forward am
run by Mass Additive Manufacturing

Ultrafuse® ABS Fusion+

Easy to print | heat resistance | nice surface

Extended TDS

Complete Technical Documentation and Testing Summary

Version 1.2

Contents

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

Technical Data Sheet

Ultrafuse® ABS Fusion+, an engineering filament which has been optimized for 3D-printing.

Filament Properties		
Filament Diameter	1.75 mm	2.85 mm
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	750 g, 2.0 kg, 4.0 kg
Available colors	natural, grey, 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 S5
Nozzle Temperature[1)]	260 – 280 °C	280 °C
Build Chamber Temperature	-	-
Bed Temperature	100 – 120 °C	100 °C
Bed Material	Glass*	Glass + glue (e.g. 3D Lac)
Nozzle Diameter	≥ 0.4 mm	0.4 mm
Print Speed	40 - 80 mm/s	40 mm/s
Max Volumetric Speed[2)]	21 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

Further Recommendations	
Drying recommendations to ensure printability and best mechanical properties[3)]	60 °C in a hot air dryer or vacuum oven for at least 8 to 10 hours.
Support material compatibility	Single material breakaway, Ultrafuse® BVOH

General Properties	Standard	Average Values
Filament Density[4)]	ISO 1183-1	1084 kg/m^3
Poisson-Number	ISO 527	0.41

[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	XZ-Direction	ZX-Direction
Tensile strength[6]	ISO 527	28.3 MPa	-	20.7 MPa
Elongation at Break[6]	ISO 527	7.0 %	-	1.8 %
Young's Modulus[7]	ISO 527	1445 MPa	-	1349 MPa

Flexural Properties[6] [8]	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Flexural Strength	ISO 178	46.6 MPa	48.7 MPa	26.5 MPa
Flexural Modulus	ISO 178	1390 MPa	1290 MPa	1170 MPa
Flexural Elongation at Break	ISO 178	5.3 %	5.4 %	2.3 %

Impact Properties[6]	Standard	Average Values		
		XY-Direction	XZ-Direction	ZX-Direction
Impact Strength Charpy (notched)	ISO 179-2	38.6 kJ/m²	49.2 kJ/m²	3.0 kJ/m²
Impact Strength Charpy (unnotched)	ISO 179-2	148.1 kJ/m²	173.7 kJ/m²	8.6 kJ/m²
Impact Strength Izod (notched)	ISO 180	36.9 kJ/m²	41.8 kJ/m²	3.1 kJ/m²
Impact Strength Izod (unnotched)	ISO 180	128.3 kJ/m²	127.0 kJ/m²	8.3 kJ/m²

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

Thermal Properties[6]	Standard	Average Values
HDT A at 1.8 MPa	ISO 75-2	75 °C
HDT B at 0.45 MPa	ISO 75-2	96 °C
Vicat softening point at 50 N	ISO 306	78 °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
Measured on milled specimens

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.

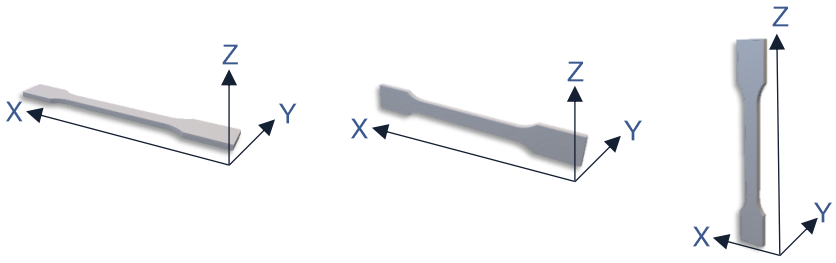
Vicat softening point at 10 N	ISO 306	103 °C
Glass Transition Temperature	ISO 11357-2	109 °C
Melt Volume-Flow Rate (MVR)	ISO 1133	4.7 cm^3/10 min (250 °C, 5 kg)

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	67

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.



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.

