



FITTINGS UNLIMITED, INC.

Adapter & Fitting Specialist

A light blue line drawing of a 90-degree elbow fitting. It has a threaded port on the top and a threaded port on the left side. The text 'Thread and Port Identification Guide' is overlaid on the fitting.

**Thread and Port
Identification Guide**

800-348-8467

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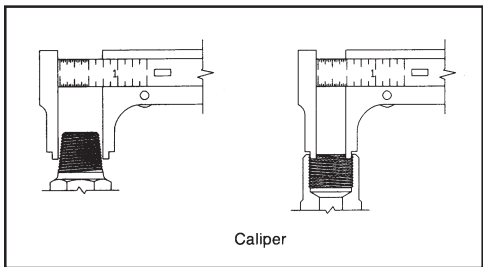
Explanation of Symbols Thread Designations

GENERAL INFORMATION

- BSP - British Standard Pipe
- BSPP - British Standard Pipe Parallel
- BSPT - British Standard Pipe Tapered
- DIN - Deutsche Industrial Norme (German)
- ISO - International Standards Organization
- JIC - Joint Industrial Council
- JIS - Japanese Industrial Standard
- NPSM - National Pipe Straight Mechanical
- NPTF - National Pipe Tapered Fuel
- SAE - Society of Automotive Engineers (American)

How to Measure Threads

By using a combination of three tools, identifying connectors is easy to do.

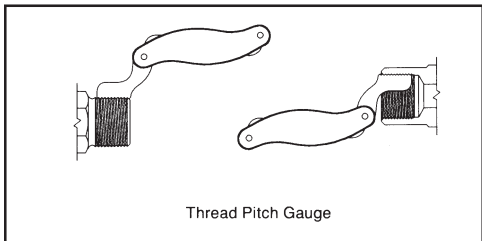


A caliper is used to measure the O.D. of a male thread and I.D. of a female thread.

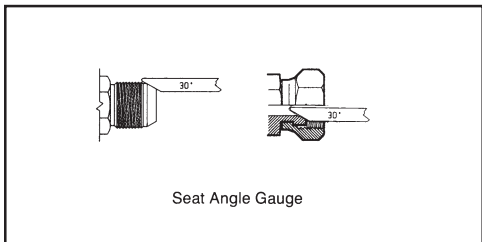
NOTE: When comparing your measurements with those on the following pages it should be remembered that threads can become worn and distorted from use and you may not compare exactly to the figures in the tables.

For your convenience, dimensions are in both millimeters and inches.

How to Measure Threads



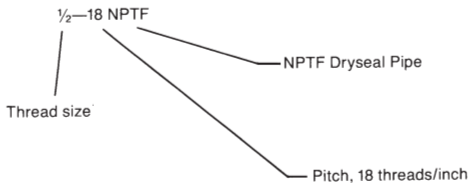
The thread pitch gauge measures the threads per inch. For metric threads the gauge will identify the distance between threads.



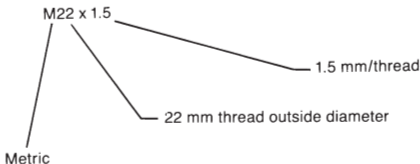
The seat angle gauge is used by placing the gauge angle on the sealing surface. The centerline of the end fitting and the gauge should be parallel.

“Metric” vs “English” Threads

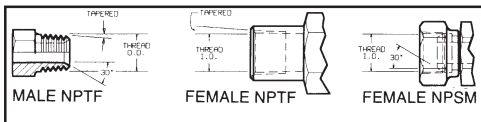
In the English system the thread size and pitch (number of threads per inch) are given, along with the thread type.



Metric threads indicate the thread outside diameter (O.D.) and the width of one thread, both in millimeters.



American Dryseal Pipe threads (NPTF and NPSM)



This commonly used connection incorporates two methods of sealing.

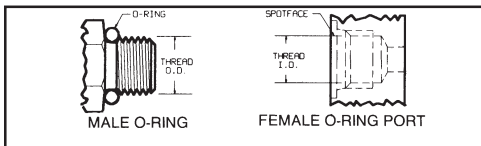
The male NPTF (Dryseal) tapered thread will mate with the NPTF tapered female, which is usually a port, and seal when the special threads are crushed together. Additional sealing aids such as pipe dope and teflon tape are often used with these threads. If the male end has a 30° seat it will mate with the 30° cone seat in the NPSM straight thread swivel female, usually found on adapters, and is mechanically held together by the threads.

NPTF & NPSM threads are not interchangeable with British pipe threads.

American Dryseal Pipe threads (NPTF and NPSM) (cont.)

Dash Size	Inch Size	Thread	Male Thread O.D.		Female Thread I.D.	
			mm	in	mm	in
-2	$\frac{1}{8}$	$\frac{1}{8}$ -27	10.3	.41	9.4	.37
-4	$\frac{1}{4}$	$\frac{1}{4}$ -18	13.7	.54	12.4	.49
-6	$\frac{3}{8}$	$\frac{3}{8}$ -18	17.3	.68	15.7	.62
-8	$\frac{1}{2}$	$\frac{1}{2}$ -14	21.3	.84	19.3	.76
-12	$\frac{3}{4}$	$\frac{3}{4}$ -14	26.9	1.06	24.9	.98
-16	1	1-11 $\frac{1}{2}$	33.3	1.31	31.5	1.24
-20	1 $\frac{1}{4}$	1 $\frac{1}{4}$ -11 $\frac{1}{2}$	42.2	1.66	40.1	1.58
-24	1 $\frac{1}{2}$	1 $\frac{1}{2}$ -11 $\frac{1}{2}$	48.3	1.90	46.2	1.82
-32	2	2-11 $\frac{1}{2}$	60.4	2.38	57.9	2.28

SAE J514 Straight Thread O-Ring Boss (ref. J1926)



This straight thread connection uses the same threads as the JIC 37° flare shown on page 12. However, the 37° flare has been removed and an O-Ring added. When mated with a female O-Ring boss port, the O-Ring is trapped in a special tapered counterbore to effect the seal.

