Ultrafuse® PC GF30

Strong | Temperature resistant | flame retardant

Extended TDS

Complete Technical Documentation and Testing Summary

Version 1.1

Contents

Are you looking for an updated TDS version? Check out the latest online version here.

Technical Data Sheet

With its resilience to UV light and its flame retardancy and

UL 94 V0 verification it is perfectly suitable for various industrial applications.

Filament Properties		
Filament Diameter	1.75 mm	2.85 mm
Average diameter Tolerance	±0.050 mm	±0.1 mm
Average ovality	<0.050 mm	<0.050 mm
Available Spool size	750 g, 2.0 kg, 4.0 kg, 8.0 kg	750 g, 2.0 kg, 4.0 kg, 8.0 kg
Available colors	natural, white, black, …	

Spool Properties				
Spool size	750 g	2.0 kg	4.0 kg	8.0 kg
Outer diameter	200 mm	300 mm	350 mm	355 mm
Inner diameter	50.5 mm	51.5 mm	51.7 mm	36 mm
Width	55 mm	103 mm	103 mm	167 mm

Recommended 3D-Print processing parameters		Used for test specimens
Printer	FFF printer	JCR 600
Nozzle Temperature[1)]	280 – 330°C	330 °C
Build Chamber Temperature	-	80 °C
Bed Temperature	80 – 100°C	130 °C
Bed Material	PC adhesive	Glass
Nozzle Diameter	≥ 0.6 mm	0.6 mm
Print Speed	30 - 60 mm/s	40 mm/s
Max Volumetric Speed[2)]	23.2 mm^3/s	//

Please check your standard and/or high speed print profile availability for an easy start at www.forward-am.com.

[1] Fast printing might require an additional increase of the nozzle temperature; the stated printing speed is based on current validations. As equipment and technology continues to evolve, it is possible that even higher printing speeds may be attainable in the future.
[2] Based on Bambu Lab X1C with a nozzle diameter of 0.6 mm

Further Recommendations	
Drying recommendations to ensure printability and best mechanical properties[3)]	100 °C in a hot air dryer or vacuum oven for 4 to 16 hours

General Properties	Standard	Average Values
Filament Density[4)]	ISO 1183-1	1263 kg/m^3

[3] Please note: To ensure constant material properties the material should always be kept dry.
[4] measured on filament

Tensile Properties[5]	Standard	Average Values		
		XY-Direction[6]	XZ-Direction[7]	ZX-Direction[8]
Tensile strength[9]	ISO 527	36.1 MPa	-	11.2 MPa
Elongation at Break[9]	ISO 527	2.4 %	-	1.1 %
Young's Modulus[10]	ISO 527	2665 MPa	-	1231 MPa

Flexural Properties[6] [11]	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Flexural Strength	ISO 178	63.4 MPa	78.8 MPa	19.0 MPa
Flexural Modulus	ISO 178	2690 MPa	3450 MPa	934 MPa
Flexural Elongation at Break	ISO 178	3.2 %	2.9 %	2.5 %

Impact Properties[6]	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Impact Strength Charpy (notched)	ISO 179-2	6.1 kJ/m²	6.5 kJ/m²	1.8 kJ/m²
Impact Strength Charpy (unnotched)	ISO 179-2	17.1 kJ/m²	18.9 kJ/m²	3.7 kJ/m²
Impact Strength Izod (notched)	ISO 180	5.6 kJ/m²	5.4 kJ/m²	2.1 kJ/m²
Impact Strength Izod (unnotched)	ISO 180	13.9 kJ/m²	17.8 kJ/m²	3.4 kJ/m²

[5] Samples were conditioned in standard climate (23°C, 50% RH 72h)

6

7

8

[9] Testing speed: 5 mm/min
[10] Testing speed: 1 mm/min
[11] Testing speed: 2 mm/min

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. Values in this document are average values, measured and calculated according to the instructions in the listed standards. The used specimens are produced with the Fused Filament Fabrication method. Measured values can vary depending on used print orientation and print parameters.

Please contact us for further product information, like for example REACH, RoHS, FCS.

The safety data given in this publication is for informational purposes only and does not constitute a legally binding MSDS. The relevant MSDS can be obtained upon request from your supplier or you may contact Forward AM Technologies GmbH directly at sales@forward-am.com.

Process materials in a well-ventilated room, or use professional extraction systems.

Thermal Properties[6)]	Standard	Average Values
HDT A at 1.8 MPa	ISO 75-2	137 °C
HDT B at 0.45 MPa	ISO 75-2	140 °C
Vicat softening point at 50 N	ISO 306	143 °C
Vicat softening point at 10 N	ISO 306	150 °C
Glass Transition Temperature	ISO 11357-2	142 °C
Melting Temperature	ISO 11357-3	259°C
Melt Volume-Flow Rate (MVR)	ISO 1133	26.0 cm^3/10 min (300°C, 2.16 kg)
Melt Mass-Flow Rate (MFR)	ISO 1133	30.1 g/10 min (300°C, 2.16 kg)

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. Values in this document are average values, measured and calculated according to the instructions in the listed standards. The used specimens are produced with the Fused Filament Fabrication method. Measured values can vary depending on used print orientation and print parameters.

Please contact us for further product information, like for example REACH, RoHS, FCS.