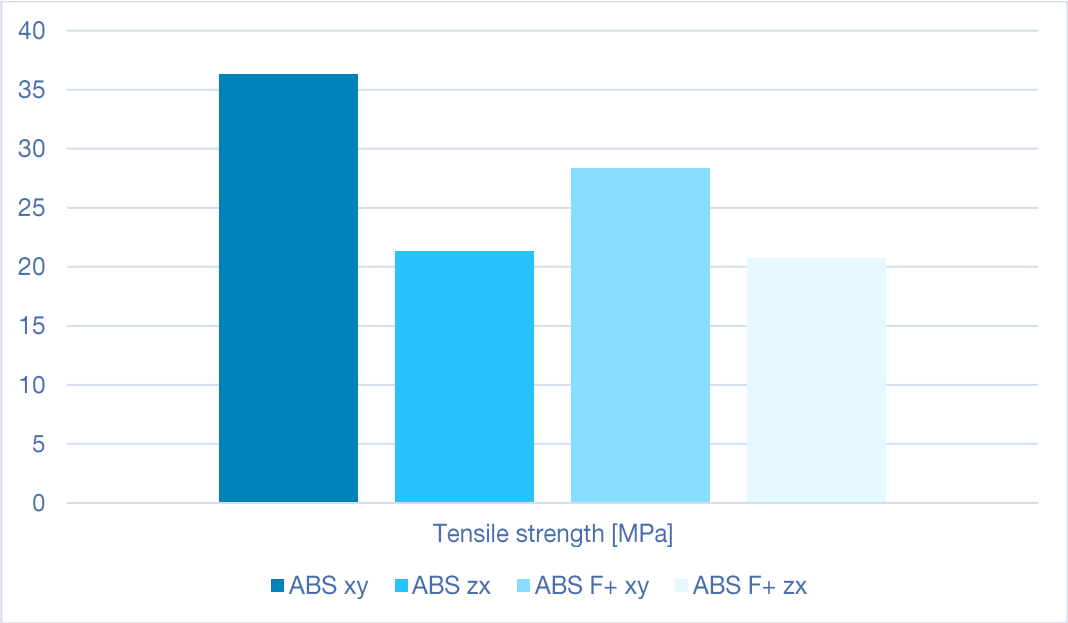
Please contact us for further product information, like for example REACH, RoHS, FCS.

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.

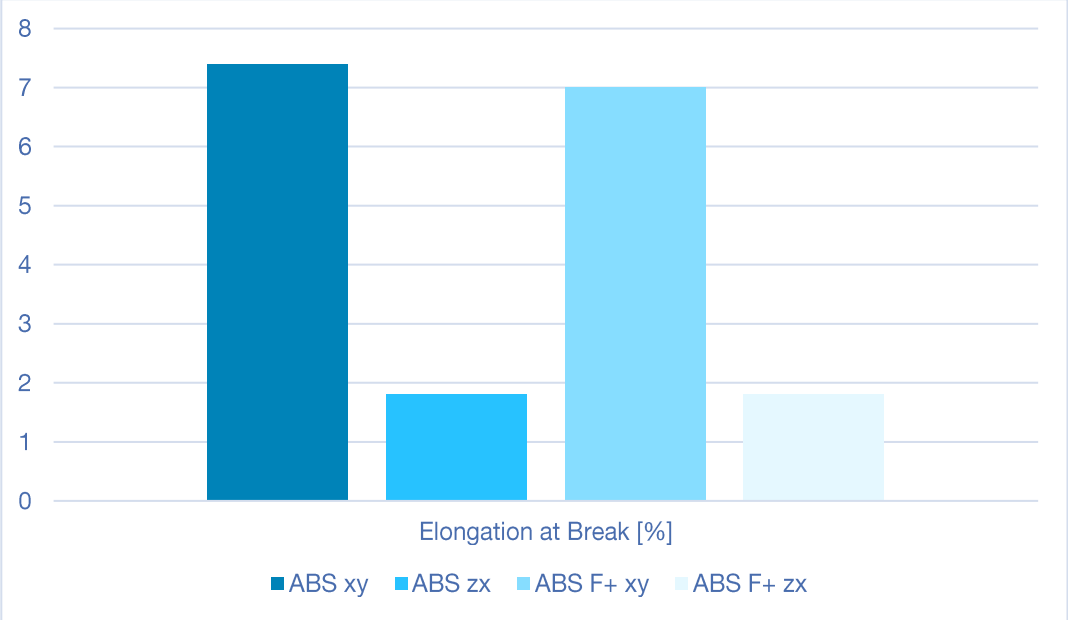
Process materials in a well-ventilated room, or use professional extraction systems.

