

MATERIAL INFORMATION

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COMPOSITUM FILAMENT SERIES™

Compositum Filament Series™ is line of filaments which are made from granulated substances developed especially for use in FDM spatial printing. Material changes have already been made at the monomer stage, which has resulted in materials with excellent mechanical, thermal and physical properties. At this time Compositum Filament Series™ include six materials: ABS EX™, ABS ST™, ABS AT™, PCABS EH™, ASA MP™.



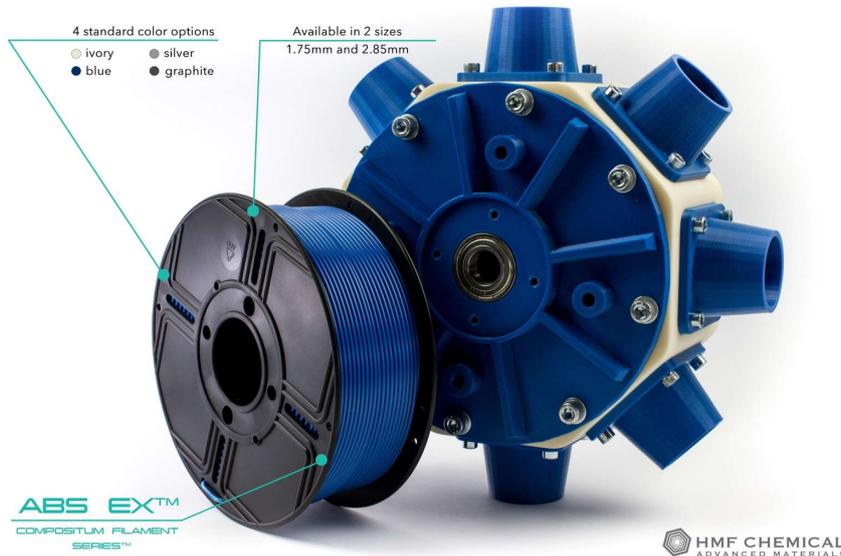
Application:

Practical advantages of Compositum Filament Series™ make them applicable in many areas of industry and professional activity. Compositum filaments are successfully used, among others, for:

- manufacturing elements of production lines and spare parts of machines and devices,
- prototyping car parts in automotive,
- manufacturing untypical tools, handles and fixings in production departments,
- manufacturing bases for sand casting molds,
- manufacturing cases for electronic production,
- manufacturing parts of cassettes,
- manufacturing elements of hand prostheses,
- manufacturing adapters for feeders in plastic industry,
- manufacturing elements of mock-ups for architectural designs,

- unitary and low-mass-produced manufacturing in furniture industry,
- prototyping mechanical and electronic elements and units.

Compositum ABS EX™



ABS materials are dedicated for industry and professional application in close chamber FDM 3D printers. ABS EX™ filaments are marked by excellent cohesion of layers and very low linear contraction (up to 0,4%). Thanks to it the difference in mechanical properties of the printed sample compared to the model produced by the injection method is only 8%. Additionally, ABS EX™ characterized by excellent machining processing: turning, milling, threading etc.

The ABS EX™ filament, as well as the entire Compositum filament family is characterized by a low emissions of volatiles and very low absorption of moisture, thanks to that, the moisture absorbing substance is no required.

The strength tests performed on the printed samples represent real strength values of the material, obtained by FDM spatial printing.

