// FITTINGS GUIDELINES

FITTING IDENTIFICATION

Dash numers

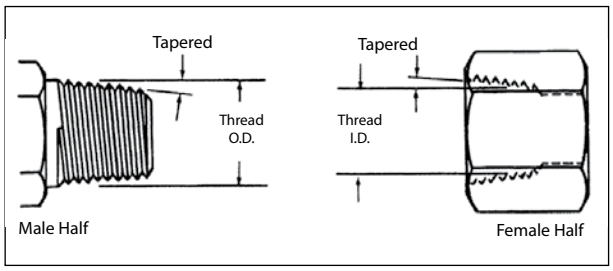
Most fluid piping system sizes are measured by dash numbers. These are universally used abbreviations for the size of component expressed as the numerator of the fraction with the denominator always being 16. For example, a -04 port is 4/16 or 1/4 inch. Dash numbers are usually nominal (in name only) and are abbreviations that make ordering of components easier.

There are many coupling systems used for hydraulic connections. They are identified as:
American, British, French, German, Japanese.
This section lists the origin and coupling style.
Descriptions and dimensional data follows each coupling style.

AMERICANT THREAD TYPES

NPTF (National Pipe Tapered Fuel)

This is a dryseal thread, the National pipe tapered thread for fuels. This is used for both male and female ends. This connection is still widely used in fluid power systems, even through it is not recommended by the National Fluid Power Association (N.F.P.A.) for use in hydraulic applications.
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.



NPSF (National Pipe Straight Thread for Fuels)

The National pipe straight thread for fuels. This is sometimes used for female ends and properly mates with the NPTF male end. However, the SAE recommends the NPTF thread in preference to the NPSF for female ends.

NPSM (National Pipe Straight Mechanical)

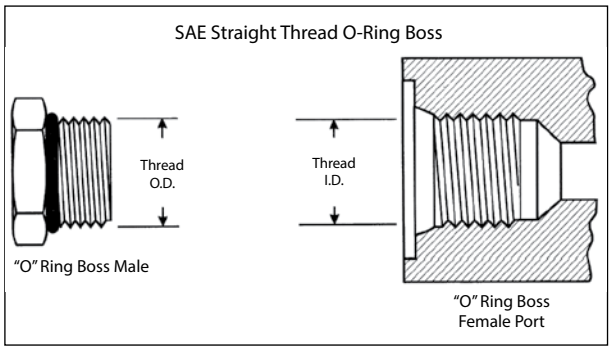
National pipe straight thread for mechanical joint. This is used on the female swivel nut of iron pipe swivel adapters. The leak-resistant joint is not made by the sealing fit of threads, but by a tapered seat in the coupling end. This connection is sometimes used in fluid power systems.

Thread Identification Table
National Pipe Straight Mechanical (NPSM)
National Pipe Tapered for Fuels (NPTF)

Tube Size	Tube Size	Thread Size	Female Thread I.D.		Male Thread O.D.	
Dash	(in)	(in-TPI)	(mm)	(in)	(mm)	(in)
-2	1/8	1/8-27	8.7	0.34	10.3	0.41
-4	1/4	1/4-18	11.9	0.47	14.3	0.56
-6	3/8	3/8-18	15.1	0.59	17.5	0.69
-8	1/2	1/2-14	18.3	0.72	21.4	0.84
-12	3/4	3/4-14	23.8	0.94	27.0	1.06
-16	1	1-11.1/2	30.2	1.19	33.3	1.31
-20	1.1/4	11/4-11.1/2	38.9	1.53	42.9	1.69
-24	1.1/2	11/2-11.1/2	44.5	1.75	48.4	1.91
-32	2	2 - 11.1/2	57.2	2.25	60.3	2.38

SAE J514 Straight Thread O-Ring Boss (ORB)

This port connection is recommended by the N.F.P.A. for optional leakage control in medium and high pressure hydraulic systems. The O'ring boss male will mate with an O'ring boss female only.



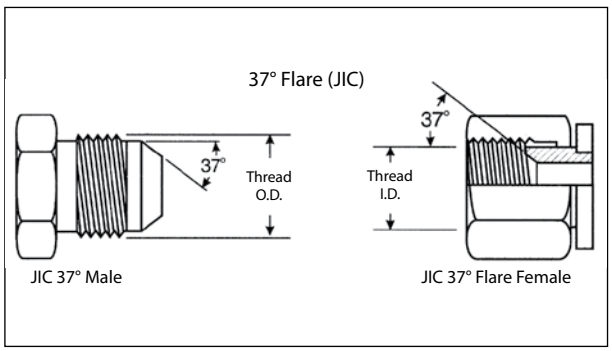
Thread Identification Table
SAE J514 Straight Thread O-Ring Boss

Tube Size	Tube Size	Thread Size	Female Thread I.D.		Male Thread O.D.	
Dash	(in)	(in-TPI)	(mm)	(in)	(mm)	(in)
-2	1/8	5/16-24	6.9	0.27	7.8	0.31
-3	3/16	3/8-24	8.5	0.34	9.4	0.37
-4	1/4	7/16-20	9.9	0.39	11.2	0.44
-5	5/16	1/2-20	11.5	0.45	12.6	0.49
-6	3/8	9/16-18	12.9	0.51	14.1	0.56
-8	1/2	3/4-16	17.5	0.69	18.9	0.74
-10	5/8	7/8-14	20.5	0.81	22.1	0.87
-12	3/4	1.1/16-12	24.9	0.98	26.9	1.06
-14	7/8	1.3/16-12	28.1	1.11	30.3	1.18
-16	1	1.5/161/2	31.3	1.23	33.1	1.31
-20	1.1/4	1.5/8-12	39.2	1.54	41.1	1.62
-24	1.1/2	1.7/8-12	45.6	1.79	47.4	1.87
-32	2	2.1/2-12	61.4	2.42	63.3	2.49

The male has straight threads 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.
The threads hold the connection mechanically.

SAE J514 37° (JIC)

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 by establishing a line contact between the male flare and the female cone seat. The threads hold the connection mechanically.