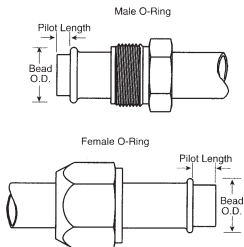
Dash Size	Inch Size	Thread	Male Thread O.D.		Female Thread I.D.	
			mm	in	mm	in
-2	1/8	5/16-24	7.9	.31	6.9	.27
-3	3/16	3/8-24	9.6	.38	8.6	.34
-4	1/4	7/16-20	11.2	.44	9.9	.39
-5	5/16	1/2-20	12.7	.50	11.4	.45
-6	3/8	9/16-18	14.2	.56	12.9	.51
-8	1/2	3/4-16	19.0	.75	17.0	.67
-10	5/8	7/8-14	22.3	.88	20.3	.80
-12	3/4	1 1/16-12	26.9	1.06	24.9	.98
-14	7/8	1 3/16-12	30.0	1.18	27.7	1.09
-16	1	1 5/16-12	33.3	1.31	31.0	1.22
-20	1 1/4	1 5/8-12	41.4	1.63	39.1	1.54
-24	1 1/2	1 7/8-12	47.7	1.88	45.5	1.79
-32	2	2 1/2-12	63.5	2.50	61.2	2.41

O-Ring Pilot Threads

O-Ring Pilot Threads

How to Identify O-Ring Pilot Thread Sizes

This connection is common to air conditioning systems, both in vehicle and commercial applications. Both the male and female halves of the connections have a pilot, either long or short. The seal takes place by compressing an O-ring adjacent to the bead of the tube. The threads hold the connection together mechanically.



(Continued on next page)

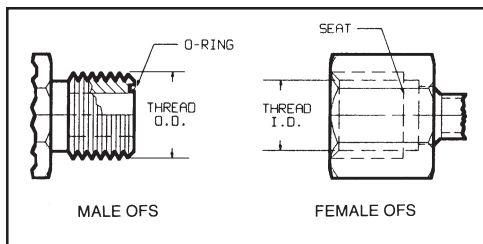
O-Ring Pilot Threads

How to Identify O-Ring Pilot Thread Sizes (cont.)

Inch Size	Dash Size	MALE THREAD O.D. (INCH)			FEMALE THREAD I.D. (INCH)		
		Nominal Thread	Frac.	Decimal	Nominal Thread	Frac.	Decimal
3/8	06	5/8-18	5/8	.62	5/8-18	9/16	.57
1/2	08	3/4-18	3/4	.75	3/4-16	11/16	.69
5/8	10	7/8-18	7/8	.87	7/8-14	13/16	.81
3/4	12	1 1/16-16	1 1/16	1.06	1 1/16-14	1	.99

Inch Size	LONG PILOT			SHORT PILOT		
	Nominal Tube Size	Bead O.D. (Inch)	Pilot Length	Bead O.D. (Inch)	Pilot Length	
3/8	06	.52	.28	.52	.19	
1/2	08	.64	.39	.64	.19	
5/8	10	.77	.39	.77	.19	
3/4	12	.91	.39	.91	.19	

SAE J1453 O-Ring Face Seal (OFS)

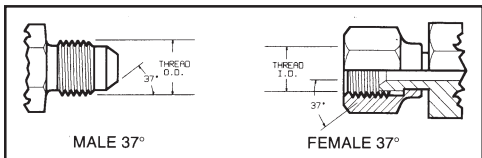


The new connection is designed for leak-free use to 6000 psi.

The O-Ring in the face of the straight thread male end seals against the flat face female seat and is mechanically held in place by a swivel female nut.

Dash Size	Inch Size	Thread	Male Thread O.D.		Female Thread I.D.	
			mm	in	mm	in
-4	1/4	9/16-18	14.2	.56	12.9	.51
-6	3/8	11/16-16	17.3	.68	16.0	.63
-8	1/2	13/16-16	20.6	.81	19.0	.75
-10	5/8	1-14	25.4	1.00	23.6	.93
-12	3/4	13/16-12	30.0	1.18	27.8	1.10
-16	1	17/16-12	36.6	1.44	34.5	1.36
-20	1 1/4	1 11/16-12	42.7	1.68	40.6	1.60
-24	1 1/2	2-12	50.8	2.00	48.8	1.92

SAE J514, 37° Flare (Hydraulic)



Commonly referred to as 37° JIC, this connection is widely used in hydraulic systems. When the straight threads are engaged, the 37° male seat seals on the 37° female flare seat.

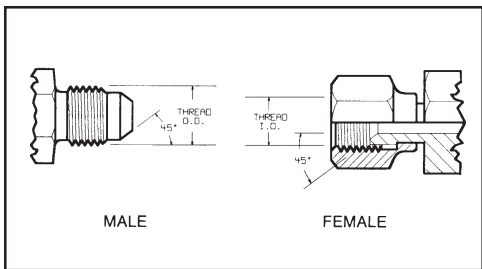
Most thread sizes are identical to the 45° SAE connections as noted on page 13. Care must be taken not to confuse these two connectors which have different seating angles.

SAE J514, 37° Flare (Hydraulic) (cont.)

