Cubic Ink® High Performance 4-3800 VP

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

Liquid Properties	Value[1]	Unit
Viscosity @25 °C (DIN EN ISO 3219)	47	mPa·s
Density (DIN EN ISO 15212-1)	1.10	g/mL
Critical Energy (E_c) @405 / 385 nm	3.6 / 4.4	mJ/cm²
Depth of Penetration (D_p) @405 / 385 nm	0.53 / 0.35	mm
Tensile Properties[2] (DIN EN ISO 527-5A)		
Ultimate Tensile Strength	49	MPa
Yield Strength	49	MPa
Tensile Modulus	2400	MPa
Elongation at Break	12	%
Flexural Properties[3] (DIN EN ISO 178)		
Flexural Strength	67	MPa
Flexural Modulus	1700	MPa
Deflection at Fracture	>10	%
Impact Properties		
Izod notched (DIN EN ISO 180)	34	J/m
Charpy notched (DIN EN ISO 179-1)	3.4	kJ/m²
Izod unnotched (DIN EN ISO 180)	260	J/m
Hardness (DIN EN ISO 7619)		
Shore Hardness (green)	68 - 75	D
Shore Hardness	81	D

Thermal Properties

T_g (DSC)[4]	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^{-6} K^{-1}
CTE (90 °C, 200 °C) (DIN EN ISO 11359-2)	113	x 10^{-6} K^{-1}
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^{14}	Ω·cm
Volume Resistivity after 7 d/RT H_2O (IEC60093)	2.7 x 10^{11}	Ω·cm
Comparative Tracking Index (IEC60112)	>600	V

Flame (UL94)

Flammability, horizontal (at 3.2 mm)	HB	-

Chemical Resistance

Water Uptake, 168 h, 23 °C[5]	6.1	%
Performance after Water Uptake, 24 h, 23 °C[6]	28	%

Thermal Ageing[7]

125 °C for 672 hours	<1	%

Ageing at –40 °C[6]

for 168 hours	<1	%

UV Ageing[6,8]

for 1000 hours	<1	%

Cytotoxicity[9] (DIN EN ISO 10993-5)

In-vitro cytotoxicity	On request	

Print Appearance/ Color

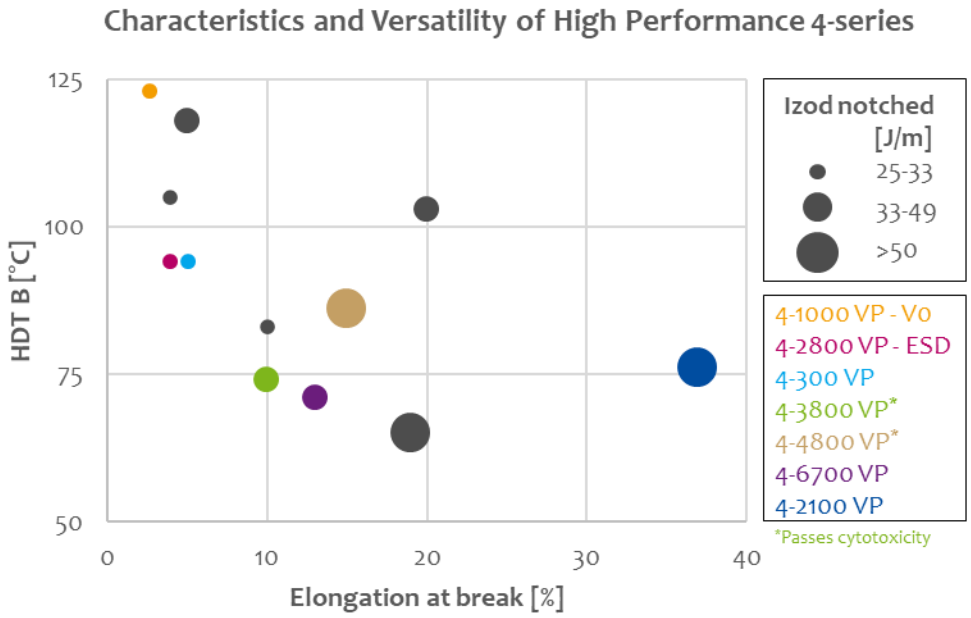
Natural color is translucent light yellow. Also available in cyan, magenta, yellow, black and grey. More colors on request.

