

// MATERIAL · BAMBU LAB · FDM

PLA MATTE

A chalky, light-absorbing finish that hides layer lines and photographs beautifully — bought for the look, and paid for in strength.

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PLA Matte is PLA loaded with a fine mineral filler that scatters light instead of reflecting it. The result is a soft, velvety surface with no shine, on which the individual layers of a print almost disappear. It is the material of choice for anything meant to be looked at — figures, props, display models, architectural studies — and it is the second most popular PLA after Basic for exactly that reason. The filler changes more than the appearance, though: the material is about 6 % denser, flows less easily, and gives up a noticeable share of PLA Basic's strength and toughness, particularly between layers. Treat it as a cosmetic grade.

FEELS LIKE

Smooth, dry, slightly chalky

Like an eggshell-finish paint; fingerprints do not show

THE EFFECT

No gloss, hidden layer lines

Colours look deeper and flatter, almost like coloured stone

STRENGTH

Lower than PLA Basic

Roughly 15 % less in a pull; about half the layer toughness

COLOUR RANGE

24 colours

Muted, designer palette: charcoal, ivory, latte, sakura, nardo grey and others

EASE OF PRINTING

Easy, with two caveats

Slightly more clog-prone at speed; some colours stick poorly on cool plates

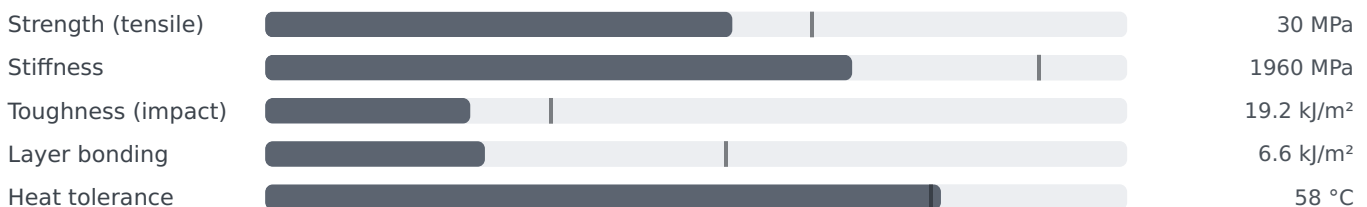
WEIGHT

1.31 g/cm³

About 5 % fewer metres per kilogram than PLA Basic

Where it sits in the range

Each bar shows this material against the strongest value found anywhere in this series of guides, PLA and PETG together (bar full = best in the series). The dark tick marks plain PLA Basic, the material most people know, so you can see at a glance where this one gives up or gains something. Values come from the manufacturer's own datasheets, measured on test bars printed flat (X-Y).



■ PLA Matte | PLA Basic reference

Good for

- Tabletop miniatures, busts and figurines that will be photographed or displayed
- Cosplay props and costume pieces before painting, or left unpainted

Not the right choice for

- Load-bearing brackets, hooks, clips and mechanical parts
- Thin-walled or tall parts likely to be knocked — layers separate more easily than PLA Basic
- Parts that must survive drops

- Architectural models, product mock-ups and design studies
- Home décor: vases, planters, wall art, lamp bodies
- Any print where you would otherwise sand and prime to hide layers

- Food contact, heat above ~55 °C, prolonged sun — the general PLA limits
- Nozzles finer than 0.4 mm at high speed, where the lower melt flow invites clogs

Why matte costs strength

The filler particles that break up surface reflections also sit between polymer chains inside the material, and every particle is a place where a crack can start. The datasheet shows the price: tensile strength falls from 35 to 30 MPa, bending strength from 76 to 53 MPa, and unnotched impact from 26.6 to 19.2 kJ/m² in the flat direction. The steepest drop is across the layers — 6.6 kJ/m² against 13.8 for PLA Basic — which matches what users report: matte prints snap along a layer line with less provocation. No print setting recovers this; it is in the material. If a matte part must also be strong, print it with more walls and orient it so the load runs along the layers.

