Thread Chart

For All Hose I.D.'s Except C5 Series, C14 and AC134a.

DASH SIZE	2	3	4	5	6	7	8	10	12	14	16	20	24	32	40	48
NPTF Pipe Thread	1/8–27		1/4–18		3/8–18		1/2–14		3/4–14		1–11½	1¼–11½	1½–11½	2–11½	2½–8	3–8
NPSM Swivel Thread	1/8–27		1/4–18		3/8–18		1/2–14		3/4–14		1–111/2	11/4–111/2	11/2–111/2	2–111/2		
JIC 37° Flare Thread	5/16–24	3/8–24	7/16–20	1/2–20	9/16–18		3/4-16	7/8–14	1 1/16–12	1 3/16–12	1 5/16–12	1 5/8–12	1 7/8–12	2 1/2–12	3–12	3 1/2–12
SAE 45° Flare Thread	5/16–24	3/8–24	7/16–20	1/2–20	5/8–18	11/16–16	3/4-16	7/8–14	1 1/16–14							
SAE O-Ring Thread	5/16–24	3/8–24	7/16–20	1/2–20	9/16–18		3/4-16	7/8–14	1 1/16–12	1 3/16–12	1 5/16–12	1 5/8–12	1 7/8–12	2 1/2–12		
Flat-Face Thread			9/16–18		11/16–16		13/16-16	1–14	1 3/16–12		1 7/16–12	1 11/16–12	2–12			
Inverted Flare Thread	5/16-28	3/8–24	7/16–24	1/2–20	5/8–18	11/16–18	3/4–18	7/8–18	1 1/16-16							
Compression Thread	5/16–24	3/8–24	7/16–24	1/2–24	9/16–24	5/8–24	11/16–20	13/16–18	1–18							
Code 61 Flange Head O.D.							1.19	1.335	1.50		1.75	2.00	2.38	2.81	3.31	4.00
Code 62 Flange Head O.D.							1.25		1.62		1.88	2.12	2.50	3.12		
BSPP Thread	1/8-28		1/4-19		3/8-19		1/2–14	5/8–14	3/4–14		1–11	1 1/4–11	1 1/2–11	2–11		
BSPT Thread	1/8-28		1/4-19		3/8-19		1/2–14	5/8–14	3/4–14		1–11	1 1/4–11	1 1/2–11	2–11		
Japanese Pipe Tapered Thread	1/8-28		1/4-19		3/8-19		1/2–14	5/8–14	3/4–14		1–11	1 1/4–11	1 1/2–11	2–11		
Japanese Flare Thread	1/8-28		1/4-19		3/8-19		1/2–14	5/8–14	3/4–14		1–11	1 1/4–11	1 1/2–11	2–11		
Copper/Nylon Air Brake Thread			7/16–24		17/32–24		11/16–20	13/16–18	1–18							

METRIC (mm)	8	10	12	14	16	18	20	22	24	26	30	33	36	42	45	52
MDL		M10X1.0	M12X1.5	M14X1.5	M16X1.5	M18X1.5		M22X1.5		M26X1.5	M30X2.0		M36X2.0		M45X2.0	M52X2.0
MDH					M16X1.5	M18X1.5	M20X1.5		M24X1.5		M30X2.0		M36X2.0	M42X2.0	M45X2.0	M52X2.0
Komatsu						M18X1.5		M22X1.5	M24X1.5		M30X1.5	M33X1.5	M36X1.5	M42X1.5		
French							M20X1.5		M24X1.5		M30X1.5		M36X1.5		M45X1.5	M52X1.5

See male metric adapter threads.**

Coupling Identification

There are five coupling systems generally used for hydraulic connections today. They are identified geographically or by country as:

North American
British
French
German
Japanese

This section lists the origin and coupling style found in each country. Brief descriptions and dimensional data follows each coupling style.

North American Thread Types

Iron Pipe Thread Abbreviations

N National
P Pipe
S Straight Thread
T Tapered Thread
F Fuels
M Mechanical Joint

NPTF

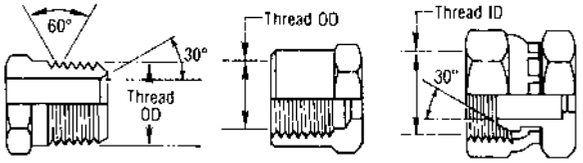
National Pipe Tapered thread for Fuel is a dryseal thread. It is used for both male and female ends.

The NPTF male will mate with the NPTF, NPSF, or NPSM female.

The NPTF male has tapered threads and a 30° inverted seat. The NPTF female has tapered threads and no seat. The seal takes place by deformation of the threads. The NPSM female has straight threads and a 30° inverted seat. The seal takes place on the 30° seat.

The NPTF connector is similar to, but not interchangeable with, the BSPT connector. The thread pitch is different in most sizes. Also, the thread angle is 60° instead of the 55° angle found on BSPT threads.

NPT Pipe Thread



NPTF Solid Male (MP, MPLN)

NPTF or NPSF Solid Female (FP)

NPSM Swivel Female (FPX)

NPSF

National Pipe Straight thread for Fuels is sometimes used for female ends and properly mates with the NPTF male end. However, SAE recommends the NPTF thread in preference to the NPSF for female ends.

NPSM

National Pipe Straight thread for Mechanical Joint is used on the female swivel nut of iron pipe swivel adapters. The leak-resistant joint is not made by the sealing fit of threads, but by a tapered seat in the coupling end.

Dash Size	Nominal Size (In.)	No. Threads per Inch	Female Thread I.D. (In.)	Male Thread O.D. (In.)	Max. Torque Recommendation for Dry NPTF* (Ft. Lbs.)
-2	1/8	27	23/64	13/32	20
-4	1/4	18	15/32	35/64	25
-6	3/8	18	19/32	43/64	35
-8	1/2	14	3/4	27/32	45
-12	3/4	14	61/64	1-1/16	55
-16	1	11-1/2	1-13/64	1-5/16	65
-20	1-1/4	11-1/2	1-17/32	1-43/64	80
-24	1-1/2	11-1/2	1-25/32	1-29/32	95
-32	2	11-1/2	2-1/4	2-3/8	120

*NOTES:

1. Torque values can vary considerably depending on thread condition. Use only enough torque to achieve adequate sealing.
2. With female straight or parallel pipe threads (NPSM), maximum values are 50 percent of those listed in the table.
3. If thread sealant is used, maximum values shown should be decreased by 25 percent.

Coupling Identification

North American Thread Types (con't.)

*JIC (37° Flare)

The Society of Automotive Engineers (SAE) specifies a 37° angle flare or seat be used with high pressure hydraulic tubing. These are commonly called JIC couplings.

