\text{in/in-}^\circ\text{F}$			
	C.T.E. 32°F – 122°F	56 $\mu\text{in/in-}^\circ\text{F}$			
	C.T.E. 122°F – 212°F	82 $\mu\text{in/in-}^\circ\text{F}$	33 – 72 $\mu\text{in/in-}^\circ\text{F}$ <i>(no temp range given)</i>	37 $\mu\text{in/in-}^\circ\text{F}$ <i>(no temp range given)</i>	44 $\mu\text{in/in-}^\circ\text{F}$ <i>(no temp range given)</i>
	C.T.E. 212°F – 302°F	99 $\mu\text{in/in-}^\circ\text{F}$			
D150-98	Dielectric Constant 60Hz	4.1	3.7	3.1	
	Dielectric Constant 1KHz	3.9			
	Dielectric Constant 1MHz	3.6	3.7	3	3.5 – 3.8
D149-97a	Dielectric Strength	389 V/mil	350 – 500 V/mil	671 V/mil	1161 V/mil
E1545-00	Tg	98.6 °F (37°C)		302 °F (150°C)	
D648-98c	HDT @ 66 psi	127 °F (52.9°C)	201 – 405 °F (94-207°C)	266 °F (130°C)	410 °F (210°C)
	HDT @ 264 psi	114 °F (45.7°C)	187 – 381 °F (86-194°C)	266 °F (130°C)	177 °F (80.5°C)

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N/A: Not Available