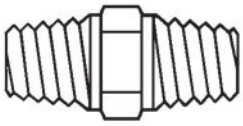
Thread Information

Pipe Threads

Pipe threads are either tapered or straight (parallel). The two styles may or may not be compatible. Refer to thread information chart on page 1127.

Tapered threads

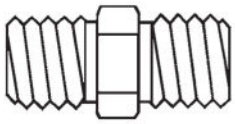


tapered threads

Tapered threads are the most common type of thread available. As the name implies, they have a slight taper. When mated together and tightened, the threads compress and may form a seal. Usually a thread sealant is required. The mating threads both hold the fitting in place and seal the connection. The most widely used pipe threads in North America are NPT (National Pipe Taper). Some confusion may result from the use of NPT, FPT, and MPT in describing threads. Both FPT and MPT are NPT threads, with FPT meaning female threads (internal) and MPT meaning male threads (external).

NPTF (Dryseal) threads are modified NPT threads, which are less likely to leak without a sealant. For a leak-free seal, we recommend using a sealant compound or PTFE tape. You can use NPTF threads with NPT threads, but you'll lose some of the leak-free characteristics.

Straight threads



straight threads

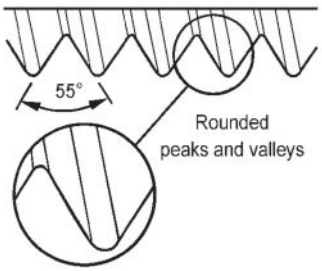
Straight (parallel) threads are used for mechanical joining. They serve one purpose - to hold a fitting in place. As a result, an O-ring (elastomer), hard metal seal or a soft seat seal is required. Straight pipe threads include NPSM (National Pipe Straight Mechanical), and NPSH (National Pipe Straight Hose). Sizing and pitches may differ from the NPT threads

Less common straight threads are GHT (Garden Hose) and NST (fire hose coupling).

NPT vs. BSP (British Standard Pipe)

BSP threads are common in many countries outside the United States. BSP consists of two types of threads - BSPT (British Standard Pipe Taper) and BSPP (British Standard Pipe Parallel).

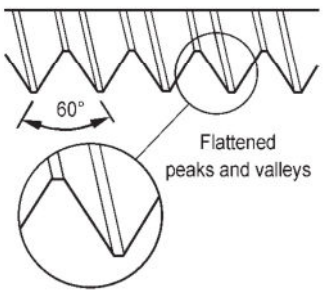
BSPT/BSPP threads



BSPT threads have a slight taper similar to NPT. BSPP threads are straight (parallel) threads and have the same thread angle, shape and threads per inch (pitch) as BSPT threads. *BSPT and BSPP threads should not be substituted for NPT threads.*

NPT and BSPT/BSPP threads have different angles, shape, and (in most cases) threads per inch (pitch). The thread angle is 60° for NPT threads; 55° for BSPT/BSPP threads. NPT threads are flattened at the peaks and valleys, while BSPT/BSPP threads are rounded.

NPT threads



Nominal Pipe Size	Threads per inch	
	NPT	BSPT / BSPP
1/16"	27	---
1/8"	27	28
1/4"	18	19
3/8"	18	19
1/2"	14	14
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
2-1/2"	8	11
3"	8	11
3-1/2"	8	11
4"	8	11
5"	8	11
6"	8	11
8"	8	11

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Thread Information

Identifying Threads

It is important to identify the threads required before ordering couplings.

Identifying threads can sometimes be the most difficult and frustrating part of coupling selection. However, without the right combination of threads, you may not provide a functional or safe connection.

The diameters, threads per inch (TPI) and thread pitch, etc. are necessary to completely identify a thread. Ring, plug, and GO/NOGO gauges are required to accurately gauge or identify threads. In the field, in the absence of these gauges, thread leaf gauges can be used to identify the threads per inch (TPI) and the thread pitch. On threads you have determined to be straight threads, a caliper can be used to measure the outside diameter of the male (ODM) or the inside diameter of the female (IDF). A caliper can also be used to take measurements of tapered thread diameters. However, these are more difficult to define because of the taper. Fortunately, there are few tapered threads to deal with and these can usually be identified from the nominal ODM and the TPI.

However, identifying the thread may not fully identify what is needed in a mating fitting. The application is the primary *limiting factor on the thread type used.* Dixon® offers products with a wide variety of threads used with hose, pipe, and hydraulics.

When attempting to choose a fitting, it is always advisable to first identify the thread to which it must connect. This may entail checking with a fitting or equipment manufacturer.

