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PLA AERO

A foaming PLA whose density you set with the nozzle temperature — down to a third of solid PLA — made for RC aircraft and anything that must be light above all else.

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A foaming PLA whose density you set with the nozzle temperature — down to a third of solid PLA — made for RC aircraft and anything that must be light above all else.

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3 · How it is printed

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PLA Aero contains a chemical blowing agent that decomposes in the hot end and fills the extruded plastic with microscopic gas bubbles. The hotter the nozzle, the more it foams: at 190 °C it prints almost solid, at 260 °C it expands to nearly three times its volume and the printed part weighs a third of what solid PLA would. That makes it the material for model aircraft, gliders and drones, where every gram of airframe is a gram of payload or flight time, and where foamed walls a single line thick can be printed in vase mode. It is also the most demanding PLA in the range to print well: flow must be reduced to match the expansion, the melt oozes freely, small nozzles clog, large nozzles leak, the filament is soft enough to trouble the material system, and the layers of a foamed part bond weakly. In the right hands it produces astonishingly light structures; it is not a general-purpose filament.

FEELS LIKE

Light, matte, slightly spongy

Like dense expanded foam with a skin; dents rather than cracks

THE EFFECT

Weight set by temperature

1.17 g/cm³ at 190 °C down to 0.42 g/cm³ at 260 °C

STRENGTH

Low, and very low across layers

Z impact 3.1 kJ/m² — the lowest in the range

DIFFICULTY

Highest in the range

Flow calibration, ooze control and model choice all matter

NOZZLE

0.4 mm only

0.2 clogs; 0.6 and 0.8 hardened leak

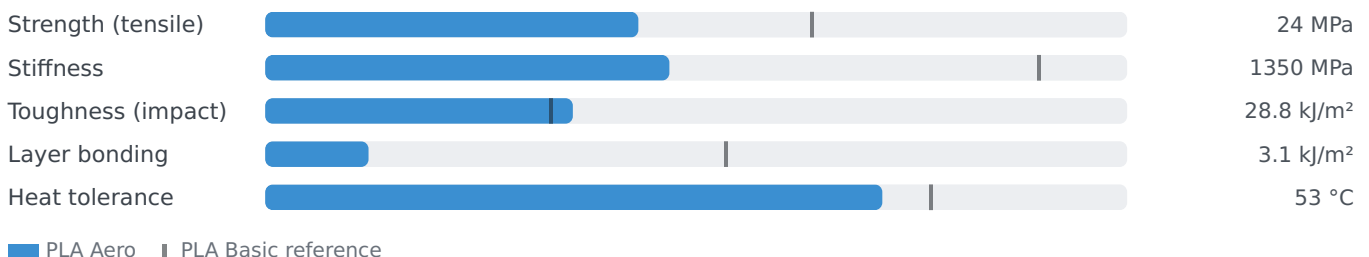
TYPICAL BUYER

RC aircraft builders

Wings, fuselages, gliders, drone shells

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).



Good for

- RC aircraft wings, fuselages, tails and cowlings printed as single-wall shells

Not the right choice for

- Anything structural, load-bearing or precise
- Small, detailed or complex models with many travel moves — ooze ruins them

- Gliders and indoor flyers where mass dominates performance
- Drone shells, ducts and fairings
- Floats, buoys and lightweight props for display
- Large decorative shells and lamp bodies where weight and material cost matter

- Parts loaded across their layers
- Beginners, or printers without a working flow calibration routine
- Food contact, heat, sun: the general PLA limits, plus a lower softening point than most

Foaming: the temperature-to-density relationship

The blowing agent begins to break down above roughly 190 °C and releases gas progressively faster as the nozzle temperature rises, up to a peak at 260 °C; at 270 °C the expansion actually falls back slightly. Because the same length of filament now produces more volume, the slicer's flow ratio must be reduced in proportion — from around 0.95 at 190 °C to 0.35 at 260 °C — or the print over-extrudes into a blobby mess. The manufacturer publishes the full table, reproduced in the printing section. Foamed material is far weaker than solid: the datasheet's mechanical values were measured at 210 °C, where the material is only about 15 % foamed, and even there it is the weakest PLA in the range. At flying weights the layer bond is little more than a skin. Aircraft designs compensate with geometry — closed single-wall sections, spars, and ribs — and by keeping the print in one continuous vase-mode path with no seams.

2 · Living with a PLA Aero print

A foamed Aero part is light, a little soft, and easily dented. Its everyday limits are those of PLA with a lower softening point and much less strength.

