What hole size does an M4 heat-set insert need?

Asked 3D Content Team
Published October 10, 2026 · Last verified October 10, 2026

Abstract. Hole diameter, depth and boss wall for standard and short M4 heat-set inserts: a 5.6 mm hole per Ruthex or 5.7 mm per CNC Kitchen for a 6.3 mm insert.

Keywords: heat-set-inserts, threads-and-fasteners

Table 1. The number

Manufacturer	Insert	Outer diameter	Length	Hole diameter	Blind hole depth	Minimum wall
Ruthex	RX-M4x8.1 (standard)	6.3 mm	8.1 mm	5.6 mm	9.1 mm min	2.1 mm
Ruthex	M4S (short)	6.3 mm	4.0 mm	5.6 mm	5.0 mm min	2.1 mm
CNC Kitchen	M4 x 8.1 (standard)	6.3 mm	8.1 mm	5.7 mm	9.1 mm min	2.1 mm
CNC Kitchen	M4 x 4 (short)	6.3 mm	4.0 mm	5.7 mm	5.0 mm min	2.1 mm

1 What hole size does an M4 heat-set insert need?

An M4 heat-set insert needs a 5.6 to 5.7 mm hole. Ruthex lists 5.6 mm and CNC Kitchen 5.7 mm for their standard M4 inserts, 6.3 mm across and 8.1 mm long, and for the 4.0 mm short versions. Make a blind hole at least 1 mm deeper than the insert and keep a 2.1 mm minimum wall.

1.1 The number

Ruthex figures come from its specification tables as published by 3DJake, and CNC Kitchen figures from the metric dimensions table on its own store page, both read 10 October 2026. Hole depth is the insert length plus 1 mm, the minimum CNC Kitchen's table draws for a blind hole.

The "M4 x 8.1" in a product name is the thread size and the insert length. Within each maker, standard and short M4 inserts share the outer diameter, hole and wall, so switching between them changes only the hole depth.

1.2 Why

The hole is narrower than the insert so the knurl, the ridged outside of the brass, has plastic to grip. The 6.3 mm knurled body is 0.6 to 0.7 mm wider than the 5.6 to 5.7 mm hole, which leaves 0.3 to 0.35 mm of plastic per side to melt and push into the grooves.

The extra depth, in a blind hole that does not go through the part, gives displaced plastic a place to collect. CNC Kitchen asks for a straight hole, not tapered, and says a chamfer at the edge is normally not needed.

Printed holes come out smaller than modeled. In CNC Kitchen's insert tests, a 4.0 mm M3 hole had to be modeled at 4.1 mm to print at size. That 0.1 mm is the same size as the gap between the two makers' M4 holes, so a test print settles which one your printer needs. CNC Kitchen links a test part for finding your own compensation in each print orientation. Its target: a hole just large enough for the installation tip to go in easily, with no burr left under the insert after melting.

1.3 How thick should the boss be for an M4 insert?

Leave at least 2.1 mm of plastic around the hole, the minimum wall both Ruthex and CNC Kitchen list for standard and short M4 inserts. That makes the boss, the printed column the insert sits in, at least 9.8 mm across with the Ruthex hole or 9.9 mm with the CNC Kitchen hole. An M3 insert needs 1.6 mm around a 4.0 mm hole, or 7.2 mm across. The M3 figures are in What hole size does an M3 heat-set insert need?.

The wall carries the outward push of the knurl. Below the minimum, the soft boss bulges during install, then splits along a layer line as it cools or when the screw is tightened.

1.4 How to check it on your own print

1. Model a test boss with the maker's hole (5.6 mm for Ruthex, 5.7 mm for CNC Kitchen) and 2.1 mm of wall. Make the hole 9.1 mm deep for a standard insert or 5.0 mm for a short one. Add a second hole 0.1 mm larger.
2. Print it in the same material and orientation as the real part.
3. Set the soldering iron 10 to 20 °C above your printing temperature, the rule from CNC Kitchen. The per-material numbers are in What temperature should the iron be for PLA, PETG and ABS inserts?.
4. Install one insert in each hole. Use the hole where the tip drops in freely, the insert sinks flush without forcing, and no burr pushes through the back.
5. Look for bulging, whitening or a crack along a layer line in the wall. If you see any, thicken the wall before you print the real part.

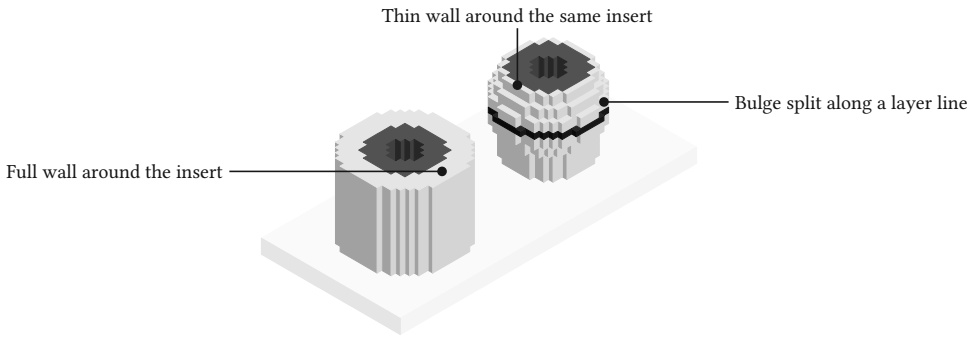


Figure 1. The wall carries the outward push of the knurl, so a boss thinner than the minimum bulges during the install and can split along a layer line.

6. Thread in an M4 screw, tighten it firmly and pull by hand. The insert should stay flush and not turn.

References

[1] ruthex Threaded Inserts M4 (50 pieces), M4x8.1, specification table (3DJake). https://www.3djake.com/ruthex/threaded-inserts-m4-50-pieces. Accessed October 10, 2026.
[2] ruthex Threaded Inserts M4S (50 pieces), M4Sx4.0, specification table (3DJake). https://www.3djake.com/ruthex/threaded-inserts-m4s-50-pieces. Accessed October 10, 2026.
[3] CNC Kitchen Heat Set Insert M4 x 8.1 product page and metric dimensions table. https://cnckitchen.store/products/heat-set-insert-m4-x-8-1-50-pieces. Accessed October 10, 2026.
[4] Tips & Tricks for Heat-Set Inserts used in 3D printing, CNC Kitchen. https://www.cnckitchen.com/blog/tipps-amp-tricks-fr-gewindeeinstze-im-3d-druck-3awey. Accessed October 10, 2026.
[5] Threaded Inserts for 3D Prints - Cheap VS Expensive, CNC Kitchen. https://www.cnckitchen.com/blog/threaded-inserts-for-3d-prints-cheap-vs-expensive. Accessed October 10, 2026.

Cite as: Asked 3D. "What hole size does an M4 heat-set insert need?." October 10, 2026. https://asked3d.com/answers/m4-heat-set-insert-hole-size. Last verified October 10, 2026.