The fire hose thread specifications for some local municipal fire equipment and hydrants may vary according to local specifications. These can generally be most easily identified by contacting the local fire department responsible for the hydrant. The most common thread used on fire equipment is National Standard Thread (NST), also known as National Hose thread (NH).

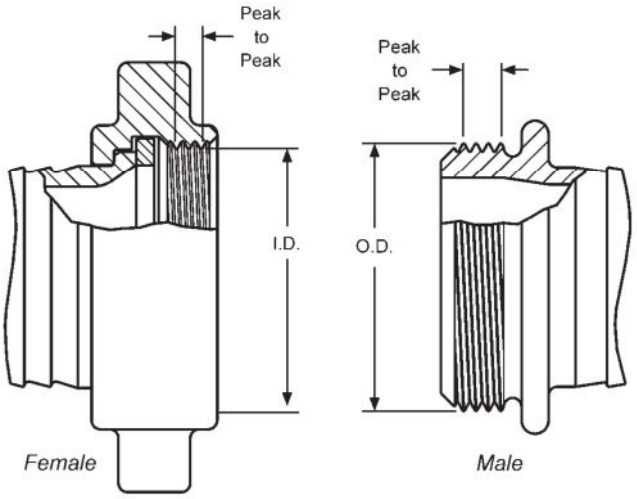
When it is not possible to identify the thread:

1. Determine the number of threads per inch by measuring the distance from peak of thread to peak of thread across the largest number of whole threads. Then divide the number of threads by the measurement (this will provide the TPI).

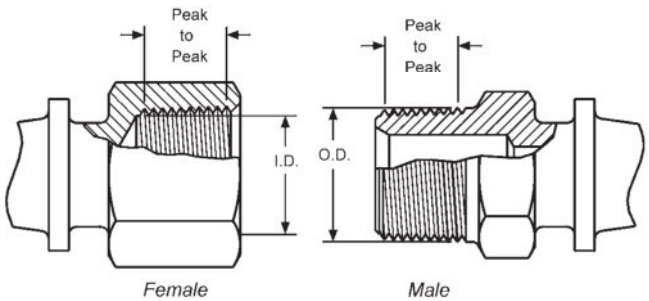
2. Check to see if the thread is straight or tapered.
   a) Straight Threads
      Measure the outside diameter of the male (ODM) or the inside diameter of the female (IDF), from peak of thread to peak of thread.
   b) Tapered Threads
      Measure the outside diameter of the male (ODM) at the large end and the small end, or the inside diameter of the female (IDF) at the large end and the small end, from peak of thread to peak of thread. Then measure the outside diameter (O.D.) of the unthreaded pipe.

Once the application and these two pieces of information have been determined, the thread can generally be determined. When in doubt, call Dixon at 800.355.1991.

Straight Thread



Tapered Thread



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Thread Types

Abbreviation	System Name	Compatibility	Seal Method
BSPP	British Standard Pipe Parallel	male BSPP with female BSPP	washer
		female BSPP with male BSPP	washer
		female BSPP with male BSPT	washer
BSPTr	British Standard Pipe Taper	male BSPTr with female BSPTr	thread
		male BSPTr with female BSPP	washer
		female BSPTr with male BSPTr female BSPTr not compatible with male BSPP	thread
CHT	American Standard Fire Hose Thread (1" National Hose Thread is Chemical Hose Thread, also known as Booster Hose Thread)	1" male NH (NST) with 1" female NH (NST)	washer
		1" female NH (NST) with 1" male NH (NST)	washer
		1" thread is used on both 3/4" hose & 1" hose	not compatible
GHT	Garden Hose Thread	male GHT with female GHT	washer
		female GHT with male GHT	washer
		thread is same for all size hose	not compatible
IPS	Iron Pipe Straight Thread	generic name for Straight Pipe Thread see NPSH for compatibility	washer
IPT	Iron Pipe Thread	generic name for All Pipe Thread	more information required
JIC	Joint Industrial Committee	used with other mating JIC threads	mechanical
NH or NST	American Standard Fire Hose Coupling Thread (National Hose thread also known as National Standard Thread)	male NH (NST) with female NH (NST)	washer
		female NH (NST) with male NH (NST) thread pitch and diameters of fire threads may vary according to local and municipal regulations not compatible with other systems	washer
NPT	American Standard Taper Pipe Thread (National Pipe Tapered)	male NPT with female NPT	thread
		male NPT with female NPTF	thread
		male NPT with female NPSM	washer
		male NPT with female NPSH	washer
		female NPT with male NPT	thread
		female NPT with male NPTF female NPT not compatible with male NPSM or male NPSH	thread
NPTF	American Standard Taper Pipe Fuel Dryseal Thread (National Pipe Tapered Dryseal)	male NPTF with female NPTF	thread
		male NPTF with female NPT	thread
		male NPTF with female NPSM	washer
		male NPTF with female NPSH	washer
		female NPTF with male NPTF	thread
		female NPTF with male NPT	thread
		female NPTF with male NPSM or NPSH NPTF with NPTF threads do not require sealant for the initial use, after that, sealant is required	not compatible
NPSH	American Standard Straight Pipe for Hose Couplings (National Pipe Straight Hose)	male NPSH with female NPSH	washer
		female NPSH with male NPSH	washer
		female NPSH with male NPT	washer
		female NPSH with male NPTF	washer
		female NPSH with male NPSM	washer
NPSM	American Standard Straight Mechanical Joints (National Pipe Straight Mechanical)	male NPSM with female NPSM	Seal can be either mechanical or washer. Mating fittings must be of same type.
		male NPSM with female NPSH	
		female NPSM with male NPSM	
		female NPSM with male NPT	
		female NPSM with male NPTF	
SIPT	Straight Iron Pipe Thread	generic name for Straight Pipe Thread	washer
TIPT	Tapered Iron Pipe Thread	generic name for Tapered Pipe Thread	thread
NYFD	NYFD Fire Department	straight thread used in New York City	washer
Chicago	Chicago Fire Department	straight thread used in Chicago	washer

