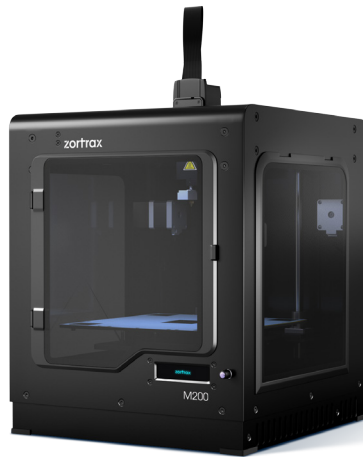


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TECHNICAL DATA SHEET

Date of issue: 20.06.2017 | Version: 1.00

Z-PLA Pro

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Technical Data Sheet: Z-PLA Pro

Mechanical Properties	Metric	English	Comments
Tensile Strength at Yield	45 MPa	6530 psi	ISO 527
Tensile Strength at Break	27 MPa	3920 psi	ISO 527
Elongation at Yield	2%	2%	ISO 527
Elongation at Break	17%	17%	ISO 527
Tensile Modulus	4.3 GPa	624 ksi	ISO 527
Charpy Impact	55 kJ/m ²	26.2 ft-lb/in ²	ISO 179/1eU
Thermal Properties	Metric	English	Comments
Deflection Temperature at 0.45 MPa (66 psi)	47 °C	117 °F	ISO 75
Other Properties	Metric	English	Comments
Specific Gravity	1.3 - 1.5 g/cm ³	10.8 - 12.5 lb/gal	
Melt Flow Rate	36 cm ³ /10 min Load 2.16 kg, Temperature 190 °C	2.2 in ³ /10 min Load 4.76 lb, Temperature 374 °F	ISO 1133

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Samples of Z-PLA Pro used to carry out the tests were made through plastic moulding.

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Date of issue: 20.06.2017 | Version: 1.00

Z-ASA Pro

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Technical Data Sheet: Z-ASA Pro

Mechanical Properties	Metric	English	Comments
Tensile Strength at Yield	47.5 MPa	6890 psi	ISO 527
Elongation at Break	15%	15%	ISO 527
Tensile Modulus	2.02 GPa	293 ksi	ISO 527
Charpy Impact, Notched	18 kJ/m ²	8.57 ft-lb/in ²	ISO 179
Thermal Properties	Metric	English	Comments
Melting Point	230 °C ± 10 °C	446 °F ± 50 °F	ISO 294
Vicat Softening Point	98 °C	208 °F	ISO 306
Other Properties	Metric	English	Comments
Specific Gravity	1.11 g/cm ³	9.26 lb/gal	ISO 1183
Melt Flow Rate	45 g/10 min Load 5 kg, Temperature 260 °C	0.0992 lb/10 min Load 11 lb, Temperature 500 °F	ISO 1133

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MATERIAL DATA SHEET

Date of issue: 12.12.2014 | Update: 20.09.2016 | Version: 1.03

Z-GLASS

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Material Data Sheet: Z-GLASS

Physical Properties	Metric	English	Comments
Specific Gravity	1.27 g/cm ³	10.598 lbs/gal	ASTM D792
Maximum Moisture Content	0.020	0.020	
Linear Mold Shrinkage, Flow	0.0040 - 0.010 cm/cm Thickness 3.20 mm	0.0040 - 0.010 in/in Thickness 0.126 in	ASTM D955
Light transmittance	75 - 90 % Wall thickness 0.4 mm	75 - 90 % Wall thickness 0.0157 in	ISO 13468-1
Mechanical Properties	Metric	English	Comments
Hardness, Rockwell R	111	111	ASTM D785
Tensile Strength at Break	76.5 MPa Thickness 3.20 mm	11100 psi Thickness 0.126 in	50mm/min; ASTM D638
Elongation at Break	4.0 % Thickness 3.20 mm	4.0 % Thickness 0.126 in	50mm/min; ASTM D638
Flexural Yield Strength	127 MPa Thickness 3.20 mm	18500 psi Thickness 0.126 in	1.3mm/min; ASTM D790
Flexural Modulus	4.12 GPa Thickness 3.20 mm	597 ksi Thickness 0.126 in	15mm/min; ASTM D790
Izod Impact, Notched	0.686 J/cm Thickness 3.20 mm, Temperature 23.0 °C	1.29 ft-lb/in Thickness 0.126 in, Temperature 73.4 °F	ASTM D256
Thermal Properties	Metric	English	Comments
Melting Point	225 °C	437 °F	ASTM D3418
Deflection Temperature at 0.46 MPa (66 psi)	200 °C Thickness 6.40 mm	392 °F Thickness 0.252 in	Unannealed; ASTM D648
Deflection Temperature at 1.8 MPa (264 psi)	180 °C Thickness 6.40 mm	356 °F Thickness 0.252 in	Unannealed; ASTM D648

