

British Standard Pipe – BSP

BSP pipe, Like American National pipe (NPT, NPSM), is designated by trade size, rather than actual diameter, which is approximately equal to the thread's Major Diameter in the table below.

There are two types of BSP threads:

- BSPT: British Standard Pipe Taper -also known as R threads
- BSPP: British Standard Pipe Parallel -also known as G threads

Both styles have the same thread angle, shape, and pitch (threads per inch). However, BSPT threads are tapered and BSPP threads are straight (parallel). BSP threads have a 55° included angle and have rounded peaks and valleys (this is a Whitworth thread form).

Here are the actual thread dimension data for BSPP and BSPT threads. The major diameter is a bit **larger** smaller than the actual OD of the pipe, and the minor diameter should be very close to what you would measure inside the female threaded end of a fitting. Note that the Gage Length dimension pertains only to the BSPT (tapered) thread.

BSP thread Dimensions

Trade Size	Threads per inch	Pitch		Major Diameter		Minor Diameter		Gage length	
		in.	mm	in.	mm	in.	mm	in.	mm
1/8	28	0.0357	0.907	0.3830	9.728	0.3372	8.565	0.1563	3.970
1/4	19	0.0526	1.337	0.5180	13.157	0.4506	11.445	0.2367	6.012
3/8	19	0.0526	1.337	0.6560	16.662	0.5886	14.950	0.2500	6.350
1/2	14	0.0714	1.814	0.8250	20.955	0.7336	18.633	0.3214	8.164
5/8	14	0.0714	1.814	0.9020	22.911	0.8106	20.589		
3/4	14	0.0714	1.814	1.0410	26.441	0.9496	24.120	0.3750	9.525
7/8	14	0.0714	1.814	1.1819	30.020	1.0976	27.879		
1	11	0.0909	2.309	1.3090	33.249	1.1926	30.292	0.4091	10.391
1 1/4	11	0.0909	2.309	1.6500	41.910	1.5336	38.953	0.5000	12.700
1 1/2	11	0.0909	2.309	1.8820	47.803	1.7656	44.846	0.5000	12.700
2	11	0.0909	2.309	2.3470	59.614	2.2306	56.657	0.6250	15.875
2 1/2	11	0.0909	2.309	2.9600	75.184	2.8436	72.227	0.6875	17.463
3	11	0.0909	2.309	3.4600	87.884	3.3436	84.927	0.8125	20.638
4	11	0.0909	2.309	4.4500	113.030	4.3336	110.073		

NPT vs. BSP Pipe

While NPT threads are common in the United States, BSP threads are widely used in many other countries. I have found that my Japanese-built injection mold presses have predominantly BSP fittings.

- BSPT -British Standard Pipe Taper
- BSPP -British Standard Pipe Parallel
- NPT -National Pipe Taper
- NPS -National Pipe Straight

While the actual specified outside diameters of American National Pipe differ slightly from those of British Standard Pipe, either thread may reliably be cut onto a pipe of its respective trade size. BSPT and BSPP threads are analogous to NPT and NPS threads, respectively.

WARNING: Never, never try to mate a BSP fitting with an NPT or NPS fitting if the pressure holding capability is at all critical.

NPT/NPS and BSP threads are not compatible due to the differences in their thread forms, and not just the fact that most diametrical sizes have a different pitch. NPT/NPS threads have a 60° included angle and have flattened peaks and valleys (this is a Sellers thread form); BSP threads have a 55° included angle and have rounded peaks and valleys (this is a Whitworth thread form).

NPT and BSP thread pitches (threads per inch, TPI) are listed below. To determine pitch, use a thread gauge or count the number of threads that fall into a 1" span. Note that, strictly speaking, when we use threads per inch, we are actually specifying the inverse of the pitch, pitch being in units of [length] / [peak to peak]. Metric threads are usually specified in actual pitch, e.g., 1.5mm, 2.0mm, etc. This is the actual length of each thread, peak to peak. Although the term "pitch" is universally used, albeit loosely, to describe threads per inch, the actual pitch of a 1/4BSP fitting is really 1/19 inch, or 0.0526 inches.

Pipe Size	Pitch (Threads/Inch)	
	NPT/NPS	BSP
1/16"	27	---
1/8"	27	28
1/4"	18	19
3/8"	18	19
1/2"	14	14

Pipe Size	Pitch (Threads/Inch)	
	NPT/NPS	BSP
3/4"	14	14
1"	11 1/2	11
1 1/4"	11 1/2	11
1 1/2"	11 1/2	11
2"	11 1/2	11

Pipe Size	Pitch (Threads/Inch)	
	NPT/NPS	BSP
3"	8	11
3 1/2"	8	11
4"	8	11
5"	8	11
6"	8	11

American National Pipe - NPT/NPS

American National pipe (NPT, NPS), Like British Standard Pipe (BSP), is designated by trade size, rather than actual diameter, as shown in the table below.