Availability and Storage

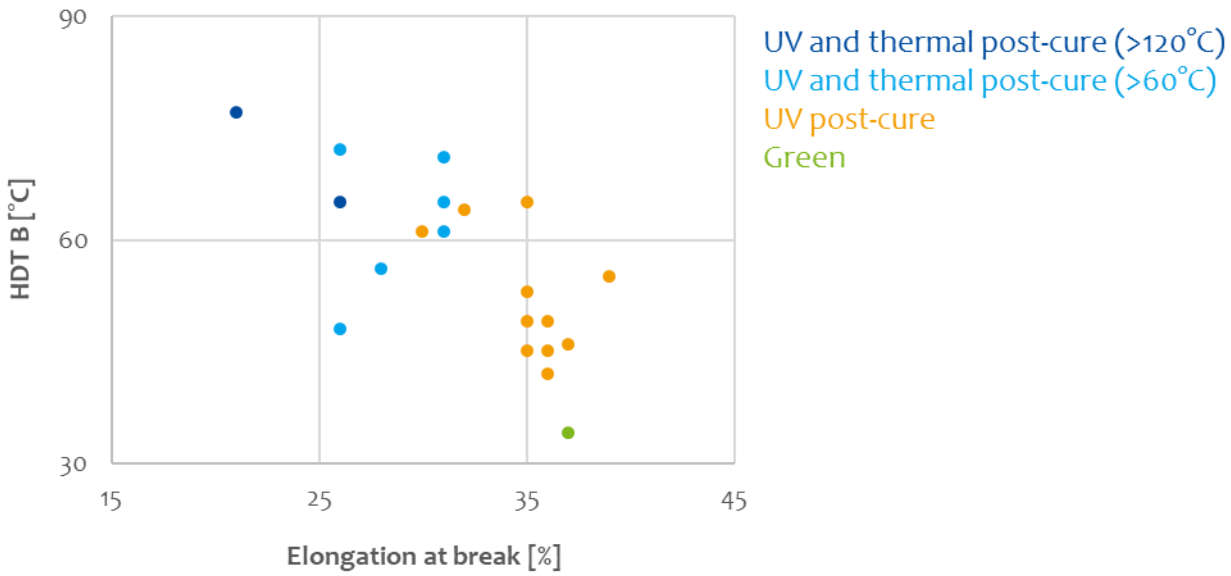
Batch sizes starting from 1 kg.

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

[1]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. [2]5 mm/min; [3]5 mm/min; [4]–20 - 200 °C, 20 K/min; [5]Weight loss of 5A-specimen DIN EN ISO 527; [6]Relative loss of tensile modulus, tensile strength, elongation at break and HDT B compared to reference; [7]Relative loss of elongation at break and HDT B compared to reference, DIN EN ISO 527-5A, 5 mm/min; [8]QUV weathering tester following ISO 4892-3 with High Performance 4-3700 VP; [9]Testing at 22 °C, 61% rel. humidity, duration of extraction 24 h at 37 °C following DIN EN ISO 10993-5 and -12.