Dash Size	Inch Size	Thread	Male Thread O.D.		Female Thread I.D.	
			mm	in	mm	in
-2	1/8	5/16-24*	7.9	.31	6.9	.27
-3	3/16	3/8-24*	9.6	.38	8.6	.34
-4	1/4	7/16-20*	11.2	.44	9.9	.39
-5	5/16	1/2-20*	12.7	.50	11.4	.45
-6	3/8	9/16-18	14.2	.56	12.9	.51
-8	1/2	3/4-16*	19.0	.75	17.0	.67
-10	5/8	7/8-14*	22.3	.88	20.3	.80
-12	3/4	1 1/16-12	26.9	1.06	24.9	.98
-14	7/8	1 3/16-12	30.0	1.18	27.7	1.09
-16	1	1 5/16-12	33.3	1.31	31.0	1.22
-20	1 1/4	1 5/8-12	41.4	1.63	39.1	1.54
-24	1 1/2	1 7/8-12	47.7	1.88	45.5	1.79
-32	2	2 1/2-12	63.5	2.50	61.2	2.41

*Same thread as SAE 45° Flare

SAE J512, 45° Flare



The SAE 45° flare connectors are similar to the 37° connectors except for the flare angle, and seal in the same manner.

45° connectors are commonly found in automotive applications, on brass adapters, and are generally used at lower pressures than 37° flare fittings.

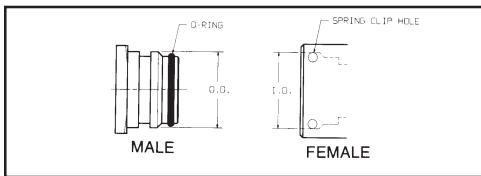
Many sizes have threads identical to those on 37° JIC connectors. Check the threads and flares carefully to make positive identification.

SAE J512, 45° Flare (cont.)

Dash Size	Inch Size	Thread	Male Thread O.D.		Female Thread I.D.	
			mm	in	mm	in
-2	1/8	5/16-24*	7.9	.31	6.9	.27
-3	3/16	3/8-24*	9.6	.38	8.6	.34
-4	1/4	7/16-20*	11.2	.44	9.9	.39
-5	5/16	1/2-20*	12.7	.50	11.4	.45
-6	3/8	5/8-18	15.7	.62	14.2	.56
-7	7/16	1 1/16-16	17.3	.68	15.7	.62
-8	1/2	3/4-16*	19.0	.75	17.0	.68
-10	5/8	7/8-14*	22.3	.88	20.3	.80
-12	3/4	1 1/16-14	26.9	1.06	25.1	.99
-14	7/8	1 1/4-12	31.7	1.25	29.5	1.16
-16	1	1 3/8-12	35.0	1.38	32.5	1.28

*Same thread as 37° JIC Flare

STAPLE Connection- SAE J1467

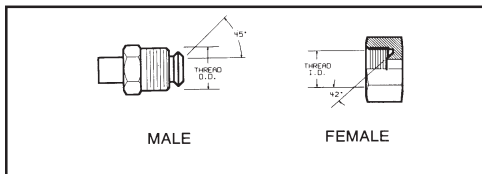


This connection was developed in Germany and is now used world wide on underground mining machinery.

The male end, with an entrapped O-Ring, is pushed into the female and held in place by a “U” shaped clip or retaining staple. The O-Ring does the sealing. There are no threads.

Dash Size	Inch Size	Male End O.D.		Female End I.D.	
		mm	in	mm	in
-4	1/4	14.7	.58	15.0	.59
-6	3/8	19.8	.78	20.0	.79
-8	1/2	23.9	.94	24.1	.95
-12	3/4	28.7	1.13	29.0	1.14
-16	1	38.9	1.53	39.1	1.54
-20	1 1/4	45.7	1.80	46.0	1.81
-24	1 1/2	54.9	2.16	55.1	2.17
-32	2	64.0	2.52	64.3	2.53

SAE J512 Inverted Flare

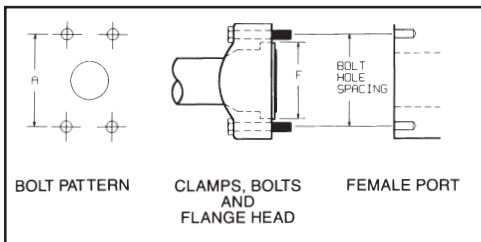


The male inverted flare connector will have a 42° seat (if machined) and a 45° seat with flared tubing. Both seal on the 42° seat in the female, and the straight threads hold the parts together mechanically.

This connector is common in automotive applications.

Dash Size	Inch Size	Thread	Male Thread O.D.		Female Thread I.D.	
			mm	in	mm	in
-2	1/8	5/16-28	7.9	.31	6.9	.27
-3	3/16	3/8-24	9.6	.38	8.6	.34
-4	1/4	7/16-24	11.2	.44	9.9	.39
-5	5/16	1/2-20	11.7	.50	11.4	.45
-6	3/8	5/8-18	15.7	.62	14.2	.56
-7	7/16	11/16-18	17.3	.68	15.7	.62
-8	1/2	3/4-18	19.0	.75	17.0	.68
-10	5/8	7/8-18	22.3	.88	20.3	.80
-12	3/4	1 1/16-16	26.9	1.06	25.1	.99

SAE J518-Code 61 and Code 62 4-Bolt Flanges



This connection is commonly used world wide to connect larger sizes on hose and tubing ($\frac{3}{4}$ " to 3") in fluid power systems.

An O-Ring, inserted into a ring groove in the flange head seals on a smooth faced female port, and is held in place by two clamp halves (or a one piece clamp) which are held tight by four bolts located in a rectangular pattern.

