

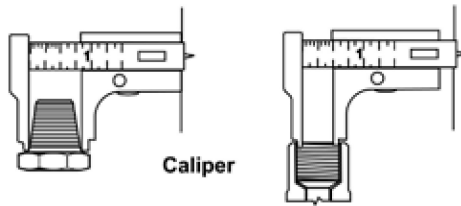
## Fitting Identification

### Identifying couplings is as easy as 1-2-3-4!

Tools required: ID/OD Calipers, Seat Angle Gauge and Thread Pitch Gauges.

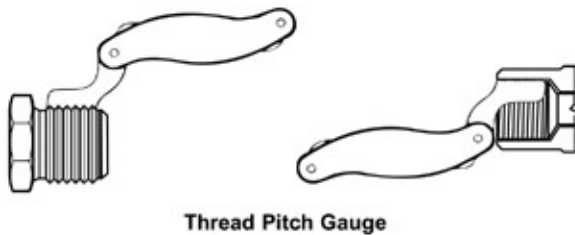
#### 1. Measuring Threads

A caliper is used to measure the OD of male threads and the ID of female threads. Measure at the largest point. In some cases, threads may be worn, and the exact measurement taken may not match exactly to the thread charts. For accuracy, it is recommended the male thread be measured.



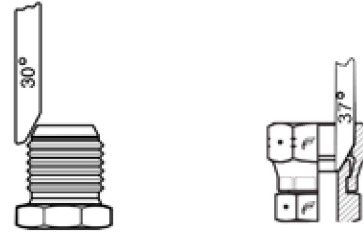
#### 2. Measuring Thread Pitch

A Thread Pitch Gauge is used to determine the number of threads per inch or the distance between threads in a metric connection. To ensure an accurate reading, make sure the fit of the thread gauge is snug.



#### 3. Measuring Seat Angle

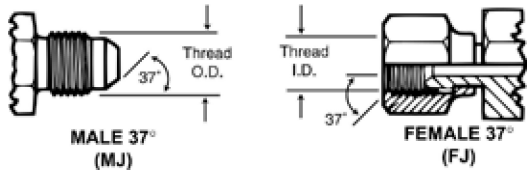
A Seat Angle Gauge is used to measure the angle of the sealing surface. For either male or female fittings, place the gauge on the sealing surface. An accurate reading is taken when the gauge is parallel to the centerline of the coupling.



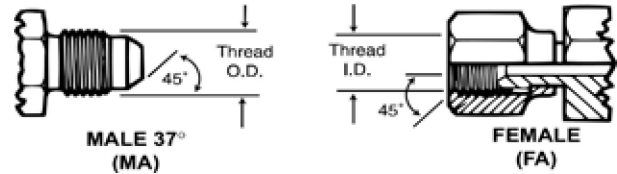
#### 4. Comparing Measurements to the Tables

ID/OD measurements, thread pitch and seat angle will be used to identify the fitting. Measurements taken can be used to compare with the dimensions found on charts in the following pages.

## JIC 37° - SAE J514



## SAE 45° - SAE J512



JIC 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 connection as noted below. Care must be taken not to confuse these two connectors which have different seating angles.

The SAE 45° connectors seal in the same manner and are similar to the JIC 37° connectors except for the flare angle. 45° connectors are commonly found in automotive applications, on brass adapters, and are generally used at lower pressures than JIC 37° fittings. Many sizes have threads identical to those on JIC 37° connectors.

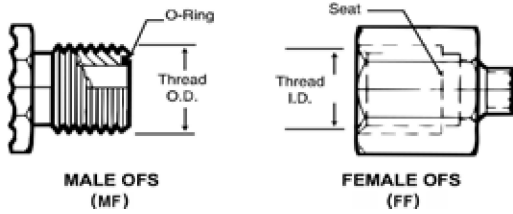
Dash Size	Inch Size	Thread	Male Thread OD		Female Thread ID	
			mm	in	mm	in
-2	1/8	5/16 -24*	7.9	0.31	6.8	0.27
-3	3/16	3/8 -24*	9.6	0.38	8.3	0.33
-4	1/4	7/16 -20*	11.2	0.44	9.9	0.39
-5	5/16	1/2 -20*	12.7	0.50	11.5	0.45
-6	3/8	9/16 -18	14.3	0.56	12.7	0.50
-8	1/2	3/4 -16*	19.0	0.75	17.5	0.69
-10	5/8	7/8 -14*	22.3	0.88	20.6	0.81
-12	3/4	1 1/16 -12	27.0	1.06	24.6	0.97
-14	7/8	1 3/16 -12	30.1	1.18	28.2	1.11
-16	1	1 5/16 -12	33.3	1.31	31.2	1.23
-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	61.5	2.42

