

Filament Comparison

	Standard Line					Support Line		High Temperature Line	Engineering Line					Reinforced Line					
	PLA	PET	ABS	PP	rPET	BVOH	HIPS	PPSU	PLA PRO1	ABS Fusion+	ASA	PA	PC/ABS FR	PP GF30	PET CF15	PAHT CF15	PA6 GF 30	PC GF30	
Printed Part Density Dry [kg/m³] ISO 1183-1	1248,0	1329,0	1040,0	911,0	1273,0	1138,0	1023,0	1272,0	1250,0	1075,0	1069,0	1115 / (1050,0)	1167,0	1066,0	1366 / (1234,0)	1232 / (1275,0)	1519,0	1176,0	
HDT (1.8 Mpa) - dry [°C] ISO 75-2	55,0	61,0	91,0	41,0	65,0	-	86,0	211,0	-	71,0	92,0	65,0	79,0	73,0	80,0	92 / (91,0)	82 / (87,0)	124,0	
HDT (0.45 Mpa) - dry [°C] ISO 75-2	65,0	63,0	96,0	54,0	71,0	-	91,0	215,0	-	91,0	101,0	135,0	86,0	127,0	108,0	145 / (128,0)	110 / (114,0)	134,0	
Glass Transition Temperature [°C] ISO 11357-2	61,0	71,0	104,0	-	83,0	69,0	99,0	222,0	63,0	114,0	112,0	49,0	94,0	-5,0	79,0	70,0	67,0	142,0	
Melting Temperature [°C] ISO 11357-3	151,0	-	-	131,0	-	175,0	-	-	170,0-180,0	-	-	195,0-197,0	227,0	158,0	245,0	234,0	209,0	259,0	
Melt Volume Rate [cm³/10 min] ISO 1133	21,2 @ 220 °C, 5 kg	16,3 @ 220 °C, 2.16 kg	24,2 @ 260 °C, 5 kg	6,7 @ 230 °C, 2.16	15,1 @ 220 °C, 5 kg	11,4 @ 210 °C, 2.16 kg	29,3 @ 260 °C, 2.16 kg	16,4 @ 360 °C, 5 kg	18,2 @ 210 °C, 2.16 kg	10 @ 250 °C, 5 kg	3,9 @ 260 °C, 2.16 kg	49,5 @ 275 °C, 5 kg	46,6 @ 260 °C, 5 kg	11,7 @ 260 °C, 2.16 kg	25 @ 260 °C, 2.16 kg	42,2 @ 275 °C, 5 kg	58,3 @ 275 °C, 5kg	26 @ 300 °C, 2.16 kg	
Crystallization Temperature [°C] ISO 11357-3	-	-	-	83,0	-	122,0	-	-	-	-	-	147,0	-	125,0	204,0	180,0	167,0	-	
Tensile strength [MPa] ISO 527	XY	34,7	33,4	36,3	15,5	38,6	33,7	18,4	74,5	48,0	29,5	34,6	61,4 / (33,2)	50,1	41,7	63,2	103,2 / (62,9)	78,3 / (46,4)	36,1
	ZX	21,2	17,2	21,3	9,0	14,7	8,7	13,7	49,0	21,8	17,9	12,0	16,4 / (17,6)	17,3	15,9	12,5	18,2 / (19,1)	14,9 / (12,2)	11,2
Elongation at Break [%] ISO 527	XY	4,2	2,7	7,4	118,6	4,3	14,8	1,4	7,3	21,9	10,9	4,5	9,6 / (143,3)	10,7	4,4	3,7	1,8 / (2,9)	2,2 / (3,2)	2,4
	ZX	1,2	1,1	1,8	5,4	1,2	0,6	1,3	2,9	0,9	2,1	1,0	0,8 / (12,8)	0,8	0,8	0,5	0,5 / (0,8)	0,8 / (1,9)	1,1
Young's Modulus [MPa] ISO 527	XY	2308,0	1933,0	1958,0	541,0	1640,0	2339,0	1588,0	2221,0	3166,0	1379,0	1828,0	2419 / (395,0)	2545,0	2628,0	6178,0	8386 / (5052,0)	5036 / (2469,0)	2664,0
	ZX	2131,0	1665,0	1608,0	435,0	1334,0	1426,0	1603,0	2150,0	2930,0	1106,0	1400,0	2122 / (334,0)	2188,0	2242,0	2822,0	3532 / (2455,0)	2380 / (1156,0)	1231,0
Flexural Strength [MPa] ISO 178	XY	98,0	66,7	56,6	22,9	66,9	53,8	31,8	105,0	92,4	48,3	59,4	77 / (17,7)	88,1	76,8	108,0	160,7 / (125,1)	147,4 / (80,2)	63,4