J518 flanges come in two pressure classes. The standard series, Code 61, which goes to 5000 psi and the high pressure series, Code 62, where all sizes are rated at 6000 psi.

J518 is interchangeable with ISO 6142, DIN 20066 and JIS B 8363, except for the bolt sizes.

SAE J518-Code 61 and Code 62 4-Bolt Flanges (cont.)

SAE Code 61-Standard Series

Dash Size	Inch Size	Bolt Size	Flange O.D. "F" ± .010		Bolt Spacing "A" ± .010		Code 61 Max Working Pressure PSI
			mm	in	mm	in	
-8	1/2	5/16-18 x 1 1/4	30.2	1.19	38.1	1.50	5000
*10	5/8	METRIC	34.0	1.34	-	-	
-12	3/4	3/8-16 x 1 1/4	38.1	1.50	47.6	1.88	5000
-16	1	3/8-16 x 1 1/4	44.4	1.75	52.4	2.06	5000
-20	1 1/4	7/16-14 x 1 1/2	50.8	2.00	58.7	2.31	4000
-24	1 1/2	1/2-13 x 1 1/2	60.3	2.38	69.8	2.75	3000
-32	2	1/2-13 x 1 1/2	71.4	2.81	77.8	3.06	3000
-40	2 1/2	1/2-13 x 1 3/4	84.1	3.31	88.9	3.50	2500
-48	3	5/8-11 x 1 3/4	101.6	4.00	106.4	4.19	2000

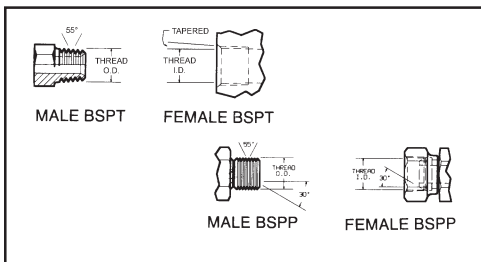
*Non SAE Size, common on Komatsu Equipment

SAE Code 62-High Pressure Series

Dash Size	Inch Size	Bolt Size	Flange O.D. "F" ± .010		Bolt Spacing "A" ± .010		Code 62 Max Working Pressure PSI
			mm	in	mm	in	
-8	1/2	5/16-18 x 1 1/4	31.7	1.25	40.5	1.59	6000
-12	3/4	3/8-16 x 1 1/2	41.3	1.63	50.8	2.00	6000
-16	1	7/16-14 x 1 3/4	47.6	1.88	57.1	2.25	6000
-20	1 1/4	1/2-13 x 1 3/4	54.0	2.13	66.7	2.63	6000
-24	1 1/2	5/8-11 x 2 1/4	63.5	2.50	79.4	3.13	6000
-32	2	3/4-10 x 2 3/4	79.4	3.13	96.8	3.81	6000

British Standard Pipe-BSP

(BSPP Parallel & BSPT Tapered)



The British BSP connections include two types of threads, BSPP which are straight (or parallel) and BSPT which are tapered.

The BSPT tapered male will mate with a BSPT tapered female (usually a port) and seals on the threads.

The BSPP parallel male has a 30° chamfered seat which seals with a BSPP swivel female on its 30° cone seat. (Similar to the American NPSM-NPTF connection, however, the BSPP swivel female end is commonly found on couplings).

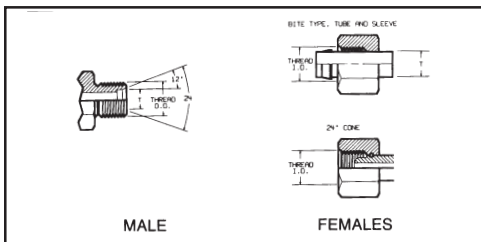
The BSP threads are similar to, but not interchangeable with, American NPTF pipe threads.

British Standard Pipe-BSP

(BSPP Parallel & BSPT Tapered) (cont.)

Dash Size	Inch Size	Thread	Male Thread O.D.		Female Thread I.D.	
			mm	in	mm	in
-2	1/8	1/8 - 28	10.3	.41	9.4	.37
-4	1/4	1/4 - 19	13.7	.54	12.4	.49
-6	3/8	3/8 - 19	17.3	.68	15.7	.62
-8	1/2	1/2 - 14	21.3	.84	19.3	.76
-10	5/8	5/8 - 14	22.9	.90	21.1	.83
-12	3/4	3/4 - 14	26.9	1.06	24.9	.98
-16	1	1 - 11	33.3	1.31	31.5	1.24
-20	1 1/4	1 1/4 - 11	42.2	1.66	40.1	1.58
-24	1 1/2	1 1/2 - 11	48.3	1.90	46.2	1.82
-32	2	2 - 11	60.4	2.38	57.9	2.28

French Metric GAZ w/24° Seat



This metric connection consists of a male and two female styles, both of which seal on the 24° taper in the male end. These connections are generally found only on French made equipment.

