

Explore the Best Production-Grade
Powders for 3D Printing.



PBF MATERIALS 2022

BASF
We create chemistry

FORWARD
Innovating Additive Manufacturing

**Ultrasint® Powders for Powder
Bed Fusion (PBF)**

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EXPLORE THE BEST PRODUCTION-GRADE POWDERS FOR 3D PRINTING

Industrial 3D printing is at your fingertips with High-Performance materials and professional technologies provided by **BASF-Forward AM**.





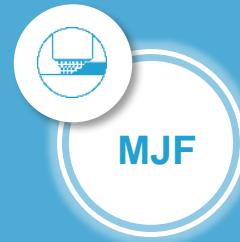
1. POWDER BED FUSION

Explore the line of performance polymers that are perfectly adapted to scaled 3D printing production for any application.

PBF Technologies Overview



Selective melting of thin polymer powder layers by laser energy.



Areal melting of thin polymer powder layers by applying an absorbing ink and fusing by lamps.

**The direct production of end-use parts is now reality-
From digital CAD data to finish polymer parts within hours.**



2. COMPARISON TABLES

Take a look at the main differences among our materials. Mechanical properties, chemical compatibility, test summary, certification summary and machine compatibility.

Mechanical Properties Comparison

	PA6		PP	PA11			TPU		
	PA6	PA6 MF	PP nat 01	PA11	PA11 CF	PA11 ESD	TPU 01 for HP JF	TPU 88A	TPU 88A black
Tensile Strength / MPa	66/47*	91/62*	28	52/45*	82/71*	65/55*	9	8	8
Young's Modulus / GPa	3.7/1.7*	6.2/3.3*	1.4	1.8/1.1*	5.9/4.5*	3.1/2.3*	0.085	0.075	0.085
Elongation at break / %	2/16*	2/7*	30	28/45*	7/11*	20/22*	280	270	360
Charpy Impact Strength, Unnotched / kJ/m ²	7.5/6.8*	13/28*	29	184/198*	54/63*	80/101*	no break	no break	no break
HDT A / °C	103	121	62	76	151	111			
HDT B / °C	192	209	102	176	189	186			
Shore A Hardness							88-90	88-90	86-88
Available Colors	white	black	natural	natural**, black	black	grey	grey	white	black
Special Properties	tightness, heat ageing	in-particle reinforcement	chemical resistance	toughness	lightweight	ESD safe	rubber-like	rubber-like	rubber-like
Recycling Rate Old / New in %***	60/40	60/40	60/40	60/40	60/40	60/40	80/20	80/20	80/20

Typical values. All values shown are measured in x-direction. Full TDS available in website.

*) dry/conditioned **) technical data shown here is based on this color

***) Typical value. The recycling rate depends on machine type used, usage intensity and individual part quality requirement

Mechanical Properties Comparison

	PA6		PP	PA11			TPU		
	PA6	PA6 MF	PP nat 01	PA11	PA11 CF	PA11 ESD	TPU01 for HP JF	TPU 88A	TPU 88A black
Stiffness	★★★★	★★★★			★★★★	★★★			
Strength	★★★★	★★★★★		★★	★★★★	★★			
Ductility	★★★★		★★★★	★★★★		★★	★★★★★	★★★★★	★★★★★
Toughness		★★★★		★★★★	★★★★	★★★★	★★★★★	★★★★★	★★★★★
Temperature Resistance	★★★★★	★★★★			★★★				

This Typical values. All values shown are measured in x-direction.

*) dry/conditioned **) technical data shown here is based on this color

***) Typical value. The recycling rate depends on machine type used, usage intensity and individual part quality requirement

Chemical Compatibility Overview

+ Highly Compatible

O Compatible

- Not Compatible

	PA6	PA11	PP	TPU
Motor Oil	+	+	+	+
Break Fluid	+	+	+	-
Cooling Fluid	+	O	+	O
Acetone	+	+	+	-
Ethanol	+	+	+	O
Hydrochloric Acid	-	-	+	-
Sulfuric Acid	-	-	+	-
Gasoline / Petrol	+	+	O	Not Tested

The data contained in this publication is an indication based on publicly available chemical compatibility data. In view of the many factors that may affect processing and application of our product (e.g. temperature, concentration, time, pressure, machine type, printing parameters, ageing, individual requirements), 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.

