forward am
run by Mass Additive Manufacturing

Ultrafuse® ASA

UV resistant | temperature stability | outdoor weather resistant

Extended TDS

Complete Technical Documentation and Testing Summary

Version 1.2

Contents

Technical Data Sheet 3

Mechanical Properties Diagrams 7

Thermal Properties Diagrams 8

Industrial Chemical Resitance 9

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Technical Data Sheet

Ultrafuse® ASA is with its UV resistance and good temperature stability an ideal material for outdoor 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, 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	Ultimaker 3
Nozzle Temperature[1)]	260 – 280°C	260°C
Build Chamber Temperature	Closed chamber, passively heated	-
Bed Temperature	100 – 120°C	100°C
Bed Material	PC adhesive	Glass + Magigoo PC
Nozzle Diameter	≥ 0.4 mm	0.4 mm
Print Speed	30 - 60 mm/s	40 mm/s
Max Volumetric Speed[2)]	18 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 0.4 mm

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

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

Further Recommendations	
Drying recommendations to ensure printability and best mechanical properties[3)]	Ultrafuse® ASA can be dried at 60°C in a hot air dryer or vacuum oven for 4 to 16 hours
Support material compatibility	Single material breakaway, Ultrafuse® HiPS, XIONEER® VXL 90, XIONEER® VXL 111

General Properties	Standard	Average Values
Filament Density[4)]	ISO 1183-1	1073 kg/m³
Poisson-Number	ISO 527	0.35

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

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Tensile Properties[5]	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Tensile strength[6]	ISO 527	34.6 MPa	-	12.0 MPa
Elongation at Break[6]	ISO 527	4.5%	-	1.0%
Young's Modulus[7]	ISO 527	1828 MPa	-	1400 MPa

Flexural Properties[5] [8]	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Flexural Strength	ISO 178	59.4MPa	61.2 MPa	19.9 MPa
Flexural Modulus	ISO 178	1733 MPa	1638 MPa	1041 MPa
Flexural Elongation at Break	ISO 178	5.4%	5.2%	2.9%

Impact Properties[5]	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Impact Strength Charpy (notched)	ISO 179-2	8.9 kJ/m²	14.1 kJ/m²	2.7 kJ/m²
Impact Strength Charpy (un-notched)	ISO 179-2	42.7kJ/m²	41.2 kJ/m²	5.1 kJ/m²
Impact Strength Izod (notched)	ISO 180	8.7 kJ/m²	11.4kJ/m²	1.9 kJ/m²
Impact Strength Izod (un-notched)	ISO 180	36.8 kJ/m²	39.3 kJ/m²	6.8 kJ/m²

For the diagrams on mechanical properties see Chapter: Mechanical Properties Diagrams

Thermal Properties[5]	Standard	Average Values
HDT A at 1.8 MPa	ISO 75-2	92°C
HDT B at 0.45 MPa	ISO 75-2	101°C
Glass Transition	ISO 11357-2	112°C

[5] Samples were conditioned in standard climate (23°C, 50% RH 72h)
[6] Testing speed: 5 mm/min
[7] Testing speed: 1 mm/min
[8] Testing speed: 2 mm/min

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Temperature

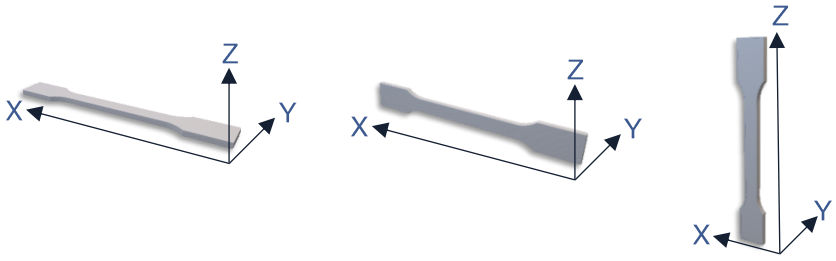
Melt Volume-Flow Rate (MVR)	ISO 1133	3.9 cm^3/10 min (260°C, 2.16kg)

For the diagrams on thermal properties see Chapter: Thermal Properties Diagrams.

Hardness and Abrasion	Standard	Typical Values
Shore Hardness D (15s)	DIN ISO 7619-1	70

Print direction explanation

The orientation of the 3D printed part in the printer is always aligned with the longest axis first. The print direction is consistently along the Z-axis.