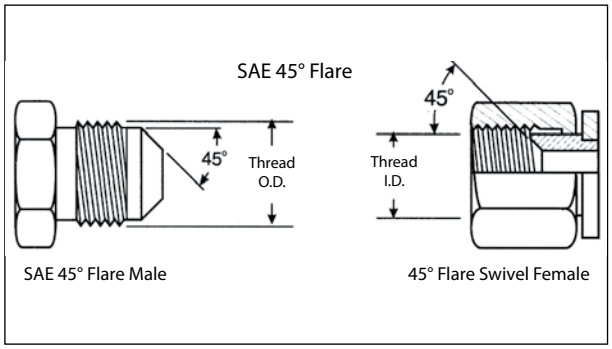
Thread Identification Table
SAE J514 37° Flare (JIC)

Tube Size	Tube Size	Thread Size	Female Thread I.D.		Male Thread O.D.	
Dash	(in)	(in-TPI)	(mm)	(in)	(mm)	(in)
-2	1/8	5/16-24	6.9	0.27	7.8	0.31
-3	3/16	3/8-24	8.5	0.34	9.4	0.37
-4	1/4	7/16-20	9.9	0.39	11.2	0.44
-5	5/16	1/2-20	11.5	0.45	12.6	0.49
-6	3/8	9/16-18	12.9	0.51	14.1	0.56
-8	1/2	3/4-16	17.5	0.69	18.9	0.74
-10	5/8	7/8-14	20.5	0.81	22.1	0.87
-12	3/4	1.1/16-12	24.9	0.98	26.9	1.06
-14	7/8	1.3/16-12	28.1	1.11	30.3	1.18
-16	1	1.5/16-12	31.3	1.23	33.1	1.31
-20	1.1/4	1.5/8-12	39.2	1.54	41.1	1.62
-24	1.1/2	1.7/8-12	45.6	1.79	47.4	1.87
-32	2	2.1/2-12	61.4	2.42	63.3	2.49

CAUTION: In the -02, -03, -04, -05, -08 and -10 sizes, the threads of the SAE 45° flare and the SAE 37° flare are the same. However, the sealing surface angles are not the same. Carefully measure the seat angle to differentiate.

SAE J512 45°

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 - commonly used in refrigeration, automotive and truck piping systems. The SAE 45° flare male will mate with an SAE 45° flare female only.
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.



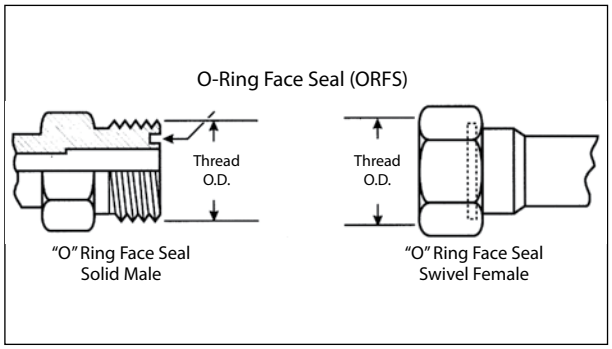
Thread Identification Table
SAE J512 45°

Tube Size	Tube Size	Thread Size	Female Thread I.D.		Male Thread O.D.	
Dash	(in)	(in-TPI)	(mm)	(in)	(mm)	(in)
-2	1/8	5/16-24	6.9	0.27	7.9	0.31
-3	3/16	3/8-24	8.6	0.34	9.6	0.38
-4	1/4	7/16-20	9.9	0.39	11.2	0.44
-5	5/16	1/2-20	11.4	0.45	12.7	0.50
-6	3/8	5/8-18	14.2	0.56	15.7	0.62
-7	7/16	11/16-16	15.7	0.62	17.3	0.68
-8	1/2	3/4-16	17.0	0.68	19.0	0.75
-10	5/8	7/8-14	20.3	0.80	22.3	0.88
-12	3/4	1.1/16-14	25.1	0.99	26.9	1.06
-14	7/8	1.1/4-12	29.5	1.16	31.7	1.25
-16	1	1.3/8-12	32.5	1.28	35.0	1.38

The threads hold the connection mechanically.
CAUTION: In the -02, -03, -04, -05, -08 and -10 sizes, the threads of the SAE 45° flare and the SAE 37° flare are the same. However, the sealing surface angles are not the same. Carefully measure the seat angle to differentiate.

SAE J1453 O-Ring Face Seal (ORFS)

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. This connection offers the very best leakage control available today.



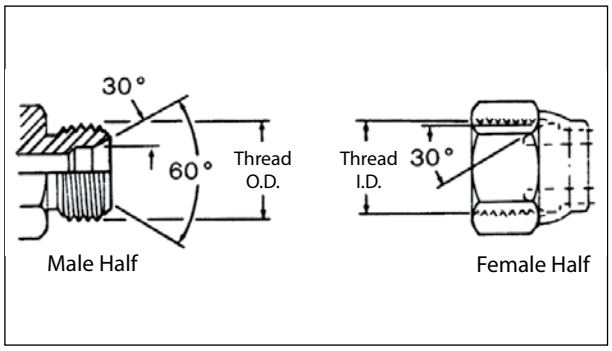
Thread Identification Table
SAE J1453 O-Ring Face Seal (ORFS)

Tube Size	Tube Size	Thread Size	Female Thread I.D.		Male Thread O.D.	
Dash	(in)	(in-TPI)	(mm)	(in)	(mm)	(in)
-4	1/4	9/16-18	12.9	0.51	14.1	0.56
-6	3/8	11/16-16	15.9	0.63	17.3	0.68
-8	1/2	13/16-16	19.1	0.75	20.5	0.81
-10	5/8	1-14	23.6	0.93	25.2	0.99
-12	3/4	1.3/16-12	28.1	1.11	30.0	1.18
-16	1	1.7/16-12	34.4	1.36	36.3	1.43
-20	1.1/4	1.11/16-12	40.8	1.61	42.7	1.68
-24	1.1/2	2-12	48.7	1.92	50.6	1.99

The male connector has a straight thread and a machined flat face. The female has a straight thread and a machined flat face. The seal takes place by compressing the O-Ring onto the flat face of the female, similar to the split flange type fitting. The threads hold the connection mechanically.

SAE J512 Inverted Flare

This connection is frequently used in automotive systems.The male connector can either be a 45° flare in the tube fitting form or a 42° seat in the machined adapter form. The female has a straight thread with a 42° inverted flare. The seal takes place on the flared surface. The threads hold the connection mechanically

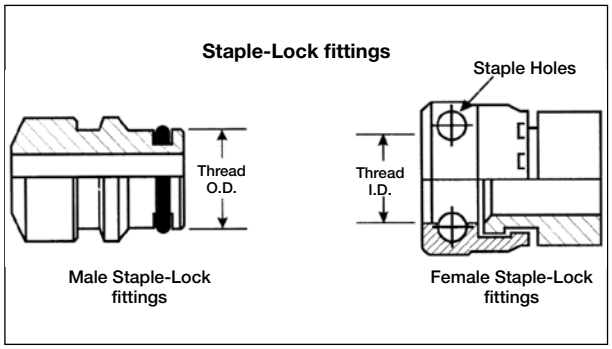


Thread Identification Table
SAE J512 Inverted Flare

Tube Size	Tube Size	Thread Size	Female Thread I.D.		Male Thread O.D.	
Dash	(in)	(in-TPI)	(mm)	(in)	(mm)	(in)
-2	1/8	5/16-28	6.9	0.27	7.9	0.31
-3	3/16	3/8-24	8.6	0.34	9.6	0.38
-4	1/4	7/16-24	9.9	0.39	11.2	0.44
-5	5/16	1/2-20	11.4	0.45	12.7	0.50
-6	3/8	5/8-18	14.2	0.56	15.7	0.62
-7	7/16	11/16-18	15.7	0.62	17.3	0.68
-8	1/2	3/4-18	17.0	0.68	19.0	0.75
-10	5/8	7/8-18	20.3	0.80	22.3	0.88
-12	3/4	1.1/16-16	25.1	0.99	26.9	1.06

SAE J1467 Clip Fastener

This is a radial O-Ring seal connection commonly used for hydraulic applications in underground mines. The male contains an exterior O-Ring and backup ring, plus a groove to accept the “staple”. The female has a smooth bore with two holes for the staple.



