

# Technical Data Sheet

# Ultrafuse® PAHT CF15

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Version No.: 4.0

## General information

### Components

High temperature Polyamide based filament filled with 15% carbon fibers for Fused Filament Fabrication.

### Product Description

Ultrafuse® PAHT CF15 is a high-performance 3D printing filament that opens new application fields in FFF printing. In parallel to its advanced mechanical properties, dimensional stability, and chemical resistance, it has very good processability. It works in any FFF printer with a hardened nozzle. In addition to that, it is compatible with water-soluble support material and HiPS, which allow printing complex geometries that work in challenging environments. Ultrafuse® PAHT CF15 offers high temperature resistance, low moisture absorption and is also suitable for ESD SAFE (surface resistivity  $10^5$ - $10^{11}$   $\Omega$ ) applications.

### Delivery form and warehousing

Ultrafuse® PAHT CF15 filament should be stored at 15 - 25°C in its originally sealed package in a clean and dry environment. If the recommended storage conditions are observed the products will have a minimum shelf life of 12 months.

### Product safety

Recommended: Process materials in a well ventilated room, or use professional extraction systems. For further and more detailed information please consult the corresponding material safety data sheets.

### Disclaimer

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed.

### Filament Properties

Filament Diameter	1.75 mm	2.85 mm
Diameter Tolerance	±0.050 mm	±0.075 mm
Roundness	±0.050 mm	±0.075 mm
Available Spool size	750 g	750 g
Available colors	black	

### Spool Properties

Available Spool size	750 g
Outer diameter	200 mm
Inner diameter	50.5 mm
width	55 mm

### Recommended 3D-Print processing parameters

### Used for test specimens

Printer	FFF printer	DDdrop
Nozzle Temperature	260 – 280 °C / 500 – 536 °F	285 °C / 545 °F
Build Chamber Temperature	-	-
Bed Temperature	100 – 120 °C / 212 – 248 °F	110 °C / 212 °F
Bed Material	PEI or Glass	Glass
Nozzle Diameter	≥ 0,6 mm, Ruby or hardened	≥ 0.6 mm
Print Speed	30 - 80 mm/s	45 mm/s

Please check your print profile availability for an easy start at [www.forward-am.com](http://www.forward-am.com).

### Further Recommendations

Drying recommendations to ensure printability and best mechanical properties	80 °C in a hot air dryer or vacuum oven for at least 4 to 16 hours. Please note: To ensure constant material properties the material should always be kept dry.
Support material compatibility	Single material breakaway, Ultrafuse® BVOH, Ultrafuse® HIPS

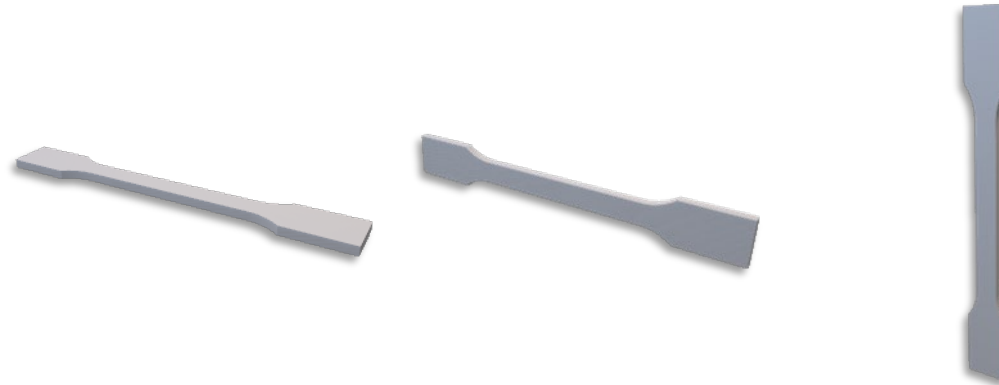
General Properties		Standard
Filament Density* (conditioned <sup>1</sup> )	1203 kg/m <sup>3</sup> / 75.1 lb/ft <sup>3</sup>	ISO 1183-1
Shore Hardness D, 15s / A, 30s	72	ISO 7619-1
Poisson-Number (dry)	0,44	ISO 527
Poisson-Number (conditioned <sup>1</sup> )	0,51	ISO 527

\*measured on filament

<sup>1</sup>Conditioning of the specimens: Standard climate (23°C, 50% RH 72h)

Thermal Properties		Standard
HDT at 1.8 MPa (dry)	92 °C / 198 °F	ISO 75-2
HDT at 0.45 MPa (dry)	145 °C / 293 °F	ISO 75-2
HDT at 1.8 MPa (conditioned <sup>1</sup> )	91 °C / 196 °F	ISO 75-2
HDT at 0.45 MPa (conditioned <sup>1</sup> )	128 °C / 262 °F	ISO 75-2
Vicat softening point @ 50 N (dry)	205 °C / 401 °F	ISO 306
Vicat softening point @ 10 N (dry)	221 °C / 429.8 °F	ISO 306
Vicat softening point @ 50 N (conditioned <sup>1</sup> )	192 °C / 377.6 °F	ISO 306
Vicat softening point @ 10 N (conditioned <sup>1</sup> )	217 °C / 422.6 °F	ISO 306
Glass Transition Temperature	70 °C / 158 °F	ISO 11357-2
Crystallization Temperature	180 °C / 356 °F	ISO 11357-3
Melting Temperature	234 °C / 453 °F	ISO 11357-3
Melt Volume Flow Rate	42.2 cm <sup>3</sup> /10min / 2.6 in <sup>3</sup> /10min (275°C/5kg)	ISO 1133

