

## Cubic Ink® High Performance 4-4800 VP Black

Highly impact resistant and flexible material with good toughness and scratch resistance for final part production

Liquid Properties	Value <sup>1</sup>	Unit
Viscosity @25 °C (DIN EN ISO 3219)	220	mPa·s
Density (DIN EN ISO 15212-1)	1.10	g/mL
Critical Energy (E <sub>c</sub> ) @405 / 385 nm	1.7 / 2.7	mJ/cm <sup>2</sup>
Depth of Penetration (D <sub>p</sub> ) @405 / 385 nm	0.10 / 0.11	mm
<b>Tensile Properties<sup>2</sup> (DIN EN ISO 527-5A)</b>		
Ultimate Tensile Strength	34	MPa
Yield Strength	33	MPa
Tensile Modulus	1500	MPa
Elongation at Break	30	%
<b>Flexural Properties<sup>2</sup> (DIN EN ISO 178)</b>		
Flexural Strength	38	MPa
Flexural Modulus	1200	MPa
Deflection at Fracture	>10	%
<b>Impact Properties</b>		
Izod notched (DIN EN ISO 180)	51	J/m
Charpy notched (DIN EN ISO 179-1)	6	kJ/m <sup>2</sup>
Izod unnotched (DIN EN ISO 180)	380	J/m
Charpy unnotched (DIN EN ISO 179-1)	48	kJ/m <sup>2</sup>

### Hardness (DIN EN ISO 7619)

Shore Hardness (green)	56 - 58	D
Shore Hardness	73	D

### Thermal Properties

T <sub>g</sub> (TMA) <sup>3</sup>	81	°C
HDT A (DIN EN ISO 75)	54	°C
HDT B (DIN EN ISO 75)	75	°C
CTE (-50 °C, 70 °C) (DIN EN ISO 11359-2)	113	x 10 <sup>-6</sup> K <sup>-1</sup>
CTE (100 °C, 200 °C) (DIN EN ISO 11359-2)	122	x 10 <sup>-6</sup> K <sup>-1</sup>
Specific Heat Capacity, 20 °C (DIN EN ISO 11357-4)	1.77	J/(g·K)

### Electrical Properties

Dielectric strength (IEC60243-1)	19	kV/mm
Relative Permittivity (Dielectric Constant, 22 °C, 10000 Hz, IEC60250)	6.9	-
Dissipation Factor (22 °C, 10000 Hz, IEC60250)	0.012	-
Volume Resistivity (22 °C, IEC60093)	3.1 x 10 <sup>14</sup>	Ω·cm
Comparative Tracking Index (IEC60112)	>600	V

### Chemical Resistance

Water Uptake, 168 h, 23 °C <sup>4</sup>	5.4	%
Performance after Water Uptake, 24 h, 23 °C <sup>5</sup>	7	%
Performance after Water Uptake, 0.5 h, 90 °C <sup>5</sup>	<1	%
Performance after Ethanol Uptake, 0.5 h, 23 °C <sup>5</sup>	<1	%

### Thermal Ageing<sup>6</sup>

80 °C for 1000 hours	<1	%
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### UV Ageing<sup>6,7</sup>

for 168 hours	<1	%
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### Cytotoxicity<sup>8</sup> (DIN EN ISO 10993-5)

In-vitro cytotoxicity	Passed	
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## Print Appearance/ Color