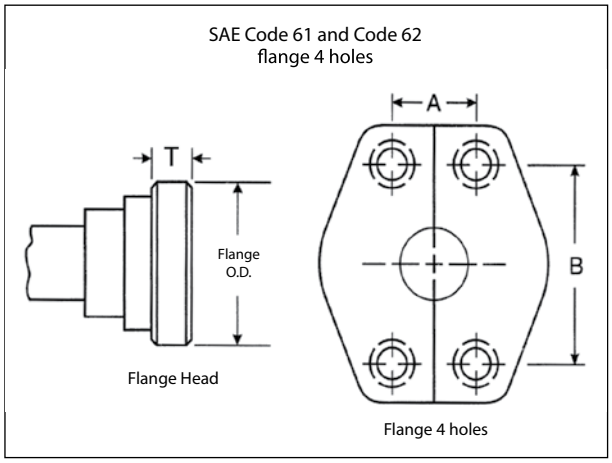
Thread Identification Table
SAE J1467 Clip Fastener

Dash Size	Inch Size	Female Staple-Lock I.D.		Male Staple-Lock O.D.	
	(in)	(mm)	(in)	(mm)	(in)
-4	1/4	14.9	19/32	15.1	19/32
-6	3/8	19.9	51/64	20.1	51/64
-8	1/2	23.9	61/64	24.1	61/64
-12	3/4	28.9	1.9/64	29.1	1.9/64
-16	1	38.9	1.35/64	39.1	1.35/64
-20	1.1/4	45.9	1.13/16	46.1	1.13/16
-24	1.1/2	54.9	1.11/64	55.2	2.11/64
-32	2	63.9	1.17/32	64.2	2.17/32

A “U” shaped retaining clip or staple is inserted through the two holes, passing through the groove in the male to lock the connection together. The seal takes place by contact between the O-Ring in the male and the smooth bore of the female.

SAE J518/ISO - DIS 6162/JIS B8363 O-Ring Flange

This connection is commonly used in fluid power system. There are two pressure ratings. Code 61 Form R, PN 35/350 bar, Type I, is referred to as the “standard” series and Code 62 Form S, PN 415 bar, Type II, is the “heavy duty“ “6000 psi” series. The design concept for both series is the same, but the bolt hole spacing and flanged head diameters are larger for the higher pressure, Code 62 connection.
The female (port) is an unthreaded hole with four bolt holes in a rectangular pattern around the port.
The male consists of a flanged head, grooved for an O-Ring, and either a captive flange or split flange halves with bolt holes to match the port. The seal take place on the O-Ring, which is compressed between the flange head and the flat surface surrounding the port. The threaded bolts hold the connection together.
SAE J518, DIN 20066, ISO/DIS 6162 and JIS B 8363 are interchangeable, except for bolt sizes.
*All Code 61 flange head hose couplings meet or exceed SAE J518 Code 61 requirements for hydraulic split flange connections. The Code 61 flange head design can withstand a maximum operating pressure of 3000 to 5000 psi depending on size.



Flange Dash	SAE Cod 61 FORM R - PN 35/350 - TYPE I								SAE Cod 62 FORM S - PN 415 - TYPE II								CATERPILLAR							
	Flange Head Size		Flange Head T		A		B		Flange Head Size		Flange Head T		A		B		Flange Head Size		Flange Head T		A		B	
Size	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)
-8	1.19	30.2	.265	6.7	.69	17.5	1.50	38.1	1.25	31.8	.305		.71	18.2	1.59	40.5								
-10*	1.34	34.0	.265	6.7	.78	19.8	1.69	42.9																
-12	1.50	38.1	.265	6.7	.87	22.2	1.89	47.6	1.63	41.3	.345	8.7	.94	23.8	2.00	50.8	1.63	41.3	.56	14.2	.94	23.8	2.00	50.8
-16	1.75	44.5	.315	8.0	1.03	26.2	2.05	52.4	1.88	47.6	.375	9.5	1.10	27.8	2.25	57.2	1.88	47.6	.56	14.2	1.10	27.8	2.25	57.2
-20	2.00	50.8	.315	8.0	1.19	30.2	2.31	58.7	2.13	54.0	.405	10.3	1.26	31.8	2.63	66.7	2.13	54.0	.56	14.2	1.26	31.8	2.63	66.7
-24	2.38	60.3	.315	8.0	1.41	35.7	2.75	69.9	2.50	63.5	.495	12.6	1.44	36.6	3.13	79.4	2.50	63.5	.56	14.2	1.44	36.6	3.13	79.4
-32	2.81	71.4	.375	9.5	1.69	42.9	3.06	77.8	3.13	79.4	.495	12.6	1.73	44.4	3.81	96.8	3.13	79.4	.56	14.2	1.73	44.4	3.81	96.8
-40	3.31	84.1	.375	9.5	2.00	50.8	3.50	88.9																

T = Thickness
-10 is a non SAE size flange

How to measure

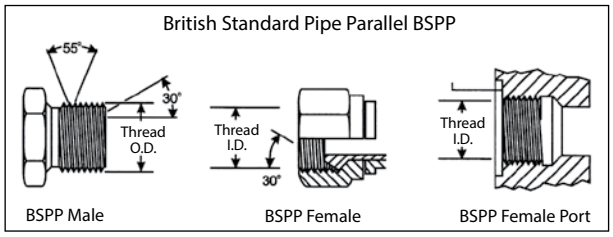
Four Bolt Flange - First measure the port hole diameter using the caliper. Next, measure the longest bolt hole spacing from centre-to-centre (Dimension “A”) or measure the flanged head diameter. O.D.

1. The size -10, which is common outside of North America is not an SAE Standard size.
2. Caterpillar flanges, which are the same flange O.D. as SAE Code 62, have a thicker flange head.
3. Poclain flanges, which are completely different from SAE flanges.