Mechanical Propertie Diagrams

Comparison Ultrafuse® ABS and Ultrafuse® ABS Fusion+

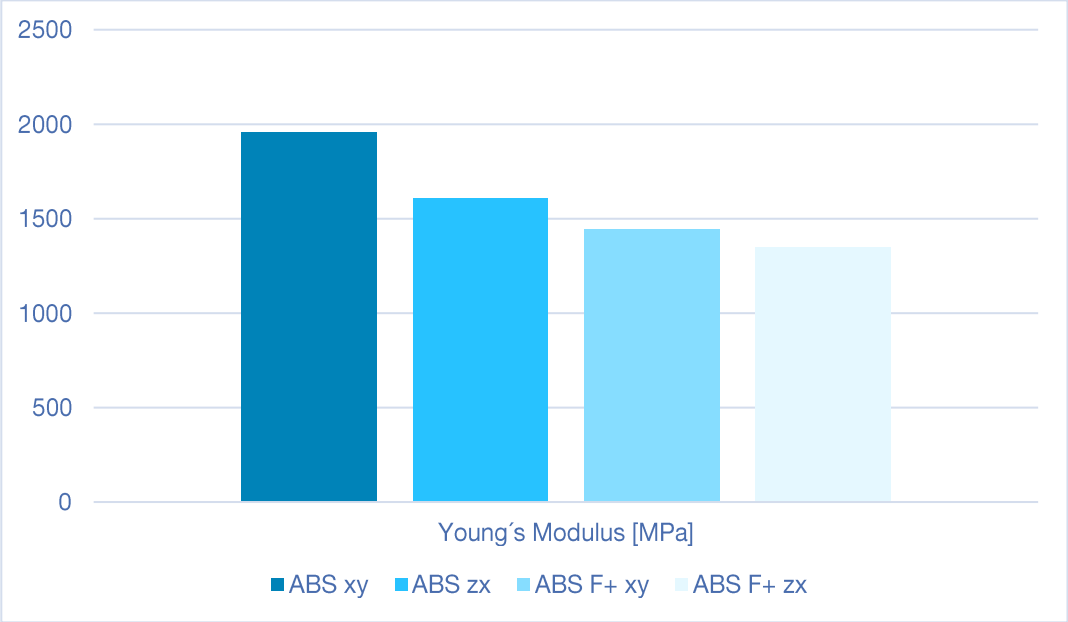


Tensile strength comparison Ultrafuse® ABS and Ultrafuse® ABS F+

