What hole size does an M3 heat-set insert need?

Asked 3D Content Team
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Abstract. Hole diameter, hole depth and minimum boss wall for standard, short and Voron M3 heat-set inserts, taken from the Ruthex and CNC Kitchen size tables.

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

Table 1. The number

Manufacturer	Insert part	Outer diameter	Recommended hole diameter	Recommended hole depth
Ruthex	RX-M3x5.7 (5.7 mm)	4.6 mm	4.0 mm	L + 1 mm min (blind)
Ruthex	M3 Short (4.0 mm)	4.6 mm	4.0 mm	L + 1 mm min (blind)
Ruthex	RX-M3x5x4 Voron (4.0 mm)	5.0 mm	4.4 mm	L + 1 mm min (blind)
CNC Kitchen	M3 x 5.7 Standard	4.6 mm	4.0 mm	L + 1 mm min (blind)
CNC Kitchen	M3 x 3 Short	4.6 mm	4.0 mm	L + 1 mm min (blind)
CNC Kitchen	M3 x 5 x 4 Voron	5.0 mm	4.4 mm	L + 1 mm min (blind)

1 What hole diameter does an M3 heat-set insert need?

An M3 heat-set insert with a 4.6 mm outer diameter needs a 4.0 mm hole. Ruthex and CNC Kitchen both publish 4.0 mm for their standard and short M3 brass inserts. A blind hole should be at least 1 mm deeper than the insert. The 5.0 mm Voron M3 insert needs a 4.4 mm hole.

1.1 The number

Figures from the Ruthex and CNC Kitchen size tables, 15 September 2026.

1.2 Why

The hole is smaller than the brass insert so the knurls bite. A soldering iron or insert press melts the plastic, and the knurls drive it into the grooves. That displaced plastic is what resists pull-out.

The hole also needs room below the insert, since melting pushes a slug of plastic ahead of the tip. Both makers draw a blind hole at least 1 mm deeper than the insert. CNC Kitchen adds: straight, not tapered, no chamfer.

Printed holes come out undersized. In CNC Kitchen's tests a 4.0 mm hole had to be modeled at 4.1 mm. Shrinkage varies with material, printer and orientation, so print a test part. A burr on the back of the boss means the hole was too small.

2 How thick should the boss wall be around an insert?

Keep at least 1.6 mm of plastic around a 4.6 mm M3 insert. Ruthex and CNC Kitchen both give that minimum wall in

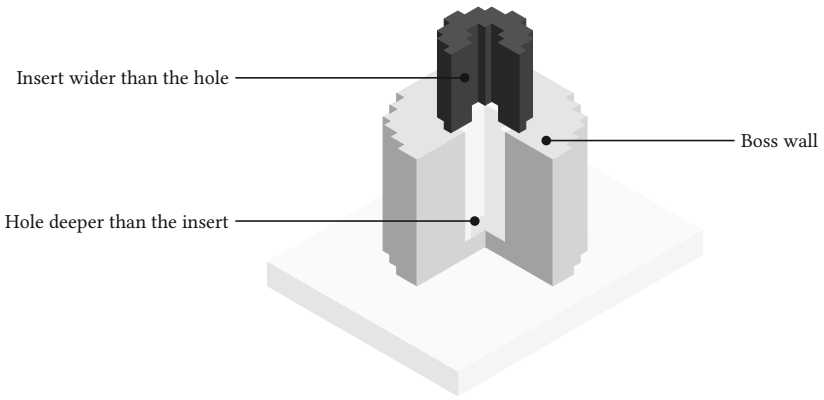


Figure 1. The hole is narrower than the insert so the knurl has plastic to melt into, and deeper than the insert so the displaced plastic has somewhere to go.

their size tables for standard and short M3 inserts. For the 5.0 mm Voron M3 insert, Ruthex lists 1.3 mm and CNC Kitchen 1.6 mm.

2.1 Why

The knurl drives plastic outward. That puts the wall around the hole in hoop stress, the tension a barrel hoop carries. A thin wall bulges while soft, then splits along a layer line as it cools or as a screw is torqued. The datasheet minimum is the wall that carries that load.

2.2 How to check it on your own print

1. Print a test boss at the datasheet hole and wall, in the real part's material and orientation.
2. Install with a soldering iron 10 to 20 °C above printing temperature: about 225 °C for PLA (polylactic acid), 245 °C for PETG (glycol-modified PET) and 265 °C for ABS (acrylonitrile butadiene styrene), per CNC Kitchen.
3. Inspect for bulging, whitening or a crack along a layer line, and a burr on the back.
4. Thread in a screw and pull hard by hand. A sound boss holds and the insert stays flush.

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