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We create chemistry



3D Printing Materials & Solutions

Spring 2023

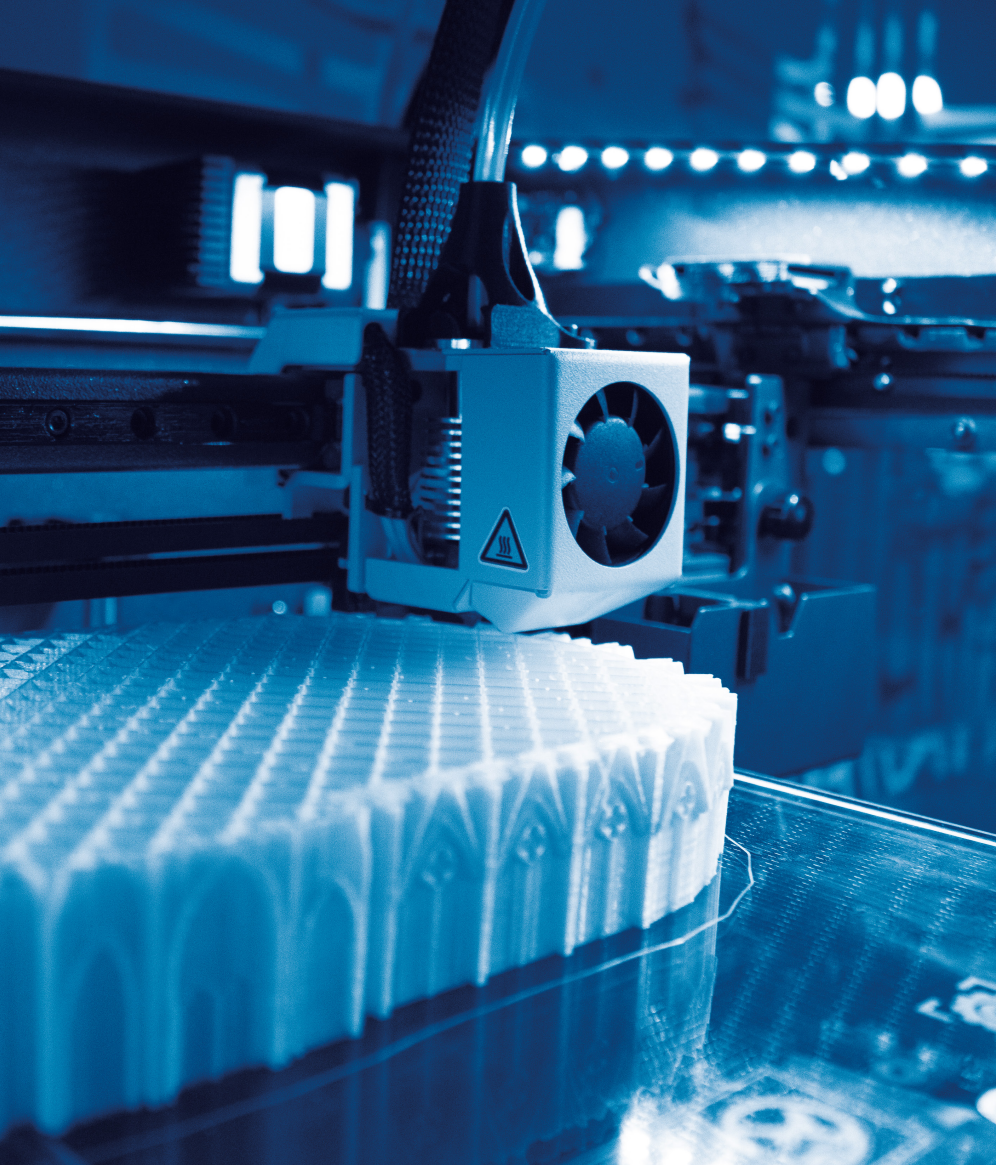
Innovating Additive Manufacturing



Discover one of the largest portfolios of high-performance materials for Additive Manufacturing

At Forward AM, we accompany you from first idea to final printed part. Our portfolio includes materials for all major Additive Manufacturing technologies - from powders to plastic and metal filaments to photopolymers.

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FUSED FILAMENT FABRICATION

Explore one of the broadest portfolios for Fused Filament Fabrication. Our Ultrafuse® line comprises filaments ranging from engineering-grade materials, through reinforced and support materials, to advanced metal filaments for a variety of industrial applications.

Mechanical Properties Comparison



Full Comparison Table

		Ultrafuse® Standard Filaments					Ultrafuse® Support Filaments	
		PLA	PET	ABS	PP	rPET	BYOH	HIPS
HDT (0.45 Mpa) [°C] ISO 75-2		65,0	63,0	96,0	54,0	71,0	-	91,0
Tensile Strength [MPa] ISO 527	XY	34,7	33,4	36,3	15,5	38,6	33,7	18,4
	ZX	21,2	17,2	21,3	9,0	14,7	8,7	13,7
Elongation at Break [%] ISO 527	XY	4,2	2,7	7,4	118,6	4,3	14,8	1,4
	ZX	1,2	1,1	1,8	5,4	1,2	0,6	1,3
Young's Modulus [MPa] ISO 527	XY	2308,0	1933,0	1958,0	541,0	1640,0	2339,0	1588,0
	XZ	2131,0	1665,0	1608,0	435,0	1334,0	1426,0	1603,0
Impact Strength Charpy (unnotched) [kJ/m²] ISO 179-2	XY	13,2	18,4	36,4	41,8	55,5	-	36,0
	XZ	14,3	9,7	42,2	62,3	33,7	-	57,6
	ZX	4,3	4,6	6,8	13,6	3,3	-	8,6
Impact Strength Izod (unnotched) [kJ/m²] ISO 180	XY	11,0	12,3	40,0	37,7	48,2	-	35,0
	XZ	9,6	7,7	35,7	37,6	21,9	-	57,1
	ZX	4,7	4,1	7,2	11,6	4,4	-	9,1