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MATERIAL DATA SHEET

Date of issue: 12.12.2014 | Update: 20.09.2016 | Version: 1.03

Z-HIPS

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Material Data Sheet: Z-HIPS

Physical Properties	Metric	English	Comments
Specific Gravity	1.04 g/cm ³	8.679 lbs/gal	ASTM D792
Maximum Moisture Content	0.010	0.010	
Linear Mold Shrinkage, Flow	0.0040 - 0.0080 cm/cm Thickness 3.20 mm	0.0040 - 0.0080 in/in Thickness 0.126 in	ASTM D955
Melt Flow	6.0 g/10 min Load 5.00 kg, Temperature 200 °C	6.0 g/10 min Load 11.0 lb, Temperature 392 °F	ASTM D1238 (G)
	16 g/10 min Load 3.80 kg, Temperature 230 °C	16 g/10 min Load 8.38 lb, Temperature 446 °F	ASTM D1238 (I)
	69 g/10 min Load 10.0 kg, Temperature 220 °C	69 g/10 min Load 22.0 lb, Temperature 428 °F	ASTM D1238 (G)
Mechanical Properties	Metric	English	Comments
Hardness, Rockwell R	109	109	ASTM D785
Tensile Strength, Yield	34.3 MPa Thickness 3.20 mm	4980 psi Thickness 0.126 in	50mm/min; ASTM D638
Elongation at Break	79 % Thickness 3.20 mm	79 % Thickness 0.126 in	50mm/min; ASTM D638
Elongation at Yield	4.0 % Thickness 3.20 mm	4.0 % Thickness 0.126 in	50mm/min; ASTM D638
Tensile Modulus	2.26 GPa Thickness 3.20 mm	327 ksi Thickness 0.126 in	1mm/min; ASTM D638
Flexural Yield Strength	53.9 MPa Thickness 3.20 mm	7820 psi Thickness 0.126 in	15mm/min; ASTM D790
Flexural Modulus	2.67 GPa Thickness 3.20 mm	387 ksi Thickness 0.126 in	15mm/min; ASTM D790
Izod Impact, Notched	0.490 J/cm Thickness 3.20 mm, Temperature -30.0 °C	0.918 ft-lb/in Thickness 0.126 in, Temperature -22.0 °F	ASTM D256

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Electrical Properties	Metric	English	Comments
Volume Resistivity	1.00e+14 ohm-cm	1.00e+14 ohm-cm	
Dielectric Strength	40.0 kV/mm	1020 kV/in	
Arc Resistance	120 - 180 sec	120 - 180 sec	ASTM D495
Thermal Properties	Metric	English	Comments
Deflection Temperature at 0.46 MPa (66 psi)	92.0 °C Thickness 6.40 mm	198 °F Thickness 0.252 in	Unannealed; ASTM D648
Deflection Temperature at 1.8 MPa (264 psi)	83.0 °C Thickness 6.40 mm	181 °F Thickness 0.252 in	Unannealed; ASTM D648
Vicat Softening Point	95.0 °C Load 5.00 kg	203 °F Load 11.0 lb	50°C/h; ASTM D1525
UL RTI, Electrical	50.0 °C Thickness ≥1.50 mm	122 °F Thickness ≥0.0591 in	
	50.0 °C Thickness ≥3.00 mm	122 °F Thickness ≥0.118 in	
UL RTI, Mechanical with Impact	50.0 °C Thickness ≥1.50 mm	122 °F Thickness ≥0.0591 in	
	50.0 °C Thickness ≥3.00 mm	122 °F Thickness ≥0.118 in	
UL RTI, Mechanical without Impact	50.0 °C Thickness ≥1.50 mm	122 °F Thickness ≥0.0591 in	
	50.0 °C Thickness ≥3.00 mm	122 °F Thickness ≥0.118 in	
Flammability, UL94	HB Thickness ≥1.60 mm	HB Thickness ≥0.0630 in	
	HB Thickness ≥3.20 mm	HB Thickness ≥0.126 in	