There are two basic types of National pipe threads:

- NPT: National Pipe Taper
- NPS: National Pipe Straight

NPT threads are also sometimes referred to as

- MIP (Male Iron Pipe)
- FIP (Female Iron Pipe)
- IPT (Iron Pipe Thread)
- FPT (Female Pipe Thread)
- MPT (Male Pipe Thread)

Note that these references are somewhat casual, and might possibly be used in reference to NPS instead of NPT.

Both NPT and NPS have the same thread angle, shape, and pitch (threads per inch). However, NPT threads are tapered and NPS threads are straight (parallel). Both threads have a 60° included angle and have flat peaks and valleys (this is a Sellers thread form).

If you've worked with pipe much at all, you've probably noticed that the size of the pipe isn't really what size the pipe is. Unlike tubing, which is generally specified by its OD, or hose, which is generally specified by its ID, pipe is specified by something else... its Trade Size. So when you say "3/4 pipe," you're actually saying "pipe whose OD is a little more than an inch, and whose ID is about 53/64." -that is, if you are talking about schedule 40 pipe, which is generally what is used for most plumbing applications.

Pipe dimensions are specified by trade size and schedule, according to the following table. Note that while British Standard Pipe dimensions are similar, they are not equivalent to the American Standard Pipe Sizes. See [NPT vs. BSP Pipe](#) for comparison thread.

American Standard Pipe Diameters

Trade Size	Nom. OD	Schedule 10		Schedule 40		Schedule 80		Schedule 160	
		ID	Wall	ID	Wall	ID	Wall	ID	Wall
1/8	0.405	0.307	0.049	0.269	0.068	0.215	0.095		
1/4	0.540	0.410	0.065	0.364	0.088	0.302	0.119		
3/8	0.675	0.545	0.083	0.493	0.091	0.423	0.126		
1/2	0.840	0.674	0.083	0.622	0.109	0.546	0.147	0.466	0.187
3/4	1.050	0.884	0.109	0.824	0.113	0.742	0.154	0.614	0.218
1	1.315	1.097	0.109	1.049	0.133	0.957	0.179	0.815	0.250
1-1/4	1.660	1.442	0.109	1.380	0.140	1.278	0.191	1.160	0.250
1-1/2	1.900	1.682	0.109	1.610	0.145	1.500	0.200	1.338	0.281
2	2.375	2.157	0.109	2.067	0.154	1.939	0.218	1.689	0.343
2-1/2	2.875	2.635	0.120	2.469	0.203	2.323	0.276	2.125	0.375
3	3.500	3.260	0.120	3.068	0.216	2.900	0.300	2.626	0.437
4	4.500	4.260	0.120	4.026	0.237	3.826	0.337	3.438	0.531
5	5.563	5.295	0.134	5.047	0.258	4.813	0.375	4.313	0.625
6	6.625	6.357	0.134	6.065	0.280	5.761	0.432	5.189	0.718
8	8.625	8.329	0.148	7.981	0.322	7.625	0.500	6.813	0.906

Thread Type Compatibility

In order for two components to fit properly, thread types must be compatible. See the list below for thread types that can be used together.

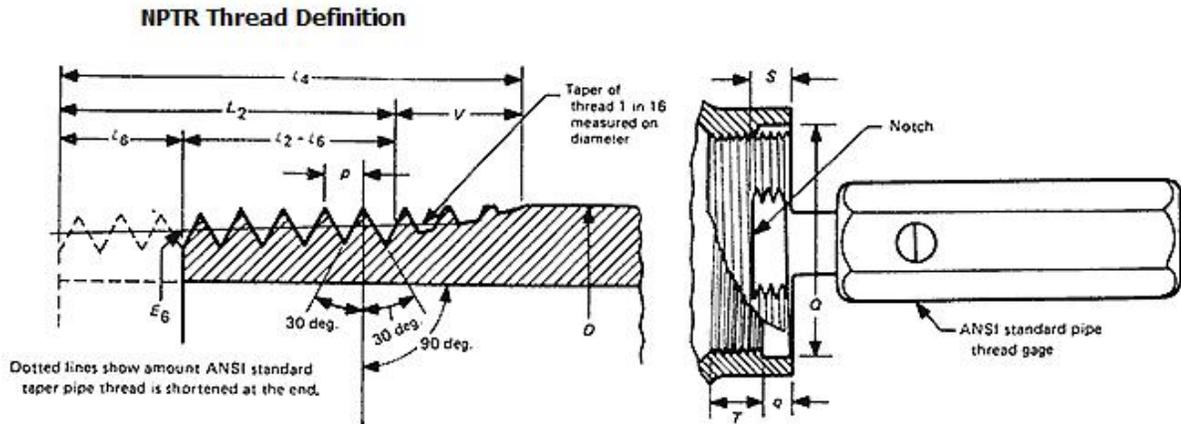
Tapered Threads	This thread...	...is Compatible with	...is Plausibly Compatible with	...might Possibly work with
NPT— National Pipe Taper (Note : MPT and FPT are NPT threads; the "M" indicates male and the "F" indicates female)	Male NPT	Female NPT, NPTF	Female NPSM, NPSH, NPSL, NPSC	
	Female NPT	Male NPT, NPTF	Male NPSH	Male NPSM
NPTF— National Pipe Tapered Fuel (Note : NPTF threads are also known as Dryseal)	Male NPTF	Female NPTF, NPT	Female NPSM and NPSH	
	Female NPTF	Male NPTF, NPT	Male NPSH	Male NPSM
BSPT— British Standard Pipe Taper (also known as R threads)	Male BSPT	Female BSPT	Female BSPP	
	Female BSPT	Male BSPT		
NPSM— National Pipe Straight Mechanical	Male NPSM	Female NPSM, NPSH		Female NPT, NPTF
	Female NPSM	Male NPSM.	Male NPT and NPTF	
NPSH— National Pipe Straight Hose	Female NPSH	Male NPSH, NPSM.	Male NPT and NPTF	
	Male NPSH	Female NPSH		Female NPT
BSPP— British Standard Pipe Parallel (also known as G threads)	Male BSPP	Female BSPP		Female BSPT
	Female BSPP	Male BSPP	Male BSPT	
NPSC— National Pipe Straight Coupling	Female NPSC	Male NPT		
NPSL— National Pipe Straight Locknut	Female NPSL	Male NPSM, NPSH	Male NPT	
NH/NST— National Hose/National Standard Thread		NH/NST		
GHT— Garden Hose Thread	GHT	GHT only**		
UN— Unified		UN only		
Metric Thread DIN 3852		DIN 3852 only		
Metric Thread DIN 3901/3902		DIN 3901/3902 only		