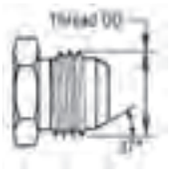
The JIC 37° flare male will mate with a JIC female only.* The JIC male has straight threads and a 37° flare seat. The JIC female has straight threads and a 37° flare seat. The seal is made on the 37° flare seat.

Some sizes have the same threads as the SAE 45° flare. Carefully measure the seat angle to differentiate.

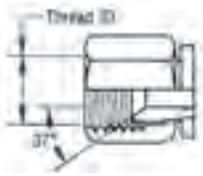
***Note:** Some C5, C5E and Lock-On couplings may have dual machined seats (both 37° and 45° seats).*

Dash Size	Nominal Size (In.)	Thread Size	Female Thread	Male Thread	Steel Torque Recommendation (Ft. Lbs.)	
			I.D. (In.)	O.D. (In.)	Min.	Max.
-2	1/8	5/16 – 24	17/64	5/16	–	–
-3	3/16	3/8 – 24	21/64	3/8	–	–
-4	1/4	7/16 – 20	25/64	7/16	10	11
-5	5/16	1/2 – 20	29/64	1/2	13	15
-6	3/8	9/16 – 18	1/2	9/16	17	19
-8	1/2	3/4 – 16	11/16	3/4	34	38
-10	5/8	7/8 – 14	13/16	7/8	50	56
-12	3/4	1-1/16 – 12	31/32	1-1/16	70	78
-14	7/8	1-3/16 – 12	1-7/64	1-3/16	–	–
-16	1	1-5/16 – 12	1-15/64	1-5/16	94	104
-20	1-1/4	1-5/8 – 12	1-35/64	1-5/8	124	138
-24	1-1/2	1-7/8 – 12	1-51/64	1-7/8	156	173
-32	2	2-1/2 – 12	2-27/64	2-1/2	219	243

JIC 37° Flare



JIC 37° Male (MJ)



JIC 37° Flare Female (FJX)

*SAE (45° Flare)

A term usually applied to fittings having a 45° angle flare or seat. Soft copper tubing is generally used in such applications as it is easily flared to the 45° angle. These are for low-pressure applications—such as for fuel lines and refrigerant lines.

The SAE 45° flare male will mate with an SAE 45° flare female only or a dual seat JIC/SAE 45°.*

The SAE male has straight threads and a 45° flare seat. The SAE female has straight threads and a 45° flare seat. The seal is made on the 45° flare seat.

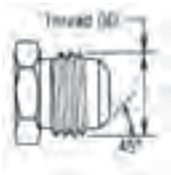
Some sizes have the same threads as the SAE 37° flare.

Carefully measure the seat angle to differentiate.

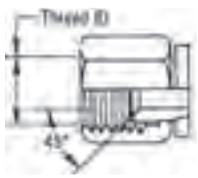
***Note:** Some C5, C5E and Lock-On couplings may have dual machined seats (both 37° and 45° seats).*

Dash Size	Nominal Size (In.)	Thread Size	Female Thread	Male Thread	Steel Torque Recommendation (Ft. Lbs.)	
			I.D. (In.)	O.D. (In.)	Min.	Max.
-2	1/8	5/16 – 24	17/64	5/16	–	–
-3	3/16	3/8 – 24	21/64	3/8	–	–
-4	1/4	7/16 – 20	25/64	7/16	10	11
-5	5/16	1/2 – 20	29/64	1/2	13	15
-6	3/8	5/8 – 18	9/16	5/8	17	19
-7	7/16	11/16 – 16	5/8	11/16	–	–
-8	1/2	3/4 – 16	11/16	3/4	34	38
-10	5/8	7/8 – 14	13/16	7/8	50	56
-12	3/4	1-1/16 – 14	63/64	1-1/16	70	78

SAE 45° Flare



SAE 45° Flare Male (MS)



SAE 45° Flare Swivel Female (FSX)

Special Power Steering Thread End

Dash Size	Nominal Size (In.)	Thread Size	Female Thread	Male Thread
			I.D. (In.)	O.D. (In.)
-6	3/8	11/16 – 18	5/8	11/16

Coupling Identification

North American Thread Types (con't.)

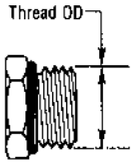
O-Ring Boss

The O-ring boss male will mate with an O-ring boss female only. The female is generally found on ports.

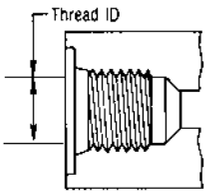
The male has straight threads, a sealing face and an O-ring. The female has straight threads and a sealing face. The seal is made at the O-ring on the male and the sealing face on the female.

Dash Size	Nominal Size (In.)	Thread Size	Female Thread	Male Thread	O-Ring		Steel Torque Recommendations (Ft. Lbs)			
							Below 4,000 psi Working Pressure		Above 4,000 psi Working Pressure	
			I.D. (In.)	O.D. (In.)	I.D. (In.)	DESCR	Min.	Max.	Min.	Max.
-2	1/8	5/16 – 24	17/64	5/16	0.239	–	–	–	–	–
-3	3/16	3/8 – 24	21/64	3/8	0.301	30R	–	–	8	10
-4	1/4	7/16 – 20	25/64	7/16	0.351	40R	14	16	14	16
-5	5/16	1/2 – 20	29/64	1/2	0.414	50R	–	–	18	20
-6	3/8	9/16 – 18	1/2	9/16	0.468	60R	24	26	24	26
-8	1/2	3/4 – 16	11/16	3/4	0.644	80R	37	44	50	60
-10	5/8	7/8 – 14	13/16	7/8	0.755	100R	50	60	72	80
-12	3/4	1-1/16 – 12	31/32	1-1/16	0.924	120R	75	83	125	135
-14	7/8	1-3/16 – 12	1-7/64	1-3/16	1.048	140R	–	–	160	180
-16	1	1-5/16 – 12	1-15/64	1-5/16	1.171	160R	111	125	200	220
-20	1-1/4	1-5/8 – 12	1-35/64	1-5/8	1.475	200R	133	152	210	280
-24	1-1/2	1-7/8 – 12	1-51/64	1-7/8	1.720	–	156	184	270	360
-32	2	2-1/2 – 12	2-27/64	2-1/2	2.337	–	–	–	–	–

SAE Straight Thread O-Ring Boss



O-Ring Boss Male (MB, MBX)



O-Ring Boss Female Port (FB)

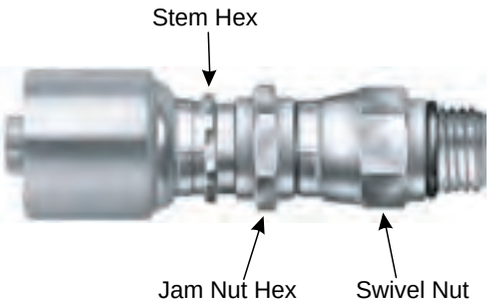
Gates Adapterless—MBAX

The Gates Adapterless coupling is designed for use in OEM assembly line applications. It eliminates the need for an adapter by directly connecting into the port, which reduces the number of possible leak points and reduces installation labor. It allows easy installation and eliminates the troubles of alignment on bent tube assemblies. It eliminates the performance limitations of the traditional male swivel. A jam nut locks the coupling into place.