Product Statement/Certification Summary

	PA6		PP	PA11			TPU		
	PA6	PA6 MF	PP nat01	PA11	PA11 CF	PA11 ESD	TPU01 for HP JF	TPU 88A	TPU 88A black
Skin Contact			●	●			●	●	
USP class IV				●					
Food Contact				●					
UL Blue Card							●		

- Statement available
- Test in progress

Test Summary 1/2

● Test results available ● Test in progress

			PA6		PP	PA11			TPU		
			PA6	PA6 MF	PP nat 01	PA11	PA11 CF	PA11 ESD	TPU01 for HP JF	TPU 88A	TPU 88A black
Basic TDS	Tensile (X, Z)	ISO 527-2	●	●	●	●	●	●	●	●	●
	Flexural (X, Z)	ISO 178	●	●	●	●	●	●	●	●	
	Impact Notched/Unnotched (X, Z)	ISO 179-1 & ISO 180	●	●	●	●	●	●	●	●	●
	HDT/Vicat (X, Z)	ISO 75-2 & ISO 306	●	●	●	●	●	●	●	●	●
Application Specific Testing	Long Term Heat Ageing	-	●	●							
	UV Stability	ISO 4892-2B Cycle 3			●	●			●	●	●
	Weathering	ISO 4892-2A Cycle 1	●	●	●	●			●	●	
	Hydrolysis Resistance	-	●	●					●	●	
	Air Tightness / Burst Pressure	No Specific Standard	●	●					●	●	
	Temperature Performance	Low Temperature Mechanicals									
	Temperature Performance	High Temperature Mechanicals	●	●	●	●	●	●	●	●	

Test Summary 2/2

● Test results available ● Test in progress

			PA6		PP	PA11			TPU		
			PA6	PA6 MF	PP nat01	PA11	PA11 CF	PA11 ESD	TPU01 for HP JF	TPU 88A	TPU 88A black
Electrical	Specific Volume Resistivity	IEC 62631-3-1	●	●	●	●	●	●	●		
	Specific Surface Resistivity	IEC 62631-3-2	●	●	●	●	●	●	●		
	Dielectric Strength	IEC 60234-1	●	●	●	●	●	●	●		
	CTI	IEC 60112		●							
	Fatigue	Rossflex							●	●	●
Flame Retardance	Flammability	UL 94	●	●	●	●	●	●	●	●	
	Flammability	FMVSS 302							●	●	

Material Machine Compatibility

- Compatible
- Open parameter kit needed

		PA6		PP		PA11				TPU		
		PA6	PA6 MF	PP nat 01	HP 3D HR PP	PA11 white	PA11 black	PA11 CF	PA11 ESD	TPU01 for HP JF	TPU 88A white	TPU 88A black
EOS	EOS P1xx					○	○				○	○
	EOS P3xx/P7xx					○	○				○	○
HP	5200 Series				●					●		
Farsoon	HT403P, HT/ST25xP	●	●	●		●	●	●	●		●	●
	SS403P, eForm			●		●	●	●	●		●	●
Prodways	P1000, P1000X			○		○	○	○	○		○	○
3D Systems	Sinterstations, Vanguard, sPro 60			●		●	●	●	●		●	●
XYZp	MfgPro230 xS					●	●	●	●		●	●

Compatibility for other non-listed machines on request. Open machines typically do not work 'plug & play' when introducing new materials. BASF Forward AM provides starting parameters and technical support for each combination listed. Printing parameters may vary and must be fine-tuned/validated for each machine and application. In view of the many factors that may affect the processing behavior, 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 processability of the product on the equipment or suitability for an application.



3 ■ PRODUCT PORTFOLIO

The new Forward AM Ultrasint® powders set new standards in 3D printing using polymer powders and enable new possibilities for advanced applications, from functional prototyping through to end-use serial production parts. Our materials fulfill the highest quality standards and are designed for ease of use on most common printing equipment.



PA6

Standard
Color: White



Media Tightness

Lower water uptake than
injection molded PA6



Thermal Performance

Good heat-ageing
performance



High Strength & Rigidity

Tensile Modulus of 2450 MPa

TESTS & CERTIFICATIONS



Burst Pressure Test

Essential for pressurized tanks
or media-transporting elements



Ultrasint® PA6

Suited for:



Industrial

*Piping and media
flow/storage parts*



Automotive

*Engine
compartment parts*



Construction

Air ducts

Machine Compatibility

SLS high temperature machines
For example Farsoon

Post Processing

- Coating - Ultracur3D®
- Chemical Smoothing

This information and values are presented as guidance only and based on BASF Forward AM's knowledge and experience. It is believed to be accurate, however all guarantees are explicitly denied. This document was updated December 2021.