2 · Living with a PLA Matte print

A matte print lives much like any PLA print, with one extra courtesy: its surface is more porous than a glossy one, so it marks a little more easily and cleans a little less easily.

Heat	Softens from about 55–60 °C; the datasheet's glass transition is 61 °C, a degree above PLA Basic. Same rules: no cars, radiators or dishwashers.
Sunlight	The matte surface hides fading better than gloss does, but the polymer still embrittles under years of UV.
Water and damp	Insoluble; slightly lower moisture uptake than PLA Basic (0.40 %). Fine for indoor use; avoid permanently wet outdoor planters.
Chemicals	As PLA: fine with oils and isopropyl alcohol, attacked by acids, alkalis and some solvents.
Food	Not certified for food contact, and the filler is undisclosed. Use PLA Pure.
Marks and dirt	Dark colours show dust and light colours pick up scuffs more than glossy PLA. A soft brush or slightly damp cloth restores them.
Load over time	Creeps under sustained load like all PLA, and is weaker to begin with. Keep it decorative.
End of life	General waste or 3D-print recycling; industrially compostable in principle, but the filler is inert.

Looks and feel

Flat, even and free of shine, with the crisp appearance of a spray-painted object straight from the printer. Layer lines are present but hard to see except under raking light. Textured build plates give an equally matte underside, so there is no glossy first layer to hide.

Care

- Dust with a soft brush; wipe with a barely damp cloth
- Keep away from heat sources and long-term sun
- Sanding is rarely needed; if you must, wet-sand lightly — heavy sanding polishes the surface and removes the matte effect
- Takes primer and acrylic paint exceptionally well because of its tooth

- Superglue and epoxy bond normally

Handle tall, thin matte prints with care

Independent users have measured matte layer adhesion at as little as a third of glossy PLA. A tall vase or a figure's outstretched arm can break along a layer with a knock that a PLA Basic print would shrug off.

What PLA actually is

PLA stands for polylactic acid. It is a polyester made by fermenting plant sugars — usually corn starch or sugarcane — into lactic acid and then linking those molecules into long chains. That plant origin is why PLA is often described as a bioplastic: the carbon in it was recently in a field, not in an oil well. It is the most widely used material in desktop 3D printing for a practical reason: it melts at a low temperature, barely shrinks as it cools, and therefore prints reliably on almost any machine without an enclosure.

Its two well-known limits follow from the same chemistry. PLA is a semi-crystalline polymer with a glass transition around 55–60 °C, so it starts to soften at temperatures a car dashboard or a sunny windowsill can reach. And although it is compostable in principle, that only happens in an industrial composting plant at around 60 °C with the right microbes; in a garden heap, in soil or in the sea it behaves like any other plastic for many years. Printed PLA should go into general waste or a dedicated 3D-print recycling stream, not the organic bin. Every variant in this series is a PLA base with something changed — a filler, a pigment system, an additive package or a foaming agent — and each guide explains what that change does to the material's behaviour.

3 · How it is printed

PLA Matte prints on the standard PLA profile, but its lower melt flow (18 g/10 min against 42 for PLA Basic) means it tolerates less abuse at high speed through small nozzles, and some colours are fussier about first-layer adhesion. The manufacturer's published window is below.

Manufacturer print window

Nozzle temperature	190–230 °C
Bed temperature	35–45 °C on the Cool Plate; 45–65 °C on smooth or textured PEI
Build plates	Cool Plate, High-Temperature Plate, Textured PEI; textured PEI gives the most consistent adhesion
Bed adhesive	Glue stick or liquid glue recommended
Chamber	25–45 °C, no enclosure
Print speed	Up to 300 mm/s (store guidance: 270 mm/s with a 0.4 mm nozzle and 0.2 mm layers)
Part cooling fan	On
Retraction	0.6–1.0 mm at 20–40 mm/s
Max overhang without support	About 55°
Max unsupported bridge	About 30 mm