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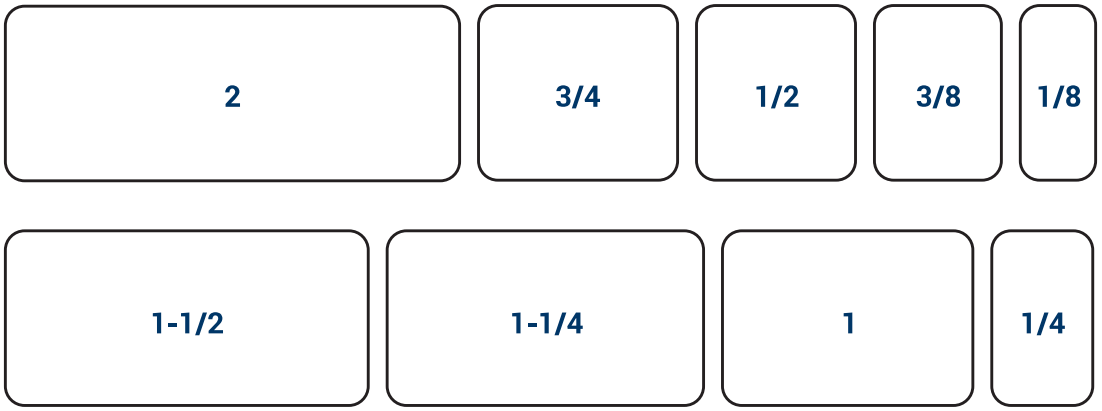
Thread Chart for Hydraulic Fittings

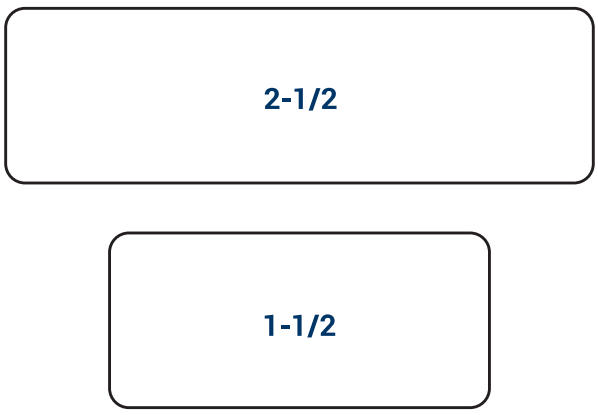
Dash Size	2	4	6	8	10	12	16	20	24	32	40	48
JIC 37 degree Flare Thread	5/16-24	7/16-20	9/16-18	3/4-16	7/8-14	1-1/16-12	1-5/16-12	1-5/8-12	1-7/8-12	2-1/2-12	---	---
SAE O-ring Thread	---	7/16-20	9/16-18	3/4-16	7/8-14	1-1/16-12	1-5/16-12	1-5/8-12	1-7/8-12	2-1/2-12	---	---
NPTF Pipe Thread	1/8-27	1/4-18	3/8-18	1/2-14	---	3/4-14	1-11 1/2	1-1/4-11 1/2	1-1/2-11 1/2	2-11 1/2	---	---
NPSM Swivel Thread	---	1/4-18	3/8-18	1/2-14	---	3/4-14	1-11 1/2	1-1/4-11 1/2	1-1/2-11 1/2	2-11 1/2	---	---
Flat Face Thread	---	9/16-18	11/16-16	13/16-16	1-14	1-3/16-12	1-7/16-12	---	---	---	---	---
Code 61 Flange Head O.D.	---	---	---	1.19	---	1.50	1.75	2.00	2.38	2.81	3.31	4.0
Code 62 Flange Head O.D.	---	---	---	1.25	---	1.62	1.88	2.12	2.50	3.12	---	---
British Thread BSPP/BSPT	---	1/4-19	3/8-19	1/2-14	_	3/4-14	1-11	---	---	---	---	---