ABS EX™ - ISO (ASTM) Property

Item	Measuring Method	Condition	Unit	Value
Physical				
Specific Gravity	ISO 1183	Natural color	g/cm3	1.040
Melt Flow Index	ASTM D1238	200°C/5kg 220°C/10kg	g/10min	3.8 38.3
Mechanical				
Tensile Strength	ASTM D638	5mm/min	MPa	39.23
Flexural Strength	ASTM D790	2.8mm/min	MPa	56.88
Flexural Modulus	ASTM D790	2.8mm/min	MPa	2059
IZOD Impact Strength	ASTM D256	1/1 inch	kgfcm/cm	22
Rockwell Hardness	ASTM D785	R Scale		108
Thermal				
Heat Deflection Temperature	ASTM D648		°C	85
VICAT Softening Temperature	ISO R 306	5kg	°C	98
Flammability				
Flammability	UL94	HB	mm	1.0, 1.5, 3.0, 6.0

The output parameters of the control samples:
 - filling: 100%
 - layer: 0.2mm
 - nozzle: 0.4mm
 - print temperature: 250°C
 - platform temperature: 110°C
 - Temperature of the working chamber: 54°C

While using ABS EX™ with open chamber 3d printers, it is recommended to use side panels to stabilize the print temperature and reduce thermal stress.

Recommended print settings:
Hot-End - 240-260°C
No print cooling fan
Hot-Bed – 90-120°C (COROPad), 100-120°C (C-Stick)

Compositum ABS ST™



ABS materials are dedicated for industry and professional application in close chamber FDM 3D printers. ABS ST™ material compared to the ABS EX™ is characterized by increased melt flow and greater flexibility. The great flexibility of printed models allows it to be used in the production of thin-walled components subjected to alternating bending, electronic housing components etc.

ABS ST™ filaments are marked by excellent cohesion of layers and very low linear contraction (up to 0,4%). Thanks to it the difference in mechanical properties of the printed sample compared to the model produced by the injection method is only 8%.

The ABS ST™ filament, as well as the entire Compositum filament family is characterized by a

low emissions of volatiles and very low absorption of moisture, thanks to that the moisture absorbing substance is no required. The strength tests performed on the printed samples represent real strength values of the material, obtained by FDM spatial printing.

ABS ST™ - ISO (ASTM) Property

Item	Measuring Method	Condition	Unit	Value
Physical				
Specific Gravity	ASTM D791	Natural color	g/cm3	1.038
Melt Flow Index	ISO 1133 ASTM D1238	200°C/5kg	g/10min	3.8
		200°C/5kg		2.6
		220°C/10kg		25.0
Mechanical				
Tensile Strength	ISO 527 ASTM D638	50mm/min	MPa	44.7
		5mm/min		48
Flexural Strength	ISO 178	2mm/min	MPa	64
Flexural Modulus	ISO 178	2mm/min	MPa	1840.1
Tensile Modulus	ISO 527		MPa	1967,2
Tensile Elongation at Yield	ISO 527		%	2.1
Tensile Elongation at Break	ISO 527		%	18.6
Charpy Impact Strength	ISO 179 1eA	4mm, 23°C	KJ/cm2	20.0
IZOD Impact Strength	ISO 180 1A	4mm, 23°C	KJ/cm2	20.1
Rockwell Hardness	ISO 2039	R Scale		106.2
Thermal				
Heat Deflection Temperature	ISO 75-2	0.45MPa	°C	97.6
Heat Deflection Temperature	ISO 75-2	1.8MPa	°C	92.9
VICAT Softening Temperature	ISO R 306	B/50	°C	94.4

The output parameters of the control samples:
 - filling: 100%
 - layer: 0.2mm
 - nozzle: 0.4mm
 - print temperature: 240°C
 - platform temperature: 100°C
 - Temperature of the working chamber: 54°C

While using ABS ST™ with open chamber 3d printers, it is recommended to use side panels to stabilize the print temperature and reduce thermal stress.

Recommended print settings:
 Hot-End - 240-250°C
 No print cooling fan
 Hot-Bed– 90-120°C (COROPad), 100-120°C (C-Stick)

Compositum ABS AT™



ABS materials are dedicated for industry and professional application in open and close chamber FDM 3D printers. Due to the excellent coherence of the layers, ABS AT™ is perfect for printing large and complex models without having closed or heated chamber. Models made of ABS AT™ filaments are very well machined and the strength of the internal threads is comparable to that of aluminum. Because of its very good self-lubricating properties, this material is ideal for prototypes and production of the sliding elements.

