Recommendations for printing Filament PM ESD PETG

ESD PETG is a conductive composite based on PETG with the addition of carbon black, which provides protection against electrostatic discharge (ESD). It is used for the production of housings, holders and tools in the electronics industry, assembly workplaces, clean rooms and wherever ordinary plastic parts can damage sensitive electronics with static electricity. Printing from ESD PETG is basically similar to classic PETG, but the carbon black and maintaining ESD properties bring specific demands.

What to expect from this profile – and what not to

It is not a universal profile for all geometries - carbon black makes the material more brittle than classic PETG, especially after prolonged exposure to moisture. For each print, it is necessary to consider whether the given model is suitable for ESD PETG and adjust the settings if necessary.

Expect from this profile: conductive prints with ESD properties, sufficient mechanical strength for functional housings and holders, good dimensional accuracy and a black matte finish.

Do not expect: visual perfection like with classic PETG, high impact strength (the composite is more fragile).

⚠ Golden rules for successful ESD PETG printing ⚠

Before you start printing, review these rules. Following them will determine whether you get a functional conductive part or a ruined part surface and a clogged extruder.

1. Hardened nozzle is recommended

Carbon black in ESD PETG is abrasive. The standard brass nozzle wears out over time (on the order of tens of hours of printing) and is prone to clogging during retraction .

Procedure: Use **a Hardened Steel nozzle ,** for example ObXidian for Prusa . The profile for Bamboo is tuned to 0.4 mm, the profile for Prusa to 0.6 mm.

2. Drying according to the condition of the filament

ESD PETG absorbs moisture in the air just like regular PETG. Dry filament prints smoothly, wet filament cracks and can cause fragile material to break during loading.

Procedure: If the filament is fresh from the package or has been stored dry, drying is usually not necessary. If the filament has been exposed to air for a long time or breaks **when bent** or inserted, dry it **at 65 °C for 4–6 hours** . For very damp material, up to 8–12 hours.

3. Bamboo Lab : filament outside AMS

Carbon soot gradually dusts the AMS mechanism – contaminating the sensors, tracks and ball bearings. **Printing PETG ESD can lead to feed errors or damage to the AMS.**

Procedure: Feed the filament from **an external holder** outside the AMS system. For printing, this means manual filament replacement, but it will keep the AMS in operation for a long time.

4. Adhesion: the release layer protects the substrate

ESD PETG has extremely strong adhesion to bare PEI surfaces. Without a release layer, you risk permanent damage to the substrate - pieces of the coating will come off with your part.

Procedure: Always apply the release layer to **a cold substrate** – stick glue, 3DLac, Dimafix or Magigoo . For Bambu we recommend a textured PEI sheet, for Prusa a satin or textured sheet.

5. Do not increase the maximum flow rate

The profile is tuned to a safe volumetric flow rate at which the composite can be evenly heated to ESD conductive values. Higher flow rate means colder melt, poorer layer cohesion and reduced conductivity.

Procedure: If the print is slower than you would like, **do not increase the speed** – the composite needs time to heat up. The optimal print speed is 30–60 mm/s. A lower speed allows for uniform heating of the melt and the formation of a stable conductive percolation network of carbon black – a higher speed leads to a colder melt and worse ESD properties, tearing of surfaces.

6. Clean the underside after printing

The separation layer forms an insulating film on the underside of the part, which reduces the conductivity of the contact surface in the case of ESD applications.

Procedure: After removing the print, wipe the underside with isopropyl alcohol (IPA) to ensure conductivity on the underside. This is especially important for parts that need to be grounded or conduct ESD.

7. We recommend turning off the AUX fan

The side fan creates an asymmetric temperature gradient in the part, which can disrupt the uniform cohesion of the layers and thus the continuity of the conductive carbon black network.

For which printers is the profile debugged?

We offer profiles for two platforms that we have tested in practice. Both give reliable results.