The safety data given in this publication is for informational purposes only and does not constitute a legally binding MSDS. The relevant MSDS can be obtained upon request from your supplier or you may contact Forward AM Technologies GmbH directly at sales@forward-am.com.

Process materials in a well-ventilated room, or use professional

Fire, Smoke, Toxicity (FST) properties[6]	Standard	Average Values
Fire protection on railway vehicles	EN45545-2-2016	R22 HL1-3 (1.5 mm) R22 HL1-3 (3.0 mm) R23 HL1-3 (1.5 mm) R23 HL1-3 (3.0 mm) R24 HL1-3 R26 HL1-3 (1.5 mm) R26 HL1-3 (3.0 mm)
Optical Smoke Density	FAR 25.853 (d)	PASS (1.5 mm) PASS (3.0 mm)
CIT (NFX)	EN ISO 4589-2	0.2
Flame class rating	UL 94	V-0 (1.5 mm) V-0 (3.0 mm)
Glow wire test (GWEPT)	IEC 60695-2-11	750 °C (1.5 mm) 750 °C (3.0 mm) 850 °C (1.5 mm) 850 °C (3.0 mm) 960 °C (1.5 mm) 960 °C (3.0 mm)
Oxygen Content		>32 $\%_{Oxygen}$

For the statement on Fire protection on railway vehicles, see Chapter Fire protection on railway vehicles data

Hardness and Abrasion	Standard	Typical Values
Shore Hardness D (15s)	DIN ISO 7619-1	75

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. Values in this document are average values, measured and calculated according to the instructions in the listed standards. The used specimens are produced with the Fused Filament Fabrication method. Measured values can vary depending on used print orientation and print parameters.

Please contact us for further product information, like for example REACH, RoHS, FCS.

The safety data given in this publication is for informational purposes only and does not constitute a legally binding MSDS. The relevant MSDS can be obtained upon request from your supplier or you may contact Forward AM Technologies GmbH directly at sales@forward-am.com.

Process materials in a well-ventilated room, or use professional extraction systems.

Fire protection on railway vehicles Data

Formblatt MA4.5_F003, Revision: 3.4, gültig ab: 05.01.2021

BASF
We create chemistry

Test Report according to ISO/IEC 17025 No. AVS: 2102191 Date: 2022-05-09 File: 2006115B_V_EN	DAkkS Deutsche Akkreditierungsstelle D-PL-14121-04-00
Testing laboratory BASF SE RBU Performance Materials Europe Materials and Parts Testing PMD/EX-H201 67056 Ludwigshafen Deutschland	**Contact at laboratory** Name: [redacted] Phone: E-Mail: Position: Signature: [redacted]
Client Company: BASF 3D Printing Solutions GmbH Speyerer Strasse 4 69115 Heidelberg Germany	**Contact at client** Name: [redacted] Phone: E-Mail:
Test specimen / Material A2021-2560 Ultrafuse PC GF30 black	**Test methods (Standard and publication date)** - IEC 60695-11-10:2014 vertical (equivalent to UL94:2020)
Order received on: 2021-04-09 Specimen received on: 2021-04-12 Tests conducted on: 2021-04-20	This report contains: Pages: 3 Diagrams: 0 Tables: 2 Photos: 0 Attachments: 2

Decision rule
EN45545-2:2016, R26 (EL 10): HL1-3 (V0)

Result
Test specimen of nominal thickness 1.5 and 3 mm were subjected to vertical flammability testing according to DIN EN 60695-11-10:2014 (equivalent to UL94:2018). The test result is V-0. This result provides evidence for conformity with EN45545-2:2016, R26 for HL1, HL2 and HL3.

BASF – Fire Safety Technology

Classification report according to DIN EN 45545 Part 2 : 2016-02
Railway applications - Fire protection of railway vehicles - Part 2: Requirements for fire behaviour of materials and components

Classification Report No.: 14781 / 54278 Rev. 1

Receipt of order: 03.02.2022

1. Material: (information supplied by client)

Ultrafuse PC GF30
Order number: ATLaS-2021-3296 + 3335

Colour:

End use application: interior covering train

2. Summary of results and classification:

Standard: DIN EN 45545-2:2016-02		Set of requirements: R22 / R23 / R24			
14781 / 54267	EN ISO 4589-2	LOI	≥ 32,0	[% O2]	HL3
14781 / 54265 Thickness: 1,5 mm	EN ISO 5659-2 25 kW/m² (pilot flame)	Ds (max)	19		HL3
14781 / 54290 Thickness: 3 mm	EN ISO 5659-2 25 kW/m² (pilot flame)	Ds (max)	89		HL3
14781 / 54266	NF X 70-100-1/-2 600 °C	CIT (NLP)	0,20		HL3
Final classification:		**HL3**			

Remarks:

Valid for thickness range from 1,5 mm to 3 mm
Corrected version of report 14781/54278 dated of 02.03.2022.

Any conclusions we draw about the fire safety of the materials we test are based exclusively on the results of the test under the conditions described. The extent to which such conclusions can be applied to non-tested material under non-standard conditions is the sole responsibility of the customer and is done so at his own risk. - Decision rule acc. to DIN EN ISO/IEC 17025: Wherever statements of conformity are made, no measurement uncertainty is taken into account.

BASF-Fire Safety Technology

Dr. Houssin
Head of Laboratory

Ludwigshafen, 07.04.2022

Kaiser
Technician