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MATERIAL DATA SHEET

Date of issue: 12.10.2015 | Update: 20.09.2016 | Version: 1.02

Z-PETG

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Material Data Sheet: Z-PETG

Physical Properties	Metric	English	Comments
Specific Gravity	1.27 g/cm ³	10.598 lbs/gal	ASTM D792
Maximum Moisture Content	0.013%	0.013%	ASTM D570
Mechanical Properties	Metric	English	Comments
Tensile Strength at Yield	50 MPa Thickness 3.20 mm	7252 psi Thickness 0.126 in	50mm/min (2 inch/min); ASTM D638
Tensile Strength at Break	29.4 MPa Thickness 3.20 mm	4264 psi Thickness 0.126 in	50mm/min (2 inch/min); ASTM D638
Elongation at Yield	4.5 %	4.5 %	50mm/min (2 inch/min); ASTM D638
Elongation at Break	180 % Thickness 3.20 mm	180 % Thickness 0.126 in	50mm/min (2 inch/min); ASTM D638
Flexural Strength	68.6 MPa Thickness 3.20 mm	9950 psi Thickness 0.126 in	1.27mm/min (0.05 inch/min); ASTM D790
Flexural Modulus	2.10 GPa Thickness 3.20 mm	304 ksi Thickness 0.126 in	1.27mm/min (0.05 inch/min); ASTM D790
Rockwell Hardness	108	108	ASTM D785
Izod Impact, Notched	1.05 J/cm Thickness 3.20 mm, Temperature 23.0 °C	1.97 ft-lb/in Thickness 0.126 in, Temperature 73.4 °F	ASTM D256
Thermal Properties	Metric	English	Comments
Melting Point	225 °C	437 °F	ASTM D3418
Heat Distortion Temperature	70 °C at 0.455 MPa	158 °F at 66 psi	ASTM D648

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MATERIAL DATA SHEET

Date of issue: 01.08.2014 | Update: 13.12.2016 | Version: 1.06

Z-ULTRAT

Material Data Sheet: Z-ULTRAT

Physical Properties	Metric	English	Comments
Density	1.04 g/cm ³	8.679 lbs/gal	ISO 1183
Mold Shrinkage, Flow	0.5 - 0.8% Thickness 3.20 mm	0.5 - 0.8% Thickness 0.126 in	
Melt Flow	11.7 g/10 min Load 3.80 kg, Temperature 230 °C	0.0257 lb/10 min Load 8.38 lb, Temperature 446 °F	ASTM D1238
	12 g/10 min Load 5 kg, Temperature 220 °C	0.0265 lb/10 min Load 11 lb, Temperature 428 °F	
	42 g/10 min Load 10 kg, Temperature 220 °C	0.0926 lb/10 min Load 22 lb, Temperature 428 °F	ISO 1183
Melt Viscosity	1720 1000 sec ⁻¹ , Temperature 240 °C	1720 1000 sec ⁻¹ , Temperature 464 °F	ASTM D3825
Mechanical Properties	Metric	English	Comments
Hardness, Rockwell R	113	113	
Tensile Strength, Yield	46 MPa 5 mm/min	6600 psi 0.2 in/min	ASTM D638
	46 MPa 50 mm/min	6600 psi 1.96 in/min	ISO 527
Tensile Strength, Break	35 MPa 5 mm/min	5000 psi 0.2 in/min	ASTM D638
	35 MPa 50 mm/min	5000 psi 1.96 in/min	ISO 527
Elongation at Yield	2 %	2 %	5 mm/min; ASTM D638
	2.3 %	2.3 %	50 mm/min; ISO 527
Elongation at Break	18 %	18 %	5 mm/min; ASTM D638
	40 %	40 %	50 mm/min; ISO 527