ABS AT™ provides a perfect lateral surface without any cracks. It has a significantly increased thermal resistance so that the prints do not deform and can work continuously at temperatures up to 95°C. The linear contraction determined on open printers does not exceed 0.4% and the impact strength of IZOD at -30°C reaches 8 kg•cm/cm.

The ABS AT™ filament, as well as the entire Compositum filament family is characterized by a low emissions of volatiles and very low absorption of moisture, thanks to that the moisture absorbing substance is no required

The strength tests performed on the printed samples represent real strength values of the material, obtained by FDM spatial printing.

ABS AT™ - ASTM Property

Item	Measuring Method	Condition	Unit	Value
Physical				
Specific Gravity	ASTM D791	Natural color	g/cm3	1.04
Melt Flow Index	ASTM D1238	220°C/10kg	g/10min	23.0
Mechanical				
Tensile Strength	ASTM D638	50mm/min	MPa	51.24
Flexural Strength	ASTM D790	15mm/min	MPa	79.11
Flexural Modulus	ASTM D790	15mm/min	MPa	2759
Tensile Modulus	ASTM D638	1mm/min	MPa	2221
Tensile Elongation at Break	ASTM D638	50mm/min	%	30
IZOD Impact Strength 3.2mm	ASTM D256	23°C	kg-cm/cm	23
		-30°C		8
IZOD Impact Strength 6.4mm	ASTM D256	23°C	kg-cm/cm	20
		-30°C		8
Rockwell Hardness	ASTM D785	R Scale		110
Thermal				
Heat Deflection Temperature	ASTM D648	0.45MPa	°C	90.1
Heat Deflection Temperature	ASTM D648	1.8MPa	°C	86.3
VICAT Softening Temperature	ASTM D1525	B/50	°C	94.2

The output parameters of the control samples:
 - filling: 100%
 - layer: 0.2mm
 - nozzle: 0.4mm
 - print temperature: 250°C
 - platform temperature: 100°C

Recommended print settings:

Hot-End - 245-260°C

No print cooling fan

Hot-Bed– 90-120°C (COROPad), 100-120°C (C-Stick)

Compositum PCABS EH™



PCABS EH™ - PCABS materials are dedicated for industry and professional application in open and close chamber FDM 3D printers. It is the most durable material from the group of styrene-based material available in the Compositum™ series. Due to the excellent coherence of the layers, PCABS EH™ is perfect for printing large and complex models without having closed or heated chamber. Models made of PCABS EH™ filaments are very well machined and the strength of the internal threads is comparable to that of aluminum. Because of its very good self-lubricating properties, this material is ideal for prototypes and production of the sliding elements. PCABS EH™ provides a perfect lateral surface without any cracks. It has a significantly increased thermal resistance so that the prints do not deform and can work continuously at

temperatures up to 105°C. The linear contraction determined on open printers does not exceed 0.5%.

The PCABS EH™ filament, as well as the entire Compositum filament family is characterized by a low emissions of volatiles and very low absorption of moisture, thanks to that the moisture absorbing substance is no required.

PCABS EH™ - ASTM Property

Item	Measuring Method	Condition	Unit	Value
Physical				
Specific Gravity	ASTM D791	Natural color	g/cm3	1.06
Melt Flow Index	ASTM D1238	220°C/10kg	g/10min	-
Mechanical				
Tensile Strength	ASTM D638	50mm/min	MPa	51.62
Flexural Strength	ASTM D790	2.8mm/min	MPa	66.93
Flexural Modulus	ASTM D790	2.8mm/min	MPa	2157
Tensile Elongation at Break	ASTM D638	50mm/min	%	39
IZOD Impact Strength 3.2mm	ASTM D256	23°C	kg-cm/cm	26
Rockwell Hardness	ASTM D785	R Scale		110
Thermal				
Heat Deflection Temperature	ASTM D648	0.45MPa	°C	98.1
VICAT Softening Temperature	ASTM D1525	B/50	°C	104.9