Heat	Softens from about 48–55 °C — the lowest heat deflection in the range at 48 °C under load. A model left in a car or on a sunny dashboard will sag. Dark colours in sun on a flying field warm quickly.
Sunlight	As PLA; the foamed structure also scatters UV into the material. Store models indoors.
Water and damp	Insoluble; closed-cell foam does not soak up water, but the filament itself is humidity-sensitive before printing.
Chemicals	As PLA. Many model glues and paints are solvent-based and will attack it; use foam-safe products and superglue or epoxy.
Food	Not certified for food contact.
Handling	Dents under thumb pressure at low densities; punctures easily. Repairs are straightforward with superglue and a patch.
Load over time	Creeps readily when warm; wings should be supported when stored.
End of life	General waste or 3D-print recycling.

Looks and feel

A matte, slightly rough, uniformly coloured surface with a fine open texture at high foaming levels, like a firm foam board. Layer lines are softened by the expansion. Colour is paler and more opaque than solid PLA of the same pigment because of the bubbles.

Care

- Dust; wipe gently — the surface scuffs
- Keep out of heat and away from windows
- Sand very lightly with fine paper if at all; foamed walls are thin
- Foam-safe (water-based) primers and paints only; solvent paints eat it

- Repair with thin superglue or foam-safe epoxy

Density is a choice you make at the slicer

The same spool prints a 1.1 g/cm³ solid-feeling part at 200 °C and a 0.45 g/cm³ featherweight at 250 °C. Pick the temperature for the job, then set the flow ratio from the table — never the PLA default.

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

Aero has more rules than any other PLA. The manufacturer's datasheet window is below, followed by the foaming table that governs flow ratio, and the slicer setup that the company's own guide recommends. A published configuration file for vase mode and one for normal mode are available from the manufacturer's wiki.

Manufacturer print window

Nozzle temperature	210–260 °C (datasheet); 220–260 °C (store) — below 220 °C there is almost no foaming
Bed temperature	35–45 °C with glue
Build plates	Cool Plate, High-Temperature Plate, Textured PEI
Bed adhesive	Glue stick or liquid glue, required
Chamber	25–45 °C, no enclosure
Print speed	Up to 180 mm/s (specimens 150 mm/s); constant speed throughout the print is more important than the number
Flow ratio	0.35–0.95 depending on temperature (see table); typical working range 0.5–0.8
Part cooling fan	On
Retraction	0.6–1.0 mm at 20–40 mm/s per datasheet; the guide advises reducing or disabling retraction and Z-hop in normal mode

Max overhang / bridge	About 55° / 30 mm at low foaming; far less when highly foamed
Support material	Standard PLA support; avoid where possible

Hardware and compatibility

Nozzle sizes	0.4 mm only. 0.2 mm clogs as the foam swells; 0.6 and 0.8 mm hardened nozzles leak because the foamed melt flows too freely
Nozzle material	Hardened steel or stainless steel at 0.4 mm — either is acceptable
Abrasive	No
Automatic material systems	Listed as compatible with AMS and AMS lite, with the manufacturer's own caveat that the soft filament can cause load and unload failures; feed from the external holder if it does
Spool identification	RFID tag
Flow calibration	See the callout below — the official sources disagree

Moisture, drying and storage

The manufacturer describes Aero as highly sensitive to humidity and recommends drying before use and after storage; wet Aero oozes and foams unevenly.

Forced-air oven or filament dryer	55 °C for 8 hours
Heated print bed method	65–75 °C for 12 hours, covered (usage guide: 70 °C, 12 h)
AMS 2 Pro / AMS HT	55 °C for 8 hours (usage guide)
Storage	Sealed with desiccant, below 20 % relative humidity
Annealing	50–55 °C for 6–12 hours — but not recommended for light, thin, low-infill prints, which is most Aero parts

Foaming table — flow ratio and density by nozzle temperature

Published by the manufacturer on the product page. Set the slicer flow ratio to the value for your chosen temperature; the resulting minimum density is what a fully foamed wall will weigh.

Nozzle temp	Min. flow ratio	Max. volume expansion	Max. foaming rate	Min. printed density
190 °C	≈ 0.95	≈ 100 %	≈ 0 %	1.17 g/cm ³
200 °C	0.89	110 %	10 %	1.06 g/cm ³
210 °C	0.85	115 %	15 %	1.02 g/cm ³
220 °C	0.76	129 %	29 %	0.91 g/cm ³
230 °C	0.62	158 %	58 %	0.74 g/cm ³
240 °C	0.45	217 %	117 %	0.54 g/cm ³
250 °C	0.38	258 %	158 %	0.45 g/cm ³
260 °C	0.35	280 %	180 %	0.42 g/cm ³
270 °C	0.37	265 %	165 %	0.44 g/cm ³