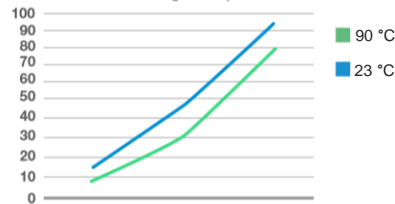
Technical Specifications

Mechanical Properties	X	Z
Tensile Strength [MPa]	47	38
E-Modulus [MPa]	1700	1850
Elongation at Break [%]	16	4.4
Charpy Impact Unnotched [kJ/m ²]	6.8	5.4

Full TDS!

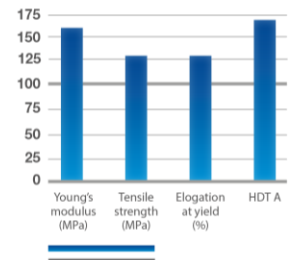
More Information

Burst Pressure (even) at High Temperatures



- Burst pressure up to 90 bar (geometry-dependent)
- Excellent long-term heat ageing performance up to ~120 °C
- Even higher thermal resistance for short-term use

Benchmark with Injection Molded PA6



- Superior performance vs. injection molded neat PA6
- Lower water uptake compared to Injection Molding
- Reduced ductility is easily compensated via redesign



PA6 MF

Mineral Filled

Color: Black



Reinforced

In-particle reinforcement technology



Thermal Performance

Good heat-ageing performance



High Strength & Rigidity

Tensile Modulus of up to 6250 MPa

TESTS & CERTIFICATIONS



Dielectric Strength

Effectiveness of a part insulation to safely operate during rated electrical conditions



CTI

Ultrasint® PA6 MF

Suited for:



Industrial

Molds, tooling equipment



Automotive

Engine bay parts
[Engine Mount use case](#)



Aerospace

Air ducts

Machine Compatibility

SLS high temperature machines
For example EOS, Farsoon & XYZ Printing

Post Processing

- Coating - Ultracur3D®
- Chemical Smoothing

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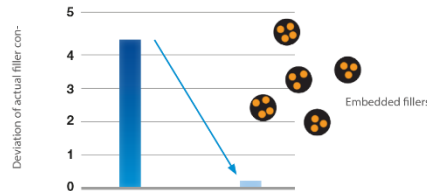
Technical Specifications

Mechanical Properties	X	Z
Tensile Strength [MPa]	91	40
E-Modulus [MPa]	6250	5900
Elongation at Break [%]	2.1	0.9
Charpy Impact Unnotched [kJ/m ²]	13.2	4.6

Full TDS!

More Information

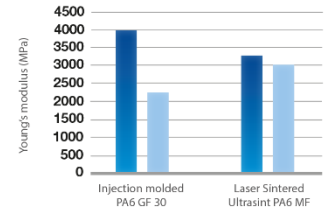
In-particle filler technology



In-particle filler technology

- Filler is embedded into the polymer particles
- Excellent homogeneity of filler distribution
- No de-mixing, improved recycling and easy handling

Rigidity vs. injection-molded PA6 GF30



Rigidity compared to injection molded PA6 GF30

- Stiffness of Ultrasint PA6 MF is much more isotropic compared to injection molded PA6 GF30 (fiber orientation)
- Easy substitution of IM performance materials with PBF

PP nat 01

Standard

Color: Natural/Translucent



Excellent Chemical Resistance

Ideal for automotive and industrial media flow and storage parts



High Rigidity

Exceptional media tightness, ductility and stiffness



High Ductility

E@B up to 30%

TESTS & CERTIFICATIONS



Skin Contact

ISO 10993-10 and ISO 10993-5



Ultrasint® PP nat 01

Suited for:



Transportation



Automotive



Industrial

Water reservoirs
and manifolds

Dashboard and car
interior components

Ergonomic tools,
air guides



Consumer
Goods



Health Care
Prosthetics &
orthotics

Machine Compatibility

SLS Machines equipped with roller recoater
For example Farsoon, Prodways, 3D Systems

Post Processing

- Coating - [Ultragur3D® UV Adhesion Promoter](#)
- Chemical Smoothing - [White paper available!](#)

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Technical Specifications

Mechanical Properties	X	Z
Tensile Strength [MPa]	28	28
E-Modulus [MPa]	1400	1400
Elongation at Break [%]	30	10
Charpy Impact Unnotched [kJ/m²]	29	20

