What bed temperature does polycarbonate need?

Asked 3D Content Team
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Abstract. Polycarbonate needs a 90 to 120 °C bed. Bambu Lab lists 90 to 110 °C, Polymaker 90 to 105 °C and Prusament PC Blend 110 ± 10 °C; PC-ABS takes 90 to 105 °C.

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

1 What bed temperature does polycarbonate need?

Polycarbonate (PC) needs a bed between 90 and 120 °C. Bambu Lab's PC data sheet gives 90 to 110 °C, Polymaker's 90 to 105 °C, and Prusament PC Blend asks 110 ± 10 °C. PC-ABS needs about the same: 90 to 105 °C from Polymaker, 100 °C from Fiberlogy. Put glue stick on a PEI (polyetherimide) plate.

1.1 The number

Table 1. The number

Filament	Bed temperature	Plate and glue
Bambu PC, data sheet	90 to 110 °C	Engineering, High Temperature or Textured PEI plate, PVP glue
Bambu PC, filament guide plate table	100 to 120 °C	Engineering, Smooth PEI or Textured PEI plate with glue stick; Cool Plate and liquid glue "Not Recommended"
Bambu PC FR	90 to 110 °C	Smooth or Textured PEI plate, glue
Polymaker PolyLite PC	90 to 105 °C	Textured PEI, "Glue when needed"
Polymaker PolyMax PC-FR	90 to 105 °C	Textured PEI, "Glue when needed"
Prusament PC Blend	110 ± 10 °C; Prusa runs 110 °C on the first layer, 115 °C after	Satin sheet; smooth PEI or powder-coated sheet with glue stick
Prusament PC Blend Carbon Fiber	110 ± 10 °C	Satin, powder-coated or smooth PEI sheet, all with glue stick
Polymaker PC-ABS	90 to 105 °C	Textured PEI, "Glue when needed"
Fiberlogy PC/ABS	100 °C	Smooth PEI with adhesive, textured PEI, or glass with adhesive

The figures come from the Bambu Lab PC and PC FR data sheets and its filament guide, Polymaker's PolyLite PC, PolyMax PC-FR and PC-ABS data sheets, Fiberlogy's PC/ABS product page, the Prusament PC Blend and PC Blend Carbon Fiber data sheets and the Prusa Knowledge Base. FR means flame retardant, and PVP glue is polyvinylpyrrolidone glue. Bambu Lab's two documents disagree by 10 °C at each end, so both are shown.

1.2 What bed temperature for PC-ABS?

90 to 105 °C on Polymaker's PC-ABS sheet, the same range it gives for straight PC. Fiberlogy's PC/ABS page gives 100 °C. The ABS (acrylonitrile butadiene styrene) in the blend does not buy a cooler bed: Bambu Lab's guide puts plain ABS at 90 to 100 °C, so PC-ABS lands at or just above it. Polymaker lists a 109 °C glass transition for PC-ABS against 113 °C for PolyLite PC.

1.3 Can my printer's bed get hot enough?

Table 2. Can my printer's bed get hot enough?

Printer	Maximum bed temperature	Chamber
Bambu Lab A1 mini	80 °C	Open frame
Bambu Lab P1S	100 °C	Enclosed, no heater
Bambu Lab X1-Carbon	110 °C at 220 V, 120 °C at 110 V	Enclosed, no heater
Original Prusa MK4S	120 °C	Open frame
Prusa CORE One+	120 °C	Up to 55 °C
Bambu Lab H2D	120 °C	Active heating, up to 65 °C
Creality K2 Plus	120 °C	Active heater, up to 60 °C

Every figure comes from the maker's own spec sheet or product page.

The A1 mini cannot reach the bottom of any range, and Bambu Lab rates PC "Not Recommended" on it. The P1S's 100 °C sits mid-way through the 90 to 110 °C data sheet range and at the floor of the 100 to 120 °C plate table. Bambu Lab rates PC "Capable" on the P1S and "Ideal" on the X1-Carbon. Every 120 °C printer on the list covers every range in the first table.

1.4 Why

PC has a high glass transition, the point where it turns from rubbery to rigid: 145 °C for Bambu PC and PC FR, 113 °C for PolyLite PC. A part shrinks as it cools below that point. The bed holds the first layers warm and stuck while the layers above contract and pull at the corners. Bambu Lab's usage guide puts it as "the anisotropic relaxation of molec-

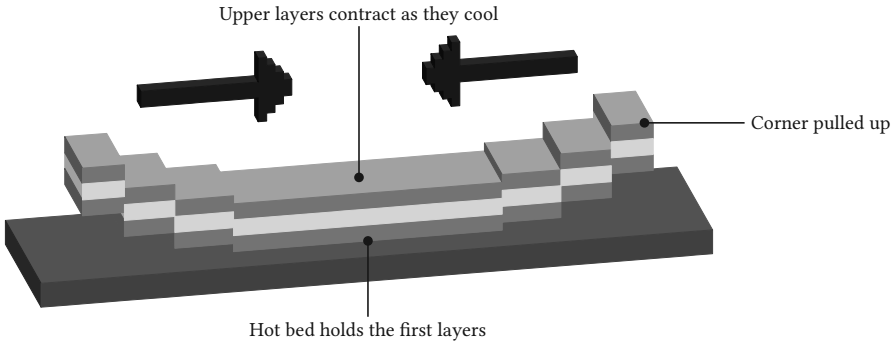


Figure 1. The bed holds the first layers of PC warm and stuck while the layers above contract and pull at the corners.

ular chains" generating "significant internal stress, resulting in model shrinkage and warping" when the surrounding air is cool.

That is why makers pair a hot bed with an enclosure. Polymaker asks for a 70 to 100 °C chamber for PolyLite PC; Bambu Lab's PC sheet asks 45 to 60 °C. Without a chamber heater the bed is the only heat source, and Bambu Lab says raising it "indirectly raises the chamber temperature." A cold room works against the bed too. Prusa reports "Bed thermal runaway" errors below about 18 °C ambient, when the printer cannot hold PC's bed temperature.

PC also bonds too well to bare smooth PEI. Prusa warns its "great adhesion might damage the surface", so every smooth PEI entry in the table pairs it with glue as a separation layer.

1.5 How to check it on your own print

- **Set it per plate in the slicer.** In Bambu Studio and OrcaSlicer the bed field sits under the filament's settings, one per plate type, with an initial-layer and an other-layers value. In PrusaSlicer it is Filament Settings, Filament, Temperature, where Bed has a First layer and an Other layers value.
- **Start where the makers test.** Bambu Lab and Polymaker printed their PC test bars on a 100 °C bed; Prusa printed PC Blend's at 115 °C on all layers.
- **On a 100 °C bed, preheat.** For the P1S and X1-Carbon in a cold room, Bambu Lab's advice is to hold the bed at maximum for 15 minutes before the print starts.
- **Glue every PEI surface.** Use glue stick on smooth and textured PEI; Bambu Lab marks liquid glue "Not Recommended" for PC.
- **If corners still lift, cut the shrinkage load.** Bambu Lab suggests infill at or below 50 percent and no more than 6 walls. Prusament adds a 4 mm brim for PC Blend parts over 5 cm.
- **If the printer throws a thermal error, warm the room.** Prusa ties it to rooms below about 18 °C.

A set bed temperature is not the temperature on top of the sheet; that gap is on bed surface temperature. For ABS on its own, see ABS bed temperature.

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