

NPT (National Pipe Thread)

National Pipe Thread is a U.S. standard for tapered (NPT) or straight (NPS) threads used to join pipes and fittings. ANSI/ASME standard B1.20.1 covers threads of 60-degree form with flat crests and roots in sizes from 1/16 inch to 24 inch Nominal Pipe Size. The taper rate for all NPT threads is 1/16 (3/16 inch per foot) measured by the change of diameter (of the pipe thread) over distance. The taper divided by a center line yields an angle 1° 47' 24" or 1.7899° as measured from the center axis.

Commonly-used sizes are 1/8, 1/4, 3/8, 1/2, 3/4, 1, 1 1/4, 1 1/2, and 2 inch, appearing on pipe and fittings by most U.S. suppliers. Smaller sizes than those listed are occasionally used for compressed air. Larger sizes are used less frequently because other methods of joining are more practical at 3 inches and above in most applications.

Nominal Pipe Size is loosely related to the inside diameter of schedule 40 pipe. Because of the pipe wall thickness, the actual diameter of the threads is larger than the NPS, considerably so for small NPS. Other schedules of pipe have different wall thickness but the OD (outer diameter) and thread profile remain the same, so the inside diameter of the pipe is therefore different from the nominal diameter.

Threaded pipes can provide an effective seal for pipes transporting liquids, gases, steam, and hydraulic fluid. These threads are now used in materials other than steel and brass, including PVC, nylon, bronze and cast iron.

The taper on NPT threads allows them to form a seal when torqued as the flanks of the threads compress against each other, as opposed to straight thread fittings or compression fittings in which the threads merely hold the pieces together and do not provide the seal. However a clearance remains between the crests and roots of the threads, resulting in a leakage around this spiral. This means that NPT fittings must be made leak free with the aid of thread seal tape or a thread sealant compound. (The use of tape or sealant will also help to limit corrosion on the threads, which can make future disassembly nearly impossible.)

There is also a semi-compatible variant called NPTF or Dryseal, designed to provide a more leak-free seal without the use of teflon tape or other sealant compound. NPTF threads are the same basic shape but with crest and root heights adjusted for an interference fit, eliminating the spiral leakage path.

Sometimes NPT threads are referred to as MPT (Male Pipe Thread), MNPT, or NPT(M) for male (external) threads and FPT (Female Pipe Thread), FNPT, or NPT(F) for female (internal) threads. An equivalent designation is MIP (Male iron pipe) and FIP (Female iron pipe).



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Pipe thread sizes

NPT Size	Nominal Diameter	Outer Diameter	Threads per inch of Thread	Pitch
1/16"	0.3125"	27	0.03704	
1/8 "	0.405"	27	0.03704	
1/4 "	0.540"	18	0.05556	
3/8 "	0.675"	18	0.05556	
1/2 "	0.840"	14	0.07143	
3/4 "	1.050"	14	0.07143	
1 "	1.315"	11½	0.08696	
1¼ "	1.660"	11½	0.08696	
1½ "	1.900"	11½	0.08696	
2 "	2.375"	11½	0.08696	
2½ "	2.875"	8	0.12500	
3 "	3.500"	8	0.12500	



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4 "	4.500"	8	0.12500
5 "	5.563"	8	0.12500
6 "	6.625"	8	0.12500
10 "	10.750"	8	0.12500
12 "	12.750"	8	0.12500
14 " OD	14 "	8	0.12500
16 " OD	16 "	8	0.12500
18 " OD	18 "	8	0.12500
20 " OD	20 "	8	0.12500
24 " OD	24 "	8	0.12500