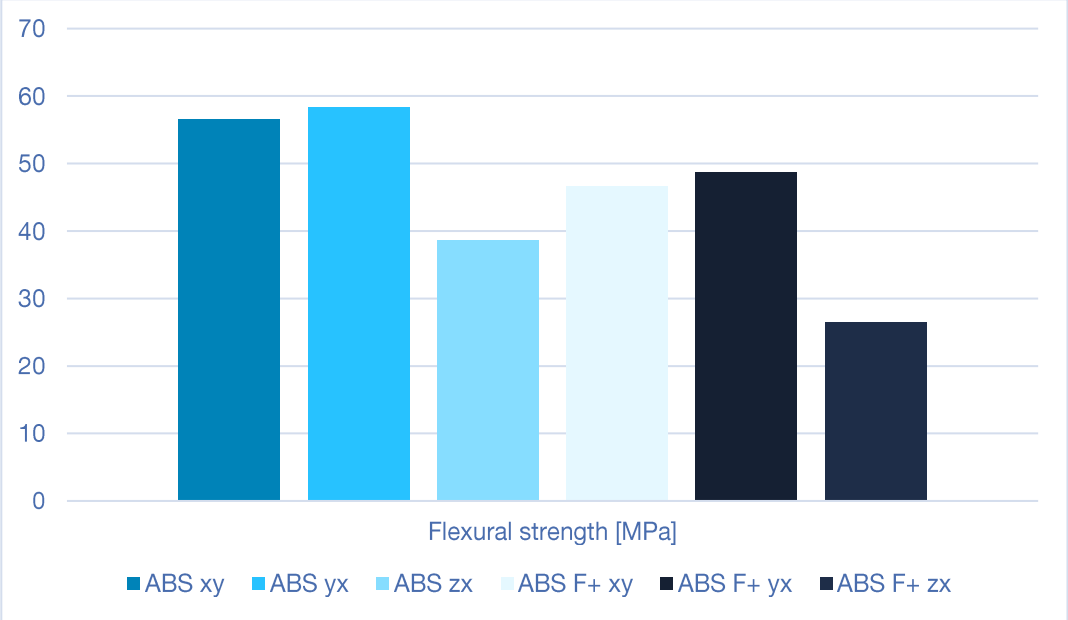


Elongation at Break comparison Ultrafuse® ABS and Ultrafuse® ABS F+

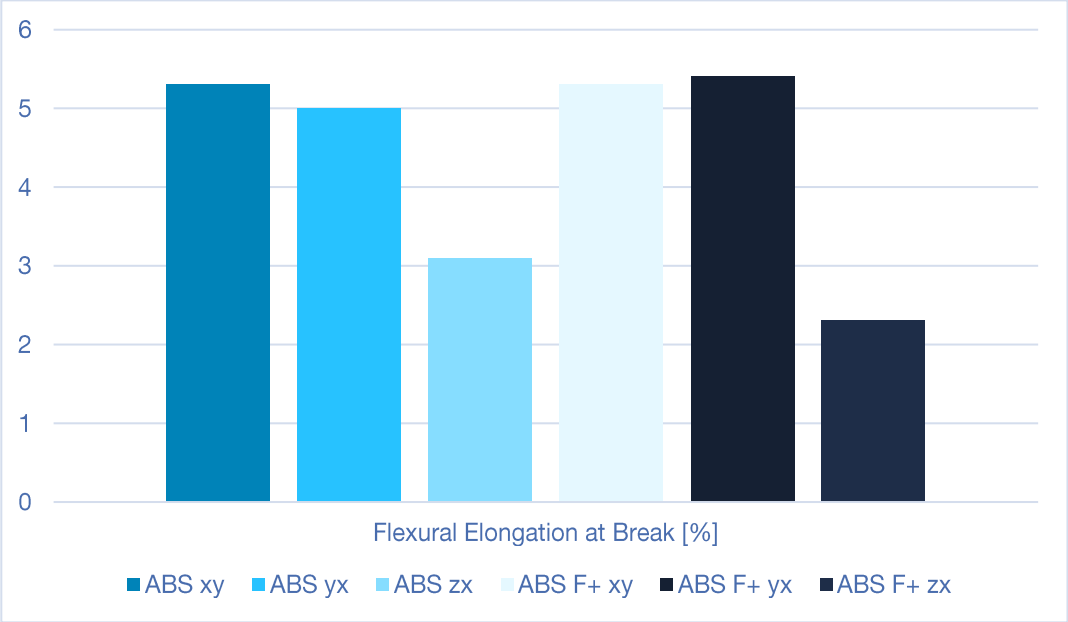
forward-am.com +49 6221 67417 900 sales@forward-am.com