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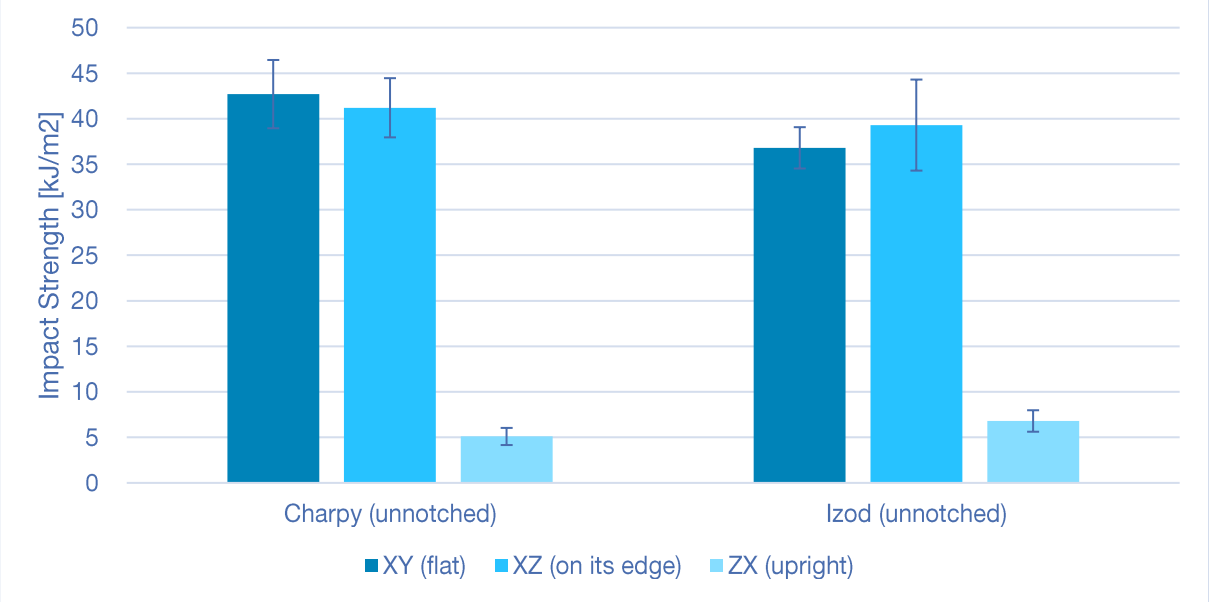
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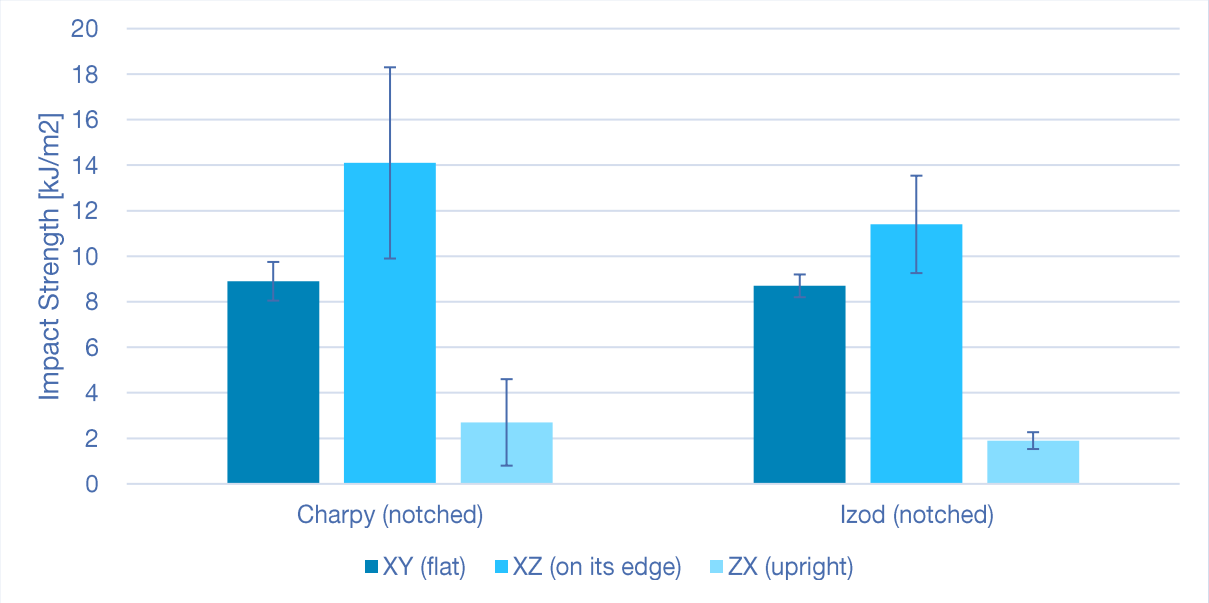
Mechanical Properties Diagrams

Impact Strength unnotched



Comparison of unnotched impact strength data for different build orientations.