Hardware and compatibility

Nozzle sizes	0.2, 0.4, 0.6 and 0.8 mm; 0.4 mm or larger is more forgiving
Nozzle material	Standard stainless is fine; the manufacturer lists no abrasion warning for the matte filler
Abrasive	Not according to the manufacturer
Automatic material systems	Compatible with all AMS generations
Spool identification	RFID tag
Format	Spool, and spool-free refill for the reusable spool

Moisture, drying and storage

Moisture uptake is low (0.40 %). The datasheet recommends a slightly gentler drying temperature than PLA Basic — 50 °C rather than 55 °C.

Forced-air oven or filament dryer	50 °C for 8 hours (datasheet); retailers quote up to 55 °C
Heated print bed method	60–70 °C for 12 hours, covered
Storage	Sealed with desiccant, below 20 % relative humidity
Warning	Not a kitchen oven or microwave

Tips that make a visible difference

- For a matte first layer, use a textured plate; on a smooth plate the underside comes out semi-gloss
- If a colour refuses to stick, raise the bed to 55–60 °C on PEI and use glue rather than raising the nozzle temperature
- Slow the outer wall slightly (60–100 mm/s) for the most uniform surface — the matte effect makes speed changes less visible than on silk, but not invisible
- Add one extra wall on anything that will be handled; it is the cheapest way to compensate for the weaker layers

Known problems and their fixes

Part breaks along a layer line

Inherent to the filled material. Increase walls, orient the load along the layers, or switch to PLA Basic or Tough+ for structural parts.

First layer lifts or the part sticks to the hotend

Reported mainly with red and lilac colours on the Cool Plate. Move to textured PEI at 55–60 °C with glue, clean the plate thoroughly, and re-run bed levelling.

Intermittent under-extrusion at high speed with a 0.2 mm nozzle

Lower melt flow than PLA Basic. Reduce speed or use a 0.4 mm nozzle.

Glossy patches on the print

Over-extrusion or a hot nozzle can polish the surface. Check flow calibration and drop the nozzle 5–10 °C.

Shiny underside

Smooth plate. Use textured PEI or accept it.

4 · The numbers — technical datasheet

Figures are the manufacturer's values from the PLA Matte Technical Data Sheet V3.0, measured on specimens printed at 220 °C / 35 °C bed with 100 % infill and dried before testing.

Physical and thermal properties

Property	Test method	Value
Density	ISO 1183	1.31 g/cm ³
Melt flow index (210 °C, 2.16 kg)	ISO 1133	18.0 ± 3.2 g/10 min
Melting temperature	DSC, 10 °C/min	163 °C
Glass transition temperature	DSC, 10 °C/min	61 °C
Vicat softening temperature	ISO 306	63 °C
Heat deflection temperature, 0.45 MPa	ISO 75	58 °C
Heat deflection temperature, 1.8 MPa	ISO 75	52 °C
Saturated water absorption (25 °C, 55 % RH)	—	0.40 %

Mechanical properties

Property	Test method	X-Y (flat)	Z (across layers)
Young's modulus	ISO 527	1960 ± 180 MPa	1670 ± 140 MPa
Tensile strength	ISO 527	30 ± 5 MPa	22 ± 4 MPa
Elongation at break	ISO 527	14.8 ± 4.2 %	4.8 ± 1.7 %
Bending modulus	ISO 178	2360 ± 250 MPa	1770 ± 210 MPa
Bending strength	ISO 178	53 ± 6 MPa	29 ± 5 MPa
Charpy impact, unnotched	ISO 179	19.2 ± 3.7 kJ/m ²	6.6 ± 1.1 kJ/m ²
Charpy impact, notched	ISO 179	6.3 ± 1.5 kJ/m ²	not published

The datasheet omits the unit on the notched X-Y impact value; kJ/m² is assumed from context.

