DESIGN GUIDELINE

Snap-Fit Design Guide

Snap-fits click together without screws, ideal for enclosures and lids. Make the hook too tall and the arm breaks, too short and it will not hold. Look up the hook height from arm thickness and length, print the arm lying flat, and it will snap together again and again.

01 · SIZE CHART

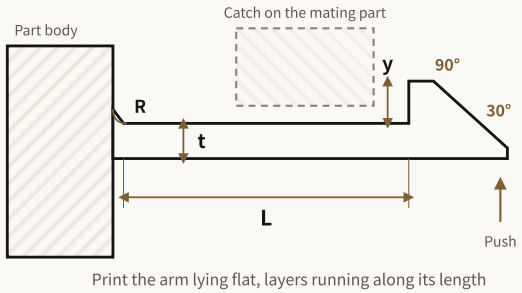
Cantilever snap-fit chart

Thickness t at root	Length L	L / t	Max hook height y PLA	Max hook height y PETG / ABS / ASA	Max hook height y PA nylon
1.2	8	6.7	**0.3**	0.6	0.8
1.2	12	10.0	**0.8**	1.4	1.9
1.6	12	7.5	**0.6**	1.0	1.4
1.6	16	10.0	**1.1**	1.8	2.6
2.0	16	8.0	**0.9**	1.5	2.1
2.0	20	10.0	**1.4**	2.3	3.2
2.4	24	10.0	**1.6**	2.8	3.9

Units: mm. Calculated for a uniform rectangular cantilever: $y = 0.67 \times \varepsilon \times L^2 \div t$, with allowable strain ε of 1.5% for PLA, 2.5% for PETG / ABS / ASA and 3.5% for nylon. The values already include a 0.7 safety factor.
Arm width does not change the hook height; make it at least 4 mm. Wider arms snap tighter and are harder to press. Keep L / t between 6 and 10: shorter arms break, longer ones hold loosely. Use the formula for sizes not in the chart.

02 · CROSS SECTION

Snap-fit diagram



Print the arm lying flat, layers running along its length

- **L** Arm length from the root to the hook's return face. Longer arms are easier to press and less likely to break.
- **t** Arm thickness at the root; at least 1.2 mm (3 lines).
- **y** Hook height that catches the mating part; keep it within the chart.
- **R** Root fillet R ≥ 0.5t, at least 0.5 mm. Sharp roots are where arms break.
- **Angle** A 30° lead-in presses in easily. A 90° return face locks for good; 45° can be pulled apart by hand.

03 · TYPES

Common snap-fit types

01 **Cantilever**: The most common: a flexible arm with a hook. Enclosures, battery covers, panels. Size it from the chart.

02 **Annular**: A full ring lip on round lids and caps. Lip height 0.3–0.5 mm; slot the lid wall in 2–4 places so it can open up.

03 **Torsion / U-shaped**: A U-shaped arm or a torsion bar spreads the strain; good for features opened often.

04 **Tab and slot**: No flexing: the tab slides in and locates with a little interference. Use the snug fit from Tolerances & fit clearance.

04 · DESIGN TIPS

Design tips

Orientation matters most

- The arm must **lie flat** on the bed, with layers running along its length.
- Printed upright, the arm is weakest between layers and snaps off at a layer line.
- If the part cannot be oriented that way, make the snap a separate part and assemble it.

Root and tapered arms

- Fillet the root at R ≥ 0.5t to avoid a stress concentration.
- Tapering the arm to half thickness at the tip lets it flex about 1.6× further without breaking.
- Do not put the root on the thinnest section of the part.

Clearance and removal

- Leave 0.2–0.3 mm per side between the hook and the catch for easy alignment.
- For snaps that must come apart, use a 45° return face or a notch for a flat screwdriver.
- Leave room around the arm to flex (at least y + 0.5 mm).

Count and placement

- Use 2–4 snaps per lid, placed symmetrically.
- Add locating ribs or pins: snaps hold, ribs align.
- For features opened hundreds of times, use screws or heat-set inserts instead.

05 · MATERIALS

Materials

Good	**PETG**	Tough and the top recommendation; survives repeated opening.
Good	**ABS / ASA**	Tough and heat resistant; good for enclosures.
Good	**PA nylon**	Best for repeated flexing; allows taller hooks.

Caution	**PLA / PLA+**	Stiff and brittle; only for snaps that are rarely opened. Use the PLA column.
Caution	**Carbon-fibre composites**	Fibre makes the material stiffer and more brittle; use the PLA column.
Caution	**Resin**	Standard resin is brittle and not recommended for snaps. Tough resin may work; ask us first.
Caution	**TPU**	Already flexible, so it needs no snap features; use an interference fit.

06 · CHECKLIST

Pre-submission checklist

- ☐ Hook height is within the chart
- ☐ The root is filleted
- ☐ There is room around the arm to flex
- ☐ Removable snaps use 45° or have a pry notch
- ☐ Arm is at least 1.2 mm thick and 4 mm wide
- ☐ The arm can be printed lying flat
- ☐ 0.2–0.3 mm per side between hook and catch
- ☐ Material or preferred orientation is noted

Questions about your design? Send it to us first

Attach your file or a screenshot and we will check hook height and material

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