BRITISH CONNECTIONS

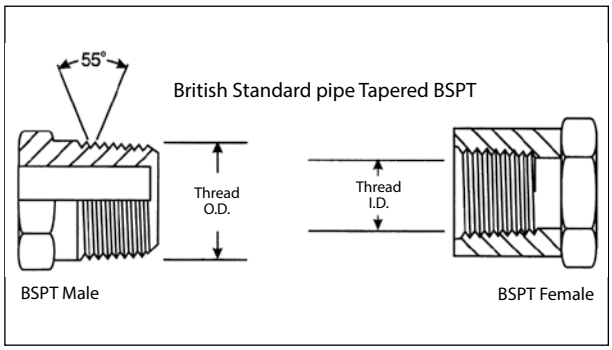
British Standard Pipe Parallel (BSPP)

Popular couplings British Standard Pipe (BSP) threads, also known as Whitworth threads.
The BSPP (parallel) male will mate with a BSPP (parallel) female or a female port.
The BSPP male has straight threads and a 30° seat.
The BSPP female has straight threads and a 30° seat.
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. The female swivel BSPP has a tapered nose which seals on the cone seat of the male.



British Standard Pipe Tapered (BSPT)

The BSPT (tapered) male will mate with a BSPT (tapered) female, or a BSPP (parallel) female. The BSPT male has tapered threads. When mating with either the BSPT (tapered) female or the BSPP (parallel) female port, the seal is made on the threads accomplished by thread distortion. A thread sealant is recommended.
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.



Thread Identification Table
BSPP - (British Standard Pipe Parallel)
BSPT - (British Standard Pipe Tapared)

Dash Size	Inch Size	Thread Size	Female Thread I.D.		Male Thread O.D.	
	(in)	(in-TPI)	(mm)	(in)	(mm)	(in)
-2	1/8	1/8-27	8.7	0.34	9.5	0.38
-4	1/4	1/4-18	11.1	0.44	13.5	0.56
-6	3/8	3/8-18	15.1	0.59	16.7	0.66
-8	1/2	1/2-14	18.3	0.72	20.6	0.81
-10	5/8	5/8-14	20.6	0.81	23.0	0.91
-12	3/4	3/4-14	23.8	0.94	26.2	1.03
-16	1	1-11	30.2	1.19	33.3	1.31
-20	1-1/4	1.1/4-11	38.9	1.53	41.1	1.66
-24	1-1/2	1.1/2-11	45.2	1.78	47.6	1.88
-32	2	2-11	56.4	2.22	59.5	2.34

FRENCH CONNECTIONS

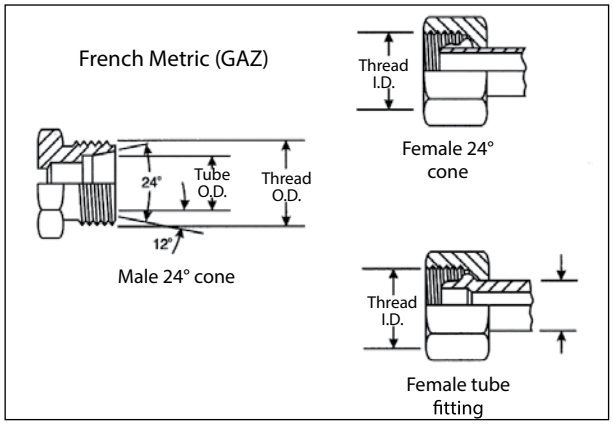
French GAZ have a 24° seat and metric threads. These are similar to German DIN couplings, but the threads are different in some sizes, the French use fine threads in all sizes. French flanges are different than SAE, they have a lip that protrudes from the flange face. These are Poclain style flanges.

Millimetrique and GAZ 24°

This connection consists of a common male and two different females. 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. The Millimetrique Series is used with whole number metric O.D. tubing and the GAZ Series is used with fractional number metric O.D. pipe size tubing.

Thread Identification Table
French Metric Millimetrique

Metric Thread	Female Thread I.D.		Male Thread O.D.		Tube O.D.	
M12 X 1.0	11.0	0.43	12.0	0.47	6	0.24
M14 X 1.5	12.5	0.49	14.0	0.55	8	0.31
M16 X 1.5	14.5	0.57	16.0	0.63	10	0.39
M18 X 1.5	16.5	0.65	18.0	0.71	12	0.47
M20 X 1.5	18.5	0.73	20.0	0.79	14	0.55
M22 X 1.5	20.5	0.81	22.0	0.87	15	0.59
M24 X 1.5	22.5	0.89	24.0	0.94	16	0.63
M27 X 1.5	25.5	1.00	27.0	1.06	18	0.71
M30 X 1.5	28.5	1.12	30.0	1.18	22	0.87
M33 X 1.5	31.5	1.24	33.0	1.30	25	0.98
M36 X 1.5	34.5	1.36	36.0	1.42	28	1.10
M39 X 1.5	37.5	1.48	39.0	1.54	30	1.18
M42 X 1.5	40.5	1.59	42.0	1.65	32	1.26
M45 X 1.5	43.5	1.71	45.0	1.77	35	1.38
M48 X 1.5	46.5	1.83	48.0	1.89	38	1.50
M52 X 1.5	50.5	1.99	52.0	2.05	40	1.57
M54 X 2.0	51.9	2.04	54.0	2.13	45	1.77



Thread Identification Table
French Metric GAZ 24° Cone

Dash Size	Metric Thread	Female Thread I.D.		Male Thread O.D.		Tube O.D.	
(dash)	(dia x pitch)	(mm)	(in)	(mm)	(in)	(mm)	(in)
-6	M20 X 1.5	18.5	0.73	20.0	0.78	13.25	0.52
-8	M24 X 1.5	22.5	0.89	24.0	0.94	16.75	0.66
-10	M30 X 1.5	28.5	1.12	30.0	1.18	21.25	0.83
-12	M36 X 1.5	34.5	1.36	36.0	1.41	26.75	1.05
-16	M45 X 1.5	43.5	1.71	45.0	1.77	33.50	1.32
-20	M52 X 1.5	50.5	1.99	52.0	2.04	42.25	1.66

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 a port. The seal is made on the 24° seat.

