

## Cubic Ink® High Performance 4-3800 VP

Material with a good balance between toughness and impact resistance for final part production

Liquid Properties	Value <sup>1</sup>	Unit
Viscosity @ 25 °C (DIN EN ISO 3219)	47	mPa·s
Density (DIN EN ISO 15212-1)	1.10	g/mL
Critical Energy (E <sub>c</sub> ) @405 / 385 nm	3.6 / 4.4	mJ/cm <sup>2</sup>
Depth of Penetration (D <sub>p</sub> ) @405 / 385 nm	0.53 / 0.35	mm
<b>Tensile Properties<sup>2</sup> (DIN EN ISO 527-5A)</b>		
Ultimate Tensile Strength	49	MPa
Yield Strength	49	MPa
Tensile Modulus	2400	MPa
Elongation at Break	12	%
<b>Flexural Properties<sup>3</sup> (DIN EN ISO 178)</b>		
Flexural Strength	67	MPa
Flexural Modulus	1700	MPa
Deflection at Fracture	>10	%
<b>Impact Properties</b>		
Izod notched (DIN EN ISO 180)	34	J/m
Charpy notched (DIN EN ISO 179-1)	3.4	kJ/m <sup>2</sup>
Izod unnotched (DIN EN ISO 180)	260	J/m
<b>Hardness (DIN EN ISO 7619)</b>		
Shore Hardness (green)	68 - 75	D
Shore Hardness	81	D

### Thermal Properties

T <sub>g</sub> (DSC) <sup>4</sup>	97	°C
HDT A (DIN EN ISO 75)	48	°C
HDT B (DIN EN ISO 75)	74	°C
CTE (-50 °C, 60 °C) (DIN EN ISO 11359-2)	91	x 10 <sup>-6</sup> K <sup>-1</sup>
CTE (90 °C, 200 °C) (DIN EN ISO 11359-2)	113	x 10 <sup>-6</sup> K <sup>-1</sup>
Specific Heat Capacity, 20 °C (DIN EN ISO 11357-4)	1.65	J/(g·K)

### Electrical Properties

Dielectric strength (IEC60243-1)	22	kV/mm
Relative Permittivity (Dielectric Constant, 21 °C, 10000 Hz, IEC60250)	8.3	-
Dissipation Factor (21 °C, 10000 Hz, IEC60250)	0.016	-
Volume Resistivity (IEC60093)	5.6 x 10 <sup>14</sup>	Ω·cm
Volume Resistivity after 7 d/RT H <sub>2</sub> O (IEC60093)	2.7 x 10 <sup>11</sup>	Ω·cm
Comparative Tracking Index (IEC60112)	>600	V

### Flame (UL94)

Flammability, horizontal (at 3.2 mm)	HB	-
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### Chemical Resistance

Water Uptake, 168 h, 23 °C <sup>5</sup>	6.1	%
Performance after Water Uptake, 24 h, 23 °C <sup>6</sup>	28	%

### Thermal Ageing<sup>7</sup>

125 °C for 672 hours	<1	%
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### Ageing at -40 °C<sup>6</sup>

for 168 hours	<1	%
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### UV Ageing<sup>6,8</sup>

for 1000 hours	<1	%
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## Cytotoxicity<sup>9</sup> (DIN EN ISO 10993-5)

In-vitro cytotoxicity	On request
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## Print Appearance/ Color

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

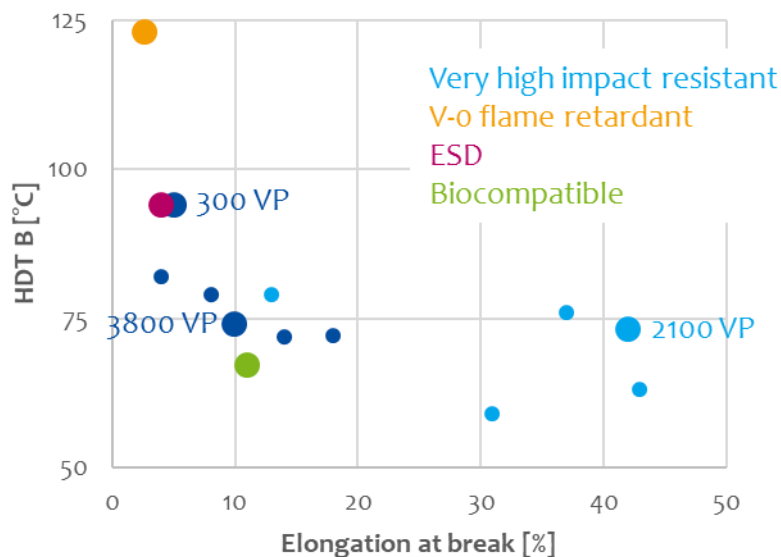
## Availability and Storage

Batch sizes starting from 1 kg.