System 1: Bamboo Lab P1S / P1P (0.4 mm hardened nozzle)

The profile is tuned for the Bambu series Lab P1. The choice for medium-sized functional ESD parts, housings and other conductive components.

- **Benefits:** P1S closed chamber stabilizes temperature and reduces warping. Excellent surface quality with 0.4 mm nozzle.
- **0.4mm hardened nozzle:** Detailed prints, ESD cases with small features and holes.
- **Limitations:** Filament must be inserted outside the AMS – carbon soot dusts the mechanism. We do not recommend multi-color printing with ESD PETG.
- **Substrate:** we recommend a textured PEI sheet with a release layer (glue, 3DLac, Dimafix).

System 2: Prusa XL / Core One (0.6mm hardened nozzle)

The profile is tuned for XL with 0.6mm hardened nozzle (ObXidian), but generally applies to all Nextruders with 0.6mm nozzle. Choice for larger functional parts with reliability priority.

- **Advantages:** Larger 0.6 mm nozzle minimizes the risk of clogging. Stable feeding with Nextruder when following the loading procedure.
- **0.4mm on Prusa:** Carbon black composite repeatedly clogs/breaks in the 0.4mm Nextruder nozzles . 0.6mm gives noticeably more reliable results. Recommended.
- **Specific step – Custom Filament:** For reliable filament feeding, create your own material (Custom Filament) in the printer menu with a feeding temperature **of 285 °C** . The standard PETG profile (230 °C) is insufficient for this composite and leads to extruder clicking or feeding errors.
- **To reduce brittleness:** Cut the end of the filament at a 45° angle before inserting. If the filament breaks when bent, dry it first.
- **Underlay:** we recommend satin or textured sheet with a separation layer.

Key printing parameters

The following table summarizes the basic parameters that apply to both profiles. The exact speeds, flow rates and other detailed settings can be found directly in the downloaded profile - we are continuously fine-tuning them based on experience, so you always have the current values in the profile itself.

Parameter	Value
Nozzle temperature	270–290°C
Pad temperature	80–90°C
Filament drying (if needed)	65°C / 4–6 hours
Nozzle	Hardened Steel
Adhesive	3DLac / Dimafix / glue
Administration	externally, outside AMS
Print speed	30–60 mm/s
Cooling	minimal (0–20%)
AUX fan	0%
Post- processing	clean the underside of the IPA

Every piece deserves a little tweaking

This profile is not and cannot be perfect for every geometry. It is a reliable starting point - some parameters may need to be adjusted for a specific part. The most common minor adjustments that you can make yourself:

- **Larger ESD enclosures:** increase the number of perimeters for better strength and higher ESD conductivity across the entire wall.
- **Thin-walled parts:** consider reducing the speed for better layer cohesion and stable conductivity.
- **Parts with screw holes:** expect slightly smaller tolerances – the composite has less flexibility than classic PETG.
- **Parts requiring dimensional accuracy:** print a 20×20×20 mm calibration cube, measure with a caliper, or adjust the % size (shrinkage) if necessary. compensation).

If you are printing a production run of the same part, we recommend printing a single test piece, verifying dimensions, ESD conductivity, and functionality, and only then starting a full print.

Summary

ESD PETG is a specialized material for electronics and ESD applications. It is not a filament for everyone, but following the guidelines below will help you get reliable conductive prints:

- **Hardened nozzle** – carbon soot destroys brass over time.
- **Drying according to the condition of the filament** – if it breaks, dry at 65 °C / 4–6 h.

- **Filament feeding outside of AMS** – this protects the mechanism.
- **Separation layer mandatory** – protects PEI from damage.
- **After printing, clean the underside with IPA** – for full ESD conductivity.
- **AUX fan off** at 0%.

With our profiles and following these principles, you will obtain functional conductive parts from ESD PETG for electronics, assembly workplaces and ESD protective applications.

One last tip : each profile is a living document. If you have experience with specific types of parts or find a better combination of parameters for your application, let us know. We are happy to improve the profiles.