The output parameters of the control samples:
 - filling: 100%
 - layer: 0.2mm
 - nozzle: 0.5mm
 - print temperature: 265°C
 - platform temperature: 110°C
 - Temperature of the working chamber: 56°C

Recommended print settings:

Hot-End - 255-265°C
No print cooling fan
Hot-Bed– 90-120°C (COROPad), 100-120°C (C-Stick)

Compositum ASA MP™



The ASA material is dedicated for industrial and professional purposes of open and closed 3D FDM printer systems. Filament Compositum ASA MP™ is characterized by an increased resistance to UV radiation and other weather conditions such as for example water/rain. Thanks to this it may be successfully used for creating elements which are displayed and used outdoors. Due to its stand-out layer consistency it is perfect for printing large and complex models without the need for a closed or heated chamber. The material possesses also good processing qualities. Additionally, its very high flexibility allows to take advantage of it in the process of manufacturing elements exposed for example to alternating bending stresses.

ASA AT™ allows to achieve perfect side surfaces, lacking any crevices. It possesses high

thermal resistance thanks to which the prints don't change their shape and may work or be displayed in temperatures exceeding 90°C. Linear shrinkage determined for open printers does not exceed 0.4%. Filament ASA MP™, similarly as the entire Compositum filament family, stands out with a low level of volatile substances and a very low absorption of moisture, thanks to which there is no need to use moisture absorbing agents.

The conducted durability research carried out on printed samples represents the material's real durability properties achieved with the FDM spatial printing method.

ASA MP™ - ASTM Property

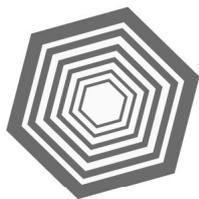
Item	Measuring Method	Condition	Unit	Value
Physical				
Specific Gravity	ASTM D792	Natural color	g/cm3	1.07
Melt Flow Index	ASTM D1238	220°C/10kg	g/10min	6.1
Mechanical				
Tensile Strength	ASTM D638	50mm/min	MPa	40.13
Flexural Strength	ASTM D790	15mm/min	MPa	63.87
Flexural Modulus	ASTM D790	15mm/min	MPa	1902
Tensile Modulus	ASTM D638	1mm/min	MPa	1712
Tensile Elongation at Break	ASTM D638	50mm/min	%	35
IZOD Impact Strength 3.2mm	ASTM D256	23°C	kg-cm/cm	45
		-30°C		6
IZOD Impact Strength 6.4mm	ASTM D256	23°C	kg-cm/cm	35
		-30°C		6
Rockwell Hardness	ASTM D785	R Scale		93
Thermal				
Heat Deflection Temperature	ASTM D648	4.6kg	°C	96
Heat Deflection Temperature	ASTM D648	18.6kg	°C	86
VICAT Softening Temperature	ASTM D1525	5kg, 50°C/h	°C	94

The output parameters of the control samples:

- filling: 100%
- layer: 0.2mm
- nozzle: 0.4mm
- print temperature: 250°C
- platform temperature: 100°C

Recommended print settings:

Hot-end - 245-260°C
No print cooling fan
Hot-Bed– 90-110°C (COROPad), 100-120°C (C-Stick)



HMF CHEMICAL

ADVANCED MATERIALS

CHEMICALLY MANUFACTURED FILAMENTS

Łódź Branch

Garnizonowa 19F/1
94-224 Łódź
POLAND

Grodzisk Mazowiecki Branch

3-go Maja 12A
05-827 Grodzisk Mazowiecki
POLAND

Niedomice Branch

Kolejowa 2
33-132 Niedomice
POLAND