[Full TDS!](#)



Ultragur3D® + UV Adhesion Promoter



Chemical smoothing



PA11

Standard
Color: White/Black



High Toughness

Able to withstand high mechanical loads and not splinter



Bio-sourced

Bio-derived from sustainable castor oil



High Ductility

E@B up to 45%

TESTS & CERTIFICATIONS



Skin Contact

ISO 10993-10 and ISO 10993-5



Food Contact



USP Class IV



Ultrasint® PA11

Suited for:



Health Care

Orthopedic parts
and external
medical devices



Automotive

Bumper
components, car
interior parts



Industrial

Medium loaded
serial production



Consumer
Goods
Eyewear

Machine Compatibility

SLS machines

For example, EOS, Farsoon, XYZ, 3DS and Prodways

Post Processing

- Coating - Ultracur3D®

[Find out more!](#)

- Chemical Smoothing

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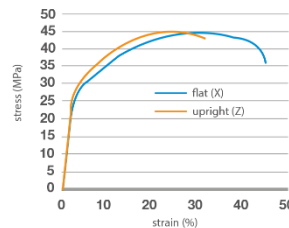
Technical Specifications

Mechanical Properties	X	Z
Tensile Strength [MPa]	45	46
E-Modulus [MPa]	1100	1250
Elongation at Break [%]	>150	54
Charpy Impact Unnotched [kJ/m ²]	198	85

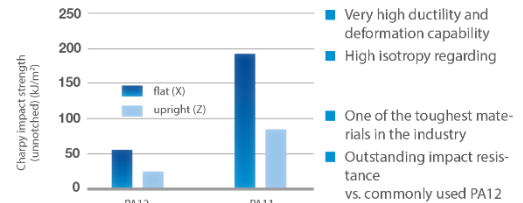
[Full TDS!](#)

More Information

High ductility



High toughness



- Very high ductility and deformation capability
- High isotropy regarding
- One of the toughest materials in the industry
- Outstanding impact resistance vs. commonly used PA12

PA11 Black CF

Carbon Fiber
Color: Black



Carbon-Fiber Reinforced

Excellent for high strength and rigidity applications



High impact resistance

Charpy impact unnotched of 63 kJ/m², good option to replace metal parts



High Strength to Weight Ratio

Key for lightweight structures

TESTS & CERTIFICATIONS



Bio-sourced

Bio-derived from sustainable castor oil



Thermal Performance

Good heat-ageing performance



Ultrasint® PA11 Black CF

Suited for:



Manufacturing

*Metal
replacement parts*



Automotive

*Aerodynamic
motorsport parts*



Industrial

*Lightweight but
rigid metal
replacement parts*



Consumer
Goods

Drones/ UAV

Machine Compatibility

SLS machines

For example, 3DS, Farsoon and Prodways

Post Processing

- Coating - Ultracur3D®
- Chemical Smoothing

[Find out more!](#)

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Technical Specifications

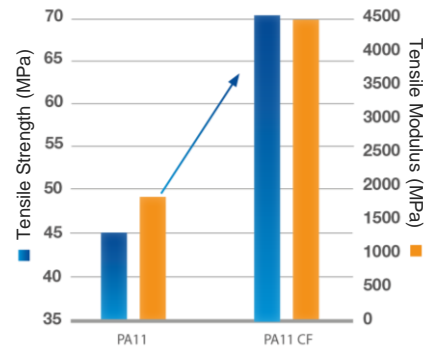
Mechanical Properties	X	Z
Tensile Strength [MPa]	71	48
E-Modulus [MPa]	4550	2000
Elongation at Break [%]	11	17
Charpy Impact Unnotched [kJ/m²]	63	51