Assemblies using the Gates Adapterless coupling can be serviced by replacing the assembly with an MB adapter in the port and a standard end termination (for example, an MB-MJ adapter and FJX couplings).

WARNING: *The tightening of the jam nut is* ***absolutely critical*** *to performance so that the Adapterless coupling does not become a "live swivel". A live swiveling condition can cause wearing of the internal seals and result in leaks.*

The Gates Adapterless coupling uses SAE O-Ring Boss threads. See the table above. The installation torque values are the same as SAE O-Ring Boss.



Coupling Identification

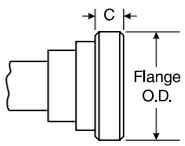
North American Thread Types (con't.)

O-Ring Flange—SAE J518

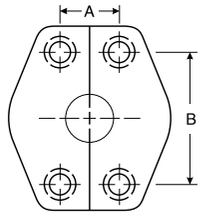
The SAE Code 61 and Code 62 4-bolt split flange is used worldwide, usually as a connection on pumps and motors. There are three exceptions.

1. The -10 size, which is common outside of North America, is not an SAE standard size (generally found on Komatsu equipment).
2. Caterpillar flanges, which are the same flange O.D. as SAE Code 62, have a thicker flange head ("C" dimension in Table).
3. Poclain flanges, which are completely different from SAE flanges.

SAE Code 61 and Code 62



Flange Head (FL/ FLH, FLC)



4-Bolt Split Flange Bolt Hose Dimensions

Dash Size	Nominal Flange Size (In.)	Code 61 (FL)				Code 62 (FLH)				Caterpillar Code 62 (FLC)			
		Flange O.D. (In.)	A (In.)	B (In.)	C (In.)	Flange O.D. (In.)	A (In.)	B (In.)	C (In.)	Flange O.D. (In.)	A (In.)	B (In.)	C (In.)
-8	1/2	1.188	.688	1.500	.265	1.250	.718	1.594	.305	–	–	–	–
-10	5/8	1.345	–	–	.265	–	–	–	–	–	–	–	–
-12	3/4	1.500	.875	1.875	.265	1.625	.937	2.000	.345	1.625	.938	2.000	.560
-16	1	1.750	1.031	2.062	.315	1.875	1.093	2.250	.375	1.875	1.094	2.250	.560
-20	1-1/4	2.000	1.188	2.312	.315	2.125	1.250	2.625	.405	2.125	1.250	2.625	.560
-24	1-1/2	2.375	1.406	2.750	.315	2.500	1.437	3.125	.495	2.500	1.438	3.125	.560
-32	2	2.812	1.688	3.062	.375	3.125	1.750	3.812	.495	3.125	1.750	3.812	.560
-40	2-1/2	3.312	2.000	3.500	.375	–	–	–	–	–	–	–	–
-48	3	4.000	2.438	4.188	.375	–	–	–	–	–	–	–	–
-56	3-1/2	4.500	2.750	4.750	.422	–	–	–	–	–	–	–	–
-64	4	5.000	3.062	5.125	.442	–	–	–	–	–	–	–	–
-80	5	6.000	3.625	6.000	.442	–	–	–	–	–	–	–	–

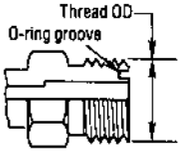
O-Ring Face Seal (ORFS)—SAE J1453

A seal is made when the O-ring in the male contacts the flat face on the female. Couplings are intended for hydraulic systems where elastomeric seals are acceptable to overcome leakage and leak resistance is crucial.

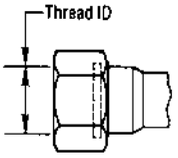
The solid male O-ring face seal fitting will mate with a swivel female O-ring face seal SAE J1453 fitting only.

An O-ring rests in the O-ring groove in the male.

O-Ring Face Seal



Male Flat-Face O-Ring (MFFOR)



Female Flat-Face O-Ring Swivel (FFORX)

Dash Size	Nominal Size (In.)	Thread Size	Female Thread	Male Thread	O-Ring Size	Ft-Lbs.	
			I.D. (In.)	O.D. (In.)		Min.	Max.
-4	1/4	9/16 – 18	1/2	9/16	-011	10	12
-6	3/8	11/16 – 16	5/8	11/16	-012	18	20
-8	1/2	13/16 – 16	3/4	13/16	-014	32	40
-10	5/8	1 – 14	15/16	1	-016	46	56
-12	3/4	1-3/16 – 12	1-1/8	1-3/16	-018	65	80
-16	1	1-7/16 – 12	1-11/32	1-7/16	-021	92	105
-20	1-1/4	1-11/16 – 12	1-19/32	1-11/16	-025	125	140
-24	1-1/2	2 – 12	1-29/32	2	-029	150	180

Coupling Identification

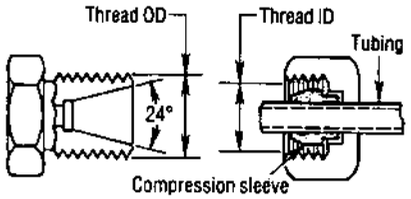
North American Thread Types (con't.)

Flareless Tube

The flareless solid male will mate with a female flareless nut and compression sleeve only.

The male has straight threads and a 24° seat. The female has straight threads and has a compression sleeve for a sealing surface. The seal is made between the compression sleeve and the 24° seat on the male, and between the compression sleeve and the tubing on the female.

Flareless Tube



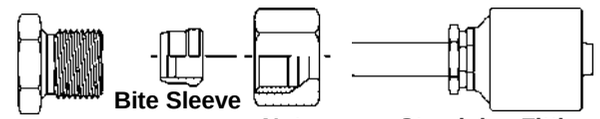
Solid Male (MFA) **Female Nut**

Dash Size	Tube Size (In).	Nominal Size (In.)	Thread Size	Female Thread	Male Thread
				I.D. (In.)	O.D. (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	11/16	3/4
-10	5/8	7/8	7/8 – 14	13/16	7/8
-12	3/4	1-1/16	1-1/16 – 12	31/32	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

North American Stand Pipe (NASP)

A stand pipe assembly is comprised of three components attached to a male fitting. The components are a Stand Pipe Tube, Bite Sleeve and Nut. The Nut is placed over the Stand Pipe, followed by the Bite Sleeve (see illustration below). The Bite Sleeve and Stand Pipe are selected on the basis of tube O.D. required.

