

## Cubic Ink® High Performance 4-1000 VP

Flame retardant material with a good balance between temperature form-stability and toughness for final part production

Liquid Properties	Value <sup>1</sup>	Unit
Viscosity @ 25 °C (DIN EN ISO 3219)	460	mPa·s
Density (DIN EN ISO 15212-1)	1.05	g/mL
Critical Energy (E <sub>c</sub> ) @405 / 385 nm	8.7 / 10.0	mJ/cm <sup>2</sup>
Depth of Penetration (D <sub>p</sub> ) @405 / 385 nm	0.60 / 0.30	mm
<b>Tensile Properties<sup>2</sup> (DIN EN ISO 527-5A)</b>		
Ultimate Tensile Strength	97	MPa
Tensile Modulus	4500	MPa
Elongation at Break	2.7	%
<b>Flexural Properties<sup>3</sup> (DIN EN ISO 178)</b>		
Flexural Strength	130	MPa
Flexural Modulus	4100	MPa
Deflection at Fracture	>3.5	%
<b>Impact Properties</b>		
Izod notched (DIN EN ISO 180)	14	J/m
Charpy notched (DIN EN ISO 179-1)	1	kJ/m <sup>2</sup>
Izod unnotched (DIN EN ISO 180)	220	J/m
Charpy unnotched (DIN EN ISO 179-1)	19	kJ/m <sup>2</sup>
<b>Hardness (DIN EN ISO 7619)</b>		
Shore Hardness	88	D

## Thermal Properties

T <sub>g</sub> (TMA) <sup>4</sup>	80	°C
HDT A (DIN EN ISO 75)	98	°C
HDT B (DIN EN ISO 75)	123	°C
CTE (-50 °C, 30 °C) (DIN EN ISO 11359-2)	53	x 10 <sup>-6</sup> K <sup>-1</sup>
CTE (70 °C, 200 °C) (DIN EN ISO 11359-2)	141	x 10 <sup>-6</sup> K <sup>-1</sup>

## Electrical Properties

Dielectric strength (IEC60243-1)	23	kV/mm
Relative Permittivity (Dielectric Constant, 20 °C, 1 MHz, IEC60250)	7.3	-
Dissipation Factor (20 °C, 1 MHz, IEC60250)	0.058	-
Volume Resistivity (IEC60093)	3.3 x 10 <sup>11</sup>	Ω·cm
Comparative Tracking Index (IEC60112)	200	V

## Flame (UL94)

Flammability, vertical (at 3.2 mm)	V-0	-
Flammability, horizontal (at 0.4 mm)	HB (FH-1)	-

## Chemical Resistance

Water Uptake, 24 h, 23 °C	2.1	%
Performance after Water Uptake, 24 h, 23 °C <sup>5</sup>	46	%

## Print Appearance/ Color

Natural color is translucent light yellow. Available in black and grey. More colors on request.

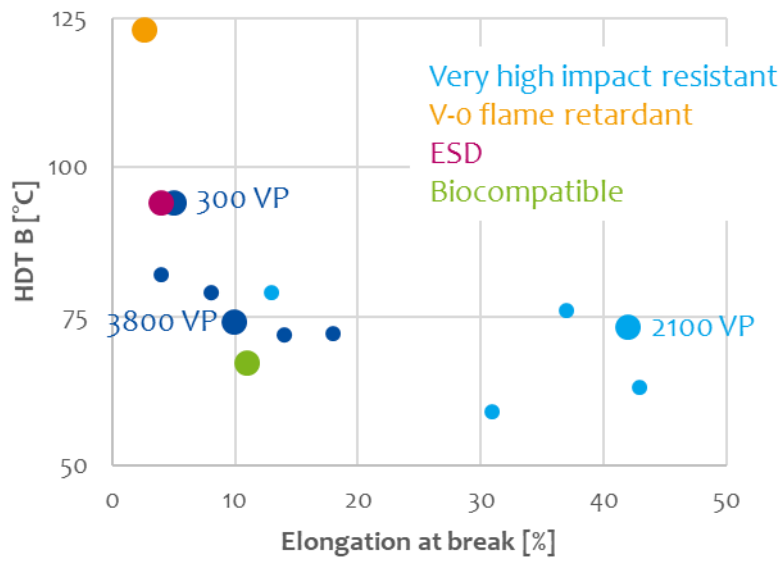
## Availability and Storage

Batch sizes starting from 1 kg.