Hose Dash Size	Thread Size	Male Thread O.D.		Female Thread I.D.		Tube O.D. "T" DIM.	
		mm	in	mm	in	mm	in
-6	M20 x 1.5	20	.78	18.5	.73	13.25	.52
-8	M24 x 1.5	24	.94	22.5	.89	16.75	.66
-10	M30 x 1.5	30	1.18	28.5	1.12	21.25	.83
-12	M36 x 1.5	36	1.41	34.5	1.36	26.75	1.05
-16	M45 x 1.5	45	1.77	43.5	1.71	33.50	1.32
-20	M52 x 1.5	52	2.04	50.5	1.99	42.25	1.66

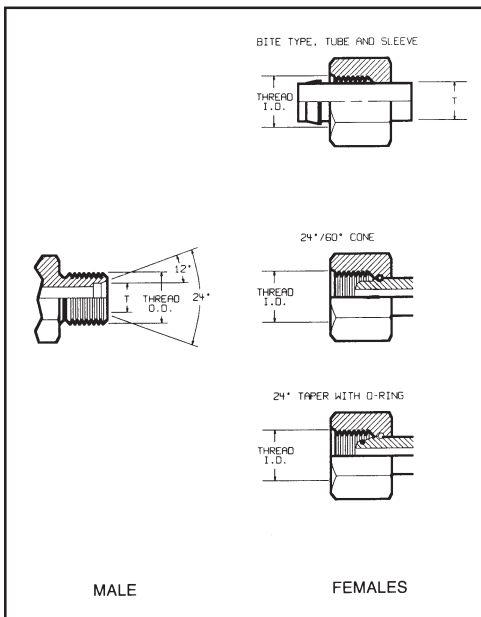
DIN 20066 4-Bolt Flange

Dimensionally and functionally the same as SAE J518 (Page 18). Form R is Code 61 and Form S is Code 62. These flanges are used with both metric or inch bolts so it is necessary to properly identify the bolt threads

DIN 20066 is interchangeable with ISO 6142, SAE J518 and JIS B 8363, except for the bolt sizes.

Dash Size	Metric Size Equivalent (mm)	Metric Bolt Sizes	
		Form R Code 61	Form S Code 62
-8	12	M8 x 1.25 x 30	M8 x 1.25 x 30
-12	20	M10 x 1.5 x 30	M10 x 1.5 x 40
-16	25	M10 x 1.5 x 30	M12 x 1.75 x 45
-20	32	M10 x 1.5 x 40	M14 x 2 x 45
-24	40	M12 x 1.75 x 40	M16 x 2 x 55
-32	50	M12 x 1.75 x 40	M20 x 2.5 x 70

DIN 2353-24° Male and Mating Females



This connector system consists of one male and three styles of female, all of which have straight metric threads.

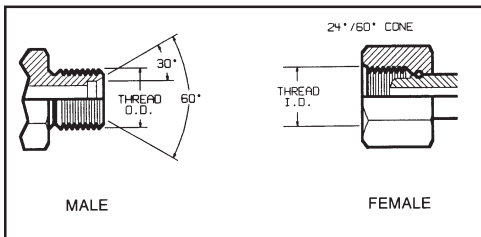
DIN 2353-24° Male and Mating Females (cont.)

Sealing takes place between the 24° seat in the male end and the respective sealing areas in the female ends.

DIN 2353 includes both a light and heavy duty series which can be identified by measuring the tube O.D.

Thread Size	Male Thread O.D.		Female Thread I.D.		Tube O.D. "T" Dim.			
					Light Duty		Heavy Duty	
	mm	in	mm	in	mm	in	mm	in
M12 x 1.5	12	.47	10.5	.41	6	.24	-	-
M14 x 1.5	14	.55	12.5	.49	8	.32	6	.24
M16 x 1.5	16	.63	14.5	.57	10	.39	8	.32
M18 x 1.5	18	.71	16.5	.65	12	.47	10	.39
M20 x 1.5	20	.78	18.5	.73	-	-	12	.47
M22 x 1.5	22	.87	20.5	.81	15	.59	14	.55
M24 x 1.5	24	.94	22.5	.89	-	-	16	.63
M26 x 1.5	26	1.02	24.5	.96	18	.71	-	-
M30 x 2	30	1.18	28	1.11	22	.87	20	.78
M36 x 2	36	1.41	34	1.34	28	1.10	25	.98
M42 x 2	42	1.65	40	1.57	-	-	30	1.18
M45 x 2	45	1.77	43	1.70	35	1.38	-	-
M52 x 2	52	2.04	50	1.97	42	1.65	38	1.50

DIN 7611-60° Series



This German standard consists of a single male and female end with straight metric threads. The female has a 60° or a universal 24°/60° cone which seals on the 60° seat in the male end.

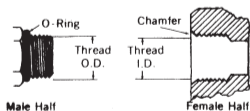
Thread Size	Male Thread O.D.		Female Thread I.D.		Tube O.D.	
	mm	in	mm	in	mm	in
M12 x 1.5	12	.47	10.5	.41	6	.24
M14 x 1.5	14	.55	12.5	.49	8	.32
M16 x 1.5	16	.63	14.5	.57	10	.39
M18 x 1.5	18	.71	16.5	.65	12	.47
M22 x 1.5	22	.87	20.5	.81	15	.59
M26 x 1.5	26	1.02	24.5	.96	18	.71
M30 x 1.5	30	1.18	28.5	1.12	22	.87
M38 x 1.5	38	1.50	36.5	1.44	28	1.10
M45 x 1.5	45	1.77	43.5	1.71	35	1.38
M52 x 1.5	52	2.04	50.5	1.99	42	1.65

ISO Connection

ISO Connection

ISO 6149 Port and Stud Ends with ISO 261 Threads and O-Ring Seal

This port connection is similar to the SAE J514 Straight Thread O-Ring Boss (ORB). The major difference is that this connection uses metric threads. The male connector has a straight thread and an O-Ring. The female port has a straight thread, a machined surface (minimum spotface) and a chamfer to accept the O-Ring. The seal takes place by compressing the O-Ring into the chamfer. The threads hold the connection mechanically.