Tips that make a visible difference

- Vase (spiral) mode is the best mode for foamed parts: one continuous wall, no seams, no travel. The guide's vase setup: classic wall generator, gap-closing radius off, 1 wall, 0 top and bottom layers, 0 % infill, all speeds equal, overhang slowdown off, reduced acceleration, even-odd slicing, print by object
- Normal mode when vase mode loses detail: same settings, plus retraction reduced or off, Z-hop off, seam "nearest", and a final check of the preview for unnecessary travel moves
- Simple, closed shapes print well; thicken thin walls to at least 1 mm on complex models
- Print a small calibration cube at your chosen temperature and weigh it; adjust flow until the walls are just closed
- Dry deeply before printing — moisture is the most common cause of oozing
- Inspect the nozzle after long prints; the manufacturer advises checking for wear on A- and H2-series nozzles

Flow calibration: two official sources, two answers

The manufacturer's PLA usage guide says to untick Dynamic Flow Calibration for Aero, because the soft, expanding filament gives inaccurate results and can string or leak during the calibration lines. A separate wiki page on lidar flow calibration says foaming materials such as PLA Aero may need flow calibration to avoid over-extrusion and suggests starting at a flow ratio of about 0.6. The practical reading: switch the automatic routine off, set flow manually from the table, and fine-tune by weighing a test print.

Known problems and their fixes

Oozing, dripping between islands, leaking after retraction

The signature Aero problem. Dry the filament thoroughly, set flow from the table, use vase mode or a model with few travel moves, reduce retraction distance (long retractions pull foamed melt back and cause leaks).

Stringing, burrs, uneven infill, internal bubbles

Extrusion pressure changes on a complex model. Simplify the model, equalise speeds, reduce acceleration.

Loading or unloading failures in the material system

Soft filament. Feed from the external spool holder.

Clog with a 0.2 mm nozzle

Not supported. 0.4 mm only.

Leaking with a 0.6 or 0.8 mm nozzle

Not supported. 0.4 mm only.

Part is heavier than expected

Temperature too low or flow too high. Move up the table.

Part collapsed after annealing

Annealing is not recommended for light, thin prints.

4 · The numbers — technical datasheet

Figures are from the PLA Aero Technical Data Sheet V4.0. Mechanical specimens were printed at 210 °C / 35 °C bed / 150 mm/s with 100 % infill and annealed — that is, at about 15 % foaming, close to solid. Real flying parts printed at 240–260 °C are much lighter and much weaker than these numbers.

Physical and thermal properties

Property	Test method	Value
Density, filament (unfoamed)	ISO 1183	1.21 g/cm ³
Density, printed	manufacturer table	0.42–1.17 g/cm ³ depending on temperature
Melt flow index (260 °C, 2.16 kg)	ISO 1133	7.7 ± 0.6 g/10 min — note the higher test temperature
Melting temperature	DSC, 10 °C/min	153 °C
Glass transition temperature	DSC, 10 °C/min	55 °C
Vicat softening temperature	ISO 306	54 °C
Heat deflection temperature, 0.45 MPa	ISO 75	53 °C
Heat deflection temperature, 1.8 MPa	ISO 75	48 °C
Saturated water absorption (25 °C, 55 % RH)	—	0.45 %

Mechanical properties

Property	Test method	X-Y (flat)	Z (across layers)
Young's modulus	ISO 527	1350 ± 250 MPa	1240 ± 180 MPa
Tensile strength	ISO 527	24 ± 2 MPa	18 ± 3 MPa
Elongation at break	ISO 527	2.6 ± 0.7 %	1.2 ± 0.4 %
Bending modulus	ISO 178	1690 ± 120 MPa	1410 ± 80 MPa
Bending strength	ISO 178	45 ± 4 MPa	17 ± 3 MPa
Charpy impact, unnotched	ISO 179	28.8 ± 1.3 kJ/m ²	3.1 ± 0.7 kJ/m ²
Charpy impact, notched	ISO 179	8.2 ± 0.7 kJ/m ²	not published

Measured at 210 °C (≈ 15 % foamed). At higher foaming levels all strength values fall substantially; no data is published for foamed states.

What the mechanical numbers mean in practice

Even near-solid, Aero is the weakest and least stiff PLA in the range: 24 MPa tensile, 1350 MPa modulus, 2.6 % elongation, and a Z impact toughness of 3.1 kJ/m² that is a quarter of PLA Basic's. Bending strength across layers is 17 MPa. The blowing agent and the bubbles it makes are voids in the polymer, and voids are where cracks begin. For a flying model this is acceptable because the structure, not the material, carries the load — closed single-wall tubes and ribbed wings are stiff in their own right — and because the weight saving is worth more than the strength lost. Thermally Aero is also the softest, with an HDT of 48 °C under load; a black wing on a summer flying field is near its limit.