Dash Size	Inch Size	Thread	Male Thread OD		Female Thread ID	
			mm	in	mm	in
-2	1/8	5/16 -24*	7.9	0.31	6.8	0.27
-3	3/16	3/8 -24*	9.6	0.38	8.4	0.33
-4	1/4	7/16 -20*	11.2	0.44	9.9	0.39
-5	5/16	1/2 -20*	12.7	0.50	11.5	0.45
-6	3/8	5/8 -18	15.9	0.62	14.2	0.56
-7	7/16	1 1/16 -16	17.5	0.68	15.9	0.62
-8	1/2	3/4 -16*	19.0	0.75	17.5	0.68
-10	5/8	7/8 -14*	22.3	0.88	20.6	0.81
-12	3/4	1 1/16 -12	26.9	1.06	25.1	0.99
-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 SAE 37°.

\* Same thread as SAE 45°.

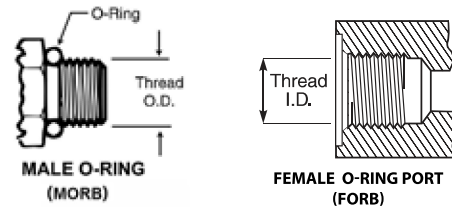
## O-Ring Face Seal - SAE J1453



This connection is designed for leak-free use to 6000 PSI. The oring 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 OD		Female Thread ID	
			mm	in	mm	in
-4	1/4	9/16 -18	14.2	0.56	12.9	0.51
-6	3/8	1 1/16 -16	17.4	0.68	16.0	0.63
-8	1/2	1 3/16 -16	20.6	0.81	19.0	0.75
-10	5/8	1 -14	25.4	1.00	23.6	0.93
-12	3/4	1 3/16 -12	30.0	1.18	28.4	1.12
-16	1	1 7/16 -12	36.6	1.44	34.0	1.34
-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

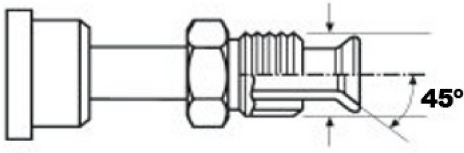
## O-Ring Boss - SAE J514



This straight thread connection uses the same threads as the JIC 37°. 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 OD		Female Thread ID	
			mm	in	mm	in
-2	1/8	5/16 -24	7.9	0.31	6.9	0.27
-3	3/16	3/8 -24	9.6	0.38	8.6	0.34
-4	1/4	7/16 -20	11.2	0.44	9.9	0.39
-5	5/16	1/2 -20	12.7	0.50	11.4	0.45
-6	3/8	9/16 -18	14.2	0.56	12.9	0.51
-8	1/2	3/4 -16	19.0	0.75	17.0	0.67
-10	5/8	7/8 -14	22.3	0.88	20.3	0.80
-12	3/4	1 1/16 -12	26.9	1.06	24.9	0.98
-14	7/8	1 1/16 -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

## SAE 45° Inverted Flare (SAE J512)



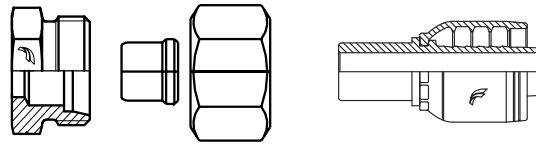
Male fitting. with a straight thread. can either be a 45-degree flare as a tube fitting or a 42-degree seat as a machined adapter. The female has a straight thread and a 42-degree inverted flare.

The seal takes place on the flared surfaces. The threads hold the connection in place mechanically.

Commonly found in automotive systems.