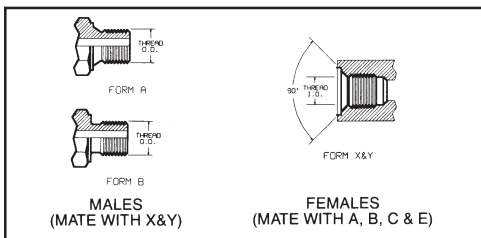


*M14 x 1,5: Recommended for diagnostic port application.

METRIC THREADS	MALE THREAD O.D. MM	FEMALE THREAD I.D. MM
M8 x 1	8	7
M10 x 1	10	9
M12 x 1,5	12	10,5
M14 x 1,5*	14	12,5
M16 x 1,5	16	14,5
M18 x 1,5	18	16,5
M22 x 1,5	22	20,5
M27 x 2	27	25
M33 x 2	33	31
M42 x 2	42	40
M48 x 2	48	46
M60 x 2	60	58

DIN 3852-Parallel Threads

Metric & Whitworth, Sheets 1 & 2



This large and somewhat complicated thread standard is divided into two sections. Sheet 1 covers metric threads and Sheet 2, Whitworth (BSP) pipe threads. Both thread styles are available in parallel or tapered configurations.

Male thread forms A,B,C or E (E is not shown here) will mate with form X or form Y female ports while tapered male form C mates with female form Z.

The parallel threads seal using various sealing rings or washers such as O-Rings, bonded seals or metal to metal seals. Form E is used by agreement between the supplier and user and also incorporates numerous sealing rings.

Form X and Y parts will always have a machined or spotfaced surface to accommodate the required seals.

DIN 3852-Parallel Threads

Metric & Whitworth, Sheets 1 & 2 (cont.)

Metric Parallel Threads - Sheet 1

Thread	Male Thread O.D.		Female Thread I.D.	
	mm	in	mm	in
M12 x 1.5	12	.47	10.5	.41
M14 x 1.5	14	.55	12.5	.49
M16 x 1.5	16	.63	14.5	.57
M18 x 1.5	18	.71	16.5	.65
M20 x 1.5	20	.78	18.5	.73
M22 x 1.5	22	.87	20.5	.81
M24 x 1.5	24	.94	22.5	.89
M26 x 1.5	26	1.02	24.5	.96
M27 x 2	27	1.06	25.5	1.00
M30 x 1.5	30	1.18	28	1.11
M30 x 2	30	1.18	28	1.11
M33 x 2	33	1.30	31.5	1.24
M36 x 2	36	1.41	34	1.34
M38 x 2	38	1.50	36	1.41
M42 x 2	42	1.65	40	1.57
M45 x 2	45	1.77	43	1.70
M48 x 2	48	1.89	46	1.81
M52 x 2	52	2.04	50	1.97

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DIN 3852-Parallel Threads

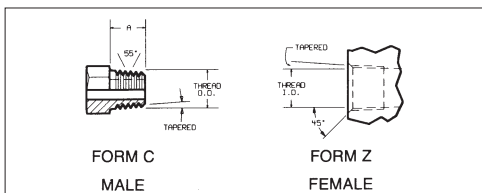
Metric & Whitworth, Sheets 1 & 2 (cont.)

Whitworth Parallel Pipe Threads - Sheet 2

Thread Size	Male Thread O.D.		Female Thread I.D.		Tube O.D.'s Series			
					L. Light		S. Heavy	
	mm	in	mm	in	mm	in	mm	in
1/8-28	10.3	.41	9.4	.37	6	.24	-	-
1/4-19	13.7	.54	12.4	.49	8	.31	6	.24
					10	.39	8	.31
3/8-19	17.3	.68	15.7	.62	12	.47	10	.39
					14	.55	12	.47
1/2-14	21.3	.84	19.3	.76	15	.59	14	.55
					18	.71	16	.63
3/4-14	26.9	1.06	24.9	.98	22	.87	20	.79
1-11	33.3	1.31	31.5	1.24	28	1.10	25	.98
1 1/4-11	42.2	1.66	40.1	1.58	35	1.38	30	1.18
1 1/2-11	48.3	1.90	46.2	1.82	42	1.65	38	1.50

DIN 3852-Tapered Threads

Metric & Whitworth, Sheets 1 & 2



The DIN 3852 form C male mates with a form Z female port and seals on the threads as they are crushed together.

Both male and female have tapered threads and are available in metric or Whitworth styles.

Metric Tapered Threads - Sheet 1

Thread	Male Thread O.D.		Female Thread I.D.		A	
	mm	in	mm	in	mm	in
M10 x 1	10	.39	8.5	.33	8	.32
M12 x 1.5	12	.47	10.5	.41	12	.47
M14 x 1.5	14	.55	12.5	.49	12	.47
M16 x 1.5	16	.63	14.5	.57	12	.47
M18 x 1.5	18	.71	16.5	.65	12	.47
M20 x 1.5	20	.78	18.5	.73	14	.55
M22 x 1.5	22	.87	20.5	.81	14	.55
M24 x 1.5	24	.94	22.5	.89	14	.55
M27 x 2	27	1.06	25.5	1.00	16	.63

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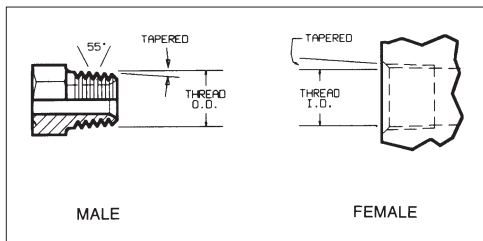
DIN 3852-Tapered Threads

Metric & Whitworth, Sheets 1 & 2 (cont.)