	XZ	105,0	76,1	58,3	21,4	65,4	50,3	32,2	114,0	99,1	48,7	61,2	95,5 / (18,1)	90,6	95,3	145,0	171,8 / (121,9)	188,2 / (130,0)	78,8
	ZX	54,9	54,4	38,6	15,6	30,2	11,4	26,8	88,9	-	23,1	19,9	40,2 / (17,3)	24,7	19,3	19,7	50,8 / (56,0)	44,2 / (29,0)	19,0
Flexural Modulus [MPa] ISO 178	XY	1860,0	2063,0	1833,0	575,0	1662,0	2236,0	1635,0	1940,0	2823,0	1406,0	1733,0	2051 / (445,0)	2550,0	3507,0	5452,0	8258 / (125,1)	4694 / (2861,0)	2690,0
	XZ	1708,0	1840,0	1767,0	494,0	1551,0	1807,0	1526,0	1910,0	2340,0	1133,0	1638,0	2246 / (468,0)	2200,0	4026,0	6293,0	7669 / (121,9)	8103 / (4300,0)	3450,0
	ZX	1715,0	1826,0	1586,0	380,0	829,0	1081,0	1227,0	1700,0	-	878,0	1041,0	2149 / (428,0)	1910,0	1671,0	2253,0	2715 / (56,0)	2371 / (1070,0)	934,0
Flexural Strain at Break [%] ISO 178	XY	4,8	4,6	5,3	9,4	5,5	4,8	5,4	No break	4,3	5,6	5,4	No break	5,6	4,6	3,7	2,4 / (No break)	4 / (11,6)	3,2
	XZ	4,2	4,6	5,0	8,8	4,8	4,4	5,2	No break	4,4	5,9	5,2	No break	6,1	3,3	2,8	2,8 / (3,6)	2,7 / (6,5)	2,9
	ZX	1,9	3,0	3,1	7,9	3,0	1,0	4,6	6,8	-	2,7	2,9	1,8 / (No break)	1,3	1,3	0,9	1,8 / (4,0)	2 / (5,3)	2,5
Impact Strength Charpy (notched) [kJ/m²] ISO 179-2	XY	2,5	1,6	16,0	5,3	4,0	-	6,5	21,8	-	32,0	8,9	5,6 / (-)	13,3	5,3	5,4	4,8 / (5,1)	8,9 / (17,0)	6,1
	XZ	1,9	1,4	17,4	8,3	2,0	-	6,6	15,0	-	41,9	15,5	3,3 / (136,0)	31,2	5,2	4,8	3,9 / (5,3)	16,2 / (20,9)	6,5
	ZX	1,7	1,2	2,8	2,5	1,0	-	4,1	5,7	-	2,5	2,7	1,2 / (9,4)	0,9	1,2	0,5	1,3 / (1,6)	- / (2,7)	1,8
Impact Strength Charpy (unnotched) [kJ/m²] ISO 179-2	XY	13,2	18,4	36,4	41,8	55,5	-	36,0	224,8	20,4	71,9	42,7	23 / (No break)	49,8	23,1	27,8	20,6 / (21,9)	38,9 / (41,8)	17,1
	XZ	14,3	9,7	42,2	62,3	33,7	-	57,6	270,5	18,8	118,7	41,2	29,7 / (No break)	65,4	25,8	32,0	19,3 / (20,4)	45,5 / (48,8)	18,9
	ZX	4,3	4,6	6,8	13,6	3,3	-	8,6	16,3	-	6,9	5,1	3,5 / (13,4)	2,9	2,5	1,3	2,9 / (2,8)	2,2 / (3,1)	3,7
Impact Strength Izod (notched) [kJ/m²] ISO 180	XY	3,3	2,1	18,8	5,3	4,4	-	6,9	13,7	-	26,4	8,7	5,8 / (85,4)	16,8	5,6	5,7	4,9 / (6,5)	9,2 / (20,9)	5,6
	XZ	2,1	1,9	18,9	10,6	3,3	-	7,1	15,8	-	38,4	11,4	3,9 / (106,0)	30,3	6,2	5,0	5,1 / (5,8)	13,4 / (19,0)	5,4
	ZX	1,6	1,8	3,5	2,3	1,5	-	4,8	5,3	-	2,2	1,9	1,7 / (10,1)	1,8	1,4	2,0	-	- / (2,7)	2,1
Impact Strength Izod (unnotched) [kJ/m²] ISO 180	XY	11,0	12,3	40,0	37,7	48,2	-	35,0	No break	-	73,1	36,8	28 / (No break)	57,0	20,5	25,1	16,4 / (16,3)	38,4 / (36,9)	13,9
	XZ	9,6	7,7	35,7	37,6	21,9	-	57,1	No break	-	131,1	39,3	45,6 / (No break)	87,9	2,4	22,6	18,1 / (15,1)	38,7 / (41,4)	17,8
	ZX	4,7	4,1	7,2	11,6	4,4	-	9,1	21,0	-	6,6	6,8	3,2 / (17,4)	3,0	2,6	2,4	2,9 / (4,1)	2,6 / (3,8)	3,4