North American Stand Pipe



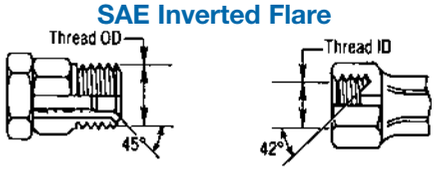
Dash Size	Tube O.D. (In.)	Tube Length (In.)
-4	0.25	0.88
-6	0.38	0.88
-8	0.50	1.00
-12	0.75	1.16
-16	1.00	1.12

SAE Inverted Flare

The SAE 45° inverted flare male will mate with an SAE 42° inverted flare female only.

The male has straight threads and a 45° inverted flare. The female has straight threads and a 42° inverted flare. The seal is made on the 45° flare seat on the male and the 42° flare seat on the female.

SAE Inverted Flare



SAE Inverted Flare Swivel Male (MIX) **SAE Inverted Flare Solid Female**

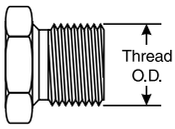
Dash Size	Nominal Size (In.)	Thread Size	Female Thread	Male Thread
			I.D. (In.)	O.D. (In.)
-2	1/8	5/16 – 28	9/32	5/16
-3	3/16	3/8 – 24	21/64	3/8
-4	1/4	7/16 – 24	25/64	7/16
-5	5/16	1/2 – 20	29/64	1/2
-6	3/8	5/8 – 18	37/64	5/8
-7	7/16	11/16 – 18	5/8	11/16
-8	1/2	3/4 – 18	45/64	3/4
-10	5/8	7/8 – 18	13/16	7/8
-12	3/4	1-1/16 – 16	1	1-1/16

Coupling Identification

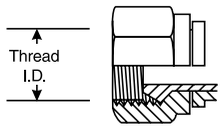
Air Brake Fittings

Female air brake swivels are designed to work exclusively with a male air brake adapter. Federal law requires only this combination to be used on air brake lines from the valve to the air brake diaphram chamber.

The male has straight threads and an inverted seat. The female has straight threads and a corresponding inverted flare. The seal is made on the flare seats of both the male and female.



Male Air Brake

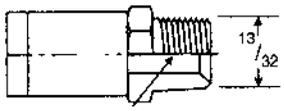


Female Air Brake Swivel

Dash Size	Thread Size	Female Thread I.D. (In.)	Male Thread O.D. (In.)
-6	3/4 – 20	23/32	3/4
-8	7/8 – 20	27/32	7/8

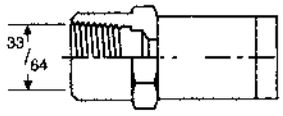
Grease Fittings

Special Male Grease Fitting



1/8–27 Pipe Thread

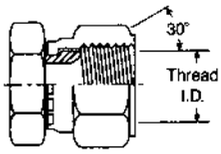
Special Female Grease Fitting



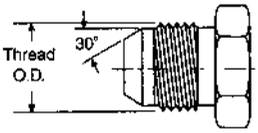
1/2–27 Tapered Thread

Parker Triple Thread Flare Fittings

Parker Triple Thread Flare Fittings



Swivel Female (FZX)



Solid Male (MZ)

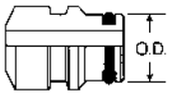
Dash Size	Nominal Size	Thread Size	Female Thread I.D. (In.)	Male Thread O.D. (In.)
-16	1-5/16	1-5/16 – 14	1-1/4	1-5/16

Press-Lok® Connectors

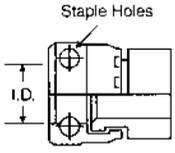
Press-Lok style connectors are found on mining equipment worldwide.

The seal is made when the O-ring on the male contacts the inside surface of the female. The two connectors are held together with a staple.

Press-Lok Connectors



Male Press-Lok Connectors



Female Press-Lok Connectors

Dash Size	Nominal Size (In.)	Female I.D. (In.)	Male O.D. (In.)
-4	1/4	.39	.40
-6	3/8	.55	.56
-8	1/2	.70	.71
-12	3/4	.94	.95
-16	1	1.22	1.23
-20	1-1/4	1.49	1.50

For more information and specifications on these couplings, please see the Gates Mining Products Catalog #99993 or visit www.gates.com/mining.

Coupling Identification

Foreign Thread Types

Identifying Foreign Couplings

If you can identify the country of origin of the equipment you are working with, it is easy to identify the coupling style. Simply find the appropriate country in the following pages and locate the particular coupling in the table that follows.

British

It is a common misconception that all foreign threads are metric. This is not always the case. There are two common thread forms: Metric and Whitworth (BSP). The country of origin and the proper nomenclature for each is listed below.

British Standard Pipe Parallel

Popular couplings have British Standard Pipe (BSP) threads, also known as Whitworth threads. These can be parallel threads (BSPP) with a 30° inverted flare or tapered threads (BSPT), with a 30° inverted flare. Port connections are usually made with BSPP threads and a soft metal cutting ring for sealing.

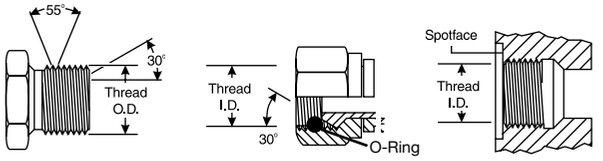
The BSPP (parallel) male will mate with a BSPOR (parallel) female or a female port.

The BSPP male has straight threads and a 30° seat. The BSPOR female has straight threads, a 30° seat, and O-ring. The female port has straight threads and a spotface. The seal on the port is made with an O-ring or soft metal washer on the male.

The BSPP (parallel) connector is similar to, but not interchangeable with, the NPSM connector. The thread pitch is different in most sizes, and the thread angle is 55° instead of the 60° angle found on NPSM threads.