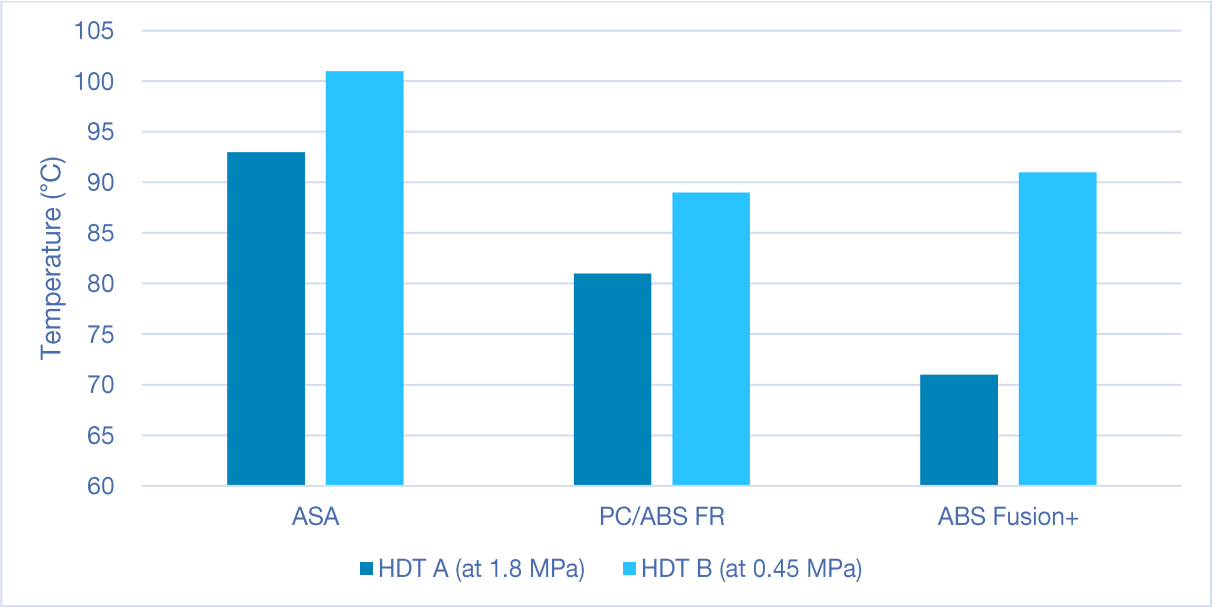
Impact Strength notched



Comparison of notched impact strength data for different build orientations.

Thermal Properties Diagrams

Heat Deflection Temperature (HDT) according to ISO 75-2



Comparison of Heat Deflection Temperatures for Ultrafuse ASA, PC/ABS FR and ABS Fusion +.

Industrial Chemical Resitance

The resistance of materials against chemicals, solvents and other contact substances is an important criterion of selection for many industrial applications. General chemical resistance depends on the period of exposure, the temperature, the quantity, the concentration and the type of the chemical substance. When exposed to industrial chemicals, the chemical bonds of polymers can break or degrade, causing a change in the mechanical properties.

Test Method and Specimens

The following table shows the expected resistance against chemicals, based on literature data for ASA in general. It is recommended to perform own tests based on the specific application requirements, such as chemical concentration, temperature and exposure duration because the chemical tests have not been performed on printed Ultrafuse® ASA specimens.

Chemical Resistance (based on general ASA literature information)			
Media	**Conc. [wt-%]**	**Temperature [°C]**	**Resistance Time**
Acetic Acid	5	20	Years
	50	50	Days
Acetone		20	No Resistance
Amyl alcohol		20	Years
Benzoic acid		20	Years
Diesel fuel		20	Years
Ethyl alcohol	40	20	Years
Grease		20	Years
Kerosene		20	Days
Nitric acid	30	20	Months