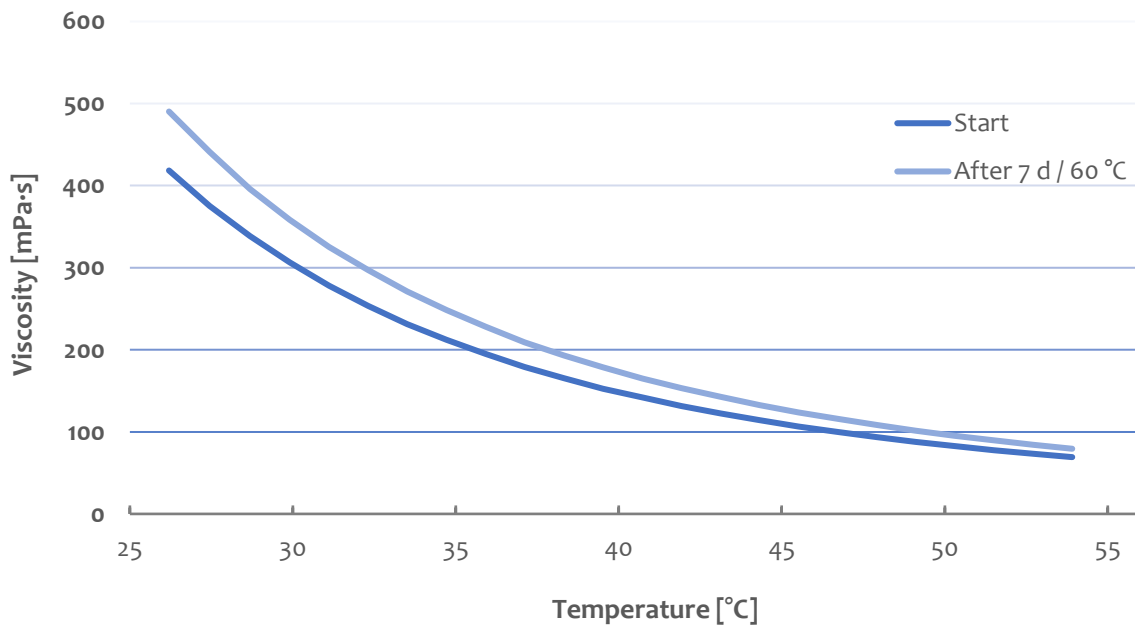
Store between 21 and 28 °C and protect from light. Stir prior to use.

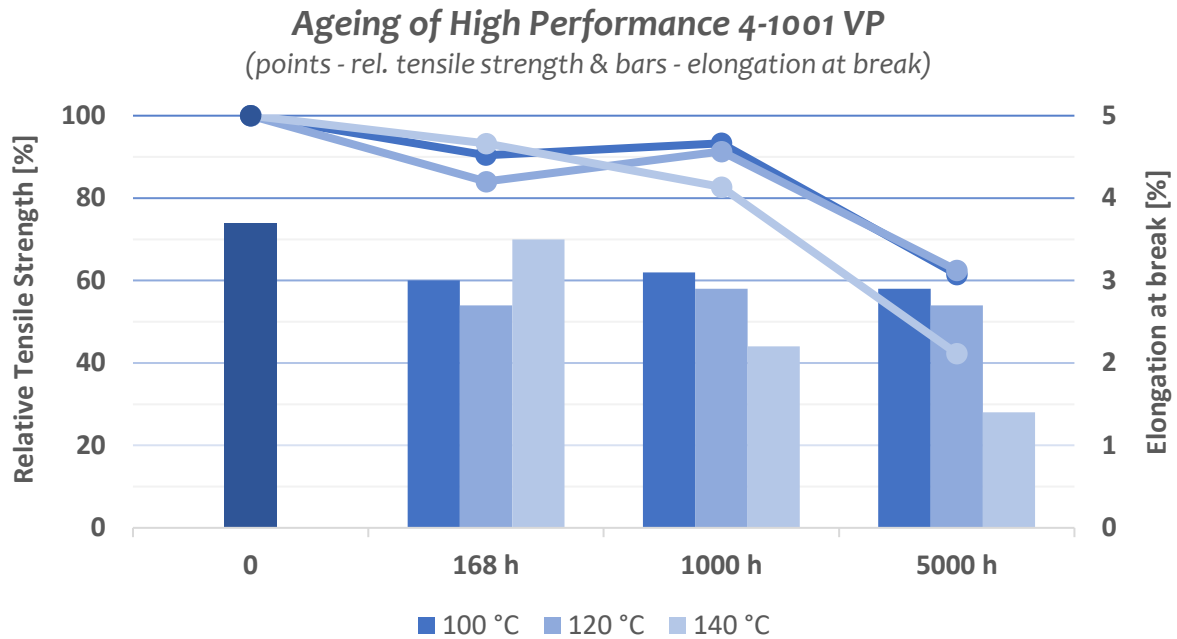
<sup>1</sup>Properties with post-processing – washed with water, UV and thermal post-cure. All material properties can vary with printer, print settings, object orientation, part geometry, post-processing and age of sample. <sup>2</sup>5 mm/min; <sup>3</sup>10 mm/min; <sup>4</sup>20 - 280 °C, 5 K/min; <sup>5</sup>Relative loss of HDT B compared to reference.

## Versatility and Customization of High Performance 4-Series



## Viscosity Profile (600 s<sup>-1</sup>) of High Performance 4-1000 VP





### Chemical Resistance

### Mass Gain [%]<sup>1</sup>

Water	2.1
Acetic Acid (5%)	2.0
Hydrochloric Acid (1%)	1.4
Nitric Acid (5%)	2.1
Sodium Hypochlorite (10%)	0.9
Hydrogen Peroxide (3%)	2.3
Sodium Hydroxide (1%)	1.0
Isopropyl Alcohol	0.2
Methanol	0.9
Butyl Glycol Acetate	0.2
Super Gasoline	0.2
Acetone	0.2
Methyl Ethyl Ketone	0.2

<sup>1</sup>Percental weight gained after 24 h submersion of printed and post-cured (washed with water, UV and thermal post-cure) 1 x 1 x 1 cm cubes.

**Cubic Ink®**  
**ACTEGA Terra GmbH**  
Mielestraße 13  
31275 Lehrte  
GERMANY

Tel +49 (0)5132 5009-600

[cubic.ink@altana.com](mailto:cubic.ink@altana.com)

[www.altana.com](http://www.altana.com)

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