What the mechanical numbers mean in practice

Compared with PLA Basic the pattern is consistent: every strength figure is lower, and the gap widens across the layers. Z-direction tensile strength is 22 MPa (73 % of the flat value, against 89 % for PLA Basic), Z bending strength is little more than half of X-Y, and Z impact toughness is half that of PLA Basic. The modulus of about 2 GPa means a matte part flexes visibly more than a Basic part of the same shape. Elongation is actually a touch higher in the flat direction — the filler does not make it glassy — but the low Z elongation (4.8 %) is what produces the characteristic clean snap along a layer. Heat resistance is essentially the same as PLA Basic.

Product format

Diameter	1.75 mm ± 0.03 mm
Net weight	1 kg
Spool	ABS, 200 × 67 mm, rated to 70 °C; also a spool-free refill

Colours	24, all opaque matte
Identification	RFID tag
Datasheet version	V3.0

Safety, certifications and chemical resistance

- Declared composition polylactic acid plus an undisclosed matting filler; odourless, no skin hazard listed
- Flammable; combustion products water and carbon oxides
- RoHS and REACH compliance stated across the filament line
- No food-contact or toy certification for this grade
- Resistant to oils and greases; not to acids, alkalis or some organic solvents
- Sanding dust from filled filaments should not be inhaled; wet-sand or wear a mask

5 · Compared with Polymaker and SUNLU

Matte PLA is the category where the three brands align most closely, because all three use a heavy mineral fill and all three pay the same strength penalty. Polymaker's Panchroma Matte (the renamed PolyTerra PLA) is the direct rival; SUNLU's Matte PLA is the budget option.

Polymaker

Panchroma Matte PLA (formerly PolyTerra PLA) · Matte PLA for Production

The closest match in the whole comparison, and even more heavily filled than Bambu's: 1.37 g/cm³ on the current sheet. It is weaker in a pull (23 MPa) but reports a higher notched impact (10 kJ/m² against 6.3), and it is the only one of the three to publish a Z figure for a matte grade — 12 MPa tensile, roughly half of flat. Sold on a recycled cardboard spool at the lowest price in Polymaker's range. Note that the older PolyTerra datasheet gives different numbers for what Polymaker says is the same material (see data notes).

Density	1.37 g/cm ³
Tensile X-Y / Z	23.2 / 12.2 MPa
Young's modulus X-Y	1997 MPa
Charpy notched X-Y	10.0 ± 0.8 kJ/m ²
Vicat	62 °C
Nozzle / bed	190–230 °C / 25–60 °C
Max speed	up to 300 mm/s
Spool	cardboard, 1 kg

SUNLU

SUNLU Matte PLA · High Speed Matte PLA

SUNLU's matte shares a datasheet row with its PLA Classic and PLA Lite, so the figures describe the base resin family rather than an independent test. Density is 1.36 g/cm³ — as heavily filled as Polymaker's — with 27 MPa tensile and a very high elongation figure. No impact, no modulus and no Z data. Available as a spool-free refill, which SUNLU offers for its matte and neither of the other two brands does.

Density	1.36 g/cm ³
Tensile	27 ± 4 MPa
Elongation	20 ± 7 %
Flexural modulus	3300 ± 400 MPa
HDT	55 ± 3 °C
Nozzle / bed	200–260 °C / 50–60 °C
Diameter	1.75 ± 0.02 mm
Formats	cardboard spool, refill

Reading cross-brand numbers fairly

Manufacturer datasheets are produced by different labs on different printers, and two numbers are comparable only when the test standard, specimen orientation and impact method match. Charpy and Izod impact results are not interchangeable; notched and unnotched results differ by a factor of three or more; and Polymaker publishes Z-direction data where SUNLU publishes none. Treat cross-brand figures as an indication of class, not a ranking. Where a brand's marketing claim is not backed by its own datasheet, this guide says so.

Bottom line. All three are decorative materials with similar limits. Bambu's has the best published flat tensile and bending strength and the RFID convenience; Polymaker's has the better notched toughness and the clearest data; SUNLU's is cheapest and comes as a refill. None should be used where PLA Basic would be marginal.