Dash Size	Nominal Size (In.)	Thread Size	Female Parallel Thread	Male Parallel Thread	Torque Recommendation (Ft. Lbs.)	
			I.D. (In.)	O.D. (In.)	Min.	Max.
-2	1/8	1/8 – 28	11/32	3/8	7	9
-4	1/4	1/4 – 19	15/32	17/32	11	18
-6	3/8	3/8 – 19	19/32	21/32	19	28
-8	1/2	1/2 – 14	3/4	13/16	30	36
-10	5/8	5/8 – 14	13/16	29/32	37	44
-12	3/4	3/4 – 14	31/32	1-1/32	50	60
-16	1	1 – 11	1-7/32	1-11/32	79	95
-20	1-1/4	1-1/4 – 11	1-17/32	1-21/32	127	152
-24	1-1/2	1-1/2 – 11	1-25/32	1-7/8	167	190
-32	2	2 – 11	2-7/32	2-11/32	262	314

British Standard Pipe Parallel (BSPOR)



BSPP Male (MBSPP) | **BSPOR Female (FBSPORX)** | **BSPOR Female Port**

British Standard Pipe Tapered

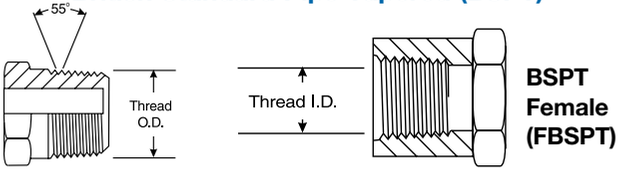
The BSPT (tapered) male will mate with a BSPT (tapered) female, or a BSPOR (parallel) female.

The BSPT male has tapered threads. When mating with either the BSPT (tapered) female or the BSPOR (parallel) female port, the seal is made on the threads.

The BSPT connector is similar to, but not interchangeable with, the NPTF connector. The thread pitch is different in most cases, and the thread angle is 55° instead of the 60° angle found on NPTF threads.

Dash Size	Nominal Size (In.)	Thread Size	Female Parallel Thread	Male Parallel Thread	Torque Recommendation (Ft. Lbs.)	
			I.D. (In.)	O.D. (In.)	Min.	Max.
-2	1/8	1/8 – 28	11/32	3/8	7	9
-4	1/4	1/4 – 19	15/32	17/32	11	18
-6	3/8	3/8 – 19	19/32	21/32	19	28
-8	1/2	1/2 – 14	3/4	13/16	30	36
-10	5/8	5/8 – 14	13/16	29/32	37	44
-12	3/4	3/4 – 14	31/32	1-1/32	50	60
-16	1	1 – 11	1-7/32	1-11/32	79	95
-20	1-1/4	1-1/4 – 11	1-17/32	1-21/32	127	152
-24	1-1/2	1-1/2 – 11	1-25/32	1-7/8	167	190
-32	2	2 – 11	2-7/32	2-11/32	262	314

British Standard Pipe Tapered (BSPT)



BSPT Male (MBSPT) | **BSPT Female (FBSPT)**

Coupling Identification

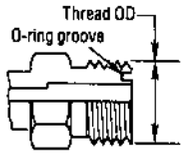
Foreign Thread Types – British (con't.)

British Flat-Face Seal

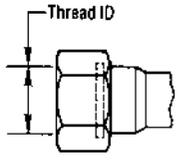
A seal is made when the O-ring in the male contacts the flat face on the female. These couplings are intended for hydraulic systems where elastomeric seals are acceptable to overcome leakage and leak resistance is crucial.

The solid male British O-ring face seal fitting will mate with a swivel female British O-ring face seal fitting only. An O-ring rests in the O-ring groove in the male.

Dash Size	Nominal Size (In.)	Thread Size	Female Parallel Thread	Male Parallel Thread	Torque Recommendation (Ft. Lbs.)	
			I.D. (In.)	O.D. (In.)	Min.	Max.
-6	3/8	3/8-19	19/32	21/32	18	20
-8	1/2	1/2-14	3/4	13/16	32	40
-12	3/4	3/4-14	31/32	1 1/32	65	80



Male British Flat-Face (MBFF)



Female British Flat-Face (FBFF)

French

Popular couplings are French GAZ. These have a 24° seat and metric threads. These are similar to German DIN couplings, but the threads are different in some sizes. Although both are metric threads, the French use fine threads in all sizes and German DIN couplings use coarse threads in larger sizes. Most port connections are flange connections. French flanges are different than SAE—they have a lip that protrudes from the flange face. These are called Poclain-style flanges.

GAZ 24°

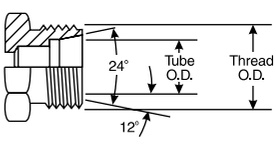
The French Metric (GAZ) male will mate with the female 24° cone or the female tube fitting.

The male has a 24° seat and straight metric threads. The female has a 24° seat or a tubing sleeve and straight metric threads and is interchangeable with female Kobelco.

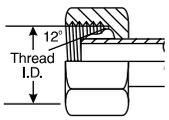
When measuring the flare angle with the seat angle gauge, use the 12° gauge. The seat angle gauge measures the angle from the connector centerline.

Metric Thread Size	Female Thread O.D. (mm)	Male Thread O.D. (mm)	Tube O.D. (mm)
M20x1.5	18.5	20.0	13.25
M24x1.5	22.5	4.0	16.75
M30x1.5	28.5	30.0	21.25
M36x1.5	34.5	36.0	26.75
M45x1.5	43.5	45.0	33.50
M52x1.5	50.5	52.0	42.25

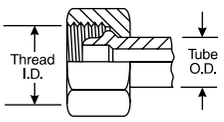
French Metric (GAZ)



Male 24° Cone



Female 24° Cone



Female Tube Fitting

Coupling Identification

Foreign Thread Types – French (con't.)

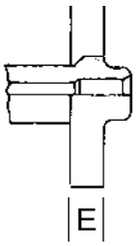
GAZ Poclain 24° Flange

The Poclain (French GAZ) 24° high pressure flange is usually found on Poclain equipment.

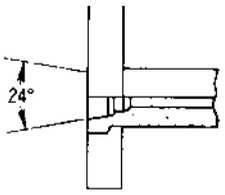
The male flange will mate with a female flange or port. The seal is made on the 24° seat.

Nominal Size (In.)	A (In.)	B (In.)	C (In.)	D (In.)	E (In.)	F (In.)
1/2	1.57	.72	2.20	1.89	.55	.35
5/8	1.57	.72	2.20	1.89	.55	.35
3/4	2.00	.94	2.75	2.38	.71	.43

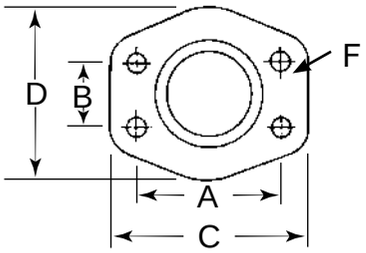
Poclain (French GAZ)



Male Flange



Female Flange



Flange Clamp

German DIN (Deutsche Industrial Norme)

Popular couplings are German DIN (Deutsche Industrial Norme). A coupling referred to as "metric" usually means a DIN coupling.

DIN 24° Cone

The DIN 24° cone male will mate with any of the females shown.

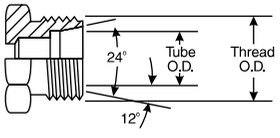
The male has a 24° seat, straight metric threads, and a recessed counterbore which matches the tube O.D. of the coupling used with it. The mating female is a 24° cone with O-ring, a metric tube fitting or a universal 24° and 60° cone.