Dash Size	Inch Size	Thread	Male Thread OD	Female Thread ID
			in	in
-2	1/8	5/16 -28	5/16	9/32
-3	3/16	3/8 -24	3/8	21/64
-4	1/4	7/16 -24	7/16	25/64
-5	5/16	1/2 -20	1/2	29/64
-6	3/8	5/8 -18	5/8	37/64
-7	7/16	1 1/16 -18	1 1/16	5/8
-8	1/2	3/4 -18	3/4	45/64
-10	5/8	7/8 -18	7/8	13/16
-12	3/4	1 1/16 -16	1 1/16	1

## SAE J514 Flareless Tube Fitting



Male and female have straight threads. Male has 24-degree seat.

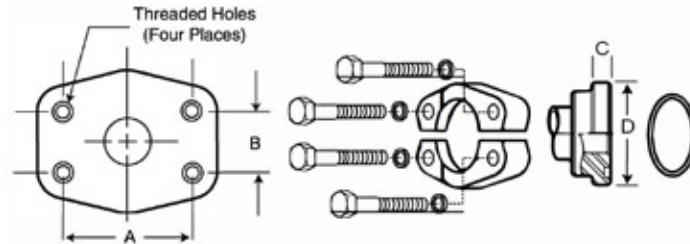
Female includes a compression sleeve for the sealing surface. A seal is formed with the compression sleeve as the female nut is tightened onto the male thread. A seal is formed between the compression sleeve, the male 24-degree seat and tubing.

Used to adapt steel tubing to a hydraulic hose assembly.

Dash Size	Tube Size	Inch Size	Thread	Female Thread OD	Male Thread ID
				in	in
-2	1/8	5/16	5/16 -24	17/64	5/16
-3	3/16	3/8	3/8 -24	21/64	3/8
-4	1/4	7/16	7/16 -20	25/64	7/16
-5	5/16	1/2	1/2 -20	29/64	1/2
-6	3/8	9/16	9/16 -18	1/2	9/16
-8	1/2	3/4	3/4 -16	1 1/16	3/4
-10	5/8	7/8	7/8 -14	13/16	7/8
-12	3/4	1 1/16	1 1/16 -12	32/32	1 1/16
-14	7/8	1 3/16	1 3/16 -12	1 7/64	1 3/16
-16	1	1 5/16	1 5/16 -12	1 15/64	1 5/16
-20	1 1/4	1 5/8	1 5/8 -12	1 35/64	1 5/8
-24	1 1/2	1 7/8	1 7/8 -12	1 51/64	1 7/8
-32	2	2 1/2	2 1/2 -12	2 27/64	2 1/2

## FLANGE - CODE 61, CODE 62, CAT

An O-Ring, inserted into a ring groove in the flange head seals on a smooth face female port, and is held in place by two clamp halves (or a one piece clamp) which are held in place by four bolts. J518 is interchangeable with ISO 6162, DIN 20066 and JIS B 8363, except for bolt size.



### CODE 61

Dash Size	Working Pressure		Flange OD "D"		Flange Thickness "C"		Bolt Spacing "A"		Bolt Spacing "B"		Bolt Size	
	psi	MPa	mm	in	mm	in	mm	in	mm	in	Imperial	Metric
-08	5,000	34.5	30.2	1.19	6.7	0.265	38.1	1.50	17.5	0.69	5/16 - 18 x 1 1/4	M8 X 1.25 X 30
-10*	5,000	34.5	34.0	1.34	6.7	0.265	42.9	1.69	19.8	0.78	5/16 - 18 x 1 1/4	M8 x 1.25 x 35
-12	5,000	34.5	38.1	1.50	6.7	0.265	47.6	1.88	22.4	0.88	3/8 - 16 x 1 1/4	M10 X 1.5 X 40
-16	5,000	34.5	44.4	1.75	8.0	0.315	52.4	2.06	26.2	1.03	3/8 - 16 x 1 1/4	M10 X 1.5 X 40
-20	4,000	27.6	50.8	2.00	8.0	0.315	58.7	2.31	30.2	1.19	7/16 - 16 x 1 1/2	M10 X 1.5 X 40
-24	3,000	20.7	60.3	2.38	8.0	0.315	69.8	2.75	35.8	1.41	1/2 - 13 x 1 1/2	M12 X 1.75 X 45
-32	3,000	20.7	71.4	2.81	9.5	0.375	77.8	3.06	42.9	1.69	1/2 - 13 x 1 3/4	M12 X 1.75 X45
-40	2,500	17.2	84.1	3.31	9.5	0.375	88.9	3.50	50.8	2.00	1/2 - 13 x 1 3/4	M12 X 1.75 X45
-48	2,000	13.8	101.6	4.00	9.5	0.375	101.6	4.19	62.0	2.44	5/8 - 11 x 1 3/4	M16 X 2.00 X45

