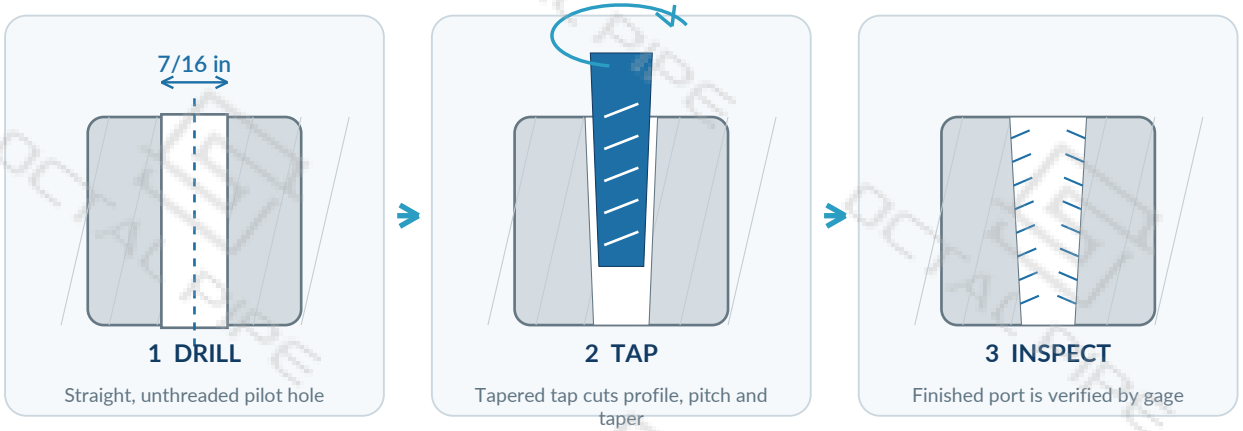
1/4-18 NPT Tap Drill Size, Tapping Depth and Inspection Guide

TAP DRILL SIZE AND THREAD DEFINITION

A 1/4-18 NPT port begins as a 7/16 in cylindrical pilot hole. The drill establishes the hole; the NPT tap forms the 60 degree tapered internal thread.

FROM PILOT HOLE TO FINISHED PORT



7/16 in controls the pilot hole

It is not the finished thread diameter.

1/4 is a nominal pipe size

It does not equal 0.250 in hole diameter.

KEY DATA

Finished internal thread	1/4-18 NPT
Common tap drill	7/16 in
Decimal diameter	0.4375 in
Exact metric conversion	11.1125 mm
Practical metric reference	11.11 mm
Thread pitch	18 TPI
Thread angle	60 degrees
Thread form	Tapered, 1:16 on diameter
Reference standard	ASME B1.20.1-2013

11 mm is 0.1125 mm smaller than 7/16 in. Treat it as a substitution only after process review and gage verification.

DRILLING AND TAPPING SEQUENCE

The machining sequence must keep the thread callout, pilot-hole geometry, tap alignment, depth control, cleaning, and final inspection connected as one process.

1 Confirm callout

Verify 1/4-18 NPT - not NPTF, BSPT, BSPP or UNC.

2 Locate and center

Control port position and prevent drill walking.

3 Drill pilot hole

Use 7/16 in and maintain the required hole axis.

4 Prepare entry

Deburr and apply only the permitted entry chamfer.

5 Align pipe tap

Start square to the drilled-hole axis.

6 Cut tapered thread

Control torque, lubrication and chip flow.

7 Control tap depth

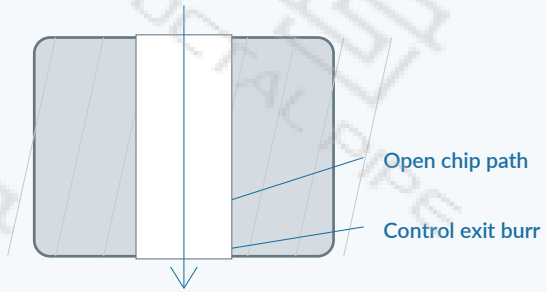
Establish repeatable depth, then confirm by gage.