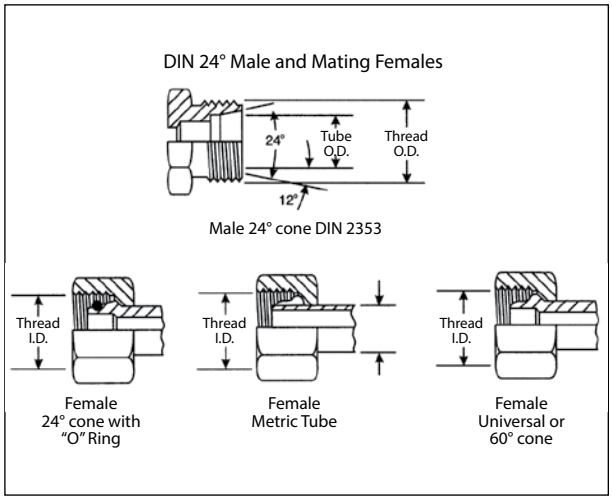
Nominal	A		B		E	
Size (in)	(mm)	(in)	(mm)	(in)	(mm)	(in)
1/2	39.9	1.57	18.3	.72	14	.55
5/8	39.9	1.57	18.3	.72	14	.55
3/4	50.8	2	23.9	.94	18	.71

GERMAN DIN CONNECTIONS

A coupling referred to as metric, usually means a DIN coupling. Flanges are standard Code 61 or Code 62.

DIN 2353 24° Cone

The DIN 24° cone male will mate with any of the three females shown below.
The male has a 24° seat, straight metric threads, and a recessed counterbore which matches the tube O.D. used with it. The mating female may be a 24° cone with O'ring, (DKO type) a metric tube fitting or a universal 24° or 60° cone.



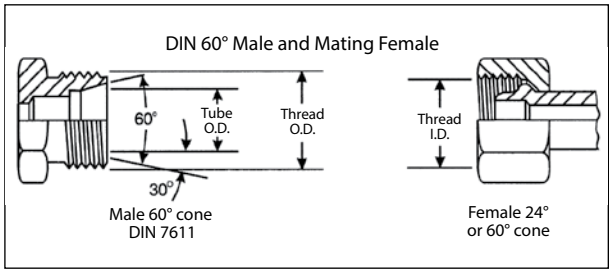
Thread Identification Table
DIN 24° Cone

Metric	Female Thread I.D.		Male Thread		Tube O.D.			
Thread	I.D.		O.D.		Light Series		Heavy Series	
(dia x pitch)	(mm)	(in)	(mm)	(in)	(mm)	(in)	(mm)	(in)
M12 X 1.5	10.5	0.41	12	0.47	6	0.24		
M14 X 1.5	12.5	0.49	14	0.55	8	0.31	6	0.24
M16 X 1.5	14.5	0.57	16	0.63	10	0.39	8	0.31
M18 X 1.5	16.5	0.65	18	0.71	12	0.47	10	0.39
M20 X 1.5	18.5	0.73	20	0.79			12	0.47
M22 X 1.5	20.5	0.81	22	0.87	15	0.59	14	0.55
M24 X 1.5	22.5	0.89	24	0.94			16	0.63
M26 X 1.5	24.5	0.96	26	1.02	18	0.71		
M30 X 2.0	27.9	1.10	30	1.18	22	0.87	20	0.79
M36 X 2.0	33.9	1.33	36	1.42	28	1.10	25	0.98
M42 X 2.0	39.9	1.57	42	1.65			30	1.18
M45 X 2.0	42.9	1.69	45	1.77	35	1.38		
M52 X 2.0	49.9	1.96	52	2.05	42	1.65	38	1.50

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. than the light, but has a thicker wall section).

DIN 3863 60° Cone

This connection is frequently used in hydraulic systems.
The DIN 60° cone male will mate with the female universal 24° or 60° cone only.
The male has a 60° seat and straight metric threads. The female has a 24° and 60° universal seat and straight metric threads. The seal takes place by contact between the cone of the male and the nose of the flareless swivel.
The threads hold the connection mechanically.

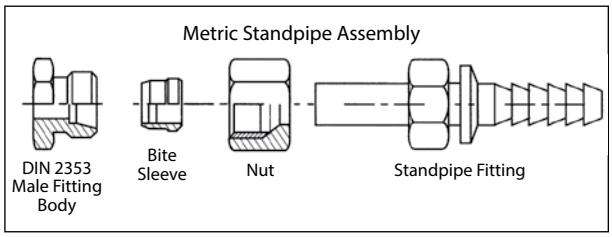


Thread Identification Table
DIN 60°

Metric Thread	Female Thread I.D.		Male Thread O.D.		Tube O.D.	
(dia x pitch)	(mm)	(in)	(mm)	(in)	(mm)	(in)
M12 X 1.5	10.5	0.41	12	0.47	6	0.24
M14 X 1.5	12.5	0.49	14	0.55	8	0.31
M16 X 1.5	14.5	0.57	16	0.63	10	0.39
M18 X 1.5	16.5	0.65	18	0.71	12	0.47
M22 X 1.5	20.5	0.81	22	0.87	15	0.59
M26 X 1.5	24.5	0.96	26	1.02	18	0.71
M30 X 1.5	28.5	1.12	30	1.18	22	0.87
M38 X 1.5	36.5	1.44	38	1.50	28	1.10
M45 X 1.5	43.5	1.71	45	1.77	35	1.38
M52 X 1.5	50.5	1.99	52	2.05	42	1.65

Metric Standpipe

A metric standpipe is comprised of three components attached to a male fitting. The components are a Standpipe, Bite Sleeve and Metric Nut. The nut is placed over the Standpipe, 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. Bite Sleeve and Standpipe are selected on the basis of tube O.D.



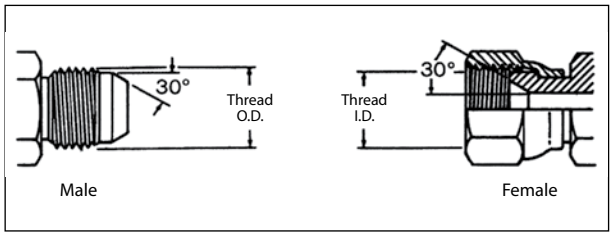
Tube O.D.	Metric Nut Thread	
(mm)	Light	Heavy
6	M12 x 1.5	
8	M14 x 1.5	M16 x 1.5
10	M16 x 1.5	M18 x 1.5
12	M18 x 1.5	M20 x 1.5
15	M22 x 1.5	
16		M24 x 1.5
18	M26 x 1.5	
20		M30 x 2.0
22	M30 x 1.5	
25		M36 x 2.0
28	M36 x 2.0	
30		M42 x 2.0
35	M45 x 2.0	
38		M52 x 2.0
42	M52 x 2.0	

JAPANESE CONNECTIONS

Japanese equipment uses JIS (Japanese Industrial Standard) couplings with a 30° seat and British Standard Pipe Parallel threads. All flanges are Code 61 or Code 62 (except -10).