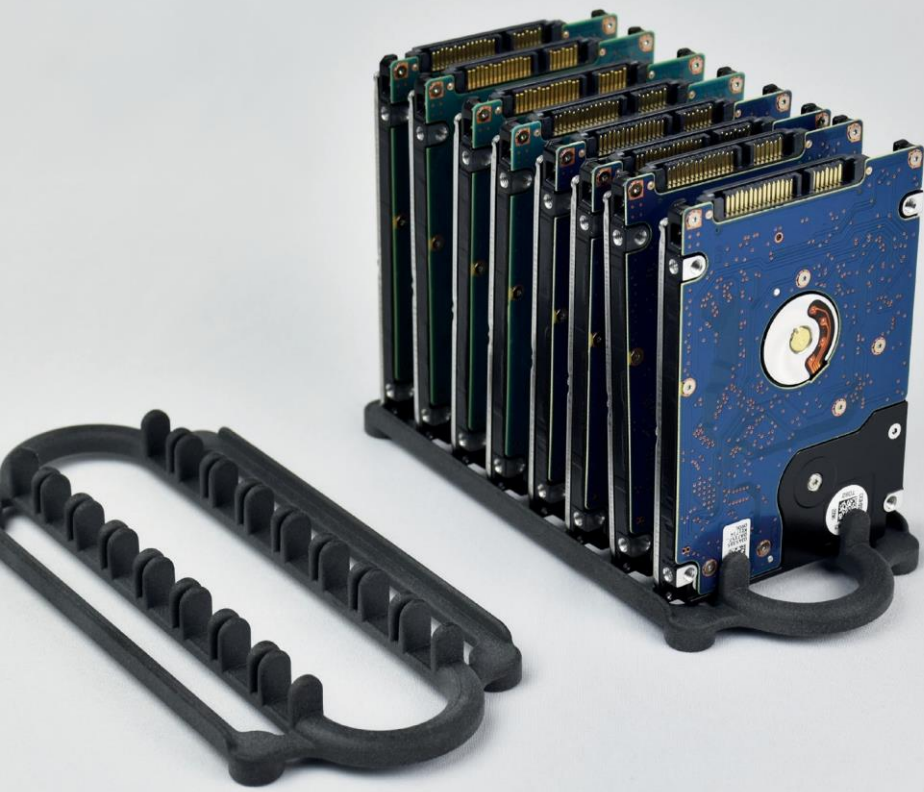
[Full TDS!](#)

More Information

Key Features

Ultrasint® PA11 black CF offers exceptionally high rigidity for the highest performance requirements and lightweight designs.





PA11 ESD

Electrostatic Safety Discharge

Color: Gray



High Toughness

Able to withstand high mechanical loads and not splinter



Electrostatic Safety Discharge

Reduces the risk of electrostatically induced damage or failure



Bio-sourced

Bio-derived from sustainable castor oil

TESTS & CERTIFICATIONS



Electrical Volume and Surface Resistivity



Thermal Performance

Good heat-ageing performance



Ultrasint® PA11 ESD

Suited for:



Electronics

Electronic housing



Automotive

Jigs and fixtures for electronics



Industrial

Tooling



Robotics

Machine Compatibility

SLS machines

For example, 3DS, Farsoon and Prodways

Post Processing

- Coating - Ultracur3D®

[Find out more!](#)

- Chemical Smoothing

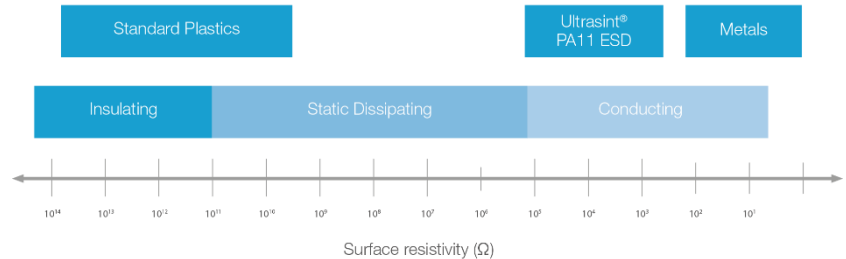
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Technical Specifications

Mechanical Properties	X	Z
Tensile Strength [MPa]	55	47
E-Modulus [MPa]	2300	1550
Elongation at Break [%]	22	31
Charpy Impact Unnotched [kJ/m ²]	101	107

Full TDS!

More Information





TPU01

Standard
Color: Gray



Lattice Structures

Enabled by BASF Ultrasilim®

[Find out more!](#)



Highly Flexible

Shore A 88 Hardness



High Reusability

Up to 80% of powder
reusability

TESTS & CERTIFICATIONS



Skin Contact

ISO 10993-10 and ISO
10993-5



Hydrolysis Resistance



High UV Stability

28

Ultrasint® TPU01

Suited for:



Sports

Protective gear



Automotive

Car interior parts

[White paper available!](#)

[View Motorbike Saddle](#)



Footwear

Shoe soles



Industrial

Ergonomic parts



Health Care

Prosthetics

[View Prosthetic](#)

[Socket](#)

Machine Compatibility

MJF Machines
HP Jet Fusion 5200 Serie

Post Processing

- Coating - Ultracur3D® Coat F [Find out more!](#)
- Chemical Smoothing [White paper available!](#)