Ultrafuse® High Temp Filaments	Ultrafuse® Engineering Filaments					Ultrafuse® Reinforced Filaments				
PPSU	PLA PRO1	ABS Fusion+	ASA	PA (Conditioned)	PC/ABS FR	PP GF30	PET CF15	PAHT CF15 (Conditioned)	PA6 GF30 (Conditioned)	PC GF30
215,0	-	91,0	101,0	135,0	86,0	127,0	108,0	128,0	114,0	134,0
74,5	48,0	29,5	34,6	33,2	50,1	41,7	63,2	62,9	46,4	36,1
49,0	21,8	17,9	12,0	17,6	17,3	15,9	12,5	19,1	12,2	11,2
7,3	21,9	10,9	4,5	143,3	10,7	4,4	3,7	2,9	3,2	2,4
2,9	0,9	2,1	1,0	12,8	0,8	0,8	0,5	0,8	1,9	1,1
2221,0	3166,0	1379,0	1828,0	395,0	2545,0	2628,0	6178,0	5052,0	2469,0	2664,0
2150,0	2930,0	1106,0	1400,0	334,0	2188,0	2242,0	2822,0	2455,0	1156,0	1231,0
224,8	20,4	71,9	42,7	No break	49,8	23,1	27,8	21,9	41,8	17,1
270,5	18,8	118,7	41,2	No break	65,4	25,8	32,0	20,4	48,8	18,9
16,3	-	6,9	5,1	13,4	2,9	2,5	1,3	2,8	3,1	3,7
No break	-	73,1	36,8	No break	57,0	20,5	25,1	16,3	36,9	13,9
No break	-	131,1	39,3	No break	87,9	2,4	22,6	15,1	41,4	17,8
21,0	-	6,6	6,8	17,4	3,0	2,6	2,4	4,1	3,8	3,4

Ultrafuse® Flexible Filaments

		TPU 85A	TPU 64D	TPU 95A	TPS 90A	TPC 45D
Shore A Hardness (3 s) ISO 7619-1		85,0	-	92,0	89,0	96
Abrasion Resistance [mm³] ISO 4649		82,0	43,0	64,0	111,0	-
Compression Set at 23 °C, 72 h [%] ISO 815		26,0	25,0	38,0	75,0	-
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	-
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	-

Ultrafuse® Metal Filaments

		316L	17-4PH
Sintered Part Density [kg/m³] ISO 1183-1		7850,0	7600,0
Elongation at Break [%] ISO 6892-1 ¹	XY	53,0	4,0
	ZX	36,0	4,0
Yield Strength, R_{p0.2} [MPa] ISO 6892-1 ¹	XY	251,0	756
	ZX	234,0	764
Vickers Hardness HV10 ISO 6507-1	XY	128	291
	ZX	128	309

Ultrafuse® PLA

Standard Filaments

Technology:

Fused Filament Fabrication

Color:

Natural, Black, White
+ 22 others



High success
rate



Repeatability



Relatively
low printing
temperatures



Non/extremely
low warpage/
shrinkage

Ultrafuse® PLA

Suited for:



Prototyping

Access all resources by scanning the QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZY
HDT (0.45 MPa) (°C)	ISO 75-2	65,0
Tensile Strength (MPa)	ISO 527	80
Elongation at Break (%)	ISO 527	4,2 / - / 1,2
Young's Modulus (MPa)	ISO 527	2308 / - / 2131
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	3,3 / 2,1 / 1,6
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	11 / 9,6 / 4,7



[Complete TDS](#)

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
210-230	-	50-70	glass	≥0,4	40-80

Ultrafuse® PET

Standard Filaments

Technology:

Fused Filament Fabrication

Color:

Black, White, Red, Blue
+ 4 others



Watertight prints
possible



Easy to print like
PLA



High resolution
prints



Ultrafuse® PET

Suited for:



Food applications



Parts where watertightness is required

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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	63,0
Tensile Strength (MPa)	ISO 527	33,4 / - / 17,2
Elongation at Break (%)	ISO 527	2,7 / - / 1,1
Young's Modulus (MPa)	ISO 527	1933 / - / 1665
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	2,1 / 1,9 / 1,8
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	12,3 / 7,7 / 4,1



[Complete TDS](#)

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
210-230	-	60-80	glass	≥0,4	40-80



Ultrafuse® ABS

Standard Filaments

Technology:

Fused Filament Fabrication

Color:

White, Blue, Yellow
+6 others



Chemical
Resistance



Very tough



High wear and
tear



Can be used for
working parts

Ultrafuse® ABS

Suited for:



Functional
prototypes



Chemical
environment



Reasonable
heat
resistance

Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	96,0
Tensile Strength (MPa)	ISO 527	36,3 / - / 21,3
Elongation at Break (%)	ISO 527	7,4 / - / 1,8
Young's Modulus (MPa)	ISO 527	1958 / - / 1608
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	18,8 / 18,9 / 3,5
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	40 / 35,7 / 7,2



[Complete TDS](#)

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
240-260	-	90-110	Tape, spray or glue	≥0,4	40-80

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Ultrafuse® PP

Standard Filaments

Technology:

Fused Filament Fabrication

Color:

White



**Tough and
Strong**



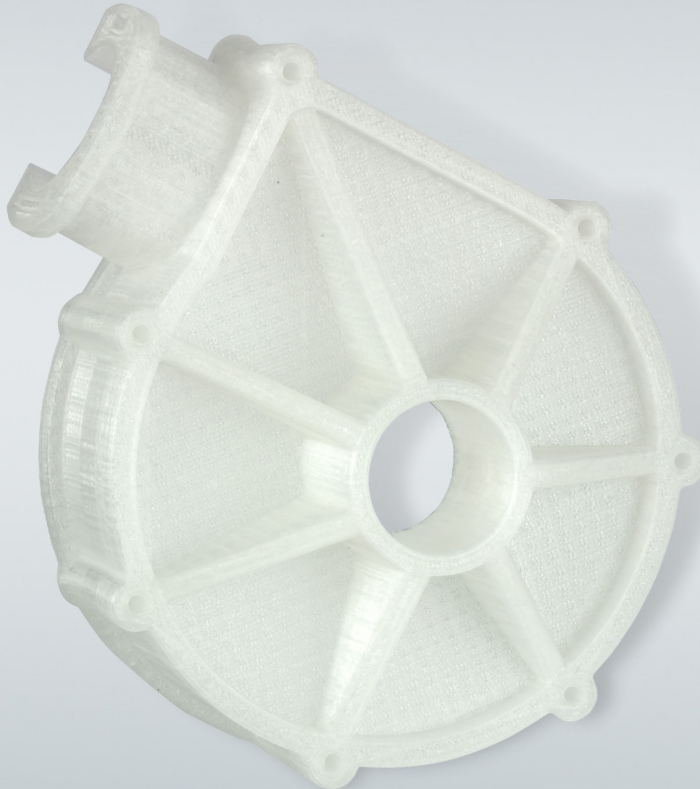
**Fatigue
Resistant**



**Chemical
Resistant**



Light weight
(low density)



Ultrafuse® PP

Suited for:



Chemical
contact



Prototyping

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QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	54,0
Tensile Strength (MPa)	ISO 527	15,5 / - / 9
Elongation at Break (%)	ISO 527	118,6 / - / 5,4
Young's Modulus (MPa)	ISO 527	541 / - / 435
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	5,3 / 10,6 / 2,3
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	37,7 / 37,6 / 11,6



[Complete TDS](#)

Advanced Testing

Skin Contact / Biocompatibility

ISO 10993-5; ISO
10993-10

Passed

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
220-240	-	60-80	PP tape or PP adhesive	≥0,4	20-50



Ultrafuse® rPET

Standard Filaments

Technology:

Fused Filament Fabrication

Color:

Blue Transparent



Sustainable
alternative to
PET



Easy to print



Great end results

Ultrafuse® rPET

Suited for:



Jigs & fixtures



Automotives parts



Prototyping

Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	71,0
Tensile Strength (MPa)	ISO 527	38,6 / - / 14,7
Elongation at Break (%)	ISO 527	4,3 / - / 1,2
Young's Modulus (MPa)	ISO 527	1640 / - / 1334
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	4,4 / 3,3 / 1,5
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	48,2 / 21,9 / 4,4



[Complete TDS](#)

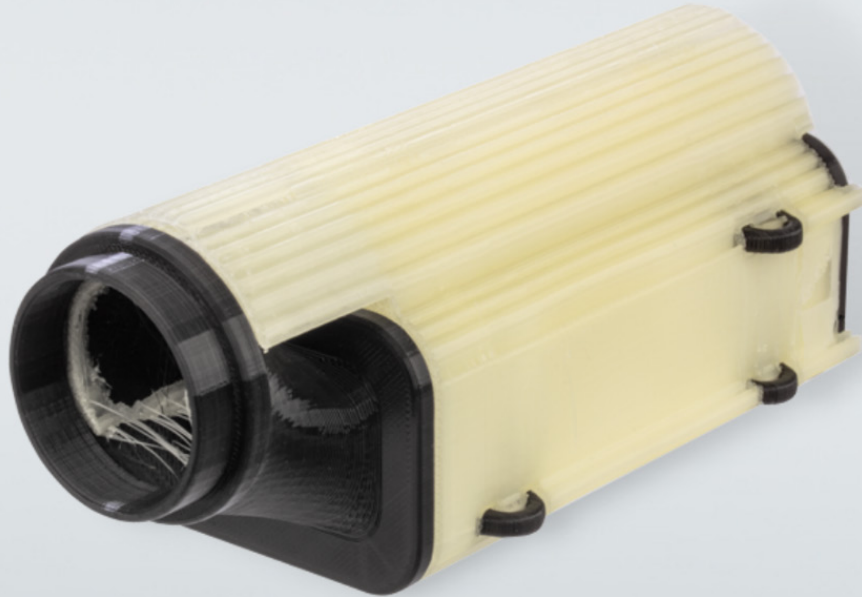
Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
225-245	-	65-85	adhesive spray or glue	≥0,4	30-60

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Ultrafuse® BVOH

Support Filaments

Technology:

Fused Filament Fabrication

Color:

Natural Yellow



Water soluble



Dissolves 2
times faster than
other PVA



Support
compatible
with multiple
materials

Ultrafuse® BVOH

Suited for:



Parts with
overhang



Complex parts



Hollow parts

Access all resources by scanning the
QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	-
Tensile Strength (MPa)	ISO 527	33,7 / - / 8,7
Elongation at Break (%)	ISO 527	14,8 / - / 0,6
Young's Modulus (MPa)	ISO 527	2339 / - / 1426



[Complete TDS](#)

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
190-210	-	60-100	glass	≥0,4	30-60

Ultrafuse® HiPS

Support Filaments

Technology:

Fused Filament Fabrication

Color:

White



**Easy post
processing**
(Glue and painting)



Good aesthetics



**Compatible with
many materials**



Ultrafuse® HiPS

Suited for:



Support material for printing applications with ABS

Access all resources by scanning the QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	91,0
Tensile Strength (MPa)	ISO 527	18,4 / - / 13,7
Elongation at Break (%)	ISO 527	1,4 / - / 1,3
Young's Modulus (MPa)	ISO 527	1588 / - / 1603
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	6,9 / 7,1 / 4,8
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	35 / 57,1 / 9,1