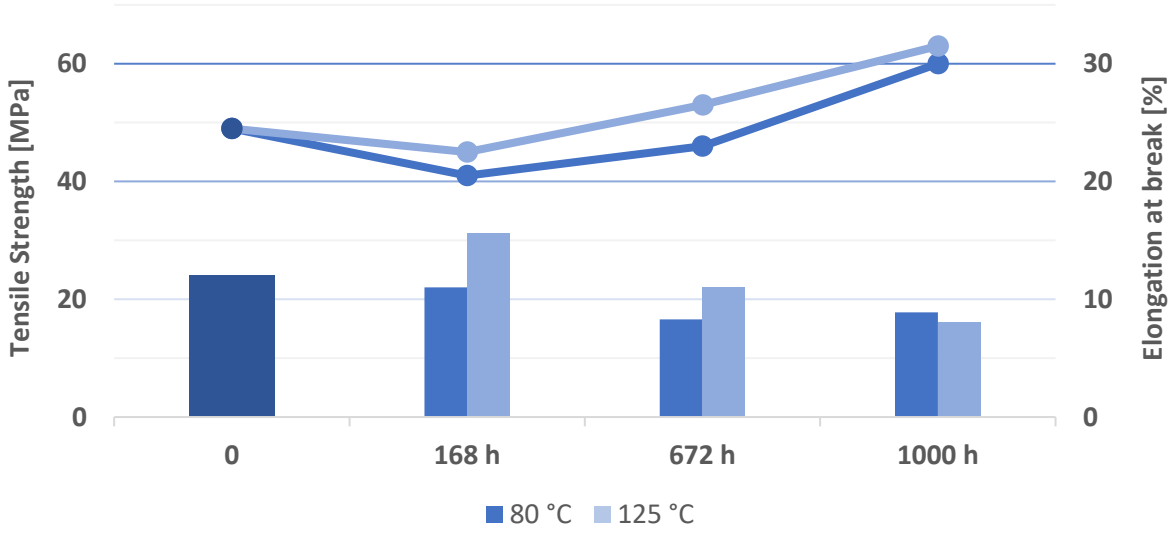


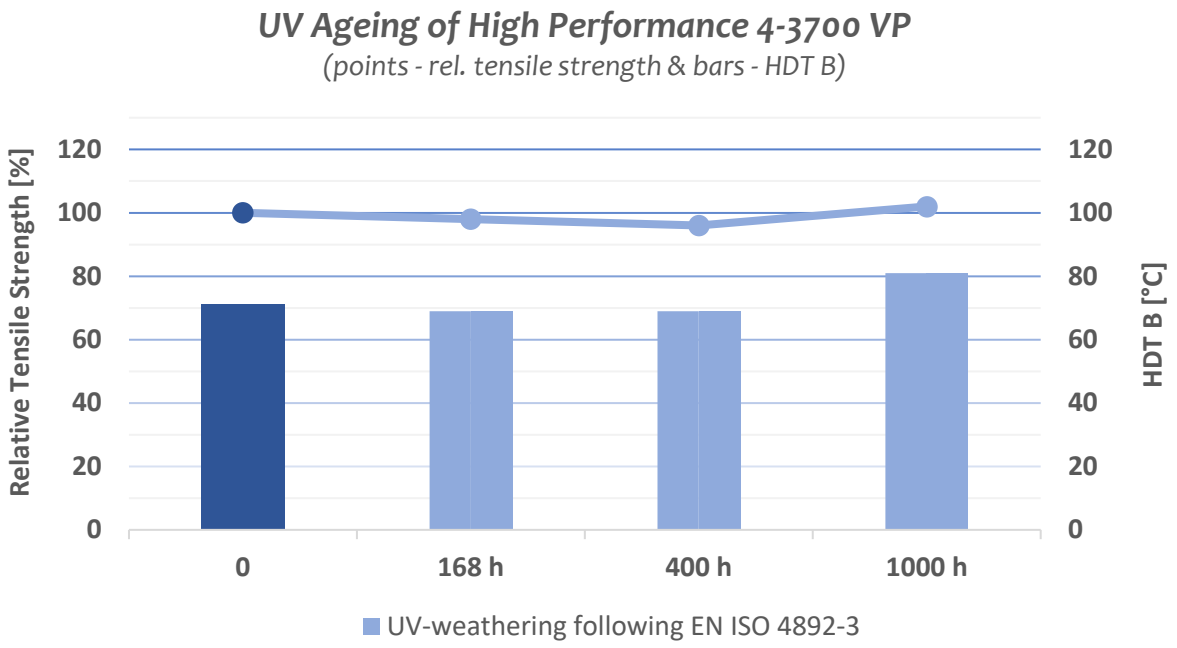
Examples of Post-Processing High Performance 4-Series



Ageing of High Performance 4-3800 VP

(points - tensile strength & bars - elongation at break)





Chemical Resistance	Mass Gain [%][1]
Water	4.4[2]
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

[1]Percental weight gained after 24 h submersion of printed and post-cured (washed with water, UV post-cure) 1 x 1 x 1 cm^3 cubes. [2]Weight loss of 5A-specimen DIN EN ISO 527.

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