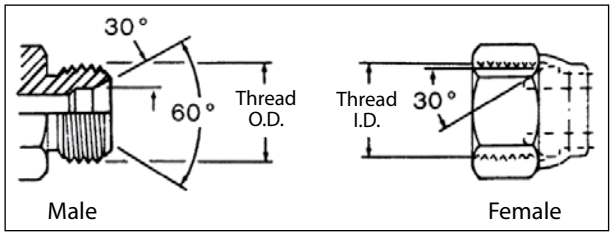
JIS 30° Flare Parallel Pipe Threads - JIS B 0202

These Japanese 30° flare male coupling 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, the same as the BSPP threads. Both the British and Japanese connectors have a 30° seat, but they are not interchangeable, because the British seat is inverted.



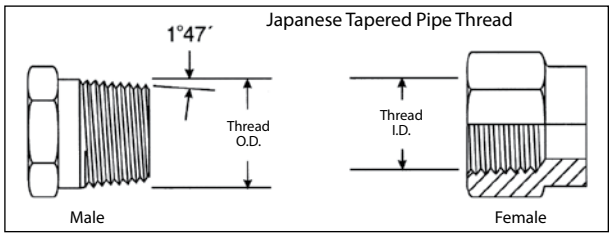
JIS 30° Inverted Seat, Parallel Pipe Threads - JIS B 0202

The JIS parallel is similar to the BSPP connection. The JIS parallel thread and the BSPP connection are interchangeable.



JIS Tapered Pipe Thread (PT) - JIS B 0203

The JIS tapered pipe thread connection is similar to the BSPT connection and fully interchangeable. The Japanese connection does not have a 30° Flare, and will not mate with the BSPP female. The thread conforms to JIS B 0203, same as BSPT threads. The seal on the JIS tapered pipe thread connection is made on the threads.

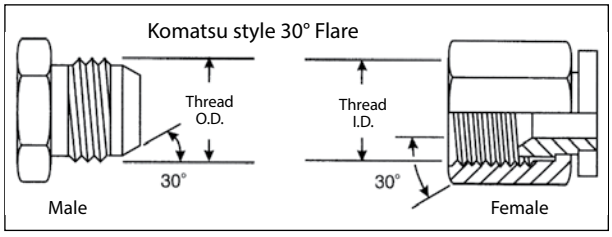


Thread Identification Table

Dash Size	Inch Size	Thread Size	Female Thread I.D.		Male Thread O.D.	
		(in-TPI)	(mm)	(in)	(mm)	(in)
-2	1/8	1/8-27	8.7	0.34	9.5	0.38
-4	1/4	1/4-18	11.1	0.44	13.5	0.56
-6	3/8	3/8-18	15.1	0.59	16.7	0.66
-8	1/2	1/2-14	18.3	0.72	20.6	0.81
-10	5/8	5/8-14	20.6	0.81	23.0	0.91
-12	3/4	3/4-14	23.8	0.94	26.2	1.03
-16	1	1-11	30.2	1.19	33.3	1.31
-20	1-1/4	1.1/4-11	38.9	1.53	41.1	1.66
-24	1-1/2	1.1/2-11	45.2	1.78	47.6	1.88
-32	2	2-11	56.4	2.22	59.5	2.34

Komatsu Style 30° Flare Parallel Threads

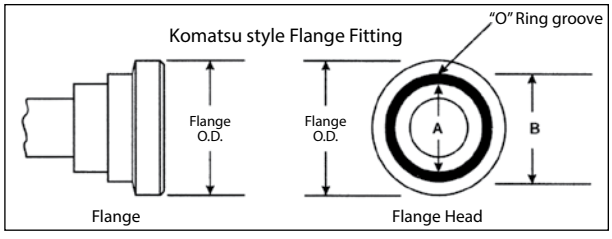
The Komatsu style 30° Flare Parallel thread coupling is identical to the Japanese 30° Flare parallel except for the threads. The Komatsu uses Metric fine threads which conform to JIS B 0207. The Komatsu connector seals on the 30° Flare.



Dash Size	Inch Size	Metrich Thread	Male Thread O.D.	B Thread I.D:
		Size	(mm)	(mm)
-6	3/8	M18x1.5	18	16.4
-8	1/2	M22x1.5	22	20.4
-10	5/8	M24x1.5	24	22.4
-12	3/4	M30x1.5	30	28.4
-16	1	M33x1.5	33	31.4
-20	1-1/4	M36x1.5	36	34.4
-24	1-1/2	M42x1.5	42	40.4

Komatsu Flange Fitting

The Komatsu 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 flange with an SAE style flange, an SAE style O-ring must be used.



Flange Dash	Flange Size	A	B
Size	(In)		
-8	1.19	.73	.98
-10*	1.34	.73	1.10
-12	1.50	.85	1.22
-16	1.75	1.12	1.50
-20	2.00	1.36	1.73
-24	2.38	1.75	2.12
-32	2.81	2.22	2.56

*is a non SAE size flange

RACOMMENDED FITTING AND ADAPTER INSTALLATION TORQUE

SAE J514 37° CONE (JIC)

Dash	Thread	Lb.ft		N.m	
		Min	Max	Min	Max
-4	7/16-20	11	12	15	16
-5	1/2-20	14	15	19	21
-6	9/16-18	18	20	24	28
-8	3/4-16	36	39	49	53
-10	7/8-14	57	63	77	85
-12	1 1/16-12	79	88	107	119
-14	1 3/16-12	94	103	127	140
-16	1 5/16-12	108	113	147	154
-20	1 5/8-12	127	133	172	181
-24	1/78-12	158	167	215	226
-32	2 1/2-12	245	258	332	350

BSPP without O-Ring

Dash	Thread	Lb.ft	N.m
-2	1/8-28	7	10
-4	1/4-19	15	20
-6	3/8-19	26	35
-8	1/2-14	44	60
-10	5/8-14	52	70
-12	3/4-14	85	115
-16	1-11	103	140
-20	1 1/4-11	155	210
-24	1 1/2-11	214	290
-32	2-11	295	400

SAE J1453 O-Ring Face Seal (ORFS)

Dash	Thread	Lb.ft		N.m	
		Min	Max	Min	Max
-4	9/16-18	18	21	25	28
-6	11/16-16	30	32	40	44
-8	13/16-16	41	44	55	60
-10	1-14	46	50	60	68
-12	1 3/16-12	65	70	90	95
-16	1 7/16-12	92	100	125	135
-20	1 11/16-12	125	140	170	190
-24	2-12	150	165	200	225

BSPP with O-Ring

Dash	Thread	Lb.ft	N.m
-2	1/8-28	N/A	N/A
-4	1/4-19	15	20
-6	3/8-19	26	35
-8	1/2-14	37	50
-10	5/8-14	44	60
-12	3/4-14	63	85
-16	1-11	85	115
-20	1 1/4-11	140	190
-24	1 1/2-11	177	240
-32	2-11	221	300