**Mechanical Properties | Dried Specimen**



Print direction	Standard	XY	XZ	ZX
		Flat	On its edge	Upright
Tensile strength <sup>2</sup>	ISO 527	103.2 MPa / 15.0 ksi	-	18.2 MPa / 2.6 ksi
Elongation at Break <sup>2</sup>	ISO 527	1.8 %	-	0.5 %
Young's Modulus <sup>3</sup>	ISO 527	8386 MPa / 1216 ksi	-	3532 MPa / 512 ksi
Flexural Strength <sup>4</sup>	ISO 178	160.7 MPa / 23.3 ksi	171.8 MPa / 24.9 ksi	50.8 MPa / 7.4 ksi
Flexural Modulus <sup>4</sup>	ISO 178	8258 MPa / 1198 ksi	7669 MPa / 1112 ksi	2715 MPa / 394 ksi
Flexural Elongation at Break <sup>4</sup>	ISO 178	2.4 %	2.8 %	1.8 %
Impact Strength Charpy (notched)	ISO 179-2	4.8 kJ/m <sup>2</sup>	3.9 kJ/m <sup>2</sup>	1.3 kJ/m <sup>2</sup>
Impact Strength Charpy (unnotched)	ISO 179-2	20.6 kJ/m <sup>2</sup>	19.3 kJ/m <sup>2</sup>	2.9 kJ/m <sup>2</sup>
Impact Strength Izod (notched)	ISO 180	4.9 kJ/m <sup>2</sup>	5.1 kJ/m <sup>2</sup>	-
Impact Strength Izod (unnotched)	ISO 180	16.4 kJ/m <sup>2</sup>	18.1 kJ/m <sup>2</sup>	2.9 kJ/m <sup>2</sup>

**Electrical Properties**

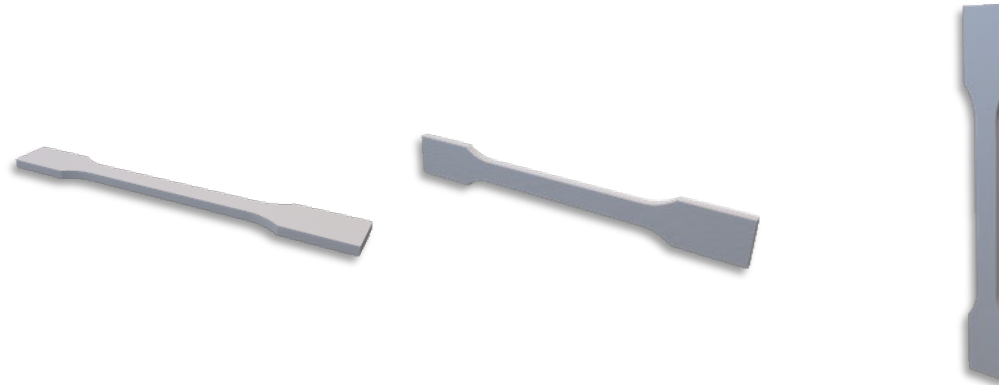
Volume resistivity	IEC 62631-3-1	3.2E+07 Ωcm	-	1.6E+05 Ωcm
Surface resistivity	IEC 62631-3-2	9.7E+05 Ω	-	1.8E+06 Ω

<sup>2</sup>testing speed: 5 mm/min

<sup>3</sup>testing speed: 1 mm/min

<sup>4</sup>testing speed: 2 mm/min

**Mechanical Properties | Conditioned Specimen<sup>1</sup>**



Print direction	Standard	XY	XZ	ZX
		Flat	On its edge	Upright
Tensile strength <sup>2</sup>	ISO 527	62.9 MPa / 9.1 ksi	-	19.1 MPa / 2.8 ksi
Elongation at Break <sup>2</sup>	ISO 527	2.9 %	-	0.8 %
Young's Modulus <sup>3</sup>	ISO 527	5052 MPa / 733 ksi	-	2455 MPa / 356 ksi
Flexural Strength <sup>4</sup>	ISO 178	125.1 MPa / 18.1 ksi	121.9 MPa / 17.7 ksi	56.0 MPa / 8.1 ksi
Flexural Modulus <sup>4</sup>	ISO 178	6063 MPa / 879 ksi	6260 MPa / 908 ksi	2190 MPa / 318 ksi
Flexural Elongation at Break <sup>4</sup>	ISO 178	No break	3.6 %	4.0 %
Impact Strength Charpy (notched)	ISO 179-2	5.1 kJ/m <sup>2</sup>	5.3 kJ/m <sup>2</sup>	1.6 kJ/m <sup>2</sup>
Impact Strength Charpy (unnotched)	ISO 179-2	21.9 kJ/m <sup>2</sup>	20.4 kJ/m <sup>2</sup>	2.8 kJ/m <sup>2</sup>
Impact Strength Izod (notched)	ISO 180	6.5 kJ/m <sup>2</sup>	5.8 kJ/m <sup>2</sup>	-
Impact Strength Izod (unnotched)	ISO 180	16.3 kJ/m <sup>2</sup>	15.1 kJ/m <sup>2</sup>	4.1 kJ/m <sup>2</sup>

<sup>1</sup>Conditioning of the specimens: Standard climate (23°C, 50% RH 72h)

<sup>2</sup>testing speed: 5 mm/min

<sup>3</sup>testing speed: 1 mm/min

<sup>4</sup>testing speed: 2 mm/min