Product Data

# NanoTool™

a DSM Product

## Product Description

DSM Somos® NanoTool™ produces strong, stiff, high-temperature resistant composite parts on conventional stereolithography machines. This third generation of Somos ProtoComposite™ materials is heavily filled with non-crystalline nanoparticles allowing for faster processing. It exhibits superior sidewall quality, along with excellent detail resolution as compared to other composite stereolithography materials.

## Applications

NanoTool's smooth surface quality and high initial modulus make it an excellent resin for metal plating, a growing application which saves time and money as an alternative to metal prototypes. It's also ideal for creating strong, stiff parts with excellent high heat resistance, including wind tunnel models for aerospace and automotive applications. A third major application area is rapid tooling for injection molding.

NanoTool™ produces strong, stiff, high-temperature resistant composite parts for use in a wide array of applications.

### Key Product Benefits:

- High heat resistance
- Water resistant
- Extremely accurate

## Technical Data: Liquid Properties

| | |
|---|---|
| Appearance | Off White |
| Viscosity | ~2,500 cps @ 30ºC |
| Density | 1.65 g/cm$^3$ @ 25ºC |

## Technical Data: Optical Properties

| | | |
|---|---|---|
| $E_c$ | 8.3 mJ/cm$^2$ | [critical exposure] |
| $D_p$ | 4.30 mils | [slope of cure-depth vs. ln(E) curve] |
| $E_{10}$ | 84 mJ/cm$^2$ | [exposure that gives 0.254 mm (.010 inch) thickness] |

(continued)

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For technical service, please visit: http://www.dsmsomos.com

# NanoTool™

## Technical Data: Mechanical Properties

| | | NanoTool™ UV Postcure | | UV & Thermal Postcure | |
|---|---|---|---|---|---|
| **ASTM Method** | **Property Description** | **Metric** | **Imperial** | **Metric** | **Imperial** |
| D638M | Tensile Strength | 61.7 -78.0 MPa | 8.9 – 11.3 ksi | 66.3 – 80.3 MPa | 9.6 – 11.6 ksi |
| D638M | Tensile Modulus | 11,000 – 11,400 MPa | 1,590 – 1,650 ksi | 10,400 – 11,200 MPa | 1,510 – 1,620 ksi |
| D638M | Elongation at Break | 0.7 – 1.0 % | 0.7 – 1.0 % | 0.7 – 1.0 % | 0.7 – 1.0 % |
| D638M | Poisson's Ratio | 0.34 – 0.38 | 0.34 – 0.38 | 0.29 – 0.36 | 0.29 – 0.36 |
| D790M | Flexural Strength | 79 – 121 MPa | 11.5 – 17.5 ksi | 103 - 149 MPa | 14.9 – 21.6 ksi |
| D790M | Flexural Modulus | 10,200 – 10,800 MPa | 1,480 – 1,570 ksi | 9,960 – 10,200 MPa | 1,440 – 1,480 ksi |
| D2240 | Izod Impact (Notched) | 0.12 – 0.15 J/cm | 0.23 – 0.29 ft-lb/in | 0.14 – 0.16 J/cm | 0.26 – 0.31 ft-lb/in |
| D256A | Hardness (Shore D) | 94 | 93 – 95 | 94 | 93 – 94 |
| D570-98 | Water Absorption | 0.23 % | 0.23 % | 0.15 – 0.16 % | 0.15 – 0.16 % |

## Technical Data: Thermal/Electrical Properties

| | | NanoTool™ UV Postcure | | UV & Thermal Postcure | |
|---|---|---|---|---|---|
| E831-05 | C.T.E. -40ºC - 0ºC (-40ºF – 32ºF) | 25.3 – 26.0ºC | 14.1 – 14.4 µin/inºF | 25.0 – 25.7 µm/mºC | 13.9 – 14.3 µin/inºF |
| E831-05 | C.T.E. 0ºC - 50ºC (32ºF – 122ºF) | 30.4 – 32.4 µm/mºC | 16.9 – 18.0 µin/inºF | 25.5 – 31.3 µm/mºC | 14.2 – 17.4 µin/inºF |
| E831-05 | C.T.E. 50ºC - 100ºC (122ºF – 212ºF) | 75.9 – 87.4 µm/mºC | 42.2 – 48.6 µin/inºF | 57.0 – 58.9 µm/mºC | 31.7 – 32.7 µin/inºF |
| E831-05 | C.T.E. 10ºC - 150ºC (212ºF – 302ºF) | 90.0 – 95.7 µm/mºC | 50.1 – 53.2 µin/inºF | 95.2 – 99.6 µm/mºC | 52.9 – 55.3 µin/inºF |
| D150-98 | Dielectric Constant 60 Hz | 4.0 | 4.0 | 3.9 | 3.9 |
| D150-98 | Dielectric Constant 1KHz | 3.9 | 3.8 – 3.9 | 3.8 | 3.8 |
| D150-98 | Dielectric Constant 1MHz | 3.6 | 3.6 – 3.7 | 3.6 | 3.6 |
| D149-97a | Dielectric Strength | 15.6 – 16.8 kV/mm | 396 – 427 V/mil | 16.1 – 16.9 kV/mm | 408 – 428 V/mil |
| E1545-00 | Tg | 57 – 62ºC | 135 – 144ºF | 86 – 89ºC | 187 - 192ºF |
| D648 | HDT @ 0.46 MPa (66 psi) | 225ºC | 437ºF | 258 – 263ºC | 496 - 506ºF |
| D648 | HDT @ 1.82 MPa (264 psi) | 85 – 90ºC | 185 – 193ºF | 104º C | 220ºF |

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