\* Komatsu

### CODE 62

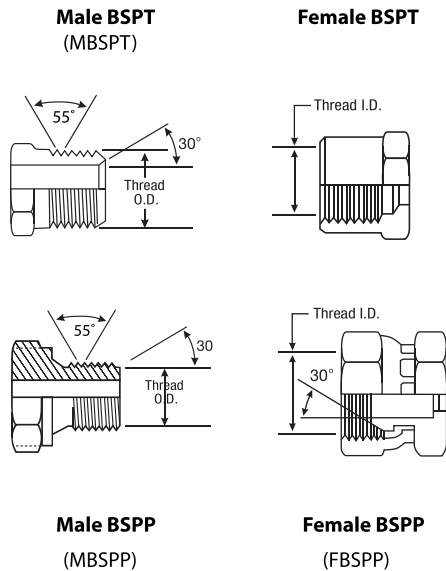
Dash Size	Working Pressure		Flange OD "D"		Flange Thickness "C"		Bolt Spacing "A"		Bolt Spacing "B"		Bolt Size	
	psi	MPa	mm	in	mm	in	mm	in	mm	in	Imperial	Metric
-08	6,000	41.4	31.7	1.25	7.8	0.305	40.5	1.59	18.3	0.72	5/16 - 18 x 1 1/4	M8 X 1.25 X 35
-12	6,000	41.4	41.3	1.63	8.8	0.345	50.8	2.00	23.9	0.94	3/8 - 16 x 1 1/2	M10 X 1.5 X 40
-16	6,000	41.4	47.6	1.88	9.5	0.375	57.1	2.25	27.7	1.09	7/16 - 14 x 1 3/4	M12 X 1.75 X 45
-20	6,000	41.4	54.0	2.13	10.3	0.405	66.7	2.63	31.8	1.25	1/2 - 13 x 1 3/4	M14 X 2.00 X 45
-24	6,000	41.4	63.5	2.50	12.6	0.495	79.4	3.13	36.6	1.44	5/16 - 11 x 2 1/4	M16 X 2.00 X 60
-32	6,000	41.4	79.4	3.13	12.6	0.495	96.8	3.81	44.5	1.75	3/4 - 10 x 2 3/4	M20 X 2.5 X 70

### CAT®

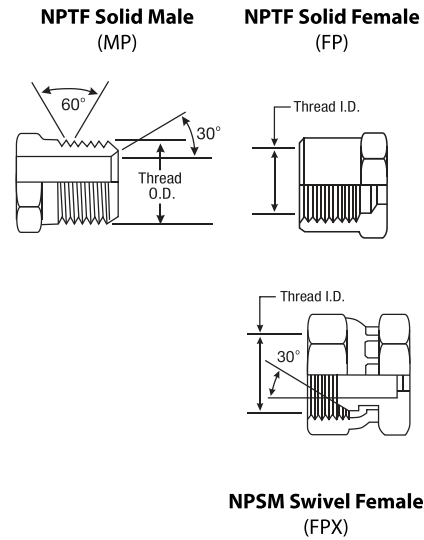
Dash Size	Working Pressure		Flange OD "D"		Flange Thickness "C"		Bolt Spacing "A"		Bolt Spacing "B"		Bolt Size	
	psi	MPa	mm	in	mm	in	mm	in	mm	in	Imperial	Metric
-12	6,000	41.4	41.3	1.63	14.2	0.560	50.8	2.00	23.9	0.94	3/8 - 16 x 1 1/2	M10 X 1.5 X 45
-16	6,000	41.4	47.6	1.88	14.2	0.560	57.1	2.25	27.7	1.09	7/16 - 14 x 1 3/4	M12 X 1.75 X 45
-20	6,000	41.4	54.0	2.13	14.2	0.560	66.7	2.63	31.8	1.25	1/2 - 13 x 1 3/4	M14 X 2.00 X 50
-24	6,000	41.4	63.5	2.50	14.2	0.560	79.4	3.13	36.6	1.44	5/16 - 11 x 2 1/4	M16 X 2.00 X 60
-32	6,000	41.4	79.4	3.13	14.2	0.560	96.8	3.81	44.5	1.75	3/4 - 10 x 2 3/4	M20 X 2.5 X 70