There is a light and heavy series DIN coupling. Proper identification is made by measuring both the thread size and the tube O.D. (The heavy series has a smaller tube O.D. but a thicker wall section than the light.)

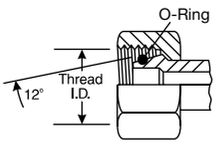
When measuring the flare angle with the seat angle gauge, use the 12° gauge. The seat angle gauge measures the angle from the connector centerline.

Metric Thread Size	Female Thread	Male Thread	Tube O.D.		Torque Recommendation (Ft. Lbs.)	
	I.D. (mm)	O.D. (mm)	Light Series (mm)	Heavy Series (mm)	Min.	Max.
M12x1.5	10.5	12.0	6	—	7	15
M14x1.5	12.5	14.0	8	—	15	26
M16x1.5	14.5	16.0	10	8	18	30
M18x1.5	16.5	18.0	12	10	22	33
M20x1.5	18.5	20.0	14	12	26	37
M22x1.5	20.5	22.0	15	14	30	52
M24x1.5	22.5	24.0	—	16	30	52
M26x1.5	24.5	26.0	18	—	44	74
M30x2.0	28.0	30.0	22	20	59	89
M36x2.0	34.0	36.0	28	25	74	111
M42x2.0	40.0	42.0	—	30	74	162
M45x2.0	43.0	45.0	35	—	133	184
M52x2.0	50.0	52.0	42	38	148	221

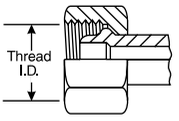
DIN 24° Male and Mating Females



Male 24° Cone, DIN 2353 (MDL/MDH)



Female 24° Cone with O-Ring (FDLORX/FDHORX)



Female Universal 24° and 60° Cone (FDLX/FDHX)

Coupling Identification

Foreign Thread Types – German DIN (con't.)

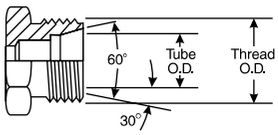
DIN 60° Cone

The DIN 60° cone male will mate with the female universal 24° or 60° cone connector only.

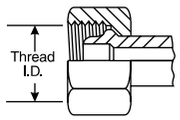
The male has a 60° seat and straight metric threads. The female has a 24° and 60° universal seat and straight metric threads.

When measuring the flare angle with the seat angle gauge, use the 30° gauge. The seat angle gauge measures the angle from the connector centerline.

Metric Thread Size	Female Thread	Male Thread	Tube O.D.	Torque Recommendation (Ft. Lbs.)	
	I.D. (mm)	O.D. (mm)	(mm)	Min.	Max.
M14x1.5	12.5	14.0	8	15	26
M16x1.5	14.5	16.0	10	18	30
M18x1.5	16.5	18.0	12	22	33
M22x1.5	20.5	22.0	15	30	52
M26x1.5	24.5	26.0	18	44	74
M30x1.5	28.5	30.0	22	59	59
M38x1.5	36.5	38.0	28	74	111
M45x1.5	43.5	45.0	35	133	184
M52x2.0	50.5	52.0	42	148	221



Male
60° Cone, DIN 6711



Female
Universal 24° and 60° Cone

Coupling Identification

Foreign Thread Types – German DIN (con't.)

DIN 3852 Couplings Type A & B (Parallel Threads)

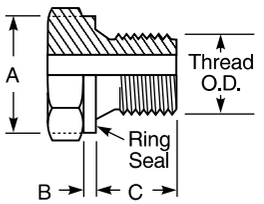
The male DIN 3852 Type A & B couplings will mate with the female DIN coupling shown below. Gates offers this thread as an adapter.

The male and female type A & B couplings have straight threads. The seal occurs when the ring seal (Type A) or the face seal (Type B) mates with the face of the female port.

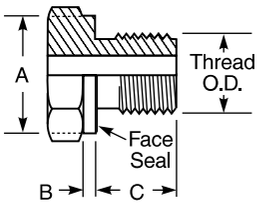
There are two series of DIN 3852 Type A & B couplings, the light (L) and the heavy (S) series.

Note: Commonly used threads on male metric adapters.

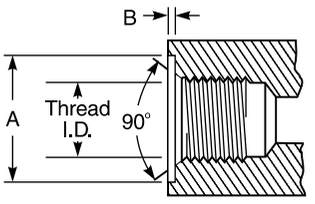
DIN 3852 Couplings Type A & B (Parallel Threads)



Male Type A



Male Type B



Female Types A & B

Series	Tube O.D. (mm)	Metric Thread Parallel								Whitworth Thread Parallel							
		Thread Size	Female			Male				Thread Size	Female (BSPOR)			Male (BSPP)			
			Thread I.D. (mm)	A (mm)	B (mm)	Thread O.D. (mm)	A (mm)	B (mm)	C (mm)		Thread I.D. (In.)	A (mm)	B (mm)	Thread O.D. (In.)	A (mm)	B (mm)	C (mm)
L Light	6	10x1.0	8.5	15	1.0	10	14	1.5	8	1/8-28	11/32	15	1.0	3/8	14	1.5	8
	8	12x1.5	10.5	18	1.5	12	17	2.0	12	1/4-19	15/32	19	1.5	1/2	17	2.0	12
	10	14x1.5	12.5	20	1.5	14	19	2.0	12	1/4-19	15/32	19	1.5	1/2	19	2.0	12
	12	16x1.5	14.5	22	1.5	16	21	2.5	12	3/8-19	19/32	23	2.0	21/32	21	2.5	12
	15	18x1.5	16.5	24	2.0	18	23	2.5	12	1/2-14	3/4	27	2.5	13/16	23	2.5	12
	18	22x1.5	20.5	28	2.5	22	27	3.0	14	1/2-14	3/4	27	2.5	13/16	27	3.0	14
	22	26x1.5	24.5	32	2.5	26	31	3.0	16	3/4-14	31/32	33	2.5	1-1/32	31	3.0	16
	28	33x2.0	31.5	40	2.5	33	39	3.0	18	1-11	1-7/32	40	2.5	1-5/16	39	3.0	18
	35	42x2.0	40.5	50	2.5	42	49	3.0	20	1-1/4-11	1-17/32	50	2.5	1-21/32	49	3.0	20
	42	48x2.0	46.5	56	2.5	48	55	3.0	22	1-1/2-11	1-25/32	56	2.5	1-7/8	55	3.0	22
S Heavy	6	12x1.5	10.5	18	1.5	12	17	2.0	12	1/4-19	15/32	19	1.5	1/2	17	2.0	12
	8	14x1.5	12.5	20	1.5	14	19	2.0	12	1/4-19	15/32	19	1.5	1/2	19	2.0	12
	10	16x1.5	14.5	22	1.5	16	21	2.5	12	3/8-19	19/32	23	2.0	21/32	21	2.5	12
	12	18x1.5	16.5	24	2.0	18	23	2.5	12	3/8-19	19/32	23	2.0	21/32	23	2.5	12
	14	20x1.5	18.5	26	2.0	20	25	3.0	14	1/2-14	3/4	27	2.5	13/16	25	3.0	14
	16	22x1.5	20.5	28	2.5	22	27	3.0	14	1/2-14	3/4	27	2.5	13/16	27	3.0	14
	20	27x2.0	25.5	33	2.5	27	32	3.0	16	3/4-14	31/32	33	2.5	1-1/32	32	3.0	16
	25	33x2.0	31.5	40	2.5	33	39	3.0	18	1-11	1-7/32	40	2.5	1-5/16	39	3.0	18
	30	42x2.0	40.5	50	2.5	42	49	3.0	20	1-1/4-11	1-17/32	50	2.5	1-21/32	49	3.0	20
	38	48x2.0	46.5	56	2.5	48	55	3.0	22	1-1/2-11	1-25/32	56	2.5	1-7/8	55	3.0	22