Fittings Size Chart

Male NPT Thread Sizes



Male NST Thread Sizes



Thread Dimensions

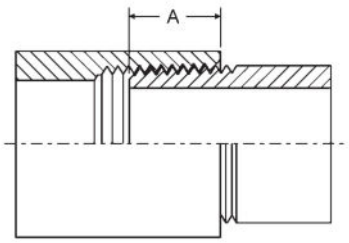
Nominal Dimensions of Standard Threads

- ODM = Outside diameter of the male
- IDF = Inside diameter of the female
- TPI = Threads per inch
- GHT (3/4") -- 1.0625 ODM, 11-1/2 TPI
- Female NPT (tapered pipe) thread is not available on hose swivel nuts

Size	Pipe O.D.	Tapered Threads		Straight Threads											
		NPT	BSPTr	NPSH			NPSM			NST (NH)			BSPP		
		TPI	TPI	TPI	ODM (max)	IDF (min)	TPI	ODM (max)	IDF (min)	TPI	ODM (max)	IDF (min)	TPI	ODM (max)	IDF (min)
1/8"	.405	27.0	28				27.0	0.397	0.358					0.383	0.337
1/4"	.540	18.0	19				18.0	0.526	0.468					0.516	0.450
3/8"	.675	18.0	19				18.0	0.662	0.603					0.656	0.588
1/2"	.840	14.0	14	14.0	0.8248	0.7395	14.0	0.823	0.747					0.825	0.733
3/4"	1.050	14.0	14	14.0	1.0353	0.9500	14.0	1.034	0.958					1.041	0.950
1"	1.315	11.5	11	11.5	1.2951	1.1921	11.5	1.293	1.201	8.0	1.375	1.2246	11	1.309	1.193
1-1/4"	1.660	11.5	11	11.5	1.6399	1.5369	11.5	1.638	1.546				11	1.650	1.534
1-1/2"	1.900	11.5	11	11.5	1.8788	1.7758	11.5	1.877	1.785	9.0	1.990	1.8577	11	1.882	1.766
2"	2.375	11.5	11	11.5	2.3528	2.2498	11.5	2.351	2.259				11	2.347	2.231
2-1/2"	2.875	8.0	11	8.0	2.8434	2.6930	8.0	2.841	2.708	7.5	3.068	2.9104	11	2.960	2.844
3"	3.500	8.0	11				8.0	3.467	3.334	6.0	3.623	3.5306	11	3.460	3.344
4"	4.500	8.0	11				8.0	4.466	4.333	4.0	5.010	4.7111	11	4.450	4.334
4-1/2"										4.0	5.760	5.4611			
5"	5.563	8.0	11				8.0	5.528	5.395	4.0	6.260	5.9602	11	5.450	5.359
6"	6.625	8.0	11				8.0	6.585	6.452	4.0	7.025	6.7252	11	6.450	6.359
8"	8.625	8.0													
10"	10.750	8.0													
12"	12.750	8.0													

Normal Engagement Length of NPT Thread in Inches (A)

- Dimensions given do not allow for variations in tapping or threading.



Thread Size	Dimension A
1/8"	1/4"
1/4"	3/8"
3/8"	3/8"
1/2"	1/2"
3/4"	9/16"
1"	11/16"
1-1/4"	11/16"
1-1/2"	11/16"
2"	3/4"
2-1/2"	15/16"
3"	1"
4"	1-1/8"
5"	1-1/4"
6"	1-5/16"
8"	1-7/16"
10"	1-5/8"
12"	1-3/4"

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