

WaterClear® Ultra 10122

Optically Clear, Colorless, Rigid, Stereolithography Resin
For Solid State (355nm) Laser Systems

Description

DSM Somos® WaterClear Ultra 10122 is a next generation optically clear resin with ABS like properties and good temperature resistance. It produces colorless, functional, accurate parts that simulate acrylic in appearance. Based on the Oxetane Advantage™, the parts also have improved water resistance over the original WaterClear 10120 resin. WaterClear Ultra is a fast, low viscosity, general-purpose resin.

Application

Ideal for applications requiring optical clarity such as:

- Automotive lenses
- Bottles
- Fluid flow analysis
- Packaging prototypes
- Light pipes

Can also be used for concept, functional models and master patterns.



Physical Properties –

| | |
|------------|---------------------------------|
| Appearance | Optically clear, Colorless |
| Viscosity | ~165 cps at 30°C |
| Density | ~1.13 g/cm ³ at 25°C |

Optical Properties at 355 nm

| | |
|----------|--|
| E_c | ~10.0 mJ/cm ² <small>[critical exposure]</small> |
| D_p | 0.16 mm (~.0065 inch) <small>[slope of cure-depth vs. ln(E) curve]</small> |
| E_{10} | 47 mJ/cm ² <small>[exposure that gives 0.254 mm (.010 inch) thickness]</small> |

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Mechanical Properties (Metric)

| ASTM Method | Description | Somos® WaterClear® Ultra UV Postcure | Acrylic |
|-------------|---------------------|--------------------------------------|-------------------|
| D638M | Tensile Strength | 55 - 56 MPa | 47 - 79 MPa |
| | Tensile Modulus | 2,860 - 2,900 MPA | 2,200 - 3,800 MPa |
| | Elongation at Break | 6 - 9 % | 1 - 30 % |
| | Elongation at Yield | 4 % | 4 % |
| | Poisson's Ratio | 0.40 - 0.42 | 0.37 - 0.45 |
| D790M | Flexural Strength | 82 - 85 MPa | 88 - 138 MPa |
| | Flexural Modulus | 2,410 - 2,570 MPa | 3,000 - 3,500 MPa |
| D256A | Izod Impact-Notched | 0.24 - 0.26 J/cm | 0.15 J/cm |
| D2240 | Hardness (Shore D) | 86 - 87 | 63 - 97 |
| D570-98 | Water Absorption | 1.1 % | 0.3 - 2.0 % |
| D542 | Index of Refraction | 1.515 | 1.498 |

N/A: Not Available

Thermal & Electrical Properties (Metric)

| ASTM Method | Description | Somos® WaterClear® Ultra UV Postcure | Acrylic |
|-------------|--------------------------|--|---------------|
| E831-00 | C.T.E. -40°C – 0°C | 63.6 - 66.8 $\mu\text{m}/\text{m}^{\circ}\text{C}$ | |
| | C.T.E. 0°C – 50°C | 87.8 - 93.0 $\mu\text{m}/\text{m}^{\circ}\text{C}$ | |
| | C.T.E. 50°C – 100°C | 164.3 - 171.9 $\mu\text{m}/\text{m}^{\circ}\text{C}$ | |
| | C.T.E. 100°C – 150°C | 149.9 - 167.1 $\mu\text{m}/\text{m}^{\circ}\text{C}$ | |
| D150-98 | Dielectric Constant 60Hz | 3.0 - 3.2 | 4.0 |
| | Dielectric Constant 1KHz | 3.3 - 3.6 | 3.5 |
| | Dielectric Constant 1MHz | 3.0 - 3.2 | 3.0 |
| D149-97a | Dielectric Strength | 14.5 - 15.5 kV/mm | 18 - 60 kV/mm |
| E1545-00 | Tg | 42 - 46 °C | 100 - 105°C |
| D648-98c | HDT@ 0.46 MPa | 46 - 47 °C | 80 - 103°C |
| | HDT @ 1.82 MPa | 42 - 43°C | 80 - 103°C |
| | Thermal postcure | | |
| | HDT @ 0.46 MPa | 59 - 61 °C | |
| | HDT @ 1.82 MPa | 49 - 50°C | |

Mechanical Properties (Imperial)

| ASTM Method | Description | Somos® WaterClear® Ultra UV Postcure | Acrylic |
|-------------|---------------------|---|-----------------|
| D638M | Tensile Strength | 7.9 - 8.1 ksi | 6.8 - 11.5 ksi |
| | Tensile Modulus | 414 - 421 ksi | 319 - 551 ksi |
| | Elongation at Break | 6 - 8 % | 1 - 30 % |
| | Elongation at Yield | 4 % | 4 % |
| | Poisson's Ratio | 0.40 - 0.42 | 0.37 - 0.45 |
| D790M | Flexural Strength | 11.8 - 12.4 ksi | 12.8 - 20.0 ksi |
| | Flexural Modulus | 349 - 373 ksi | 435 - 508 ksi |
| D256A | Izod Impact-Notched | 0.44 - 0.48 ft-lb/in | 0.3 ft-lb/in |
| D2240 | Hardness (Shore D) | 86 - 87 | 63 - 97 |
| D570-98 | Water Absorption | 1.1 % | 0.3 - 2.0 % |
| D542 | Index of Refraction | 1.515 % | 1.498 |

N/A: Not Available

Thermal & Electrical Properties (Imperial)

| ASTM Method | Description | Somos® WaterClear® Ultra UV & Thermal Postcure | Acrylic | |
|---------------|--------------------------|---|------------------|--|
| E831-00 | C.T.E. -40°F – 32°F | 35.3 - 37.1 $\mu\text{in/in-}^\circ\text{F}$ | | |
| | C.T.E. 32°F – 122°F | 48.8 - 51.7 $\mu\text{in/in-}^\circ\text{F}$ | | |
| | C.T.E. 122°F – 212°F | 91.3 - 95.5 $\mu\text{in/in-}^\circ\text{F}$ | | |
| | C.T.E. 212°F – 302°F | 83.3 - 92.9 $\mu\text{in/in-}^\circ\text{F}$ | | |
| D150-98 | Dielectric Constant 60Hz | 3.0 - 3.2 | 4.0 | |
| | Dielectric Constant 1KHz | 3.3 - 3.6 | 3.5 | |
| | Dielectric Constant 1MHz | 3.0 - 3.2 | 3.0 | |
| D149-97a | Dielectric Strength | 367 - 393 V/mil | 456 - 1520 V/mil | |
| E1545-00 | T _g (TMA) | 108 - 115°F | 212 - 221°F | |
| D648-98c | HDT @ 66 psi | 115 - 116°F | 176 - 217°F | |
| | HDT @ 264 psi | 108 - 110°F | 176 - 217°F | |
| | Thermal postcure | | | |
| | HDT @ 66 psi | 139 - 142°F | | |
| HDT @ 264 psi | 120 - 122°F | | | |

N/A: Not Available