

ProtoTool™ 20L

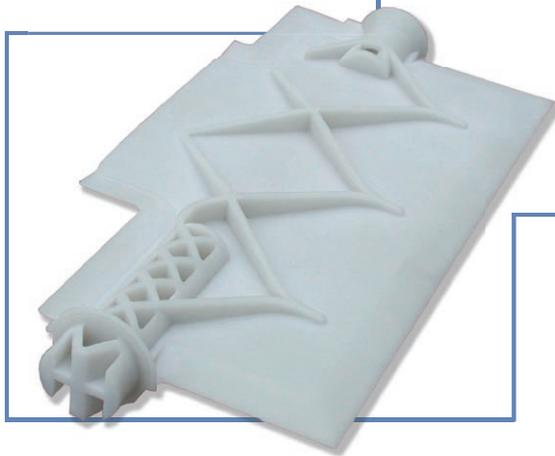
Strong, stiff, high temperature composite resin for stereolithography

Description

DSM Somos® ProtoTool™ 20L is a filled liquid material that produces strong, stiff, high temperature resistant, composite parts on conventional stereolithography machines. Parts created with Somos® ProtoTool™ 20L have an opaque gray appearance.

Application

Somos® ProtoTool™ 20L is the first composite-producing liquid resin for conventional stereolithography machines. It is ideal for applications requiring superior stiffness and strength and a high heat deflection temperature. Current applications include automotive components, wind tunnel test parts, light reflectors, pump housings, pump impellers, and injection molds.



Physical Properties – Liquid

Appearance	Opaque beige
Viscosity	~2500 cps at 30°C
Density	~1.6 g/cm ³ at 25°C

Optical Properties at 355 nm

E_c	12.5 mJ/cm ² <small>[critical exposure]</small>
D_p	0.15 mm (~0.006 inch) <small>[slope of cure-depth vs. ln(E) curve]</small>
E_{10}	66 mJ/cm ² <small>[exposure that gives 0.254 mm (.010 inch) thickness]</small>



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Mechanical Properties (Metric)

ASTM Method	Description	ProtoTool™ 20L UV Postcure
D638M	Tensile Strength	72 - 79 MPa
	Elongation at Break	1.2 - 1.3 %
	Poisson's Ratio	0.31
	Modulus of Elasticity	10,100 - 11,200 MPa
D790M	Flexural Strength	118 - 123 MPa
	Flexural Modulus	9,240 - 9,600 MPa
D256A	Izod Impact-Notched	13.3 - 13.7 J/m
D695-02a	Maximum Compressive Strength	153 Mpa
	Compressive Modulus	10,130 Mpa
DI004	Hardness (Shore D)	92.9 - 94.7
D570-98	Water Absorption	0.24 - 0.30 %

T_g = Glass Transition Temperature
HDT = Deflection Temperature

Thermal & Electrical Properties (Metric)

ASTM Method	Description	ProtoTool™ 20L UV Postcure
E831-00	C.T.E. -40°C – 0°C	28 - 30 µm/m-°C
	C.T.E. 0°C – 50°C	37 - 40 µm/m-°C
	C.T.E. 50°C – 100°C	74 - 79 µm/m-°C
	C.T.E. 100°C – 150°C	81 - 91 µm/m-°C
DI50-98	Dielectric Constant 60Hz	4.5
	Dielectric Constant 1KHz	4.2
	Dielectric Constant 1MHz	3.7 - 3.8
DI49-97a	Dielectric Strength	16.5 - 17.4 kV/mm
E1545-00	T _g	49 °C
D648-98c	HDT @ 0.46 MPa	257 - 259 °C
	HDT @ 1.81 MPa	83 - 94 °C

T_g = Glass Transition Temperature
HDT = Deflection Temperature

Mechanical Properties (Imperial)

ASTM Method	Description	ProtoTool™ 20L UV Postcure
D638M	Tensile Strength	10,400 - 11,400 psi
	Elongation at Break	1.2 - 1.3 %
	Poisson's Ratio	0.31
	Modulus of Elasticity	1,464,900 - 1,624,400 psi
D790M	Flexural Strength	17,100 - 17,800 psi
	Flexural Modulus	1,340,200 - 1,392,400 psi
D256A	Izod Impact-Notched	0.3 ft lb/in
D695-02a	Maximum Compressive Strength	22,200 psi
	Compressive Modulus	1,470,000 psi
D1004	Hardness (Shore D)	92.9 - 94.7
D570-98	Water Absorption	0.24 - 0.30 %

T_g = Glass Transition Temperature
HDT = Deflection Temperature

Thermal & Electrical Properties (Imperial)

ASTM Method	Description	ProtoTool™ 20L UV Postcure
E831-00	C.T.E. -40°F – 32°F	16 - 17 µin/in-°F
	C.T.E. 32°F – 122°F	21 - 22 µin/in-°F
	C.T.E. 122°F – 212°F	41 - 44 µin/in-°F
	C.T.E. 212°F – 302°F	45 - 51 µin/in-°F
D150-98	Dielectric Constant 60Hz	4.5
	Dielectric Constant 1KHz	4.2
	Dielectric Constant 1MHz	3.7 - 3.8
D149-97a	Dielectric Strength	420 - 443 V/mil
E1545-00	T _g	120 °F
D648-98c	HDT @ 66 psi	495 - 498 °F
	HDT @ 264 psi	181 - 201 °F

T_g = Glass Transition Temperature
HDT = Deflection Temperature