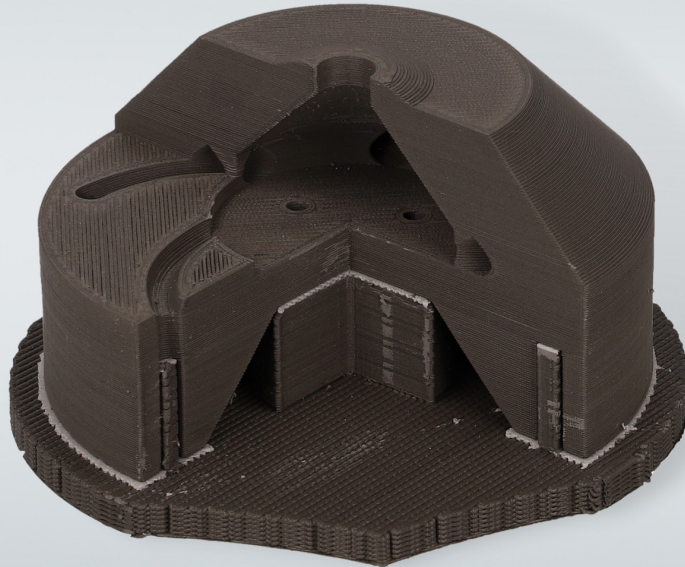
[Complete TDS](#)

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
240-260	-	100-120	spray	≥0,4	40-80

Ultrafuse® Support Layer

Support Filaments



Technology:

Fused Filament Fabrication

Color:

Natural



Suitable for
Ultrafuse® metal
filaments



Allows a wider
range of designs



Excellent
surface quality
of supported
areas of the part



Minimizes
distortion during
debinding and
sintering

Ultrafuse® Support Layer

Suited for:



Series production



Functional parts and prototypes



Tooling



Jigs and fixtures

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Additional Information

Ultrafuse® Support Layer is not developed to print stand-alone parts and should only be printed as a layer attached to the support structures in dual extrusion prints for Ultrafuse® metal filaments.

****This product is not intended for sale, distribution or use in the US and Canada and is not available to our customers in those countries.**



[Complete TDS](#)

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
245-260	passively heated, closed chamber	-	-	≥0,4	15-20

Ultrafuse® PPSU

High Temperature Filaments



Technology:

Fused Filament Fabrication

Color:

Natural



High
dimensional
stability



Resistant to
hot water and
coolants



Resistant to long-
term service
temperatures up
to 180°C



Inherently flame
retardant

Ultrafuse® PPSU

Suited for:



Suitable for autoclaving processes



Aerospace



High-temperature applications

Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	215,0
Tensile Strength (MPa)	ISO 527	74,5 / - / 49
Elongation at Break (%)	ISO 527	7,3 / - / 2,9
Young's Modulus (MPa)	ISO 527	2221 / - / 2150
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	13,7 / 15,8 / 5,3
Impact Strength Charpy (notched) (kJ/m ²)	ISO 179-2	21,8 / 15,0 / 5,7



Complete TDS

Advanced Testing

Volume resistivity [Ωcm]	Surface resistivity [Ωcm]	Dielectric strength (ortho) [kV/mm]	Vicat softening point (50 N) [°C]	Flame class rating	Glow wire test (GWEPT)	Coefficient of Thermal Expansion
IEC 62631-3-1	IEC 62631-3-2	IEC 62631-3-1	ISO 306	UL94	IEC 60695-2-11	ISO 11359-2
2,60E+15 / - / -	2,60E+15	18,5	217,0	V0 @ 1,5 mm and 3,0 mm thickness	960 °C @ 1,5 mm and 3,0 mm thickness	55 E-6/K

Flammability F1 60 sec. vertical	Flammability F2 12 sec. vertical	HR Total Heat Release [kW*min/m ²]	HRRmax [KW/m ²]	Optical Smoke Density	Smoke Toxicity	Railway
FAR 25.853 (a) (thickness 1.6 and 6.35 mm)	FAR 25.853 (a) (thickness 1.6 and 6.35 mm)	FAR 25.853 (d) (thickness 1.0 and 4.0 mm)	FAR 25.853 (d) (thickness 1.0mm)	FAR 25.853 (d) (thickness 1.0 and 4.5 mm)	AITM 3.0005 (thickness 1.5 and 4.5 mm)	EN 45545-2 (thickness 1.5 and 3.0 mm)
Passed	Passed	Passed	Passed	Passed	Passed	Classified HL1-3 R7, R23, R24, R26

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
390-410	170-210	190-220	glass	≥0,4	25-80

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Ultrafuse® PLA PRO1

Engineering Filaments



Technology:

Fused Filament Fabrication

Color:

White, Black, Grey



Speed of
printing



Strength



Versatility



Consistency

Ultrafuse® PLA PRO1

Suited for:



Jigs & fixtures



Prototyping

Access all resources by scanning the QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
Tensile Strength (MPa)	ISO 527	48 / - / 21,8
Elongation at Break (%)	ISO 527	21,9 / - / 0,9
Young's Modulus (MPa)	ISO 527	3166 / - / 2930
Impact Strength Charpy (unnotched) (kJ/m ²)	ISO 179-2	20,4 / 18,8 / -



[Complete TDS](#)

