



# PROGRAFEN

## PROGRAFEN PET-G GRAPHENE STRONG

### 1 DESCRIPTION

**PROGRAFEN PET-G GRAPHENE STRONG** is a high-quality polymer filament for 3D printers created on the basis of polyester resin. This filament has been developed in response to market demand for a professional material that, despite its high mechanical strength, allows effortless printing at high printing speeds. In addition, the material does not require special nozzles or climate chambers. The components of the filament are polyethylene terephthalate, ethylene glycol and EFG (Edge Functionalized Graphene) flake graphene. The material exhibits minimal shrinkage allowing for extremely good dimensional stability of the printed parts. The addition of graphene results in a 25% increase in the tensile strength of the material and a 20% increase in stiffness compared to pure polymer.

### 2 KEY FEATURES

- Tensile strength 25% higher than pure PET-G.
- Stiffness (Young's modulus) 20% higher than pure PET-G.
- Extrudability with standard nozzles without the risk of excessive wear in contrast to carbon fiber materials.
- MFR 170% higher than pure PET-G.
- Ability to print faster while maintaining the same nozzle temperature with respect to pure PET-G.
- Possibility to print at a lower temperature while maintaining the same speed with respect to pure PET-G.
- Reduced shrinkage compared to pure PET-G.
- Easy and safe to print.
- Deep black color.
- Higher temperature resistance than PLA.
- Resistant to environmental conditions and many chemicals.

### 3 APPLICATIONS

- Functional prototypes.
- Spare and service parts.
- Short-run productions.
- Packaging.
- Educational aids and miniatures.
- Everyday objects.

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<sup>1</sup> Graphene EFG is a product of Garmor Inc, of which AGP is the exclusive European distributor.

## 4 PROPERTIES

Table 1: Filament properties

Properties	Value	
Diameter	1,75 ± 0,05 [mm]	
Weight	0,5 [kg]	1,0 [kg]
Length	170 [m]	330 [m]

Table 2: Physical properties of the material

Physical properties	Value	Method
Density	1,29 [g/cm <sup>3</sup> ]	Mass and volume measurement
Colour	Black	-

Table 3: Mechanical properties of the material

Mechanical properties	Value	Method
Tensile strength*	55,17 ± 0,72 [MPa]	PN-EN ISO 527
Stress at break*	55,17 ± 0,72 [MPa]	PN-EN ISO 527
Relative elongation at max. stress	5,62 ± 0,61 [%]	PN-EN ISO 527
Relative elongation at break	5,62 ± 0,61 [%]	PN-EN ISO 527
Tensile modulus of elasticity	1404,00 ± 52,52 [MPa]	PN-EN ISO 527
Impact strength*	2,13 ± 0,28 [kJ/m <sup>2</sup> ]	PN-EN ISO 179

Table 4: Thermal properties of the material

Thermal properties	Value	Method
MFR	27,0 [g/10 min]	ISO 1133 (230 °C; 2,16 Kg)
Glass transition temperature	75-85 [°C]	PN-EN ISO 11357
Melting point	210-230 [°C]	PN-EN ISO 11357
Heat Deflection Temperature*	68,3 ± 0,3 [°C]	PN-EN ISO 75 (0,45 MPa)
Shrinkage	Minimal	-

Table 5: Printing conditions

Parameter	Value
Nozzle temperature	210-245 [°C]
Bed temperature	75-90 [°C]
Print speed	30-300 [mm/s]
Bed type	Texture board

Mechanical tests were carried out on samples molded using the FDM method - 100% filling, XY printing direction. Tests marked with \* were carried out using a method accredited by the Polish Centre for Accreditation.

## 5 STORAGE:

In order to maintain the highest possible quality of the product, care should be taken to adequately protect the 3D filament from moisture. Filament should be stored in a cool, dry and shaded place. In case of problems with high humidity, it is recommended that the material is sealed in an airtight container together with suitable drying agents. The original packaging maintains the optimum moisture content of the material.

## 6 SAFETY AND HANDLING CONSIDERATIONS:

Please refer to the material safety data sheets for full safety information. Safety data sheets for Prografen brand products are available at [www.prografen.com](http://www.prografen.com). PET polymers are chemically stable and have a very low degree of toxicity. Under normal conditions of use, they should not present a hazard or unusual problems if swallowed or if they come into contact with the skin or eyes. It is recommended to use the product in a ventilated area. The material is flammable.

Disposal and environmental impact:

PET-G does not pose a risk to the environment due to its chemical composition, but it is not biodegradable and therefore accumulates in the environment. Plastics should be disposed of properly in accordance with local regulations. The best way to dispose of PET-G is by recycling.

## 7 CONTACT DETAILS

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