Product format

Diameter	1.75 mm ± 0.03 mm
Net weight	1 kg (the printable volume is far greater than a normal spool's because of expansion)

Spool	ABS, 200 × 67 mm, rated to 70 °C; reusable spool with desiccant
Colours	Not enumerated on the manufacturer's page at the time of writing; third parties list about seven including White, Light Gray and Black
Identification	RFID tag
Datasheet version	V4.0

Safety, certifications and chemical resistance

- Declared composition polylactic acid; the blowing agent is not identified and no safety data sheet was located
- Odourless at rest; no skin hazard reported. The material is printed at up to 260 °C with active gas evolution and the manufacturer publishes no ventilation guidance — ventilate the room as a precaution
- Flammable; combustion products water and carbon oxides
- RoHS and REACH compliance stated across the filament line
- No food-contact or toy certification; no emissions data published
- Resistant to oils and greases; not to acids, alkalis or some organic solvents

5 · Compared with Polymaker and SUNLU

Foaming PLA — usually called LW-PLA — is a small, specialised category. Both other brands make one, and both publish less than Bambu about how it foams.

Polymaker

PolyLite LW-PLA

Polymaker's filament density is 0.9 g/cm³ before printing (its product copy also mentions 0.6 g/cm³ printed, without stating the conditions), with a narrower and cooler nozzle window of 190–210 °C and a 50–100 mm/s speed range. Its near-solid mechanical figures are similar to or slightly better than Aero's, with a much better Z tensile retention (85 %). No temperature-to-density table is published.

Density, filament	0.9 g/cm ³
Tensile X-Y / Z	24.4 / 20.8 MPa
Elongation X-Y / Z	8.8 / 2.0 %
Bending strength X-Y	50.2 MPa
Charpy notched X-Y	2.4 ± 0.3 kJ/m ²
HDT 0.45 / 1.8 MPa	54 / 50 °C
Nozzle / speed	190–210 °C / 50–100 mm/s
Retraction	3–6 mm at 40–60 mm/s

SUNLU

SUNLU LW-PLA

SUNLU's is the lightest on paper at 0.84 g/cm³ filament density, with the coolest window (180–200 °C) and the lowest strength figures. No Z data, no foaming table, no flow guidance. Cheapest of the three.

Density, filament	0.84 g/cm ³
Tensile	20 ± 4 MPa
Bending strength	35 ± 5 MPa
HDT	53 ± 3 °C
Nozzle / bed	180–200 °C / 50–60 °C
Spool	cardboard, 1 kg

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. Aero is the only one of the three with a published temperature-to-density table and slicer configuration files, which for a foaming filament is worth more than any single strength number. Polymaker's LW-PLA reports better layer retention and a gentler print window; SUNLU's is the lightest and cheapest but the least documented.

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

- Nozzle temperature: datasheet V4.0 says 210–260 °C; both store pages say 220–260 °C. The store range is more useful for foaming work.
- Nozzle sizes: the datasheet lists 0.4/0.6/0.8 mm; both store pages restrict to 0.4 mm and warn that 0.6 and 0.8 hardened nozzles leak. The store restriction is followed.
- Dynamic flow calibration: the PLA usage guide says disable it; the lidar flow-calibration wiki page says foaming materials may need it. Both are reported in the callout.
- AMS lite: the store lists it as compatible with a softness caveat; a third-party guide calls it incompatible.
- The foaming table is published on the product page, not in the datasheet.
- No refill (spool-free) format was found for this product.

Sources

- Bambu Lab, PLA Aero Technical Data Sheet V4.0 — https://store.bbldn.eu/s8/default/b9e184aa63964114843f52684f2b3471/Bambu_PLA_Aero_Technical_Data_Sheet.pdf
- Bambu Lab US Store, PLA Aero (foaming table) — <https://us.store.bambulab.com/products/pla-aero>
- Bambu Lab EU Store, PLA Aero — <https://eu.store.bambulab.com/products/pla-aero>
- Bambu Lab Wiki, PLA Usage Guide (PLA Aero sections 3.2, 4.2, 5.3; configuration files) — <https://wiki.bambulab.com/en/filament/pla>
- Bambu Lab Wiki, Flow-rate calibration by micro lidar — <https://wiki.bambulab.com/en/knowledge-sharing/flowrate-calibration-by-microlidar>
- Bambu Lab Wiki, Filament guide material table — <https://wiki.bambulab.com/en/general/filament-guide-material-table>
- Filamino, Bambu Lab filament guide — <https://filamino.com/blog/bambu-lab-filament-guide-best-spools-refills-and-settings-by-material>
- Polymaker, PolyLite LW-PLA TDS V5.4 — https://www.tinytronics.nl/product_files/006810_PolyLite_LW-PLA_TDS_US_V5.4.pdf
- SUNLU, filament parameter table — <https://www.sunlu.com/wiki/43>

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