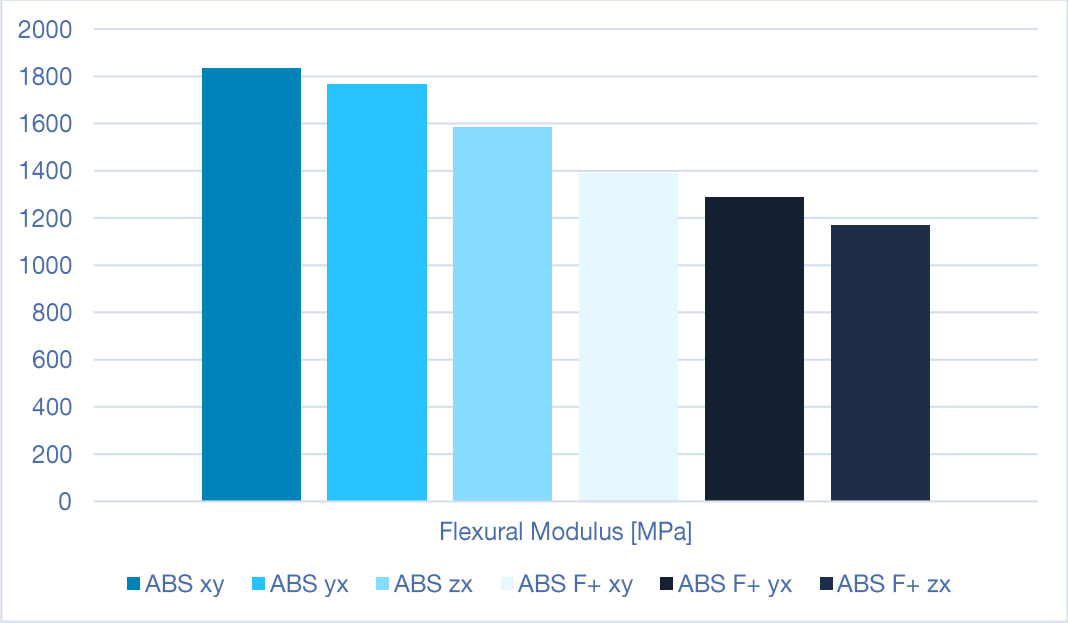
Young´s modulus comparison Ultrafuse® ABS and Ultrafuse® ABS F+



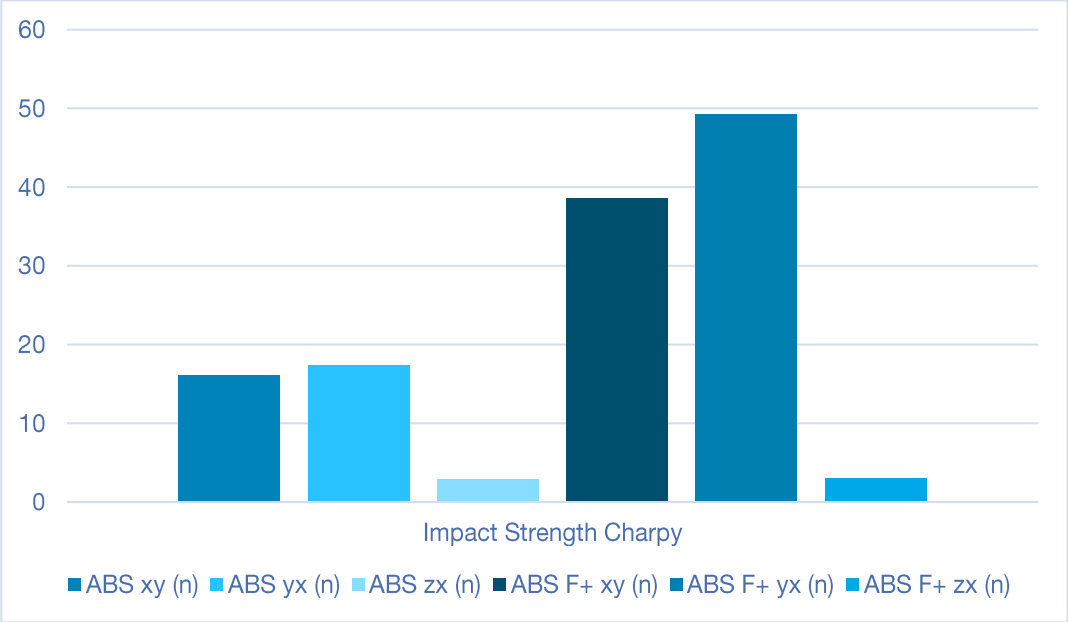
Flexural strength comparison Ultrafuse® ABS and Ultrafuse® ABS F+



