

WaterClear™ 10110

Optically Clear, Rigid, Durable Epoxy Resin For Stereolithography
For Helium Cadmium (325 nm) Lasers

"We've been using DSM Somos® products for over six years now, and Somos® 10110 continues the tradition of bringing new applications for stereolithography which allows us to gain new clients."

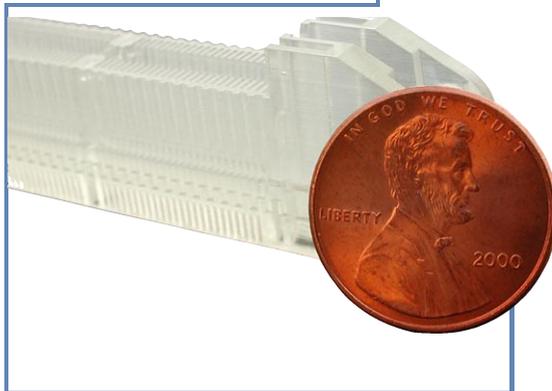
*David Yarnell
RP Manager
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Description

DSM Somos® 10110 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® 10110 Photopolymer is used in the solid imaging process to build three-dimensional parts. Somos® 10110 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/cm³ at 25°C

Optical Properties at 325 nm

E_c 9.0 mJ/cm²
 [*critical exposure*]
 D_p 0.15 mm (0.00575 inch)
 [*slope of cure-depth vs. ln(E) curve*]
 E_{10} 51 mJ/cm²
 [*exposure that gives 0.254 mm (.010 inch) thickness*]



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Mechanical Properties (Metric)

ASTM Method	Description	WaterClear™ 10110	ABS* (transparent)	Polycarbonate* (optical grade)	Nylon 66*
D638M	Tensile Strength	43.4 MPa	45.7 MPa	62.5 MPa	63.6 MPa
	Elongation at Break	37 %	41.6 %	110 %	82.8 %
	Elongation at Yield	4.2 %	N/A	6 %	10.7 %
	Modulus of Elasticity	2,040 MPa	2,000 MPa	2,300 MPa	2,100 MPa
D790M	Flexural Strength	57.7 MPa	73.5 MPa	94.2 MPa	88.4 MPa
	Flexural Modulus	1,720 MPa	2,300 MPa	2,300 MPa	2,400 MPa
D256A	Izod Impact-Notched	0.45 J/cm	1.6 J/cm	7.1 J/cm	1.5 J/cm
D542-00	Index of Refraction	1.51	1.52	1.59	N/A
D2240	Hardness (Shore D)	83	N/A	N/A	N/A
D1004	Grave's Tear	343 Kg	N/A	N/A	N/A
D570-98	Water Absorbtion	0.98 %	0.20 - 0.45 %	0.17 %	2.3 %
D638M	Poisson's Ratio	0.36			

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

N/A: Not Available

Thermal & Electrical Properties (Metric)

ASTM Method	Description	WaterClear™ 10110	ABS* (transparent)	Polycarbonate* (optical grade)	Nylon 66*
E831-00	C.T.E. -40°C ⁻¹ – 0°C ⁻¹	75.9 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. 0°C ⁻¹ – 50°C ⁻¹	109.2 μm/m-°C			
	C.T.E. 50°C ⁻¹ – 100°C ⁻¹	161 μm/m-°C			
	C.T.E. 100°C ⁻¹ – 150°C ⁻¹	183 μm/m-°C			
D150-98	Dielectric Constant 60Hz	3.9	3.7	3.1	
	Dielectric Constant 1KHz	3.8			
	Dielectric Constant 1MHz	3.5	3.7	3	3.5 – 3.8
D149-97a	Dielectric Strength	15.3 kV/mm	13.8 – 19.7 kV/mm	26.4 kV/mm	95.7 kV/mm
E1545-00	Tg	41 °C		150 °C	
D648-98c	HDT @ 0.455 MPa	51.2 °C (124 °F)	94 – 207 °C	130 °C	210 °C
	HDT @ 1.82 MPa	44.9 °C (113 °F)	86.4 – 194 °C	130 °C	80.5 °C

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

N/A: Not Available

Mechanical Properties (Imperial)

ASTM Method	Description	WaterClear™ 10110	ABS* (transparent)	Polycarbonate* (optical grade)	Nylon 66*
D638M	Tensile Strength	6,295 psi	6,628 psi	9,065 psi	9,224 psi
	Elongation at Break	37 %	41.6 %	110 %	82.8 %
	Elongation at Yield	4.2 %	N/A	6 %	10.7 %
	Modulus of Elasticity	295,877 psi	290,000 psi	334,000 psi	305,000 psi
D790M	Flexural Strength	8,369 psi	10,660 psi	13,663 psi	12,821 psi
	Flexural Modulus	249,500 psi	334,000 psi	334,000 psi	348,000 psi
D256A	Izod Impact-Notched	0.85 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)	83	N/A	N/A	N/A
D1004	Graves Tear	758 lb	N/A	N/A	N/A
D638M	Water Absorbtion	0.98 %	0.20 - 0.45 %	0.17 %	0.23 %
D570-98	Poisson's Ratio	0.36			

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

N/A: Not Available

Thermal & Electrical Properties (Imperial)

ASTM Method	Description	WaterClear™ 10110	ABS (transparent)	Polycarbonate (optical grade)	Nylon 66*
E831-00	C.T.E. -40°F – 32°F	42 $\mu\text{in/in-}^\circ\text{F}$			
	C.T.E. 32°F – 122°F	61 $\mu\text{in/in-}^\circ\text{F}$			
	C.T.E. 122°F – 212°F	89 $\mu\text{in/in-}^\circ\text{F}$	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	102 $\mu\text{in/in-}^\circ\text{F}$			
D150-98	Dielectric Constant 60Hz	3.9	3.7	3.1	
	Dielectric Constant 1KHz	3.8			
	Dielectric Constant 1MHz	3.5	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	106 °F (41°C)		302 °F (150°C)	
D648-98c	HDT @ 66 psi	124 °F (51.2°C)	201 – 405 °F (94-207°C)	266 °F (130°C)	410 °F (210°C)
	HDT @ 264 psi	113 °F (44.9°C)	187 – 381 °F (86-194°C)	266 °F (130°C)	177 °F (80.5°C)

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N/A: Not Available