Does PLA need a heated bed?

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Abstract. No. Prusa says PLA does not require a heated bed, and Polymaker and Overture start their bed range at 25 °C. Prusa still recommends a 60 °C bed.

Keywords: pla, bed-adhesion, build-plates, warping

Table 1. The number

Source	Bed temperature for PLA	What it says about heat	Surfaces it names
Prusa knowledge base	60 °C recommended	"PLA does not require a heated bed"	Satin or smooth PEI (polyetherimide) for best adhesion
Prusament PLA data sheet	40 to 60 °C	No unheated option listed	Smooth PEI, powder-coated or satin sheet
Polymaker PolyLite PLA data sheet	25 to 60 °C	Range starts at room temperature; no enclosure needed	PC (polycarbonate) and textured PEI, glue when needed
Overture PLA product page	25 to 60 °C	Range starts at room temperature	Glue stick, Magigoo or textured PEI if adhesion is poor
Bambu Lab PLA Basic data sheet	35 to 45 °C	Test specimens printed on a 35 °C bed	Cool Plate, High Temperature Plate or Textured PEI, with glue
Bambu Lab Cool Plate SuperTack	40 °C	PLA "adhere[s] firmly" even at this "low bed temperature"	SuperTack coating, PLA and PETG only
BuildTak	Cold to 60 °C on two of its surfaces, 60 °C on a third	"A heated bed is not required for printing with PLA"	BuildTak sheet
MakerBot Replicator 2 manual	No bed heat at all	"Does not have a heated build plate"	Blue painter's tape or the bare acrylic plate

1 Does PLA need a heated bed?

No. Prusa's knowledge base says PLA (polylactic acid) does not require a heated bed, and Polymaker and Overture both start their PLA bed range at 25 °C, room temperature. A heated bed still helps the first layer grip: Prusa recommends 60 °C, and Bambu Lab lists 35 to 45 °C on its own plates.

1.1 The number

Bed ranges come from the Prusa knowledge base, the Prusament, Polymaker and Bambu Lab PLA Basic data sheets, Overture's product page, Bambu Lab's build plate guide, BuildTak's FAQ and print recommendations, and the MakerBot Replicator 2 user manual.

1.2 Cold bed vs hot bed: what changes for PLA

Table 2. Cold bed vs hot bed: what changes for PLA

What changes	Cold bed (room temperature)	Heated bed
Adhesion	Comes from the surface: tape, BuildTak or bare acrylic	Rises with heat; Spoerk et al. measured PLA's highest adhesion on glass at 70 °C
Surfaces	Blue tape, bare acrylic (MakerBot), BuildTak	PEI sheets, powder-coated steel, Bambu Lab's coated plates
Part size	The unheated Replicator 2 builds up to 28.5 × 15.3 × 15.5 cm	Prusa says PLA parts can fill "almost the entire print volume"
Room temperature	15 to 32 °C, the Replicator 2's rated operating range	Bambu Lab lists a 25 to 45 °C chamber for PLA Basic
Removing the part	Tape lets parts come off more easily; BuildTak needs no heat to release PLA	On Bambu Lab's Textured PEI, wait until the bed is 35 °C or lower

1.3 Why PLA prints without bed heat

Warping comes from shrinkage. Prusa's warping guide blames "a sudden temperature difference" between the nozzle and the air around the print: the plastic shrinks as it cools and pulls the corners up. Prusa calls PLA "not prone to significant warping." With so little pull at the corners, the surface alone

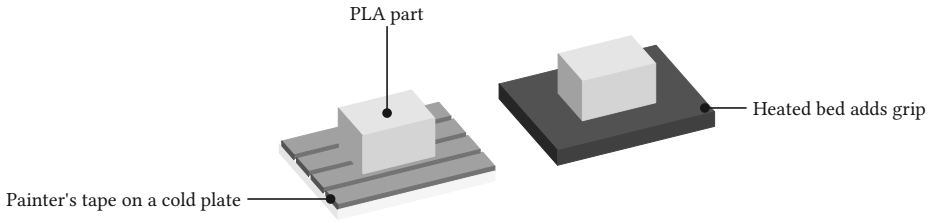


Figure 1. PLA warps so little that a taped, unheated plate can hold it down, and a heated bed adds grip on top of what the surface gives.

can hold the part, which is why MakerBot and BuildTak both print PLA on an unheated plate.

A heated bed adds grip on top of the surface's own. Spoerk and colleagues found adhesion jumps when the bed sits slightly above the plastic's glass transition, and their PLA stuck hardest to glass at a 70 °C bed. Bambu Lab's data sheet puts PLA's glass transition at 60 °C. In the same tests, PLA and ABS (acrylonitrile butadiene styrene) parts that took more than 200 N to shear off warped little and stayed attached.

More heat is not always better, and the sources disagree on the top end. When Wijnen, Sanders and Pearce heated printed PLA, they found no shrinkage at 50 °C. At 90 °C, PLA crystallized to about 20 percent and shrank 5 percent in both horizontal directions. They concluded the bed should stay at 50 °C or lower to stop PLA prints releasing early, while Prusa recommends 60 °C. For the setting on each plate type, see what bed temperature PLA needs.

1.4 How to check it on your own print

- **No heated bed: tape the plate.** MakerBot calls blue painter's tape "a great build surface" for PLA, and it lets parts release more easily. If prints still won't stick, MakerBot's fix is to print on the bare acrylic plate instead.
- **Level first, then close the gap.** MakerBot's first fix for prints that won't stick is to relevel, because uneven plate height gives uneven adhesion. Next, it suggests loosening each leveling knob about a quarter turn to bring the plate closer. On BuildTak, set the PLA nozzle gap to the thickness of card stock, about 0.2 mm.
- **Keep the room in range.** The Replicator 2 is rated for 15 to 32 °C. An unheated garage in winter can drop below that floor; see running a printer in a cold garage.
- **Add a brim for long or thin parts.** Prusa calls a brim "a good way" to increase adhesion to the print surface.
- **Heated bed: start at the maker's figure.** Use 60 °C on a Prusa sheet or 35 to 45 °C on Bambu Lab plates. If corners still lift, Overture suggests raising the bed in 5 to 10 °C steps, staying within its 60 °C ceiling.
- **Let PEI cool before removal.** Bambu Lab's Textured PEI releases parts as it cools; it recommends waiting until the bed reaches 35 °C or lower.

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