8 Clean and inspect

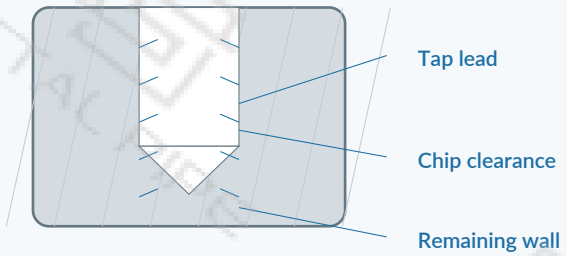
Remove chips before visual and L1 gage checks.

HOLE TYPE CHANGES DEPTH PLANNING - NOT THE COMMON TAP DRILL SIZE

THROUGH HOLE



BLIND HOLE

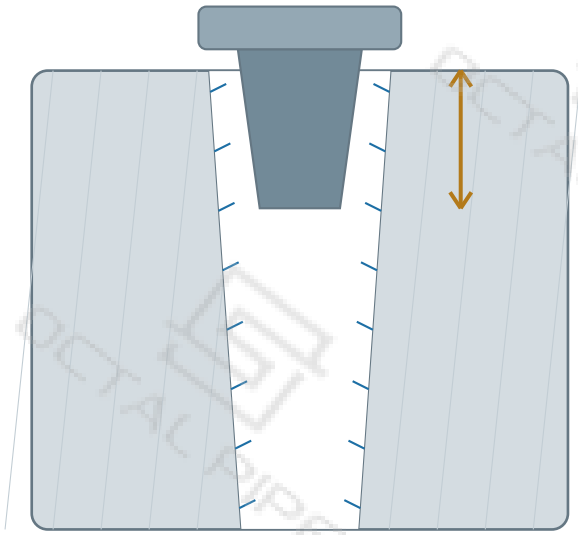


Blind-hole depth must include usable thread, tap lead, incomplete threads, drill-point allowance, chip clearance, and minimum remaining wall.

TAPPING DEPTH AND COMMON ERRORS

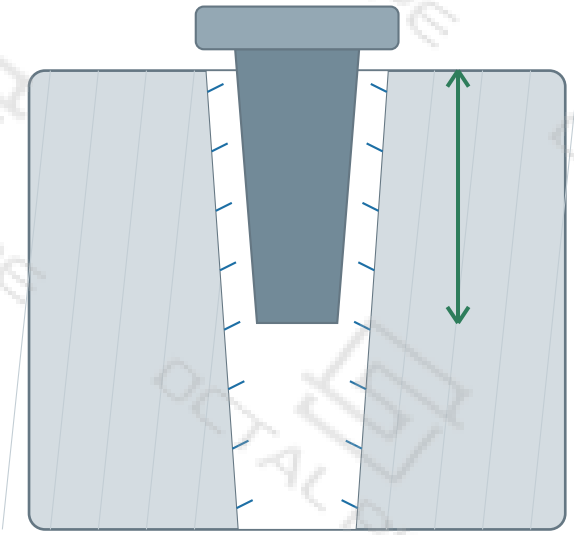
Because the NPT tap is tapered, each additional turn changes the effective thread size at the port entrance. Depth must be controlled and verified - not judged by drill size alone.