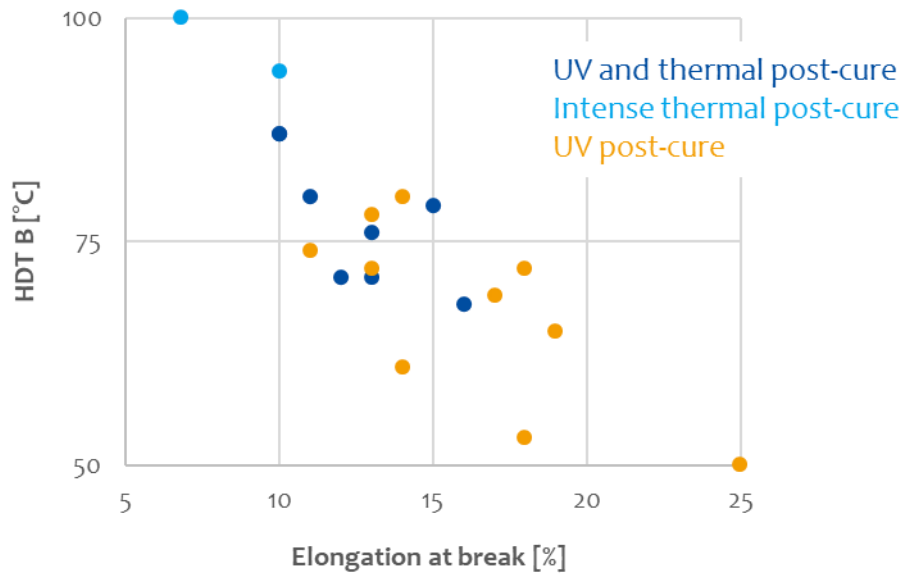
Store between 21 and 28 °C, stir before use and protect from light.

<sup>1</sup>Properties with post-processing – washed with water, UV post-treatment. 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>5 mm/min; <sup>4</sup>-20 - 200 °C, 20 K/min; <sup>5</sup>Weight loss of 5A-specimen DIN EN ISO 527; <sup>6</sup>Relative loss of tensile modulus, tensile strength, elongation at break and HDT B compared to reference; <sup>7</sup>Relative loss of elongation at break and HDT B compared to reference, DIN EN ISO 527-5A, 5 mm/min; <sup>8</sup>QUV weathering tester following ISO 4892-3 with High Performance 4-3700 VP; <sup>9</sup>Testing at 22 °C, 61% rel. humidity, duration of extraction 24h at 37 °C following DIN EN ISO 10993-5 and -12.

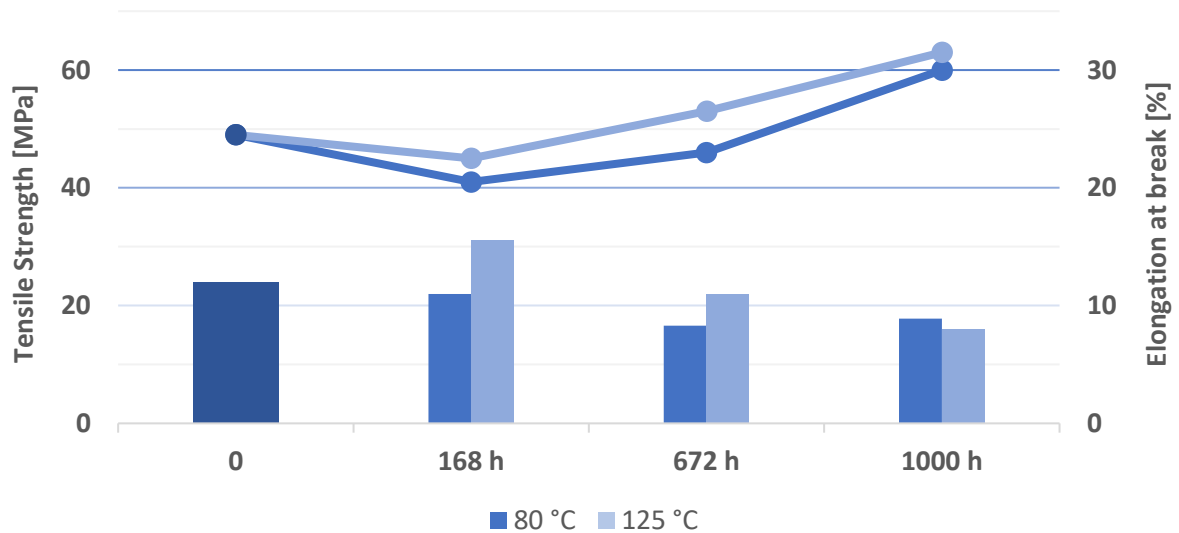
## Versatility and Customization of High Performance 4-Series