SAE Flange J518 Code 61

Dash	Thread	Lb.ft		N.m	
		Min	Max	Min	Max
-8	1/2	15	19	20	25
-12	3/4	21	29	28	40
-16	1	27	35	37	48
-20	1 1/4	35	46	48	62
-24	1 1/2	46	58	62	79
-32	2	54	66	73	90
-40	2 1/2	79	91	107	124
-48	3	137	149	186	203

JIS (B8363)

Dash	Thread	Lb.ft	N.m
-4	**1/4-19**	**19**	**25**
-6	3/8-19	25	34
-8	1/2-14	49	64
-10	5/8-14	100	132
-12	3/4-14	100	132
-16	1-11	149	196
-20	1 1/4-11	171	225
-24	1 1/2-11	194	255
-32	2-11	240	316

SAE J518 Code 62

Dash	Thread	Lb.ft		N.m	
		Min	Max	Min	Max
-8	1/2	15	19	20	25
-12	3/4	25	33	34	45
-16	1	42	50	56	68
-20	1 1/4	63	75	85	102
-24	1 1/2	117	133	158	181
-32**	2	200	217	271	294

Metric

Thread	Lb.ft		N.m	
	Min	Max	Min	Max
M12x1,5	8	11	15	20
M14x1,5	13	18	25	30
M16x1,5	19	26	35	40
M18x1,5	22	30	40	45
M20x1,5	24	33	45	50
M22x1,5	32	44	60	70
M24x1,5	41	55	75	85
M26x1,5	46	63	85	95
M30x2	57	77	105	120
M36x2	74	100	135	150
M42x2	111	151	205	230
M45x2	136	184	250	280
M52x2	147	199	270	300

JIC FFFT TORQUE METHOD

The FFFT (Flats From Finger Tight) method allows to assemble fittings and adapters at the correct torque value without a dynamometric wrench. The rotation applied according the value shown in tab.1 ensures a good sealing, avoid unscrewing and over torque that can cause nut or cone crack.

Assembling instruction:

- hand tighten the joint
- make a longitudinal mark on one of the flats of hex and continue it on the body hex as shown in Fig.1
- tighten the joint further by the number of flat as shown in Tab.1

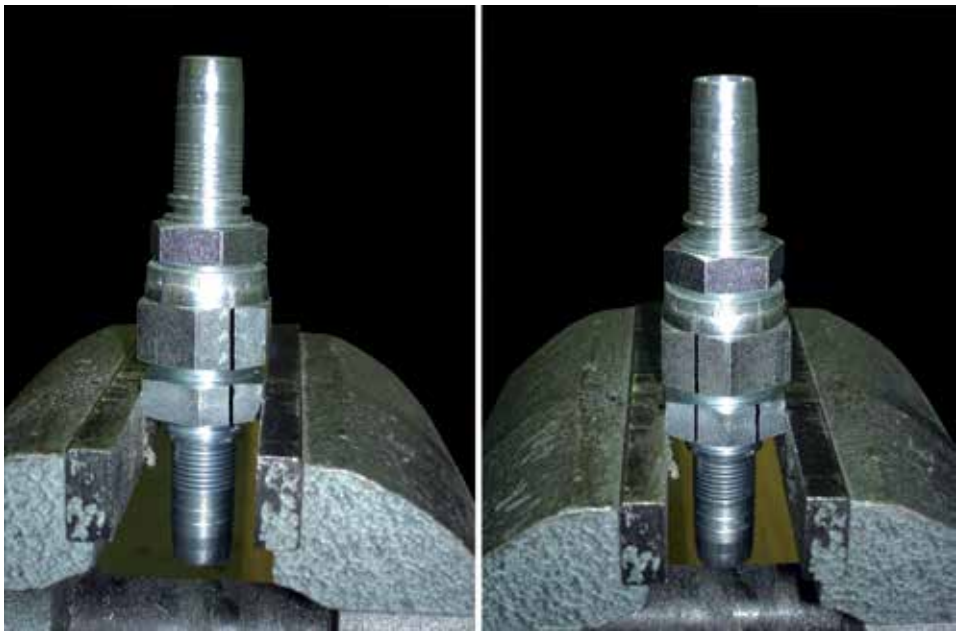


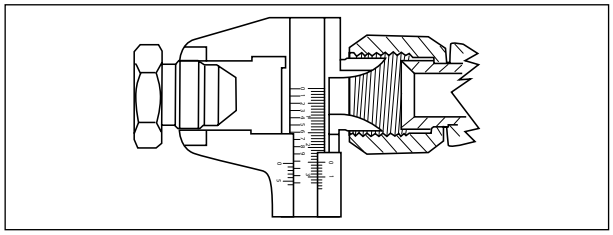
Fig. 1

Assembling value - carbon steel material - SAE J514 JIC 37° flare						
Dash size	Thread	Lb*ft		N*m		FFFT
		min	max	min	max	0/+0.25
-4	7/16-20	11	12	15	16	2
-5	1/2-20	14	15	19	21	2
-6	9/16-18	18	20	24	28	2
-8	3/4-16	36	39	49	53	1.5
-10	7/8-14	57	63	77	85	1.5
-12	1 1/16-12	79	88	107	119	1
-14	1 3/16-12	94	103	127	140	1
-16	1 5/16-12	108	113	147	154	1
-20	1 5/8-12	127	133	172	181	1
-24	1/78-12	158	167	215	226	1
-32	2 1/2-12	245	258	332	350	1

Tab. 1

HOW TO DETERMINE THE THREAD TYPE USING CALLIPERS

By measuring with a caliper the outside diameter of the thread of a male or the inside diameter of the thread of a female you will get a measure in mm. By finding this value in mm on the below table, you'll be able to find the relevant thread type.



Male OD	mm	Female ID
	8,7	G1/8" BSP
1/8" – 27 NPTF	9,5	
G1/8" BSP	9,6	
M 10 x 1	9,8	
	9,9	7/16" – 20 JIC
	10,5	M 12 x 1,5
7/16" – 20 JIC	11,0	
	11,4	1/2" – 20 SAE
	11,6	G1/4" BSP
M 12 x 1,5	11,9	
1/4" – 18 NPTF	12,5	
	12,5	M 14 x 1,5
1/2" – 20 SAE	12,6	
	12,9	9/16" – 18 JIC
G1/4" BSP	13,0	
M 14 x 1,5	13,9	
9/16" – 18 JIC	14,2	
	14,5	M16 x 1,5
	15,1	G3/8" BSP
M 16 x 1,5	15,8	
3/8" – 18 NPTF	15,9	
	16,5	M18 x 1,5
G3/8" BSP	16,6	
	17,5	3/4" – 16 JIC
M 18 x 1,5	17,9	
	18,4	20 x 1,5 DKF
3/4" – 16 JIC	18,8	
	18,8	G1/2" BSP
1/2" – 14 NPT	19,8	
20 x 1,5 CEF	19,9	
	20,4	7/8" – 14 SAE
	20,5	M 22 x 1,5
G1/2" BSP	20,8	
	20,9	G5/8" BSP
M 22 x 1,5	21,9	
7/8" – 14 SAE	22,1	
	22,5	24 x 1,5 DKF
G5/8" BSP	22,8	
24 x 1,5 CEF	23,9	
	24,5	G3/4" BSP
	24,8	1 1/16" – 12 JIC
3/4" – 14 NPTF	25,1	
	25,5	M26 x 1,5
M 26 x 1,5	25,9	
G3/4" BSP	26,3	
1 1/16" – 12 JIC	26,8	

