

Technical Data Sheet

PROGRAFEN PET-G GRAPHENE STRONG

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.

- 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.
- Resistant to environmental conditions and many chemicals.

Applications

Potential applications for PET-G PROGRAFEN GRAPHENE STRONG include:

- Prototype 3D models
- Tooling
- Construction elements
- Every-day-use items

Processing Information

PET-G PROGRAFEN GRAPHENE STRONG is easily processed on FDM/FFF 3D printers. The material is stable in the filament state, if it is being stored in a dry environment

Process Details

Preparation for printing

PET-G Graphene Strong is graphene enhanced PET-G filament, before printing following steps must be taken:

1. **Load filament into extruder head:** Is very important to heat up extruder before printing (optimal extruder temperature are 210-260 °C). When extruder reach set temperature insert filament into the way approved by 3D Printer manufacturer.
2. **Level up printing table and turn up its heating** (optimal printing table temperatures for PET-G are 60-70 °C).
3. **Upload previously prepared 3D model into 3D Printer controller.**
4. **Printing process can be started.**

Typical Material & Application Properties ⁽¹⁾

Physical Properties	PET-G PROGRAFEN GRAPHENE STRONG	Method
Specific Gravity	1.29	D792
MFR, g/10 min (230°C, 2.16kg)	27.0	ISO 1133
Mechanical Properties		
Tensile Strength, MPa	55.17 ± 0.72	ISO 527
Tensile Modulus of elasticity, MPa	1404,00 ± 52,52	ISO 527
Elongation at break, %	5,62 ± 0,61	ISO 527
Impact strength, kJ/m ²	2.13 ± 0.28	ISO 179

(1) Typical properties; not to be construed as specifications.

Processing Temperature Profile ⁽¹⁾

Extruder Head Temperature	210-245°C
Printing table Temperature	60-70°C
Post-treatment	Painting, smoothing

(1) These are starting points and may need to be optimized.

Storage

In order to maintain the highest possible quality of the printout, care should be taken to properly protect the filament against moisture. The filament should be stored in a cool, dry and shaded place. In case of problems with too high humidity, drying agents can be used, which should be placed in the filament packaging. The original packaging maintains optimal humidity and temperature of the filament.

Safety and Handling Considerations

Safety Data Sheets (SDS) for PET-G PROGRAFEN GRAPHENE STRONG are available at <https://prografen.com>. SDS's are provided to help customers satisfy their own handling, safety, and disposal needs, and those that may be required by locally applicable health and safety regulations. SDS's are updated regularly; therefore, please request and review the most current SDS's before handling or using any product.

Hazards and Handling Precautions

PET-G polymers have a very low degree of toxicity and, under normal conditions of use, should pose no unusual problems from incidental ingestion or eye and skin contact. However, caution is advised when handling, storing, using, or disposing of these resins, and good housekeeping and controlling of dusts are necessary for safe handling of product. No other precautions other than clean, body-covering clothing should be needed for handling PET-G polymers. Use gloves with insulation for thermal protection when exposure to the melt is localized. Workers should be protected from the possibility of contact with molten resin during fabrication.

Handling and fabrication of resins can result in the generation of vapors and dusts that may cause irritation to eyes and the upper respiratory tract. In dusty atmospheres, use an approved dust respirator.

Good general ventilation of the polymer processing area is recommended. At temperatures exceeding the polymer melt temperature (typically 175°C), polymer can release fumes, which may contain fragments of the polymer, creating a potential to irritate eyes and mucous membranes. Good general ventilation should be sufficient for most conditions. Local exhaust ventilation is recommended for melt operations. Use safety glasses (or goggles) to prevent exposure to particles, which could cause mechanical injury to the eye. If vapor exposure causes eye discomfort, improve localized fume exhausting methods or use a full-face respirator.

Disposal

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. For unused or uncontaminated material, the preferred option is to recycle into the process otherwise, send to an incinerator or other thermal destruction device. For used or contaminated material, the disposal options remain the same, although additional evaluation is required. Disposal must be in compliance with Federal, State/Provincial, and local laws and regulations.

Environmental Concerns

Due to its chemical composition, PET-G does not pose a threat to the environment. Nevertheless, plastics should be disposed of in appropriately labeled containers.

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