BECAUSE WE CONTINUALLY EXAMINE WAYS TO IMPROVE OUR PRODUCTS, WE RESERVE THE RIGHT TO ALTER SPECIFICATIONS WITHOUT NOTICE.

## British Standard Pipe - BSPP & BSPT



## NPTF and NPSM Pipe Threads



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.)

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 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.

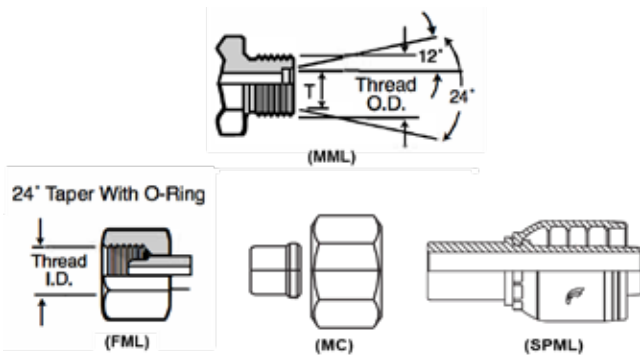
The BSP threads are similar to, but not interchangeable with, American NPTF pipe threads.

Dash Size	Inch Size	Thread	Male Thread OD		Female Thread ID	
			mm	in	mm	in
-2	1/8	1/8 -28	9.5	0.38	8.73	0.34
-4	1/4	1/4 -19	13.5	0.53	11.9	0.47
-6	3/8	3/8 -19	16.7	0.66	15.1	0.59
-8	1/2	1/2 -14	20.6	0.81	19.1	0.75
-10	3/4	3/4 -14	23.0	0.91	20.6	0.81
-12	5/8	5/8 -14	26.2	1.03	24.6	0.97
-16	1	1-11	34.0	1.34	31.0	1.22
-20	1 1/4	1 1/4 -11	42.2	1.66	38.9	1.53
-24	1 1/2	1 1/2 -11	47.8	1.88	45.2	1.78
-32	2	2-11	59.4	2.34	56.4	2.22

Dash Size	Inch Size	Thread	Male Thread OD		Female Thread ID	
			mm	in	mm	in
-2	1/8	1/8 -27	10.3	0.41	9.1	0.36
-4	1/4	1/4 -18	13.9	0.54	11.9	0.47
-6	3/8	3/8 -18	17.1	0.67	15.1	0.59
-8	1/2	1/2 -14	21.4	0.84	19.1	0.75
-12	3/4	3/4 -14	26.9	1.06	24.2	0.95
-16	1	1-11 1/2	33.3	1.31	30.5	1.20
-20	1 1/4	1 1/4 -11 1/2	42.4	1.67	38.9	1.53
-24	1 1/2	1 1/2 -11 1/2	48.5	1.91	45.2	1.78
-32	2	2-11 1/2	60.4	2.38	57.2	2.25

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## DIN 2353 - 24° Male and Mating Female



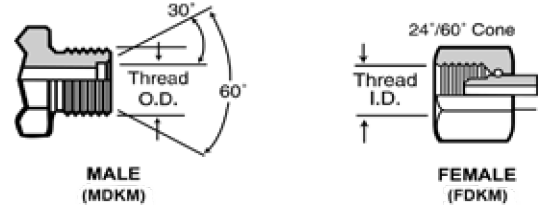
This connector system consists of one male and three styles of female, all of which have straight metric threads.