(Conditioned values) (1) ASTM D 648 (2) ASTM D638 (3) ASTM D 790 (4) ASTM D 256

	Flexible Line				
	TPU 85A	TPU 64D	TPU 95A	TPS 90A*	TPC 45D*
Printed Part Density Dry [kg/m ³] ISO 1183-1	1111,0	1157,0	1139,0	1044,0	1150,0
Glass Transition Temperature [°C] ISO 11357-2	-44,0	-26,0	-25,0	-59,0	-35,0
Melting Temperature [°C] ISO 11357-3	-	-	144,0	242,0-249,0	180,0
Compression Set at 23 °C, 72 h [%] ISO 815	26,0	25,0	38,0	75,0	-
Compression Set at 70 °C, 24 h [%] ISO 815	52,0	55,0	90,0	93,0	-
Melt Volume Rate [cm ³ /10 min] ISO 1133	10,7 @ 190 °C, 2.16 kg	40,4 @ 210 °C, 5 kg	30,7 @ 210 °C, 5 kg	19,9 @ 260 °C, 5 kg	-
Abrasion Resistance [mm ³] ISO 4649	82,0	43,0	64,0	111,0	-
Shore A Hardness (3 s) ISO 7619-1	85,0	-	92,0	89,0	-
Shore D Hardness (15 s) ISO 7619-1	29,0	58,0	45,0	29,0	-
Young's Modulus [MPa] ISO 527	XY	20,0	205,0	48,4	54,0
	ZX	27,0	168,0	46,7	37,0
Elongation at Break TPE [%] ISO 527	XY	600,0	399,0	611,0	-
	ZX	320,0	115,0	192,0	-
Stress at Break TPE [MPa] ISO 527	XY	34,0	37,0	44,2	7,0
	ZX	10,0	19,0	12,2	2,0
Strain at Break TPE [%] ISO 527	XY	-	-	-	280,0
	ZX	-	-	-	9,0
Stress at 50% Elongation [MPa] ISO 527	XY	7,2	18,0	8,3	4,8
	ZX	6,2	17	7,9	-
Stress at 100% Elongation [MPa] ISO 527	XY	8,7	21,0	10,5	5,4
	ZX	7,5	19,0	9,9	-
Stress at 200% Elongation [MPa] ISO 527	XY	10,1	-	-	6,2
	ZX	9,0	-	-	-
Stress at 300% Elongation [MPa] ISO 527	XY	-	32,0	20,3	-
	ZX	-	-	-	-
Impact Strength Charpy (notched) [kJ/m ²] ISO 179-2	XY	No break	115,0	No break	-
	XZ	No break	103,0	No break	-
	ZX	No break	34,0	16,8	-
Impact Strength Izod (notched) [kJ/m ²] ISO 180	XY	No break	No break	No break	-
	XZ	No break	No break	No break	-
	ZX	No break	43	No break	-
Impact Strength Charpy (notched) @ - 30°C [kJ/m ²] ISO 179-2	XY	47,3	4,1	128,0	No break
	XZ	95,4	4,8	120,0	No break
	ZX	9,3	2,6	14,9	14,1
Impact Strength Charpy (unnotched) @ - 30°C [kJ/m ²] ISO 179-2	XY	No break	No break	No break	No break
	XZ	No break	No break	No break	No break
	ZX	No break	23,2	No break	No break
Tensile Notched Impact Strength [kJ/m ²] ISO 8256-1	XY	No break	No break	No break	92,0
	ZX	No break	No break	No break	94,4
Tear Strength [kN/m] ISO 34-1	XY	80,0	66,0	90,0	10,0
	XZ	18,0	37,0	8,0	5,0
	ZX	30,0	79,0	14,0	4,0