Advanced Testing

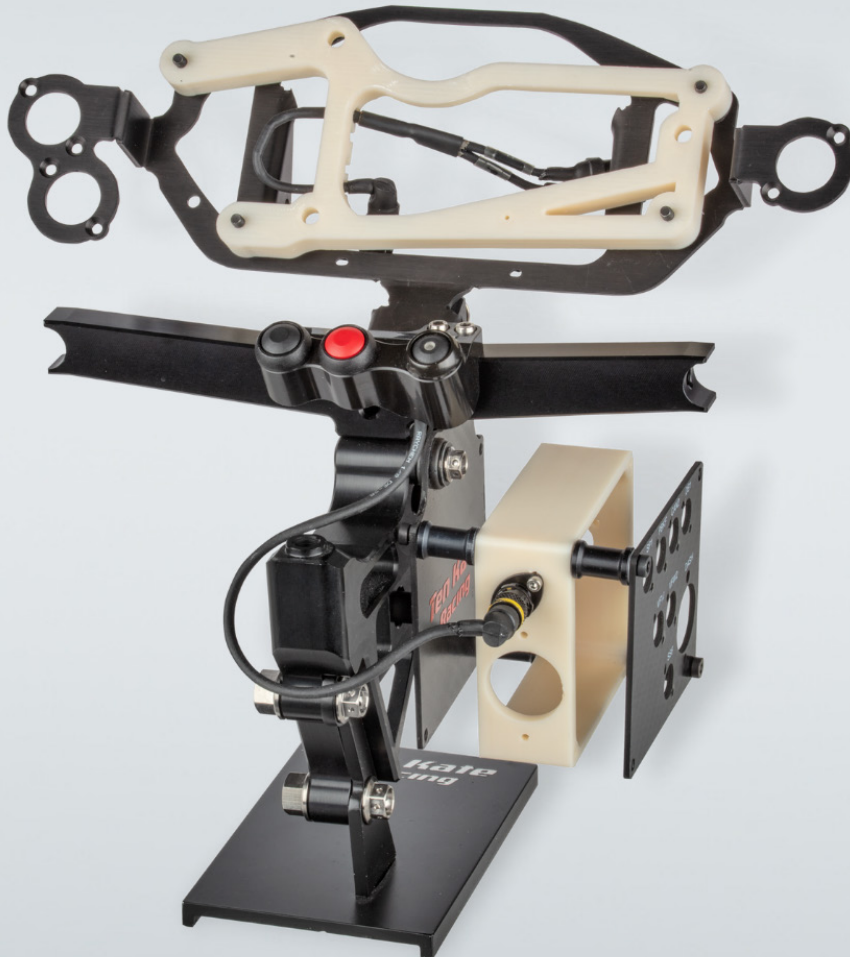
Skin Contact / Biocompatibility

ISO 10993-5; ISO 10993-10

Passed

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
200-220	-	50-70	glass	≥0,4	40-150



Ultrafuse® ABS Fusion+

Engineering Filaments

Technology:

Fused Filament Fabrication

Color:

Natural, Black, Grey



Easy to print



Direct printing
on heated glass
or print bed
surfaces



High heat
resistance



Adheres to water
soluble support

Ultrafuse® ABS Fusion+

Suited for:



Jigs &
fixtures



Automotive
parts

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QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	91,0
Tensile Strength (MPa)	ISO 527	29,5 / - / 17,9
Elongation at Break (%)	ISO 527	10,9 / - / 2,1
Young's Modulus (MPa)	ISO 527	1379 / - / 1106
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	26,4 / 38,4 / 2,2
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	73,1 / 131,1 / 6,6



Complete TDS

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
240-260	-	100-120	glass + spray glue	≥0,4	40-80



Ultrafuse® ASA

Engineering Filaments

Technology:

Fused Filament Fabrication

Color:

Natural, Black



UV Stabilized



Weather
resistance



Chemical
resistance



Resistant to
wear and tear

Ultrafuse® ASA

Suited for:



Outdoor use



Functional prototypes



Chemical environment



Reasonable heat resistance

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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	101,0
Tensile Strength (MPa)	ISO 527	34,6 / - / 12
Elongation at Break (%)	ISO 527	4,5 / - / 1
Young's Modulus (MPa)	ISO 527	1828 / - / 1400
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	8,7 / 11,4 / 1,9
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	36,8 / 39,3 / 6,8



[Complete TDS](#)

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
260-280	passively heated, closed chamber	100-120	spray or PC adhesive	≥0,4	30-60



Ultrafuse® PA

Engineering Filaments

Technology:

Fused Filament Fabrication

Color:

Natural & Black



Good fatigue
resistance



Good wear
resistance/
lubricity



Good impact
resistance at low
temperatures



Low melting
point makes
it printable
for many FFF
printers

Ultrafuse® PA

Suited for:



Suitable for a wide range of different components and machine elements



Most engineering sectors

Access all resources by scanning the QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	135,0
Tensile Strength (MPa)	ISO 527	33,2 / - / 17,6
Elongation at Break (%)	ISO 527	143,3 / - / 12,8
Young's Modulus (MPa)	ISO 527	395,0 / - / 334,0
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	85,4 / 106,0 / 10,1
Impact Strength Charpy (notched) (kJ/m ²)	ISO 179-2	- / 136,0 / 9,4



[Complete TDS](#)

Advanced Testing

Vicat softening point (50 N) [°C]

ISO 306

172,0

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
220-250	-	90-120	glass with PVA	≥0,4	30-60

Ultrafuse® PC/ABS FR

Engineering Filaments

Technology:

Fused Filament Fabrication

Color:

Black



Outstanding aesthetics



Strong layer adhesion



High print speeds possible



UL94 V0 flame retardancy



Ultrafuse® PC/ABS FR

Suited for:



Housing for
Raspberry pi



Sockets and
plugs



Housing for
handheld
devices or
powertools



Automotive
components

Access all resources by scanning the
QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZY
HDT (0.45 MPa) (°C)	ISO 75-2	86,0
Tensile Strength (MPa)	ISO 527	50,1 / - / 17,3
Elongation at Break (%)	ISO 527	10,7 / - / 0,8
Young's Modulus (MPa)	ISO 527	2545 / - / 2188
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	16,8 / 30,3 / 1,8
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	16,8 / 30,3 / 1,8



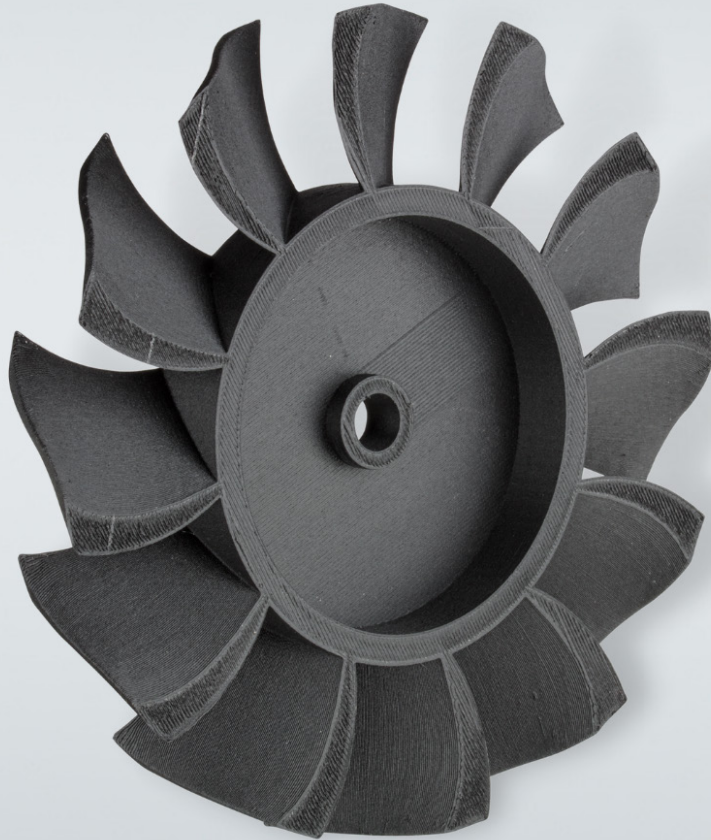
[Complete TDS](#)

