

# WINDFORM® SP

**CLASS OF MATERIAL:** Composite polyamide based material carbon filled

**TECHNOLOGY:** Selective Laser Sintering

Windform® SP is a carbon fiber reinforced composite polyamide material characterized by a dark black color. Windform® SP has excellent mechanical properties similar to Windform® XT 2.0, with the addition of increased resistance to shock, vibrations, and deformation. The material also shows increases in impact strength and elongation at break, as well as excellent thermal properties and resistance to high temperatures.

Windform® SP is a material with optimal mechanical properties per density units.

Windform® SP has waterproof properties, and is resistant to absorption of liquids and moisture.

## **APPLICATIONS:**

Windform® SP is a suitable material to create accurate and reliable prototypes, and is perfect for functional applications in Motorsports, Automotive (under the hood components such as intake manifolds) and Aerospace (components for UAV and UAS). It allows for fully functional applications, as well as dyno testing, and on track testing. It is recommended for all applications requiring resistance to impact, vibration, deformation, and high temperatures.

These applications indicated are just an example. The versatility of the product combined with the technology used allows for endless possibilities.

## **WHERE TO FIND WINDFORM® PRODUCTS**

CRP Technology produces items in Windform® SP and distributes the material in Europe and ROW. CRP USA produces items in Windform® SP and distributes the material in the US and North America.

Both CRP Technology and CRP USA offer individually customized services for timing and method of delivery depending on the needs of the customer, anywhere in the world.

## **HOW TO GET WINDFORM® PRODUCTS**

For any further information, requests for quotation, or to check delivery times, please visit our website [www.windform.com](http://www.windform.com) or send an inquiry to [info@windform.com](mailto:info@windform.com) (for Europe and ROW markets) or [info@crp-usa.net](mailto:info@crp-usa.net) (for US market).

We will be in contact to answer all inquiries.



*3D printed Automotive intake manifold functional prototype*

WINDFORM® SP	Test Method	SI Unity	Windform® SP
<b>GENERAL PROPERTIES</b>			
Density (20° C)		g/cc	1,106
Colour			BLACK
<b>THERMAL PROPERTIES</b>			
Melting point	ISO 11357-2	°C	193,3
HDT, 1.82 Mpa	ASTM D 648 TYPE B	°C	186,5
Vicat 10N	ASTM D1525-09	°C	189,9
<b>MECHANICAL PROPERTIES</b>			
Tensile Strength	UNI EN ISO 527-1	Mpa	76,10
Tensile Modulus	UNI EN ISO 527-1	Mpa	6219,60
Elongation at break	UNI EN ISO 527-1	%	11,38
Flexural Strength	UNI EN ISO 14125	Mpa	120,08
Flexural Modulus	UNI EN ISO 14125	Mpa	4647,40
Impact Strength Unnotched (Charpy 23°C)	UNI EN ISO 179-1	KJ/m <sup>2</sup>	28,68
Impact Strength Notched (Charpy 23°C)	UNI EN ISO 179-1	KJ/m <sup>2</sup>	5,82
<b>ELECTRICAL PROPERTIES</b>			
Resistivity, Volume	ASTM D257	ohm * cm	<10 <sup>8</sup>
Resistivity, Surface	ASTM D257	ohm	<10 <sup>8</sup>
<b>SURFACE FINISH</b>			
After SLS Process		Ra µm	6,20
After manual finishing		Ra µm	1,45
After CNC machining		Ra µm	1,15
<b>PROPERTIES PER DENSITY UNIT</b>			
UTS per density unit		Mpa/(g/cc)	68,81
Tensile Modulus per density unit		Mpa/(g/cc)	5623,51
Flexural Strength per density unit		Mpa/(g/cc)	108,57
Flexural Modulus per density unit		Mpa/(g/cc)	4201,99

**Note:** these are all indicative values. Data was generated from the testing of parts produced with Windform® SP material under optimal processing conditions.

**Standard Technical Details for Accuracy versus Tolerance:**

For parts up to 6" (150 mm) the standard tolerance is: +/- 0.012 inches (0,3 mm)

For parts more than 6" (150 mm) the standard tolerance is: +/- 0.002 inches per inch (0,05 mm per 25 mm)

Example: For a 9" (229 mm) part, the standard tolerance would be: +/- 0.018 inches (0,46 mm).

WINDFORM® SP	Test Method	US Unit	Windform® SP
<b>GENERAL PROPERTIES</b>			
Density (68° F)		g/cc	1.106
Colour			BLACK
<b>THERMAL PROPERTIES</b>			
Melting point	ISO 11357-2	°F	380
HDT, 1.82 Mpa	ASTM D 648 TYPE B	°F	368
Vicat 10N	ASTM D1525-09	°F	374
<b>MECHANICAL PROPERTIES</b>			
Tensile Strength	UNI EN ISO 527-1	psi	11000
Tensile Modulus	UNI EN ISO 527-1	ksi	902
Elongation at break	UNI EN ISO 527-1	%	11.38
Flexural Strength	UNI EN ISO 14125	psi	17400
Flexural Modulus	UNI EN ISO 14125	ksi	674
Impact Strength Unnotched (Charpy 73.4°F)	UNI EN ISO 179-1	ft-lb/in <sup>2</sup>	13.6
Impact Strength Notched (Charpy 73.4°F)	UNI EN ISO 179-1	ft-lb/in <sup>2</sup>	2.77
<b>ELECTRICAL PROPERTIES</b>			
Resistivity, Volume	ASTM D257	ohm * cm	<10 <sup>8</sup>
Resistivity, Surface	ASTM D257	ohm	<10 <sup>8</sup>
<b>SURFACE FINISH</b>			
After SLS Process		Ra µm	6.20
After manual finishing		Ra µm	1.45
After CNC machining		Ra µm	1.15
<b>PROPERTIES PER DENSITY UNIT</b>			
UTS per density unit		psi/[g/cc]	9980
Tensile Modulus per density unit		ksi/[g/cc]	816
Flexural Strength per density unit		psi/[g/cc]	15700
Flexural Modulus per density unit		ksi/[g/cc]	609

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Example: For a 9" (229 mm) part, the standard tolerance would be: +/- 0.018 inches (0,46 mm).



*3D printed Automotive intake manifold functional prototype*



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