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	Male Thread OD		Female Thread ID		Tube OD	
					Light Series	Heavy Series
	mm	in	mm	in	mm	mm
M12 X 1.5	12	0.47	10.5	0.41	6	--
M14 X 1.5	14	0.55	12.5	0.49	8	6
M16 X 1.5	16	0.63	14.5	0.57	10	8
M18 X 1.5	18	0.71	16.5	0.65	12	10
M20 X 1.5	20	0.78	18.5	0.73	--	12
M22 X 1.5	22	0.87	20.5	0.81	15	14
M24 X 1.5	24	0.94	22.5	0.89	--	16
M26 X 1.5	26	1.02	24.5	0.96	18	--
M30 X 2	30	1.18	28	1.11	22	20
M36 X 2	36	1.41	34	1.34	28	25
M42 X 2	42	1.65	40	1.57	--	30
M45 X 2	45	1.77	43	1.70	35	--
M52 X 2	52	2.04	50	1.97	42	38

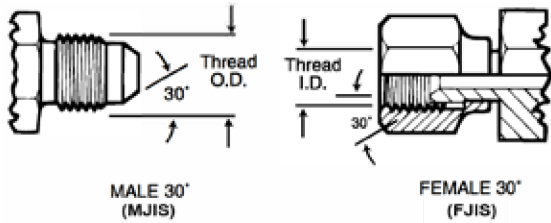
## DIN 3863 60° Cone - DKM



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	Male Thread OD		Female Thread OD		Tube OD	
	mm	in	mm	in	mm	in
M12 X 1.5	12	0.47	10.5	0.41	6	0.24
M14 X 1.5	14	0.55	12.5	0.49	8	0.32
M16 X 1.5	16	0.63	14.5	0.57	10	0.39
M18 X 1.5	18	0.71	16.5	0.65	12	0.47
M22 X 1.5	22	0.87	20.5	0.81	15	0.59
M26 X 1.5	26	1.02	24.5	0.96	18	0.71
M30 X 1.5	30	1.18	28.5	1.12	22	0.87
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

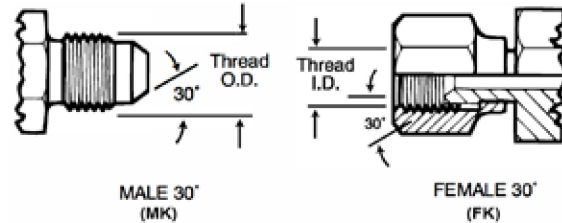
## JIS 30° Flare with Parallel Pipe Threads



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 OD		Female Thread ID	
			mm	in	mm	in
-2	1/8	1/8-28	9.5	0.37	8.7	0.34
-4	1/4	1/4-19	13.5	0.53	11.1	0.44
-6	3/8	3/8-19	16.7	0.66	15.1	0.59
-8	1/2	1/2-14	20.6	0.81	19.1	0.75
-10	5/8	5/8-14	23.1	0.91	20.6	0.81
-12	3/4	3/4-14	26.2	1.03	23.8	0.94
-16	1	1-11	33.3	1.31	30.2	1.19
-20	1 1/4	1 1/4-11	42.2	1.66	38.9	1.53
-24	1 1/2	1 1/2-11	47.8	1.88	45.2	1.78
-32	2	2	59.7	2.35	56.4	2.22

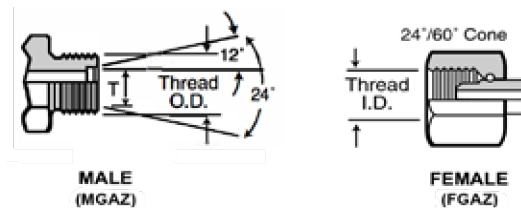
## Japanese Komatsu 30° Flare with Metric Threads



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 Size	Metric Size Equiv.	Thread	Male Thread OD		Female Thread ID	
			mm	in	mm	in
-6	9	M18 X 1.5	18	0.71	16.5	0.65
-8	12	M22 X 1.5	22	0.87	20.5	0.82
-10	16	M24 X 1.5	24	0.94	22.5	0.88
-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

## French Metric GAZ with 24° Flare



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

Dash Size	Thread	Male Thread OD		Female Thread ID		Tube OD	
		mm	in	mm	in	mm	in
-6	M20 X 1.5	20	0.78	18.5	0.73	13.75	0.52
-8	M24 X 1.5	24	0.94	22.5	0.88	16.75	0.66
-10	M30 X 1.5	30	1.18	28.5	1.12	21.25	0.84
-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

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