Advanced Testing

Flame class rating	Glow wire test (GWEPT)	Railway
UL94	IEC 60695-2-11	EN 45545-2 (thickness 1,5 and 3,0 mm)
V0 @ 1.5 mm and 3.0 mm thickness	725 °C @ 1.5 mm thickness 960 °C @ 3.0 mm thickness	Classified HL1-3 R26

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
260-280	passively heated, closed chamber	90-110	glass	≥0,4	30-50



Ultrafuse® PP GF30

Reinforced Filaments

Technology:

Fused Filament Fabrication

Color:

Black



Excellent
chemical
resistance



High heat
resistance



Improved UV
resistance



Low moisture
uptake

Ultrafuse® PP GF30

Suited for:



Functional
prototyping



Automotive/
transportation



Jigs and
fixtures

Access all resources by scanning the
QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	127,0
Tensile Strength (MPa)	ISO 527	41,7 / - / 15,9
Elongation at Break (%)	ISO 527	4,4 / - / 0,8
Young's Modulus (MPa)	ISO 527	2628 / - / 2242
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	5,6 / 6,2 / 1,4
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	20,5 / 2,4 / 2,6



Complete TDS

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
240-260	-	20-40 / 70-90	PP strapping tape / PPGF adhesive	≥0,6	30-80



Ultrafuse® PET CF15

Reinforced Filaments

Technology:

Fused Filament Fabrication

Color:

Black



Strong, rigid
components



Very low
moisture
absorption



High
dimensional
stability



Heat resistant up
to 108 °C

Ultrafuse® PET CF15

Suited for:



Automotive



Jigs & fixtures



Applications
for humid
operating
environments

Access all resources by scanning the
QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	108,0
Tensile Strength (MPa)	ISO 527	63,2 / - / 12,5
Elongation at Break (%)	ISO 527	3,7 / - / 0,5
Young's Modulus (MPa)	ISO 527	6178 / - / 2822
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	5,7 / 5 / 2
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	25,1 / 22,6 / 2,4



[Complete TDS](#)

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
250-270	-	65-85	PEI or glass	≥0,6	30-80



Ultrafuse® PAHT CF15

Reinforced Filaments

Technology:

Fused Filament Fabrication

Color:

Black



Higher chemical
resistance than
most PA grades



Strong, rigid
components



High
dimensional
stability



Low moisture
absorption

Ultrafuse® PAHT CF15

Suited for:



Automotive



Complex geometries in challenging environments

Access all resources by scanning the QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	128,0
Tensile Strength (MPa)	ISO 527	62,9 / - / 19,1
Elongation at Break (%)	ISO 527	2,9 / - / 0,8
Young's Modulus (MPa)	ISO 527	5052,0 / - / 2455,0
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	6,5 / 5,8 / -
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	16,3 / 15,1 / 4,1



[Complete TDS](#)

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
260-280	-	100-120	PEI or glass	≥0,6	30-80



Ultrafuse® PA6 GF30

Reinforced Filaments

Technology:

Fused Filament Fabrication

Color:

Black



Good chemical
resistance



Very high
stiffness and
strength



Resistance
to UV light
exposure



Excellent layer
adhesion

Ultrafuse® PA6 GF30

Suited for:



Industrial tooling



Automotive / transportation



Functional prototyping

Access all resources by scanning the QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
HDT (0.45 MPa) (°C)	ISO 75-2	114,0
Tensile Strength (MPa)	ISO 527	46,4 / - / 12,2
Elongation at Break (%)	ISO 527	3,2 / - / 1,9
Young's Modulus (MPa)	ISO 527	2469,0 / - / 1156,0
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	20,9 / 19,0 / 2,7
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	36,9 / 41,4 / 3,8



[Complete TDS](#)

Advanced Testing

Vicat softening point (50 N) [°C]

ISO 306

192,0

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
240-280	-	70-100	glass	≥0,6	30-80

Ultrafuse® PC GF30

Reinforced Filaments



Technology:

Fused Filament Fabrication

Color:

Black



UL94 V0 flame
retardancy



Very low
moisture
absorption



Good
temperature
resistance



Good heat
deflection
temperature

Ultrafuse® PC GF30

Suited for:



Electronics



Automotive /
transportation



Functional
prototyping

Access all resources by scanning the
QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZY
HDT (0.45 MPa) (°C)	ISO 75-2	134,0
Tensile Strength (MPa)	ISO 527	36,1 / - / 11,2
Elongation at Break (%)	ISO 527	2,4 / - / 1,1
Young's Modulus (MPa)	ISO 527	2664,0 / - / 1231,0
Impact Strength Izod (notched) (kJ/m ²)	ISO 180	5,6 / 5,4 / 2,1
Impact Strength Izod (unnotched) (kJ/m ²)	ISO 180	13,9 / 17,8 / 3,4



[Complete TDS](#)

Advanced Testing

Flame class rating	Railway
UL94	EN 45545-2 (thickness 1.5 and 3.0 mm)
V0 @ 1.5 mm and 3.0 mm thickness	Classified HL1-3 R22, R23, R24, R26

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
280-330	-	80-100	PC adhesive	≥0,6	30-60

Ultrafuse® TPU 85A

Flexible Filaments

Technology:

Fused Filament Fabrication

Color:

Natural



High tensile strength and outstanding resistance to tear propagation



Excellent damping characteristics



High resistance to oils, greases, oxygen and ozone



Very good low-temperature flexibility

Ultrafuse® TPU 85A

Suited for:



Automotive,
industrial
manufacturing
agriculture and
construction



Footwear,
sports and
leisure



Functional
flexible parts

Access all resources by scanning the
QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
Compression Set at 23 °C, 72 h (%)	ISO 815	26,0
Abrasion Resistance (mm ³)	ISO 4649	82,0
Shore A Hardness (3 s)	ISO 7619-1	85,0
Elongation at Break TPE (%)	ISO 527	600 / - / 320
Stress at Break TPE (MPa)	ISO 527	34 / - / 10
Tear Strength (kN/m)	ISO 34-1	80 / 18 / 30



[Complete TDS](#)

Advanced Testing

Volume resistivity [Ω cm]	Dielectric strength (orthogonal) [kV/mm]	Skin Contact / Biocompatibility
IEC 62631-3-1	IEC 62631-3-1	ISO 10993-5; ISO 10993-10
2,60E+11 / - / 2,10E+11	21,0	Passed

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
200-220	-	40	glass	≥0,4	15-40

Ultrafuse® TPU 64D

Flexible Filaments

Technology:

Fused Filament Fabrication

Color:

White, Black



Printable on
direct drive and
bowden style
printers



Compatible with
water soluble
support



High impact
resistance



High wear
and abrasion
resistance

Ultrafuse® TPU 64D

Suited for:



Tooling, jigs
and fixtures



Functional
flexible parts



Wear and tear
application

Access all resources by scanning the
QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
Compression Set at 23 °C, 72 h (%)	ISO 815	25,0
Abrasion Resistance (mm ³)	ISO 4649	43,0
Elongation at Break TPE (%)	ISO 527	399 / - / 115
Stress at Break TPE (MPa)	ISO 527	37 / - / 19
Tear Strength (kN/m)	ISO 34-1	66 / 37 / 79



[Complete TDS](#)

Advanced Testing

Skin Contact / Biocompatibility

ISO 10993-5; ISO
10993-10

Passed

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
230-255	-	55	glass	≥0,4	30-60



Ultrafuse® TPU 95A

Flexible Filaments

Technology:

Fused Filament Fabrication

Color:

White, Black



Perfect for fast
printing



High abrasion
resistance



Good resistance
to oils and
common
industrially used
chemicals



Printable on
direct drive and
bowden style
printers

Ultrafuse® TPU 95A

Suited for:



Wear and tear
application



Functional
flexible parts

Access all resources by scanning the
QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
Compression Set at 23 °C, 72 h (%)	ISO 815	38,0
Abrasion Resistance (mm ³)	ISO 4649	64,0
Shore A Hardness (3 s)	ISO 7619-1	92,0
Elongation at Break TPE (%)	ISO 527	611 / - / 192
Stress at Break TPE (MPa)	ISO 527	44,2 / - / 12,2
Tear Strength (kN/m)	ISO 34-1	90 / 8 / 14



[Complete TDS](#)

Advanced Testing

Skin Contact / Biocompatibility

ISO 10993-5; ISO
10993-10

Passed

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
210-230	-	40	glass	≥0,4	15-40



Ultrafuse® TPS 90A

Flexible Filaments

Technology:

Fused Filament Fabrication

Color:

Natural White



Non-slip
properties



Reduced
moisture uptake



Excellent layer
adhesion



Very good low-
temperature
flexibility

Ultrafuse® TPS 90A

Suited for:



Functional flexible parts



Handles of appliances



Seals and gaskets



Tooling, jigs and fixtures

Access all resources by scanning the QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZX
Compression Set at 23 °C, 72 h (%)	ISO 815	75,0
Abrasion Resistance (mm ³)	ISO 4649	111,0
Shore A Hardness (3 s)	ISO 7619-1	89,0
Strain at Break TPE (%)	ISO 527	280 / - / 9
Stress at Break TPE (MPa)	ISO 527	7 / - / 2
Tear Strength (kN/m)	ISO 34-1	10 / 5 / 4



[Complete TDS](#)

Advanced Testing

Skin Contact / Biocompatibility

ISO 10993-5; ISO 10993-10

Passed

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
260-280	-	70-90	PEI, PI or glue	≥0,4	10-30

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Ultrafuse® TPC 45D

Flexible Filaments



Technology:

Fused Filament Fabrication

Color:

Natural, Blue, Yellow
+7 others



Rubber-like
Thermoplastic
Copolyester
Elastomer
(TPE-C)



Flexibility



Impact
resistance

Ultrafuse® TPC 45D

Suited for:



Protective covers



Turning parts



Dampening



Combining hard plastics with flex

Access all resources by scanning the QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / XZ / ZY
Printed Part Density Dry (kg/m ³)	ISO 1183-1	1150,0
Melting Temperature (°C)	ISO 11357-3	180,0
Shore A Hardness (3 s)	ISO 7619-1	96
Shore D Hardness (15 s)	ISO 7619-1	44



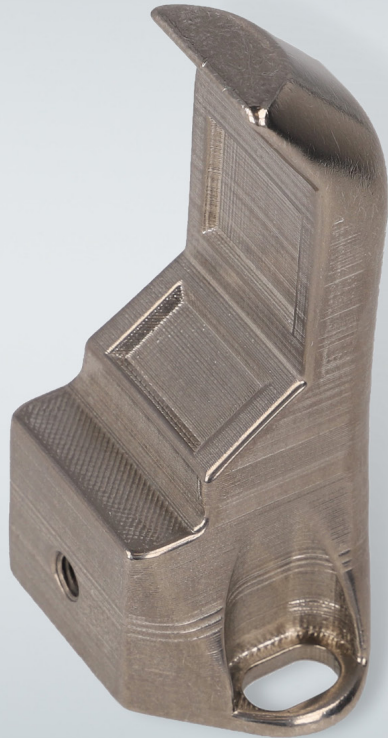
[Complete TDS](#)