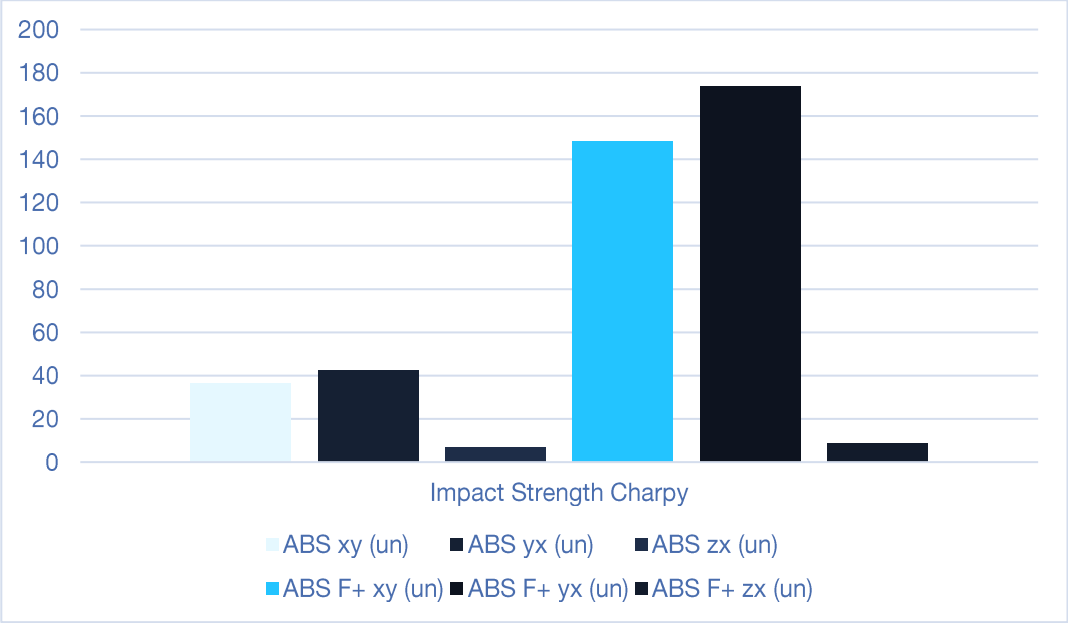
Flexural Elongation at Break comparison Ultrafuse® ABS and Ultrafuse® ABS F+



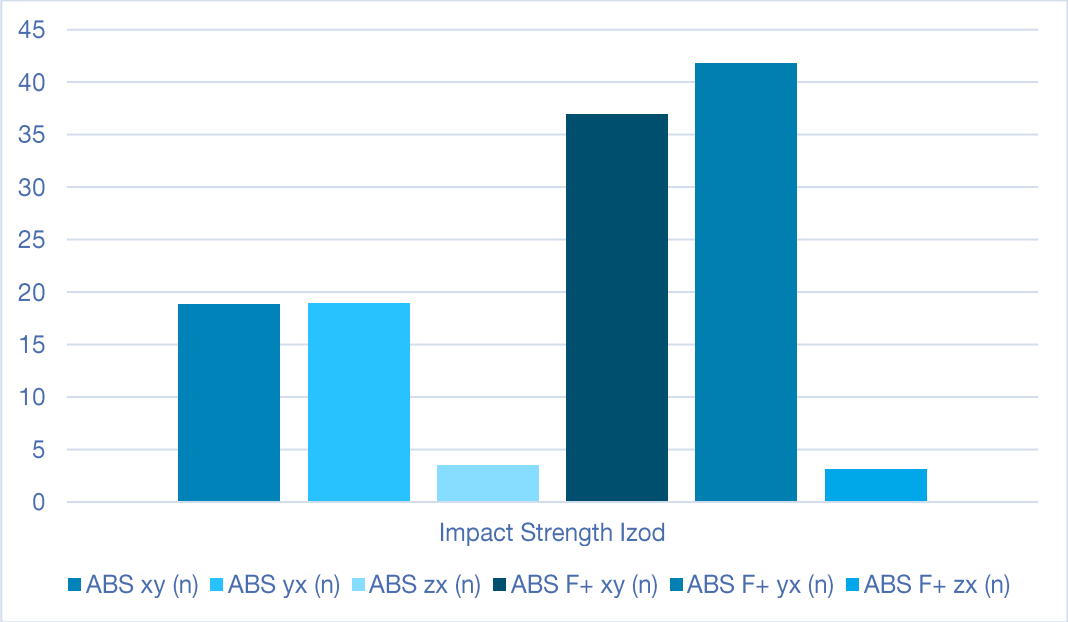
Flexural Modulus comparison Ultrafuse® ABS and Ultrafuse® ABS F+



