What is a good pressure advance value for PLA?

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Abstract. Shipped PLA profiles use 0.02 to 0.05 on direct-drive printers with a 0.4 mm nozzle (0.036 on a Prusa Core One) and 0.2 to 0.27 on a Bowden Prusa MINI.

Keywords: pressure-advance, pla, slicer-settings

1 What is a good pressure advance value for PLA?

Start at 0.02 to 0.05, the range shipped slicer profiles use for PLA on a direct-drive printer with a 0.4 mm nozzle. PrusaSlicer sends 0.036 for Prusament PLA on the Core One and MK4S. Prusa's profiles for its Bowden MINI run 0.2 to 0.27, about 4 to 8 times the direct-drive values. Then calibrate your own spool.

1.1 The number

Table 1. The number

Printer and extruder	Shipped PLA profile	Value, 0.4 mm nozzle
Prusa Core One, MK4S (direct drive)	Prusament PLA, PrusaSlicer	0.036, sent as `M572 S0.036`
Prusa Core One, MK4S (direct drive)	Generic PLA, PrusaSlicer	0.03 (`M572 S0.03`)
Prusa MK3.5 (direct drive)	Generic and Prusament PLA, PrusaSlicer	0.035 (`M572 S0.035`)
Prusa MK3S (direct drive, Linear Advance)	Generic and Prusament PLA, PrusaSlicer	0.05 (`M900 K0.05`)
Qidi Q1 Pro (direct drive)	Qidi Generic PLA, OrcaSlicer	0.042, enabled
Qidi X-Plus 4 (direct drive)	Qidi Generic PLA, OrcaSlicer	0.034, enabled
Bambu Lab printers (direct drive)	Bambu PLA Basic, Bambu Studio	None in the profile; the printer's flow dynamics calibration stores a K value. Bambu's wiki examples: 0.015 (auto), 0.018 (manual)
Any printer, generic PLA	Bambu Studio and OrcaSlicer field default	0.02, off until "Enable pressure advance" is ticked
Klipper printers	`[extruder]` default in `printer.cfg`	0, which disables it
Prusa MINI, MINI+ (Bowden, Linear Advance)	Generic and Prusament PLA, PrusaSlicer	0.2 (`M900 K0.2`)
Prusa MINI, MINI+ with Input Shaper firmware (Bowden)	Generic and Prusament PLA, PrusaSlicer	0.27 (`M572 S0.27`)

The Prusa rows are filament start G-code from Prusa's profile bundle 2.5.13 (unchanged in PrusaSlicer 2.9.6); the Qidi and generic rows come from OrcaSlicer v2.4.2′s profiles and source, the Bambu rows from Bambu Studio v02.08.02.61 and the Bambu Lab wiki, and the Klipper row from its configuration reference.

1.2 Why does a Bowden printer need a higher value?

Because a Bowden extruder leaves a long tube of filament between the drive gear and the nozzle, and that filament compresses like a spring. Pressure advance has to push in enough extra filament to take up the squeeze (what pressure advance is).

Marlin's Linear Advance docs model that free filament as a spring with K as its spring constant. They say Bowden extruders need a higher K, set partly by the tube's length, and suggest a shorter tube to keep K low.

The 4 to 8 times comes from pairing Prusa's Generic PLA rows at 0.4 mm: 0.05 on the direct-drive MK3S against 0.2 on the MINI (4 times), and 0.035 on the MK3.5 against 0.27 on the MINI with Input Shaper (about 8 times). It is a ratio between those profiles, not a rule, since tube length changes K.

1.3 What is the best pressure advance for PLA?

The value your printer's own profile ships with, until a calibration print shows a better one. Prusa's knowledge base says to keep the profile's default `M572 S` value. Bambu Studio hides the pressure advance field on Bambu printers and uses the K value from flow dynamics calibration instead: automatic on the X1, A1 and H2D series, manual only on the P1 series. Klipper ships at 0, which is off, so start from the values above.

1.4 Does every PLA use the same value?

No. On the same Core One and nozzle, PrusaSlicer gives Prusament PLA 0.036 and Generic PLA 0.03. Klipper's guide says brands, and even pigments, can need significantly different values. Bambu Lab calls the K value specific to each printer and filament pair, and says its automatic results vary by about 10% between runs.