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
210-250	-	<60	glass	≥0,4	20-50

Ultrafuse® 316L

Metal Filaments



Technology:

Fused Filament Fabrication

Color:

Steel



Attractive
Total Cost of
Ownership



Fast material
exchange



Easily applicable
filament for FFF



Easy and
affordable metal
3D printing

Ultrafuse® 316L

Suited for:



Tooling



Jigs & fixtures



Functional prototypes



Suitable for serial production

Access all resources by scanning the QR code



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Technical Specifications

Mechanical properties	Standard	Value XY / ZX
Impact Strength Charpy (notched) (kJ/m ²)	ISO 148-12	111,0
Tensile Strength (MPa)	ISO 6892-11	561 / 521
Elongation at Break (%)	ISO 6892-11	53 / 36
Yield Strength, Rp 0.2 (MPa)	ISO 6892-11	251 / 234
Vickers Hardness	ISO 6507-1	128 HV10 / 128HV10



[Complete TDS](#)

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
230-250	-	90-120	glass + tape or glue	≥0,4	15-50

Ultrafuse® 17-4PH

Metal Filaments

Technology:

Fused Filament Fabrication

Color:

Steel



Easy and
affordable way
of metal 3D
printing



Fully hardened
enables highest
strength



Wide range of
post-processing
options for green
parts



High mechanical
strength and
hardness

Ultrafuse® 17-4PH

Suited for:



Tooling



Jigs & fixtures



Functional parts & prototypes



Series production

Access all resources by scanning the QR code



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Technical Specifications

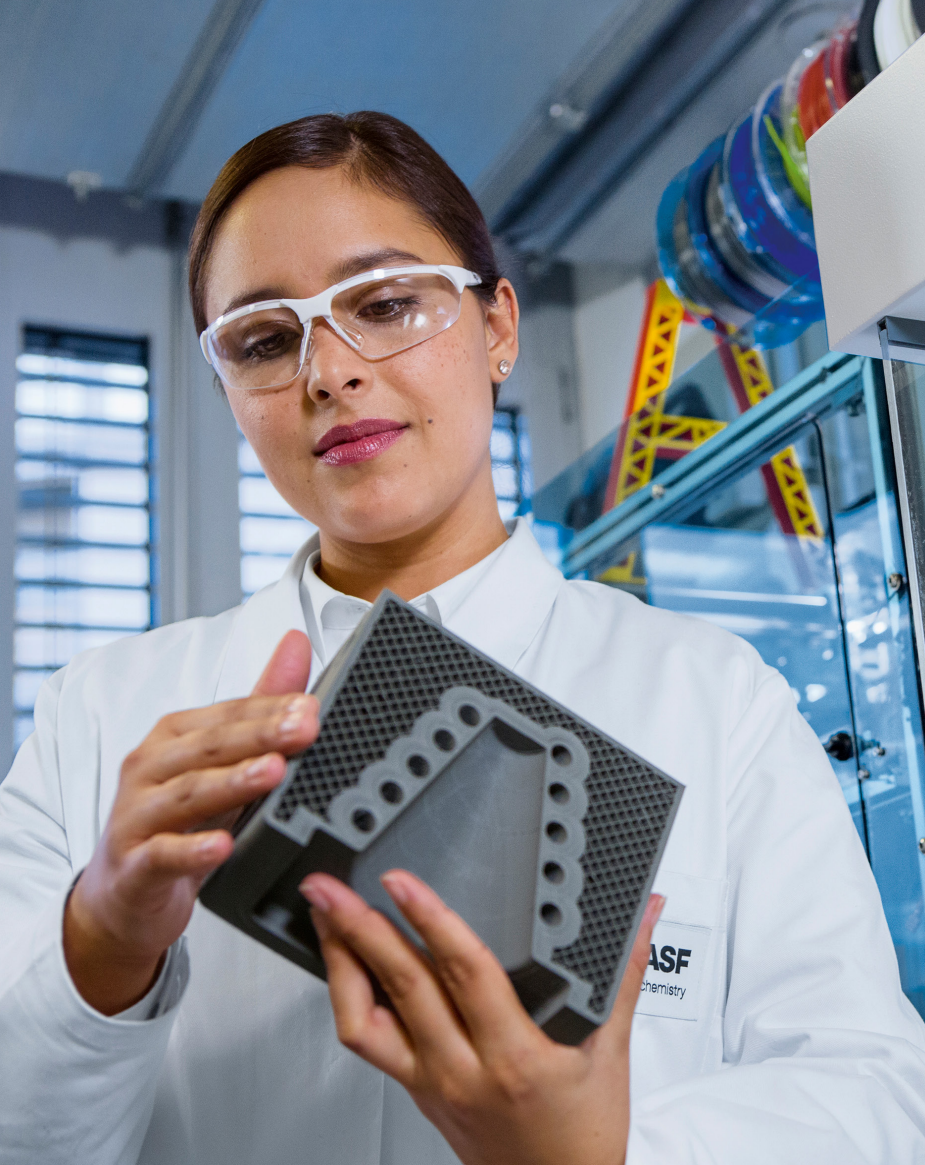
Mechanical properties	Standard	Value XY / ZX
Tensile Strength (MPa)	ISO 6892-11	990 / 1004
Elongation at Break (%)	ISO 6892-11	4 / 4
Yield Strength, Rp 0.2 (MPa)	ISO 6892-11	756 / 764
Vickers Hardness HV10	ISO 6507-1	291 / 309



[Complete TDS](#)

Print Settings

Nozzle Temperature [°C]	Build Chamber Temperature [°C]	Bed Temperature [°C]	Bed Material	Nozzle Diameter [mm]	Print Speed [mm/s]
230-250	-	90-120	glass + tape or glue	≥0,4	15-50



Have a 3D printing project in mind?

At Forward AM, we drive the industrialization of Additive Manufacturing.

We accompany customers from first idea to final printed part - on global scale, at highest quality.

Get in touch with us:

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