Whitworth Tapered Threads - Sheet 2

Thread Size	Male Thread O.D.		Female Thread O.D.		A Series		O.D.'s	Tube	
	mm	in	mm	in	mm	in		mm	in
1/8-28	10.3	.41	9.4	.37	8	.31	LL Extra Light	4	.16
								5	.20
								6	.24
								8	.31
1/8-28	10.3	.41	9.4	.37	8	.31	L Light	6	.24
1/4-19	13.7	.54	12.4	.49	12	.47		8	.31
3/8-19	17.3	.68	15.7	.62	12	.47		10	.39
								12	.47
1/2-14	21.3	.84	19.3	.76	14	.55		14	.55
								15	.59
							16	.63	
1/4-19	13.7	.54	12.4	.49	12	.47	S Heavy	18	.71
								6	.24
3/8-19	17.3	.68	15.7	.62	12	.47		8	.31
								10	.39
								12	.47
1/2-14	21.3	.84	19.3	.76	14	.55		14	.55
							16	.63	

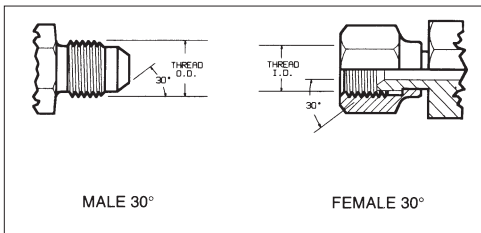
JIS Tapered Pipe Thread (PT)



The JIS tapered pipe thread (PT) is identical to and interchangeable with the British BSPT tapered pipe thread. However, the male end does not have a 60° chamfer and will only seal when the threads are crushed together in an appropriate JIS or BSP port.

Dash Size	Inch Size	Thread	Male Thread O.D.		Female Thread I.D.	
			mm	in	mm	in
-2	1/8	1/8-28	9.4	.37	8.1	.32
-4	1/4	1/4-19	13.7	.53	12.4	.49
-6	3/8	3/8-19	17.2	.68	16.0	.62
-8	1/2	1/2-14	21.5	.84	19.8	.77
-10	5/8	5/8-14	23.1	.91	20.6	.81
-12	3/4	3/4-14	26.9	1.06	25.4	1.00
-16	1	1-11	34.0	1.34	31.8	1.25
-20	1 1/4	1 1/4-11	42.6	1.68	40.4	1.59
-24	1 1/2	1 1/2-11	48.5	1.90	46.2	1.81
-32	2	2	60.4	2.37	58.2	2.29

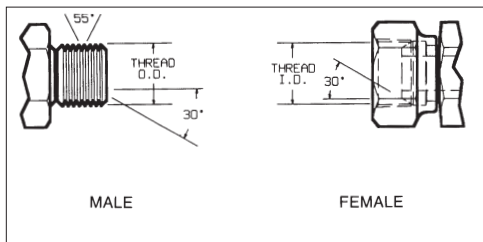
JIS 30° Flare with Parallel Pipe Threads (PF)



This Japanese connector is similar to the American 37° JIC flare except for the 30° seat angle. The straight (parallel) pipe threads are the same as BSPP.

Dash Size	Inch Size	Thread	Male Thread O.D.		Female Thread I.D.	
			mm	in	mm	in
-2	1/8	1/8 - 28	9.4	.37	8.1	.32
-4	1/4	1/4 - 19	13.7	.53	12.4	.49
-6	3/8	3/8 - 19	17.2	.68	16.0	.62
-8	1/2	1/2 - 14	21.5	.84	19.8	.77
-10	5/8	5/8 - 14	23.1	.91	20.6	.81
-12	3/4	3/4 - 14	26.9	1.06	25.4	1.00
-16	1	1 - 11	34.0	1.34	31.8	1.25
-20	1 1/4	1 1/4 - 11	42.6	1.68	40.4	1.59
-24	1 1/2	1 1/2 - 11	48.5	1.90	46.2	1.81
-32	2	2	60.4	2.37	58.2	2.29

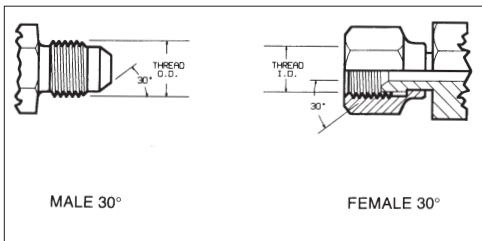
JIS 30° Male Inverted Seat w/ Parallel Pipe Threads



The JIS connector is similar to, and can be interchanged with, BSPB parallel connections. Thread conforms to JIS B 0202.

Dash Size	Inch Size	Thread	Male Thread O.D.		Female Thread I.D.	
			mm	in	mm	in
-4	1/4	1/4-19	13.7	.54	12.4	.49
-6	3/8	3/8-19	17.2	.68	16.0	.63
-8	1/2	1/2-14	21.5	.85	19.8	.78
-12	3/4	3/4-14	26.9	1.06	25.4	1.00
-16	1	1-11	34.0	1.34	31.8	1.25
-20	1 1/4	1 1/4-11	42.6	1.68	40.4	1.59
-24	1 1/2	1 1/2-11	48.5	1.91	46.2	1.82
-32	2	2 - 11	60.4	2.38	58.2	2.29

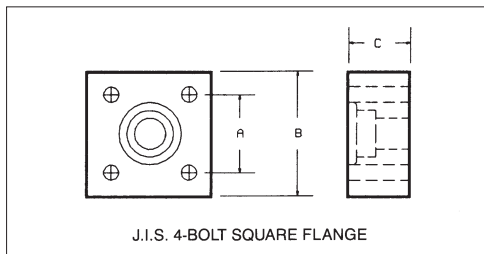
Japanese Komatsu 30° Flare w/ Metric Threads



Used extensively on Komatsu equipment, this 30° flare connector has parallel metric threads and is sometimes confused with JIS 30° flare which has parallel pipe threads.