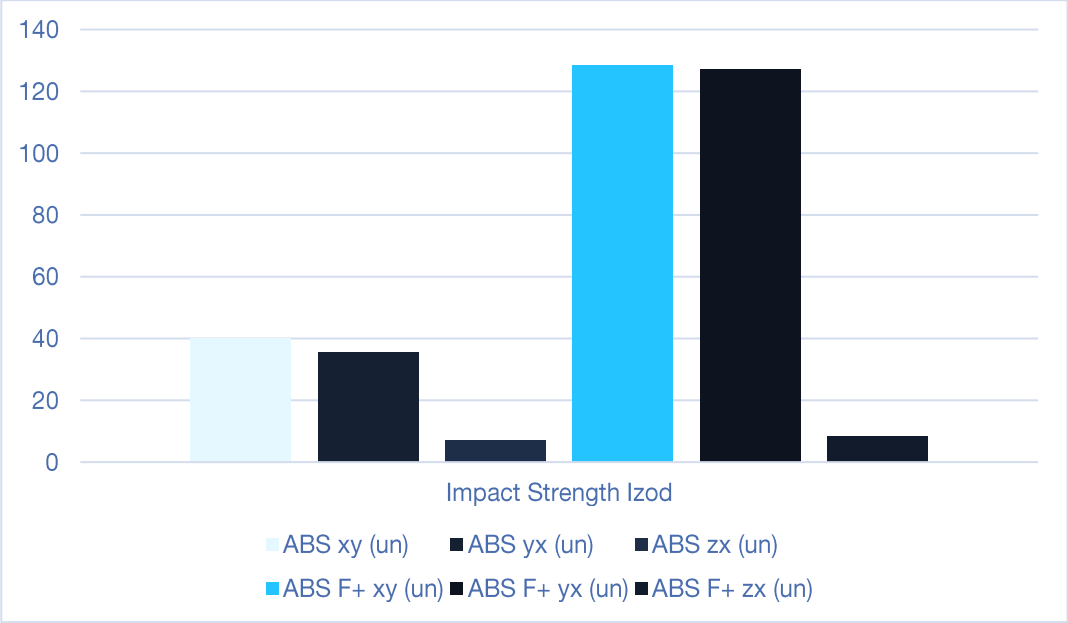
Impact Strength Charpy notched comparison Ultrafuse® ABS and Ultrafuse® ABS F+



