

NanoForm™ 15120

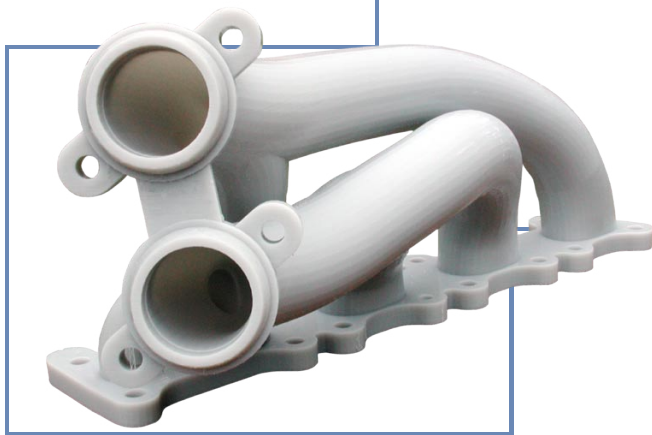
Strong, stiff, high temperature nanocomposite resin for stereolithography

Description

DSM Somos® NanoForm™ 15120 is a nanoparticle filled liquid material that produces strong, stiff, high temperature resistant, composite parts on conventional stereolithography machines. Parts created with Somos® NanoForm™ 15120 have an opaque gray appearance.

Application

Somos® NanoForm™ 15120 is a nanoparticle filled liquid suspension for use on conventional stereolithography machines. It is ideal for applications requiring superior stiffness 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

Appearance	Opaque Gray
Viscosity	~570 cps at 30°C
Density	~1.33 g/cm ³ at 25°C (liquid) ~1.38 g/cm ³ (solid)

Optical Properties at 355 nm

E _c	16.3 mJ/cm ² <small>[critical exposure]</small>
D _p	0.132 mm (~0.0052 inch) <small>[slope of cure-depth vs. ln(E) curve]</small>
E ₁₀	112 mJ/cm ² <small>[exposure that gives 0.254 mm (.010 inch) thickness]</small>

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Mechanical Properties (Metric)

ASTM Method	Description	NanoForm™ 15120 UV Postcure	NanoForm™ 15120 UV + Thermal Postcure
D638M	Tensile Strength	48 MPa	53 MPa
	Elongation at Break	2.1 %	1.2%
	Modulus of Elasticity	5,000 MPa	5,900 MPa
D790M	Flexural Strength	98 MPa	129 MPa
	Flexural Modulus	3,630 MPa	4,450 MPa
D256A	Izod Impact-Notched	0.15 J/cm	0.159 J/cm
D695-02a	Maximum Compressive Strength	137 MPa	234 MPa
	Compressive Modulus	4510 MPa	4680 MPa
D1004	Hardness (Shore D)	93	92
D570-98	Water Absorption	0.32 %	0.26 %

T_g = Glass Transition Temperature

HDT = Deflection Temperature

Thermal & Electrical Properties (Metric)

ASTM Method	Description	NanoForm™ 15120 UV Postcure	NanoForm™ 15120 UV + Thermal Postcure
E831-00	C.T.E. -40°C – 0°C	48.8 µm/m-°C	45.9 µm/m-°C
	C.T.E. 0°C – 50°C	111.9 µm/m-°C	50.9 µm/m-°C
	C.T.E. 50°C – 100°C	143.6 µm/m-°C	84.0 µm/m-°C
	C.T.E. 100°C – 150°C	106.3 µm/m-°C	128.6 µm/m-°C
	C.T.E. 150°C – 200°C	122.3 µm/m-°C	139.5 µm/m-°C
D150-98	Dielectric Constant 60Hz	4.06	3.71
	Dielectric Constant 1KHz	3.95	3.69
	Dielectric Constant 1MHz	3.73	3.49
D149-97a	Dielectric Strength	16.4 kV/mm	15.9 kV/mm
E1545-00	T _g	39 °C	80 °C
D648-98c	HDT @ 0.455 MPa	65.5 °C	269 °C
	HDT @ 1.82 MPa	52.9 °C	115 °C

T_g = Glass Transition Temperature

HDT = Deflection Temperature

The ProtoFunctional® Materials Company

Mechanical Properties (Imperial)

ASTM Method	Description	NanoForm™ 15120 UV Postcure	NanoForm™ 15120 UV + Thermal Postcure
D638M	Tensile Strength	6,900 psi	7,700 psi
	Elongation at Break	2.1 - 3.0%	1.2 - 1.5%
	Modulus of Elasticity	725,000 psi	856,000 psi
D790M	Flexural Strength	14,200 psi	18,700 MPa
	Flexural Modulus	526,000 psi	645,000 MPa
D256A	Izod Impact-Notched	0.28 ft lb/in	0.30 ft lb/in
D695-02a	Maximum Compressive Strength	19,900 psi	34,000 psi
	Compressive Modulus	654,000 psi	678,000 psi
D1004	Hardness (Shore D)	92.7	92.3
D570-98	Water Absorption	0.32%	0.26%

T_g = Glass Transition Temperature
HDT = Deflection Temperature

Thermal & Electrical Properties (Imperial)

ASTM Method	Description	NanoForm™ 15120 UV Postcure	NanoForm™ 15120 UV + Thermal Postcure
E831-00	C.T.E. -40°F – 32°F	27 µin/in-°F	26 µin/in-°F
	C.T.E. 32°F – 122°F	62 µin/in-°F	28 µin/in-°F
	C.T.E. 122°F – 212°F	80 µin/in-°F	47 µin/in-°F
	C.T.E. 212°F – 302°F	59 µin/in-°F	71 µin/in-°F
	C.T.E. 302°F – 392°F	68 µin/in-°F	78 µin/in-°F
D150-98	Dielectric Constant 60Hz	4.06	3.71
	Dielectric Constant 1KHz	3.95	3.69
	Dielectric Constant 1MHz	3.73	3.49
D149-97a	Dielectric Strength	417V/mil	404V/mil
E1545-00	T _g	102 °F	176 °F
D648-98c	HDT @ 66 psi	150 °F	517 °F
	HDT @ 264 psi	127 °F	240 °F

T_g = Glass Transition Temperature
HDT = Deflection Temperature