Dash No.	Metric Size Equiv.	Metric Thread	Male Thread O.D.		Female Thread I.D.	
			mm	in	mm	in
-6	9	M18 x 1.5	18	.71	16.5	.65
-8	12	M22 x 1.5	22	.87	20.5	.82
-10	16	M24 x 1.5	24	.94	22.5	.88
-12	19	M30 x 1.5	30	1.18	28.5	1.12
-16	25	M33 x 1.5	33	1.30	31.5	1.24
-20	32	M36 x 1.5	36	1.42	34.5	1.36
-24	38	M42 x 1.5	42	1.65	40.5	1.59

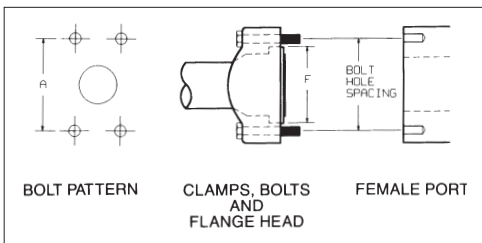
JIS 210 Kgf / cm² 4 - Bolt Square Flange



The JIS 4-bolt flange connection is conceptually similar to the SAE 4-bolt flanges except the flange is square, one piece, and the bolts are metric.

Size (mm)	Bolt Thread (metric)	A		B		C	
		mm	in	mm	in	mm	in
12	M10 x 1.5	40	1.57	63	2.48	22	.87
19	M10 x 1.5	45	1.77	68	2.67	22	.87
25	M12 x 1.75	53	2.09	80	3.15	28	1.10
32	M12 x 1.75	63	2.48	90	3.54	28	1.10
38	M16 x 2.0	70	2.76	100	3.94	36	1.42
50	M16 x 2.0	80	3.15	112	4.41	36	1.42

JIS B 8363 4- Bolt Flange



Dimensionally and functionally the same as SAE J518 (page 18). Type I is Code 61 and Type II is Code 62. Again, both metric and inch bolts can be used and it is necessary to properly identify the bolt threads.

JIS B 8363 is interchangeable with ISO 6142, DIN 20066 and SAE J518 except for the bolt sizes.

Dash Size	Metric Size Equiv. (mm)	Metric Bolt Sizes	
		Type 1 Code 61	Type 11 Code 62
-8	12	M8 x 1.25 x 30	M8 x 1.25 x 30
-12	20	M10 x 1.5 x 30	M10 x 1.5 x 40
-16	25	M10 x 1.5 x 30	M12 x 1.75 x 45
-20	32	M10 x 1.5 x 40	M14 x 2 x 45
-24	40	M12 x 1.75 x 40	M16 x 2 x 55
-32	50	M12 x 1.75 x 40	M20 x 2.5 x 70

ISO 6142 4 - Bolt Flanges

Dimensionally and functionally the same as SAE J518 (page 18) these connectors also have a standard series, PN 35/350 bar, (Code 61) and a high pressure series, PN 415 bar, (Code 62).

Unlike J518, both metric or inch bolts can be used and it is necessary to properly identify the bolt threads. If metric bolts are required, the port should be stamped with an "M".

ISO 6142 is interchangeable with SAE J518, DIN 20066 and JIS B 8363, except for the bolt sizes.

Dash Size	Metric Size Equiv. (mm)	Metric Bolt Sizes	
		PN 35/350 Bar Code 61	PN 415 Bar Code 62
-8	12	M8 x 1.25 x 30	M8 x 1.25 x 30
-12	20	M10 x 1.5 x 35	M10 x 1.5 x 40
-16	25	M10 x 1.5 x 35	M12 x 1.75 x 45
-20	32	M12 x 1.75 x 40	M14 x 2 x 50
-24	40	M14 x 2 x 40	M16 x 2 x 55
-32	50	M14 x 2 x 40	M20 x 2.5 x 70

Metric Conversions

AREA

$$1 \text{ in}^2 = 6.45 \text{ cm}^2$$

$$1 \text{ ft}^2 = .0929 \text{ m}^2$$

LENGTH

$$1 \text{ in} = 25.4 \text{ mm}$$

$$1 \text{ in} = 2.54 \text{ cm}$$

$$1 \text{ mm} = .03937 \text{ in}$$

$$1 \text{ ft} = .3048 \text{ m (meters)}$$

$$1 \text{ m} = 3.281 \text{ ft}$$

VOLUME

$$1 \text{ gal} = 3.79 \text{ l (liters) or dm}^3$$

$$1 \text{ in}^3 = 16387 \text{ mm}^3$$

PRESSURE

$$1 \text{ psi} = 6.895 \text{ kPa} = .00689 \text{ MPa}$$

$$1 \text{ psi} = .0703 \text{ kg/cm}^2$$

$$1 \text{ psi} = .0689 \text{ Bar}$$

$$1 \text{ Bar} = 14.5 \text{ psi}$$

$$1 \text{ MPa} = 145 \text{ psi} = 10 \text{ Bars}$$

$$1 \text{ kg/cm}^2 = 14.22 \text{ psi}$$

$$1 \text{ in Hg (60}^\circ\text{F)} = 3.38 \text{ kPa}$$

TORQUE

$$1 \text{ lb. in} = .113 \text{ Nm (newton-meters)}$$

$$1 \text{ lb. ft} = 1.356 \text{ Nm}$$





Locations

Cleveland, Ohio

Dallas, Texas

Houston, Texas

Salt Lake City, Utah