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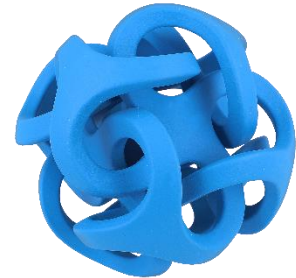
Technical Specifications

Mechanical Properties	X	Z
Tensile Strength [MPa]	9	7
E-Modulus [MPa]	85	85
Elongation at Break [%]	280	150
Charpy Impact Notched - 10°C [kJ/m²]	46	44

[Full TDS!](#)



Chemical Smoothing



Ultracur3D® Coat F

TPU 88A

Standard

Color: White



**Excellent Surface
Quality and High
Level of Detail**



Highly Flexible
Shore A 88 Hardness



High Reusability
Up to 80% of powder
reusability

TESTS & CERTIFICATIONS



Skin Contact
ISO 10993-10 and ISO
10993-5



**Hydrolysis
Resistance**



**High UV
Stability**
30



Ultrasint® TPU 88A

Suited for:



Sports

Protective gear

[View Protective
Helmet](#)



Automotive

Car interior parts

[White paper available!](#)



Footwear

Shoe soles



Industrial

Ergonomic parts



Health Care

Prosthetics

[View Prosthetic
Socket](#)

Machine Compatibility

All SLS Machines

For example EOS, Farsoon, XYZprinting & 3DS

Post Processing

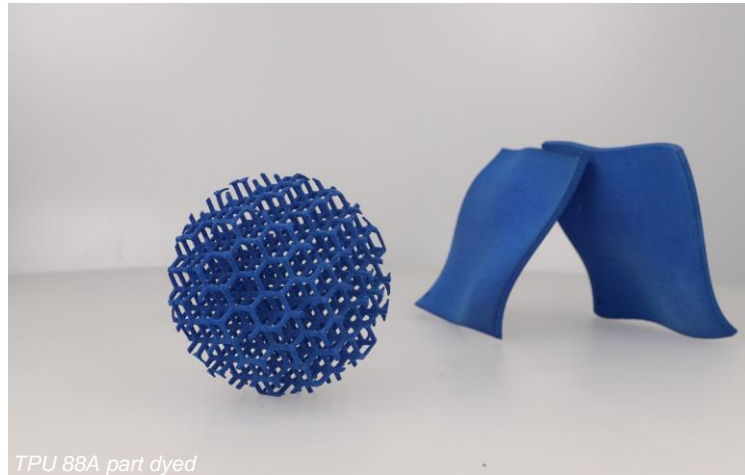
- Coating - Ultracur3D® Coat F [Find out more!](#)
- Chemical Smoothing [White paper available!](#)
- Dyeing

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Technical Specifications

Mechanical Properties	X	Z
Tensile Strength [MPa]	8	7
E-Modulus [MPa]	75	75
Elongation at Break [%]	270	130
Charpy Impact Notched - 10°C [kJ/m²]	60	58

[Full TDS!](#)



TPU 88A part dyed

TPU88A black

Standard

Color: black



Suitable for Desktop
Machines



High Elasticity and
Rebound



High Reusability

Up to 80% of powder
reusability

TESTS & CERTIFICATIONS



**High UV
Stability**



Ultrasint® TPU 88A black

Suited for:



Sports

Protective gear



Automotive

Car interior parts

[*White paper available!*](#)



Footwear

Shoe soles



Industrial

Ergonomic parts



Health Care

Prosthetics

Machine Compatibility

SLS Machines Including Desktop Machines
For example EOS, Farsoon, XYZprinting & 3DS

Post Processing

- Coating - Ultracur3D® Coat F [*Find out more!*](#)
- Chemical Smoothing [*White paper available!*](#)

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Technical Specifications

Mechanical Properties	X	Z
Tensile Strength [MPa]	8	5
E-Modulus [MPa]	85	85
Elongation at Break [%]	360	100
Charpy Impact Notched -30°C [kJ/m²]	No break	No break

[Full TDS!](#)



Chemical Smoothing



Do you have any question?

Our team is here to help you.

Let's brainstorm together. In addition to the material itself we offer **expert technical support** and the full spectrum of services from **design and simulation** through to **post-treatment of printed parts**.

We are looking forward to hearing from you! Contact us now and we will get in touch.

[CONTACT US!](#)

 **BASF**
We create chemistry

 **FORWARD AM**
Innovating Additive Manufacturing

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