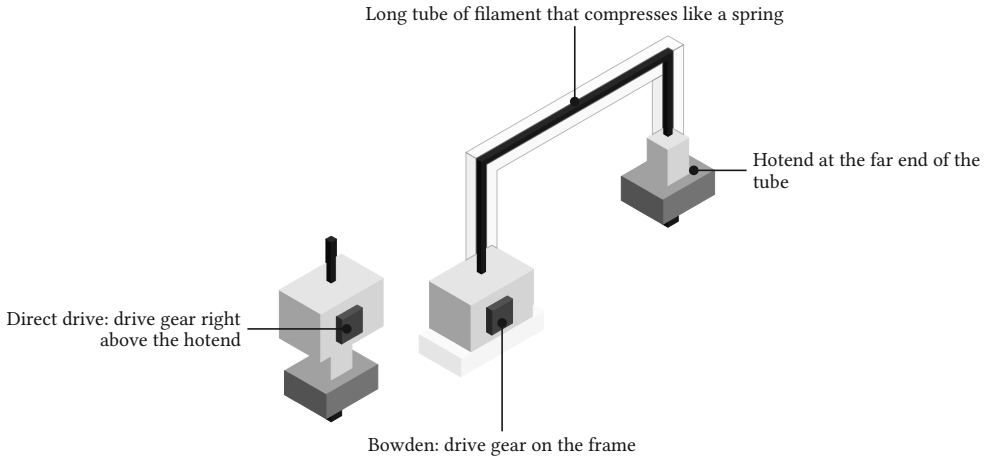


Figure 1. The longer the free filament between the drive gear and the nozzle, the more it compresses like a spring, so a Bowden extruder needs a higher pressure advance value than a direct-drive one.

1.5 Does nozzle size change pressure advance?

Yes. Prusa's profiles set one value per nozzle, higher for smaller nozzles:

Table 2. Does nozzle size change pressure advance?

Nozzle	Prusament PLA, Core One and MK4S (direct drive)	Generic PLA, MINI with Input Shaper (Bowden)
0.25 mm	0.12	0.85
0.3 mm	0.08	No such nozzle option
0.4 mm	0.036	0.27
0.5 mm	0.025	No such nozzle option
0.6 mm	0.022	0.17
0.8 mm	0.014	No PLA profile

1.6 Why do some guides give much higher pressure advance values?

Because firmware docs give one range for every extruder, Bowden included. Klipper's guide calls 0.050 to 1.000 typical, the high end usually Bowden. Marlin gives about 0.1 to 2.0 for Linear Advance 1.5, which shares Klipper's unit. Every direct-drive PLA profile in the table sits at or below the bottom of both ranges. A K of 30 to 130 is Marlin's PLA figure for the older Linear Advance 1.0, a different unit.

1.7 How to check it on your own print

1. **Find what your slicer sends now.** PrusaSlicer: Filament Settings, Custom G-code, Start G-code, then look for `M572 S` or `M900 K`. OrcaSlicer: the filament's Filament page, "Flow ratio and Pressure Advance" group. Bambu printers: the slot's K value in the Device tab's filament dialog, or Calibration, Flow Dynamics, Manage Result. Klipper: `pressure_advance` under `[extruder]` in `printer.cfg`.
2. **Dry the spool first.** Bambu Lab lists damp filament as a reason calibration results go wrong (does PLA need drying).
3. **Print a test sized for your extruder.** In OrcaSlicer, open Calibration, Pressure advance and pick DDE (direct drive, 0 to 0.1 in 0.002 steps) or Bowden (0 to 1.0 in 0.02 steps). In Klipper, run `TUNING_TOWER COMMAND=SET_PRESSURE_ADVANCE PARAMETER=ADVANCE START=0 FACTOR=.005`, or `FACTOR=.020` on a long Bowden. On a Bambu printer, run Flow Dynamics; Bambu suggests a 0.002 step in manual mode.
4. **Read the result** (how to read a pressure advance test). Bulging corners mean too low, and thin or gapped lines into a corner mean too high. When in doubt, Klipper says take the lower value.
5. **Save it in the filament profile,** not the printer profile, so each spool keeps its own value. Bambu Lab says to recalibrate after a new filament brand, a new or worn nozzle, or a change to print temperature or maximum volumetric speed.
6. **If the extruder skips after you raise the value,** lower the acceleration or turn pressure advance off. Klipper warns that values above 0.200 can leave the extruder short of torque at normal acceleration.

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