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Tensile Modulus	2.45 GPa 1 mm/min	355 ksi 0.04 in/min	ISO 527
	2.48 GPa 5 mm/min	360 ksi 0.19 in/min	ASTM D638
Izod Impact, Notched	80 J/m Temperature -30.0 °C	1.4 ft-lb/in Temperature -22.0 °F	ASTM D256
	240 J/m Temperature 23.0 °C	4.4 ft-lb/in Temperature 73.0 °F	
	7 kJ/m ² 80x10x4 mm, Temp -30.0 °C	3.33 ft-lb/in ² 3.15x0.394x0.157 in, Temperature -22.0 °F	ISO 180/1A
	16 kJ/m ² 80x10x4 mm, Temp 23.0 °C	7.61 ft-lb/in ² 3.15x0.394x0.157 in, Temperature 73.0 °F	
Charpy Impact, V-notch	18 kJ/m ² 80x10x4 mm, Span 62 mm	8.57 ft-lb/in ² 3.15x0.394x0.157 in, Span 2.44 in	ISO 179/1eA
Flexural Strength, Yield	79 MPa 1.3 mm/min, 50 mm span	11458 psi 0.05 in/min, 2 in span	ASTM D790
	70 MPa 2 mm/min	10153 psi 0.079 in/min	ISO 178
Flexural Modulus	2.62 GPa 1.3 mm/min, 50 mm span	380 ksi 0.05 in/min, 2 in span	ASTM D790
	2.5 GPa 2 mm/min	363 ksi 0.079 in/min	ISO 178
Instrumented Impact Total Energy	5 J Temperature -30.0 °C	44 in-lb Temperature -22.0 °F	ASTM D3763
	21 J Temperature 23.0 °C	185 in-lb Temperature 73.0 °F	ASTM D3763
Thermal Properties	Metric	English	Comments
Vicat Softening Point	98.0 °C	208.4 °F	Rate B/50; ASTM D 1525
	98.0 °C	208.4 °F	Rate B/50; ISO 306
	100.0 °C	212.0 °F	Rate B/120; ISO 306
Flame Class Rating	HB Thickness 1.52 mm	HB Thickness 0.0598 in	UL94

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Coefficient of Thermal Expansion	8.82E-05 1/°C -40.0 °C to 40.0 °C	4.9E-05 1/°F -40.0 °F to 104 °F	ASTM E 831; flow
	8.46E-05 1/°C -40.0 °C to 40.0 °C	4.7E-05 1/°F -40.0 °F to 104 °F	ASTM E 831; xflow
	8.82E-05 1/°C -40.0 °C to 40.0 °C	4.9E-05 1/°F -40.0 °F to 104 °F	ISO 11359-2; flow
	8.46E-05 1/°C -40.0 °C to 40.0 °C	4.7E-05 1/°F -40.0 °F to 104 °F	ISO 11359-2; xflow
Deflection Temperature at 0.45 MPa (66 psi)	95 °C Thickness 3.20 mm	203.0 °F Thickness 0.126 in	Unannealed; ASTM D648
Deflection Temperature at 1.82 MPa (264 psi)	82 °C Thickness 3.20 mm	179.6 °F Thickness 0.126 in	Unannealed; ASTM D648
Deflection Temperature at 0.45 MPa (66 psi)	89 °C 120x10x4 mm sp=100 mm	192.2 °F 4.72x0.394x0.157 in sp=3.937 in	ISO 75/Be
Deflection Temperature at 1.8 MPa (264 psi)	76 °C 120x10x4 mm sp=100 mm	168.8 °F 4.72x0.394x0.157 in sp=3.937 in	ISO 75/Ae
Relative Temperature Index, Electrical	60 °C	140 °F	UL 746B
Relative Temperature Index, Mechanical with Impact	60 °C	140 °F	UL 746B
Relative Temperature Index, Mechanical without Impact	60 °C	140 °F	UL 746B

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