How to read the datasheet

X-Y vs Z	A 3D print is a stack of layers. X-Y describes a test bar printed lying flat, where the load runs along the extruded lines. Z describes a bar printed standing up, where the load tries to pull the layers apart. Z values are always lower, and the ratio between them tells you how well the layers have fused. Real parts fail along layer lines far more often than through them.
Tensile strength (MPa)	The stress at which a bar pulled from both ends breaks. Megapascals are newtons per square millimetre: a 10 mm × 10 mm cross-section of a 35 MPa material holds roughly 3.5 kN, about 350 kg, before it snaps in a slow pull.
Young's modulus (MPa)	Stiffness — how much force it takes to stretch the material by a given amount. Higher means more rigid. It says nothing about strength: a stiff material can still be brittle.
Elongation at break (%)	How far the bar stretched before it broke, as a percentage of its original length. Low values (under 5 %) mean the material snaps with little warning; higher values mean it yields and bends first.
Bending (flexural) strength and modulus	The same two ideas measured by pressing down on the middle of a bar supported at both ends — closer to how brackets, clips and shelves are actually loaded.
Charpy impact (kJ/m²)	A pendulum hammer strikes the bar; the energy it absorbs before breaking is divided by the fracture area. This is the best single indicator of toughness — resistance to drops and knocks. Unnotched bars measure the bulk material; notched bars have a small cut that concentrates stress and give much lower numbers. Never compare a notched figure with an unnotched one, or a Charpy figure with an Izod one (a different test geometry).
Glass transition, T_g (°C)	The temperature at which the polymer's chains gain enough mobility for it to change from glassy and rigid to leathery and soft. Above T _g a loaded part will slowly creep and deform. For PLA and PETG this is the single most important thermal number.
Heat deflection temperature, HDT (°C)	The temperature at which a bar under a fixed bending load sags by a set amount. Quoted at 0.45 MPa (light load) and 1.8 MPa (heavy load); the light-load figure is always the higher of the two. Practical rule: keep loaded parts well below the 0.45 MPa figure.
Vicat softening point (°C)	The temperature at which a needle under load penetrates 1 mm into the material. Another measure of when the surface stops being hard.

Melting temperature, T_m (°C)	Where the crystalline regions melt, measured by DSC (a calorimeter). Printing happens well above T _m so the polymer flows freely.
Melt flow index, MFI (g/10 min)	How much molten material flows through a standard die in ten minutes under a fixed weight (210 °C for PLA; PETG sheets use 210–250 °C, so compare only at equal temperature). Higher means runnier and easier to push at speed; lower means more viscous, which is why some variants have lower speed limits.
Water absorption (%)	How much moisture the filament takes up from air at 55 % relative humidity. Absorbed water boils in the nozzle, causing pops, bubbles, stringing and rough surfaces — hence the drying recommendations.
Density (g/cm³)	Mass per volume. A 1 kg spool of a 1.31 g/cm ³ material contains about 5 % less printable length than a 1 kg spool at 1.24 g/cm ³ — heavier fillers cost you metres.
Annealing	Baking a finished print at a temperature just above T _g to let it crystallise further. It can raise heat resistance and stiffness but usually shrinks and sometimes warps the part.

Data notes and sources

Where sources disagree

- Drying temperature: datasheet 50 °C / 8 h; one retailer 55 °C / 8 h; the manufacturer's store page 50–70 °C / 8–12 h. The datasheet value is used.
- Bed temperature: datasheet 35–45 °C, but community fixes for adhesion failures use 55–60 °C on PEI, which the manufacturer's general filament table also permits.
- Polymaker's PolyTerra PLA sheet (density 1.31, tensile 20.9 MPa, notched Charpy 5.7 kJ/m²) and its Panchroma Matte sheet (1.37, 23.2, 10.0) describe what Polymaker calls the same material; the newer Panchroma figures are quoted.

Sources

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