Coupling Identification

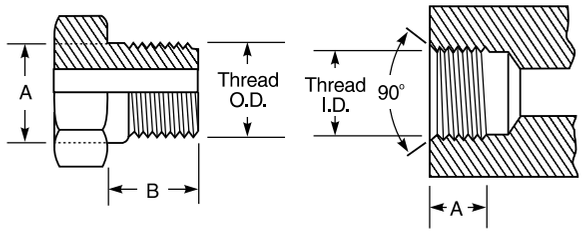
Foreign Thread Types – German DIN (con't.)

DIN 3852 Type C Metric and Whitworth Tapered (BSPT) Thread Connectors

The DIN 3852 Type C couplings are available with either metric or Whitworth British thread. The male will mate only with the female as shown.

The male and female couplings have tapered threads. The seal takes place on the threads. There are three series of DIN 3852 Type C Couplings: extra light (LL), light (L) and heavy (S).

DIN 3852 Type C Metric and Whitworth Tapered Thread Connectors



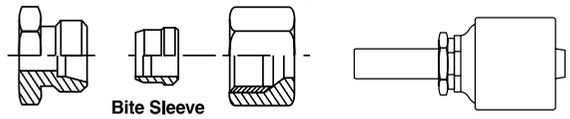
Male Female

Series	Tube O.D. (mm)	Metric Tapered Threads						Whitworth Tapered Threads					
		Thread Size	Female		Male			Thread Size	Female		Male		
			Thread I.D. (mm)	A (mm)	Thread O.D. (mm)	A (mm)	B (mm)		Thread I.D. (In.)	A (mm)	Thread O.D. (In.)	A (mm)	B (mm)
LL Extra Light	4	8x1.0	6.5	5.5	8	8.40	8	1/8-28	11/32	5.5	1/8	.392	8
	5	8x1.0	6.5	5.5	8	8.40	8	1/8-28	11/32	5.5	1/8	.392	8
	6	10x1.0	8.5	5.5	10	10.40	8	1/8-28	11/32	5.5	1/8	.392	8
	8	10x1.0	8.5	5.5	10	10.40	8	1/8-28	11/32	5.5	1/8	.392	8
L Light	6	10x1.0	8.5	5.5	10	10.40	8	1/8-28	11/32	5.5	1/8	.392	8
	8	12x1.5	10.5	8.5	12	12.53	12	1/4-19	15/32	8.5	1/4	.532	12
	10	14x1.5	12.5	8.5	14	14.53	12	1/4-19	15/32	8.5	1/4	.532	12
	12	16x1.5	14.5	8.5	16	16.53	12	3/8-19	19/32	8.5	3/8	.670	12
	15	18x1.5	16.5	8.5	18	18.53	12	1/2-14	3/4	8.5	1/2	.839	14
	18	22x1.5	20.5	10.5	22	22.65	14	1/2-14	3/4	10.5	1/2	.839	14
S Heavy	6	12x1.5	10.5	8.5	12	12.53	12	1/4-19	15/32	8.5	1/4	.532	12
	8	14x1.5	12.5	8.5	14	14.53	12	1/4-19	15/32	8.5	1/4	.532	12
	10	16x1.5	14.5	8.5	16	16.53	12	3/8-19	19/32	8.5	3/8	.670	12
	12	18x1.5	16.5	8.5	18	18.53	12	3/8-19	19/32	8.5	3/8	.670	12
	14	20x1.5	18.5	10.5	20	20.65	14	1/2-14	3/4	10.5	1/2	.839	14
	16	22x1.5	20.5	10.5	22	22.65	14	1/2-14	3/4	10.5	1/2	.839	14

Metric Stand Pipe Assembly

A metric stand pipe assembly is comprised of three components attached to a male fitting. The components are: a Stand Pipe Tube, Bite Sleeve and Metric Nut. The nut is placed over the Stand Pipe, followed by the Bite Sleeve (see illustration below). For DIN light assemblies, a DIN light metric nut is used. For DIN heavy assemblies, a DIN heavy metric nut is used. The Bite Sleeve and Stand Pipe are selected on the basis of tube O.D.

Metric Standpipe Assembly



DIN 2353 Male Fitting Body (MDL) Bite Sleeve Nut Standpipe Fitting (NASP)

Metric Stand Pipe DIN Tube O.D. (mm)	Bite Sleeve DIN Tube O.D. (mm)	Metric Nut Thread	
		Light	Heavy
6	6	M12x1.5	—
8	8	M14x1.5	M16x1.5
10	10	M16x1.5	M18x1.5
12	12	M18x1.5	M20x1.5
15	15	M22x1.5	—
16	16	—	M24x1.5
18	18	M26x1.5	—
20	20	—	M30x2.0
22	22	M30x2.0	—
25	25	—	M36x2.0
28	28	M36x2.0	—
30	30	—	M42x2.0
35	35	M45x2.0	—
38	38	—	M52x2.0
42	42	M52x2.0	—

Coupling Identification

Foreign Thread Types (con't.)

Japanese

There are two popular types of coupling styles in Japan, Japanese Industrial Standard and Komatsu. These couplings look similar to Male JIC and Female JIC Swivel couplings. However there are two major differences: The threads are BSP and the seat angle is only 30° instead of 37° for JIC.

1. **Japanese Industrial Standard.** Most Japanese equipment uses this type of coupling with a 30° seat and British Standard Pipe Parallel threads. **They are not interchangeable with British couplings, since the flare is not inverted.**
2. **Komatsu.** All Komatsu equipment uses couplings with a 30° seat and metric fine threads. All flanges are Code 61 or Code 62, except -10 which utilizes a special Komatsu-style flange that does not conform to SAE standard sizing.