*product not available for NA

		Metal Line	
		316L	17-4PH
Sintered Part Density Dry [kg/m ³] ISO 1183-1		7850,0	7600,0
Impact Strength Charpy (notched) [kJ/m ²] ISO 148-1 ²		111,0	-
Tensile strength [MPa] ISO 6892-1 ¹	XY	561,0	760,0
	ZX	521,0	730,0
Elongation at Break [%] ISO 6892-1 ¹	XY	53,0	4,0
	ZX	36,0	3,0
Yield Strength, R _{p0.2} [MPa] ISO 6892-1 ¹	XY	251,0	680,0
	ZX	234,0	700,0
Vickers Hardness ISO 6507-1	XY	128 HV10	257 HV10 352 HV 103
	ZX	128HV10	-

		Electrical Properties	
		TPU 85A	PPSU
Volume Resistivity [Ωcm] IEC 62631-3-1	XY	2,60E+11	2,60E+15
	XZ	-	-
	ZX	2,10E+11	-
Surface Resistivity [Ω] IEC 62631-3-2	XY	-	2,60E+15
	ZX	-	-
Dielectric Strength (orthogonal) [kV/mm] IEC 62631-3-1	XY	21,0	18,5

(1) ASTM D 257

Test Summary					
	PA	PC/ABS FR	PA6 GF30	PC GF30	PPSU
Flame class rating UL94	-	V0 @ 1.5 mm and 3.0 mm thickness	-	V0 @ 1.5 mm and 3.0 mm thickness	V0 @ 1.5 mm and 3.0 mm thickness
Glow wire test (GWEPT) IEC 60695-2-11	-	725 °C @ 1.5 mm thickness 960 °C @ 3.0 mm thickness	-	-	960 °C @ 1.5 mm and 3.0 mm thickness
Coefficient of Thermal Expansion ISO 11359-2	-	-	-	-	55 E-6/K
Flammability F1 60 sec. vertical FAR 25.853 (a) (thickness 1.6 and 6.35 mm)	-	-	-	-	Passed
Flammability F2 12 sec. vertical FAR 25.853 (a) (thickness 1.6 and 6.35 mm)	-	-	-	-	Passed
HR Total Heat Release [KW*min/m ²] FAR 25.853 (d) (thickness 1.0 and 4.0 mm)	-	-	-	-	Passed
HRRmax Maximum Heat Release Rate [KW/m ²] FAR 25.853 (d) (thickness 1.0)	-	-	-	-	Passed
Optical Smoke Density FAR 25.853 (d) (thickness 1.0 and 4.5 mm)	-	-	-	-	Passed
Smoke Toxicity AITM 3.0005 (thickness 1.5 and 4.5 mm)	-	-	-	-	Passed
Vicat softening point (50 N) [°C] ISO 306	172,0	-	192,0	-	217,0