Male OD	mm	Female ID
	27,9	1 3/16" – 12 JIC
	28,0	M 30 x 2
	28,5	30 x 1,5 DKF
M 30 x2	29,8	
30 x 1,5 CEF	29,9	
1 3/16" – 12 JIC	30,1	
	30,7	G1" BSP
	31,2	1 5/16" – 12 JIC
1" – 11 1/2 NPTF	31,4	
	31,5	M 33 x 1,5
G1" BSP	33,1	
1 5/16" – 12 JIC	33,2	
	34,0	M 36 x 2
	34,5	36 x 1,5 DKF
M 36 x 2	35,8	
36 x 1,5 CEF	35,9	
	36,5	M 36 x 1,5
M 38 x 1,5	37,9	
	38,8	1 5/8" – 12 JIC
	39,4	G1 1/4" BSP
	39,8	M 42 x 1,5
1 1/4"–11 1/2 NPTF	40,2	
	40,5	M 42 x 1,5
1 5/8" – 12 JIC	41,1	
1 1/4" – 11 BSP	41,7	
M 42 x2	41,8	
	42,4	M 45 x 2
	43,3	45 x 1,5 DKF
M 45 x2	44,8	
45 x 1,5 CEF	44,9	
	45,1	1 7/8" – 12 JIC
	45,2	G1 1/2" BSP
1 1/2"–11 1/2 NPTF	46,3	
1 7/8" – 12 JIC	47,5	
G1 1/2" BSP	47,7	
	49,6	M 52 x 2
	50,3	52 x 1,5 DKF
M 52 x2	51,8	
52 x 1,5 CEF	51,9	
	57,4	G2" BSP
2" – 11 1/2 NPTF	58,3	
G2" BSP	59,4	
	61,1	2 1/2" – 12 JIC
	62,5	M 65 x 2
2 1/2" – 12 JIC	63,3	

PRESSURE CONVERSION TABLES

Metric to psi (1 KPa = .145 psi)

Kilo Pascal (KPa)	Mega Pascal (KPa)	Bar (Bar)	Pounds per Square Inch (psi)
100	0,1	1	14,5
200	0,2	2	29,0
300	0,3	3	43,5
400	0,4	4	58,0
500	0,5	5	72,5
600	0,6	6	87,0
700	0,7	7	101,5
800	0,8	8	116,0
900	0,9	9	130,5
1000	1	10	145,0
2000	2	20	290,1
3000	3	30	435,1
4000	4	40	580,2
5000	5	50	725,5
6000	6	60	870,2
7000	7	70	1015
8000	8	80	1160
9000	9	90	1305
10000	10	100	1450
20000	20	200	2901
30000	30	300	4351
40000	40	400	5802
50000	50	500	7252
60000	60	600	8702
70000	70	700	10153
80000	80	800	11603
90000	90	900	13053
100000	100	1000	14504
200000	200	2000	29008
300000	300	3000	43511

psi to metric (1 psi = 6,89 KPa)

Pounds per Square Inch (psi)	Kilo Pascal (KPa)	Mega Pascal (MPa)	Bar (Bar)
10	68,9	0,07	0,7
20	137,9	0,14	1,4
30	206,8	0,21	2,1
40	275,8	0,28	2,8
50	344,7	0,34	3,4
60	413,7	0,41	4,1
70	482,6	0,48	4,8
80	551,6	0,55	5,5
90	620,5	0,62	6,2
100	689	0,70	6,9
200	1379	1,4	13,8
300	2068	2,1	20,7
400	2758	2,8	27,6
500	3447	3,4	34,5
600	4137	4,1	41,4
700	4826	4,8	48,3
800	5516	5,5	55,2
900	6205	6,2	62,1
1000	6895	6,9	68,9
2000	13790	13,8	147,9
3000	20684	20,7	206,8
4000	27579	27,6	275,8
5000	34474	34,5	344,7
6000	41369	41,4	413,7
7000	48263	48,3	482,6
8000	55158	55,2	551,6
9000	62053	62,1	620,5
10000	68948	68,9	689
20000	137895	147,9	1379
30000	206843	206,8	2068
40000	275790	275,8	2758

CONVERSION TABLES FROM IMPERIAL SYSTEM TO METRIC SYSTEM

Inches		mm
1/64	.0156	.397
1/32	.0312	.794
3/64	.0468	1.191
1/16	.0625	1.588
5/64	.0781	2.381
3/32	.0937	2.381
7/64	.1093	2.778
1/8	.1250	3.175
9/64	.1406	3.572
5/32	.1562	3.969
11/64	.1718	4.366
3/16	.1875	4.763
13/64	.2087	5.159
7/32	.2187	5.556
15/64	.2343	5.963
1/4	.2500	6.350

Inches		mm
17/64	.2656	6.747
9/32	.2812	7.144
19/64	.2968	7.541
15/16	.3125	7.938
21/64	.3281	8.334
11/32	.3437	8.731
23/64	.3593	9.128
3/8	.3750	9.525
25/64	.3906	9.922
13/32	.4062	10.319
27/64	.4218	10.716
7/16	.4375	11.113
29/64	.4531	11.509
15/32	.4687	11.906
31/64	.4843	12.303
1/2	.5000	12.700

Inches		mm
33/64	.5156	13.097
17/32	.5312	13.494
35/64	.5468	13.891
9/16	.5625	14.288
37/64	.5781	14.684
19/32	.5937	15.081
39/64	.6093	15.478
5/8	.6250	15.875
41/64	.6406	16.272
21/32	.6562	16.669
43/64	.6718	17.066
11/16	.6875	17.463
45/64	.7031	17.859
23/32	.7187	18.256
47/64	.7343	18.653
3/4	.7500	19.050

Inches		mm
49/64	.7656	19.447
25/32	.7812	19.844
51/64	.7968	20.241
13/16	.8125	20.638
53/64	.8281	21.034
27/32	.8437	21.431
55/64	.8593	21.828
7/8	.8750	22.225
57/64	.8906	22.622
29/32	.9062	23.019
59/64	.9218	23.416
15/16	.9375	23.813
61/64	.9531	24.209
31/32	.9687	24.606
63/64	.9843	25.003
1	1000	25.400