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

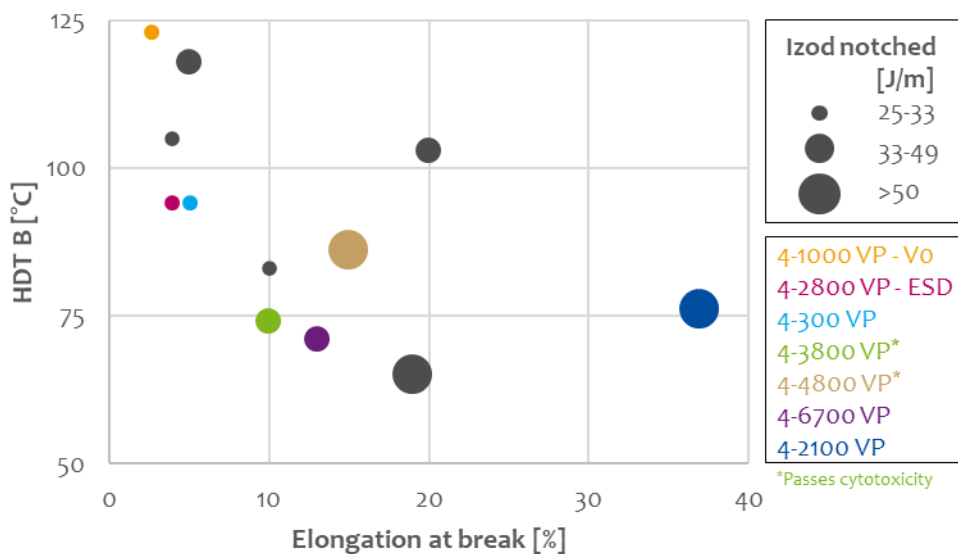
## Availability and Storage

Batch size starting from 1 kg.

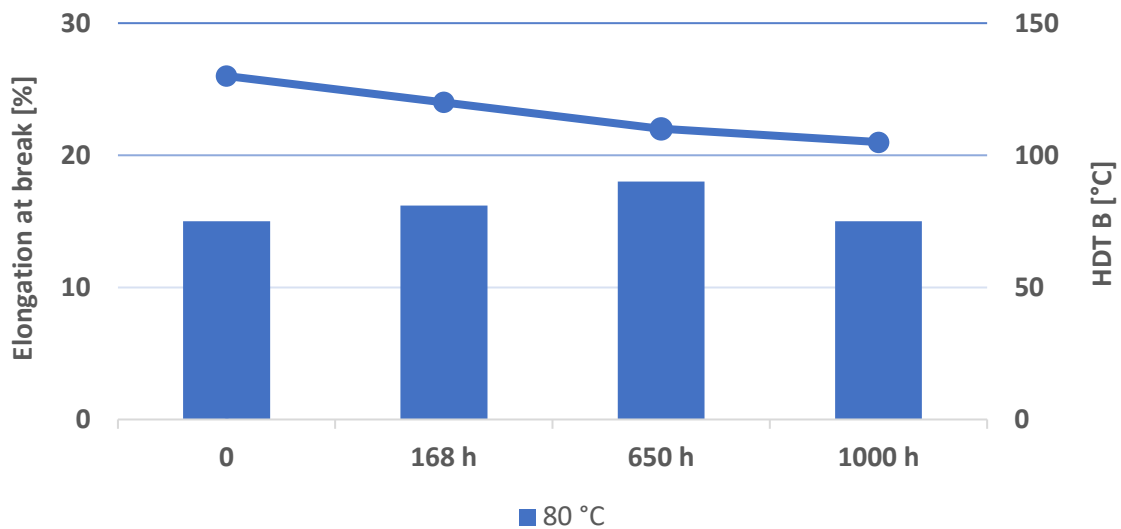
Store at room temperature between 21 and 28 °C and protect from light. Stir prior to use.

<sup>1</sup>Properties may vary with post-processing – 30 min UV-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>-60 - 200 °C, 5 K/min; <sup>4</sup>5A-specimens DIN EN ISO 527; <sup>5</sup>Relative loss of e-modulus compared to reference, DIN EN ISO 527-5A, 5 mm/min; <sup>6</sup>Relative loss of e-modulus, tensile strength and HDT B compared to reference, DIN EN ISO 527-5A, 5 mm/min and DIN EN ISO 75. <sup>7</sup>QUV weathering tester following ISO 4892-3; <sup>8</sup>Testing at 22 °C, 61% rel. humidity, duration of extraction 24 h at 37 °C following DIN EN ISO 10993-5 and -12.

Characteristics and Versatility of High Performance 4-series



**Ageing of High Performance 4-4800 VP Black**  
(points - elongation at break & bars - HDT B)



**Chemical Resistance**

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

Water	2.5
Acetic Acid (5%)	3.1
Hydrochloric Acid (1%)	2.3
Nitric Acid (5%)	3.5
Sodium Hypochlorite (10%)	1.0
Hydrogen Peroxide (3%)	2.9
Sodium Hydroxide (1%)	2.2
Isopropyl Alcohol	2.2
Methanol	13.4
Butyl Glycol Acetate	1.5
Super Gasoline	6.7
Acetone	17.7
Methyl Ethyl Ketone	17.7

<sup>1</sup>Percental weight gained after 24 h submersion of printed and post-cured (30 min UV post-cure) 1 x 1 x 1 cm<sup>3</sup> cubes.