Japanese 30° Flare Parallel Threads

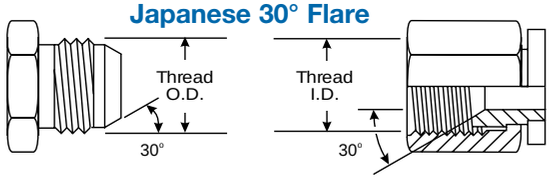
The Japanese 30° flare male connector will mate with a Japanese 30° flare female only.

The male and female have straight threads and a 30° seat. The seal is made on the 30° seat.

The threads on the Japanese 30° flare connector conform to JIS B 0202, which are the same as the BSPOR threads. Both the British and Japanese connectors have a 30° seat, but they are not interchangeable because the British seat is inverted.

Dash Size	Nominal Size (In.)	Thread Size	Female Thread I.D. (In.)	Male Thread O.D. (In.)
-2	1/8	1/8 – 28	11/32	3/8
-4	1/4	1/4 – 19	7/16	17/32
-6	3/8	3/8 – 19	19/32	21/32
-8	1/2	1/2 – 14	3/4	13/16
-10	5/8	5/8 – 14	13/16	29/32
-12	3/4	3/4 – 14	15/16	1-1/32
-16	1	1 – 11	1-13/16	1-15/16
-20	1-1/4	1-1/4 – 11	1-17/32	1-21/32
-24	1-1/2	1-1/2 – 11	1-25/32	1-7/8
-32	2	2 – 11	2-7/32	2-11/32

Japanese 30° Flare



Male (MJIS) **Female (FJISX)**

Japanese Tapered Pipe Thread

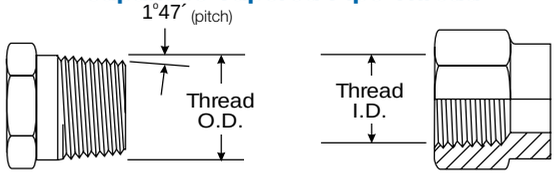
The Japanese tapered pipe thread connector is identical to and fully interchangeable with the BSPT (tapered) connector. **The Japanese connector does not have a 30° flare and will not mate with the BSPOR female.**

The threads conform to JIS B 0203, which are the same as BSPT threads.

The seal on the Japanese tapered pipe thread connector is made on the threads.

Dash Size	Nominal Size (In.)	Thread Size	Female Parallel Thread I.D. (In.)	Male Parallel Thread O.D. (In.)
-2	1/8	1/8 – 28	11/32	3/8
-4	1/4	1/4 – 19	7/16	17/32
-6	3/8	3/8 – 19	19/32	21/32
-8	1/2	1/2 – 14	3/4	13/16
-12	3/4	3/4 – 14	15/16	1-1/32
-16	1	1 – 11	1-13/16	1-15/16
-20	1-1/4	1-1/4 – 11	1-17/32	1-21/32
-24	1-1/2	1-1/2 – 11	1-25/32	1-7/8
-32	2	2 – 11	2-7/32	1-11/32
-32	2	2 – 11	2-7/32	2-11/32

Japanese Tapered Pipe Thread



Male (MBSPT) **Female (FBSPT)**

Coupling Identification

Foreign Thread Types – Japanese (con't.)

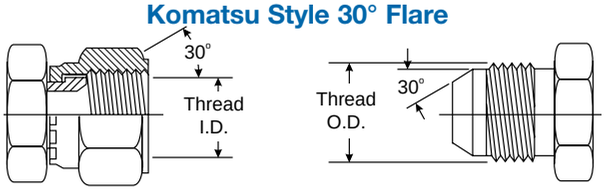
Komatsu Style 30° Flare Parallel Threads

The Komatsu style 30° flare parallel thread connector is identical to the Japanese 30° flare parallel thread connector except for the threads. The Komatsu style connector uses metric fine threads which conform to JIS B 0207. Gates identifies these as Komatsu-style by marking the hex nuts with two small notches.

The Komatsu style connector seals on the 30° flare.

Dash Size	Nominal Size (In.)	Nominal Size (mm)	Thread Size	Female Thread I.D. (mm)	Male Thread (O.D.) (mm)
-6	3/8	9.5	M18x1.5	16.5	18
-8	1/2	13	M22x1.5	20.5	22
-10	5/8	16	M24x1.5	22.5	24
-12	3/4	19	M30x1.5	28.5	30
-16	1	25	M33x1.5	31.5	33
-20	1-1/4	32	M36x1.5	34.5	36
-24	1-1/2	38	M42x1.5	40.5	42

Komatsu Style 30° Flare



Female (FKX) **Male (MK)**

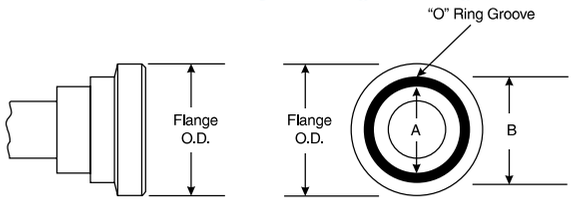
Komatsu Style Flange Fitting

The Komatsu style flange fitting is nearly identical to and fully interchangeable with the SAE Code 61 flange fitting. In all sizes the O-ring dimensions are different. When replacing a Komatsu style flange with an SAE style flange, an SAE style O-ring must always be used.

Dash Size	Nominal Size (In.)	Nominal Size (mm)	Flange O.D. (In.)	A (In.)	B (In.)
-8	1/2	12.7	1.188	.728	.984
-10*	5/8	15.9	1.345	.728	1.102
-12	3/4	19.1	1.500	.846	1.220
-16	1	25.4	1.750	1.122	1.496
-20	1-1/4	31.8	2.000	1.358	1.732
-24	1-1/2	38.1	2.375	1.750	2.125
-32	2	50.8	2.812	2.225	2.559

**(-10 is a non-SAE size flange)*

Komatsu Style Flange Fitting

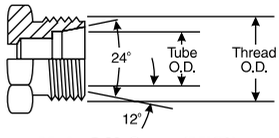


Flange (FL) **Flange Head**

Metric Kobelco Metric Bite Sleeve

These are similar to the German DIN 24° cone, but the DIN style uses courser threads. Therefore, the Kobelco and German DIN are not interchangeable for female Kobelco (see French GAZ 24° swivel).

Dash Size	Metric Thread Size	Female Thread I.D. (mm)	Male Thread O.D. (mm)
-22	M30X1.5	28	30
-28	M36X1.5	34	36
-35	M45X1.5	43	45



Male 24° Cone (MKB)