** We had **previously indicated** GHT as compatible with 3/4-NH. This was incorrect. Oops... sorry.

NPTR - National Pipe Taper Railing

NPTR - National Pipe Taper Railing

This thread is used on stair banister railings and similar mechanical applications. Care must be taken not to confuse this thread with one intended to perform a hydraulic sealing function. While it may well work, its reliability will be compromised by a lack of thread engagement. The basic diameter and pitch matches up across the board with NPT, but the male threads are cut short on the small end of the taper. This shortened thread is readily noticeable to the trained eye, but could go unnoticed by the less experienced fitter. The female fittings (typically a stanchion with a globe-shaped threaded receiver) have a clearance cut at the start of the thread to allow the male pipe thread to "disappear" when fully engaged.



Nom. Pipe Size	O.D. of Pipe (D)	Threads/in. (n)	Height of Thread (h)	Pitch Diameter at End of External Thread (E_6)	Shortening of Thread (L_6)		Length of Effective Thread ($L_2 - L_6$)		Total Length of External Thread, max. ($L_4 - L_6$)		Incomplete Threads due to Chamfer of Die, max. (V)		Depth of Recess in Fitting (q)	Dia. of Recess in Fitting (Q)	Length (T)	Distance Gage ² Notch comes below Face of Fitting (S)	
					in.	Threads	in.	Threads	in.	Threads	in.	Threads				Minimum	Minimum
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1/2	0.840	14	0.0571	0.7718	0.214	3	0.320	4.47	0.499	6.98	0.179	2 1/2	0.18	0.86	0.25	0.286	4
	1.050	14	0.0571	0.9811	0.214	3	0.332	4.64	0.510	7.15	0.179	2 1/2	0.18	1.07	0.25	0.286	4
1	1.315	11.5	0.0696	1.2299	0.261	3	0.422	4.85	0.639	7.35	0.217	2 1/2	0.22	1.34	0.30	0.348	4
1 1/4	1.660	11.5	0.0696	1.5734	0.261	3	0.446	5.13	0.707	8.13	0.261	3	0.26	1.68	0.39	0.348	4
1 1/2	1.900	11.5	0.0696	1.8124	0.261	3	0.463	5.32	0.724	8.33	0.261	3	0.26	1.92	0.43	0.348	4
2	2.375	11.5	0.0696	2.2853	0.261	3	0.496	5.70	0.757	8.70	0.261	3	0.26	2.40	0.43	0.348	4
2 1/2	2.875	8	0.1000	2.7508	0.500	4	0.638	5.10	1.013	8.10	0.375	3	0.38	2.90	0.63	0.625	5
3	3.500	8	0.1000	3.3719	0.500	4	0.700	5.60	1.075	8.60	0.375	3	0.38	3.53	0.63	0.625	5
3 1/2	4.000	8	0.1000	3.8688	0.500	4	0.750	6.00	1.125	9.00	0.375	3	0.38	4.04	0.63	0.625	5
4	4.500	8	0.1000	4.3656	0.500	4	0.800	6.40	1.175	9.40	0.375	3	0.38	4.54	0.63	0.625	5

NOTES:

- (1) These dimensions agree with those developed by the Manufacturers Standardization Society of the Valve and Fittings Industry. Thread lengths are specified to three decimal places for convenience.
- (2) American National Standard Taper Pipe Thread Plug Gage.