TOO SHALLOW



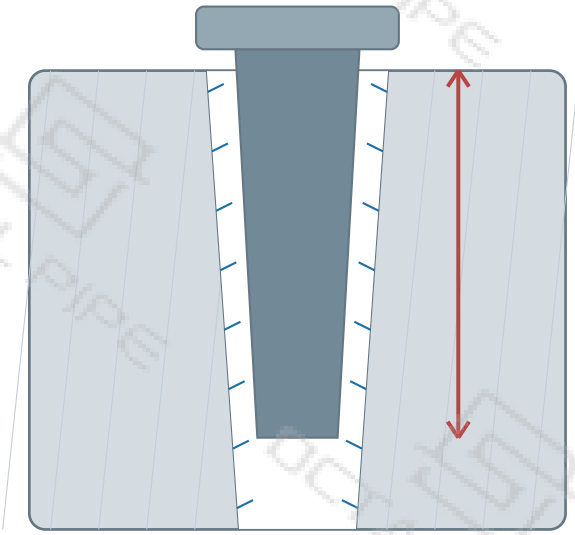
Insufficient fitting engagement

CORRECT DEPTH



Controlled engagement and gauge position

TOO DEEP



Oversized port; fitting enters too far

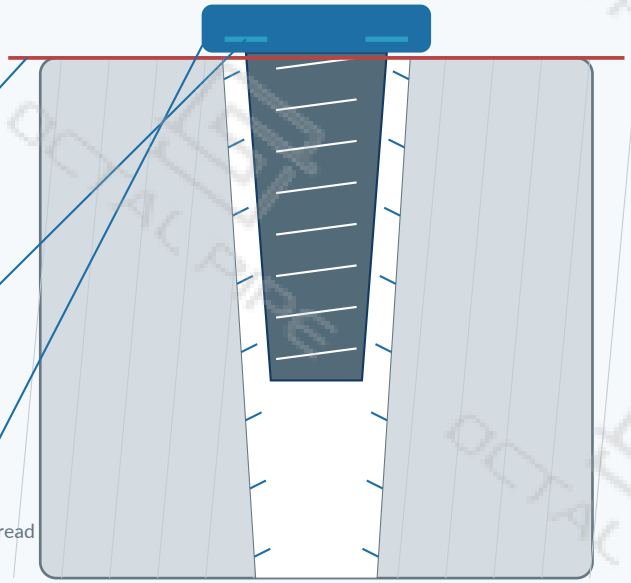
COMMON ERRORS AND THEIR EFFECTS

Error	Immediate effect	Machining / assembly risk
Using a 1/4 in drill	Pilot hole is far too small	Extreme tap load; tap damage likely
Undersized pilot hole	Too much material remains	High torque, heat and chip packing
Off-axis drilling	Tap follows the wrong axis	Misaligned fitting and uneven engagement
Excessive tap depth	Entrance size becomes too large	Fitting enters too far or feels loose
Poor chip removal	Chips recut or pack in flutes	Torn threads or broken tap

INSPECTION AND ACCEPTANCE

A correct 7/16 in pilot hole is only the starting condition. The finished 1/4-18 NPT thread is accepted by thread condition, controlled depth, and the specified NPT gage position.

L1 PLUG GAGE - INTERNAL NPT THREAD



1. **Part reference face**
   Read the gage from the defined face; a chamfer or counterbore can change this reference.
2. **L1 gage position**
   Confirms pitch-diameter position at the hand-tight engagement length.
3. **Hand pressure only**
   Do not force the gage. Clean both the thread and gage before inspection.

INSPECTION SEQUENCE

Inspection item	Method	What it confirms
Pilot-hole diameter	Bore measurement	Correct starting size
Thread condition	Clean visual inspection	No burrs, torn threads or packed chips
Finished NPT size	Calibrated L1 plug gage	Required hand-tight engagement position
Functional check	Matching fitting, if specified	Assembly and orientation
Leak / pressure test	Approved test procedure	Sealing performance, when required

ACCEPTANCE LOGIC

- Read the L1 gage from the defined part reference face.
- Account for chamfers or counterbores before reading the gage.
- Use normal hand pressure; never force the gage.
- A trial fitting does not replace calibrated gaging.

TECHNICAL REFERENCE BASIS

ASME B1.20.1-2013 - Pipe Threads, General Purpose, Inch: dimensions and gaging for NPT and related inch pipe threads.

Published 1/4-18 NPT cutting-tap data and tap-drill charts: 18 TPI and 0.4375 in (7/16 in) common/minimum tap drill reference.

NPT L1 plug-gage inspection guidance: evaluates pitch-diameter position at the L1 hand-tight engagement length.