Impact Strength Charpy unnotched comparison Ultrafuse® ABS and Ultrafuse® ABS F+



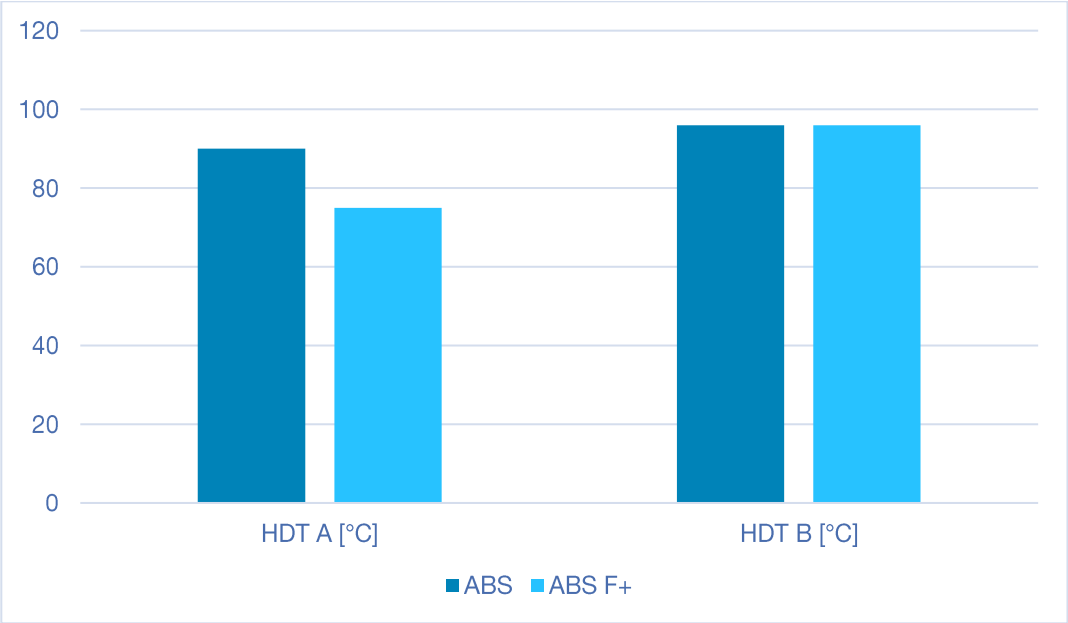
Impact Strength Izod notched comparison Ultrafuse® ABS and Ultrafuse® ABS F+



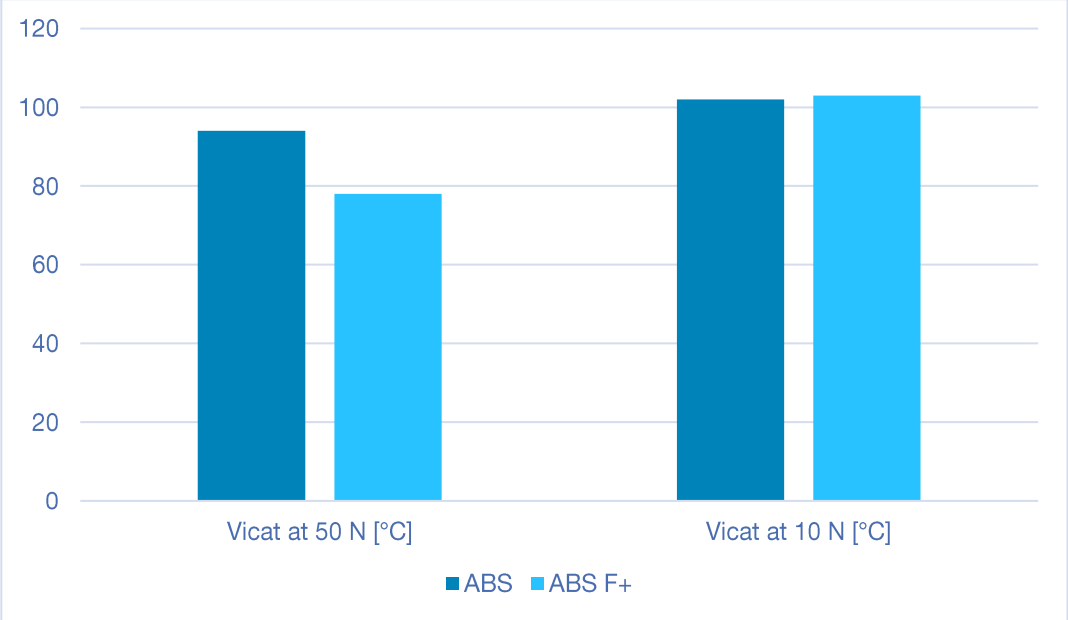
Impact Strength Izod unnotched comparison Ultrafuse® ABS and Ultrafuse® ABS F+

Thermal Properties Diagrams

Comparison Ultrafuse® ABS and Ultrafuse® ABS F+



HDT comparison Ultrafuse® ABS and Ultrafuse® ABS F+



Vicat comparison Ultrafuse® ABS and Ultrafuse® ABS F+