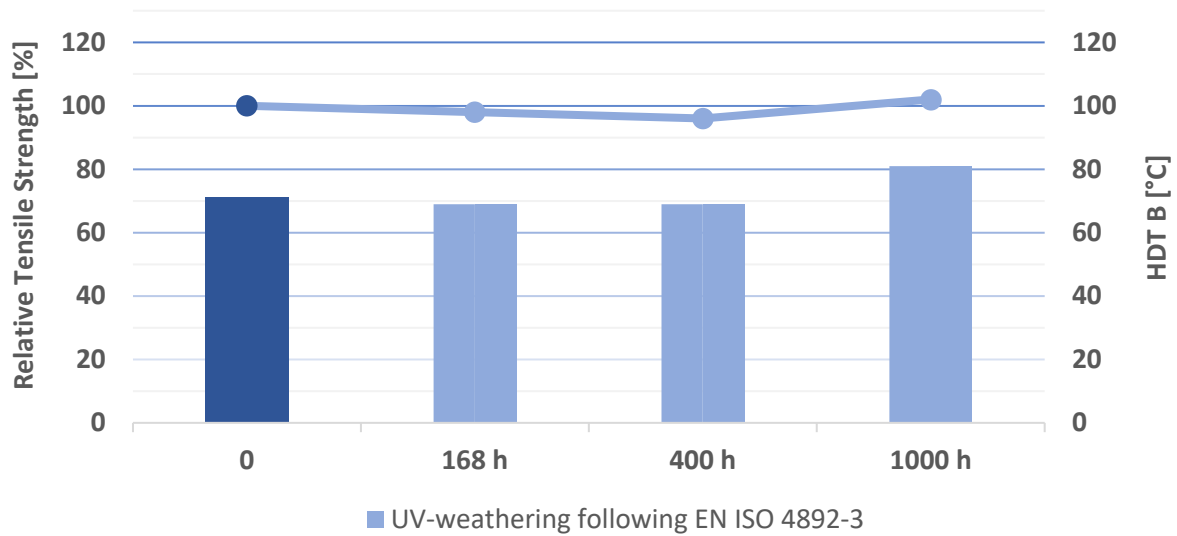
### Examples of Post-Processing High Performance 4-Series



### Ageing of High Performance 4-3800 VP (points - tensile strength & bars - elongation at break)



### UV Ageing of High Performance 4-3700 VP (points - rel. tensile strength & bars - HDT B)



#### Chemical Resistance

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

Water	4.4 <sup>2</sup>
Acetic Acid (5%)	1.5
Hydrochloric Acid (1%)	1.2
Nitric Acid (5%)	1.8
Sodium Hypochlorite (10%)	0.1
Hydrogen Peroxide (3%)	1.6
Sodium Hydroxide (1%)	1.1
Isopropyl Alcohol	<0.1
Methanol	5.6
Butyl Glycol Acetate	<0.1
Super Gasoline	0.8
Acetone	6.2
Methyl Ethyl Ketone	4.2

<sup>1</sup>Percental weight gained after 24 h submersion of printed and post-cured (washed with water, UV post-cure) 1 x 1 x 1 cm cubes. <sup>2</sup>Weight loss of 5A-specimen DIN EN ISO 527.

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