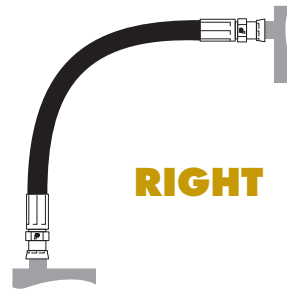
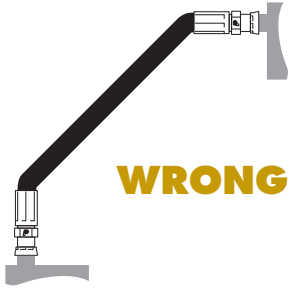


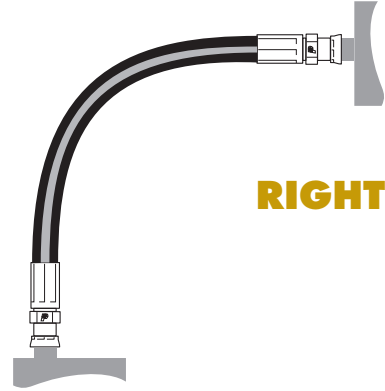
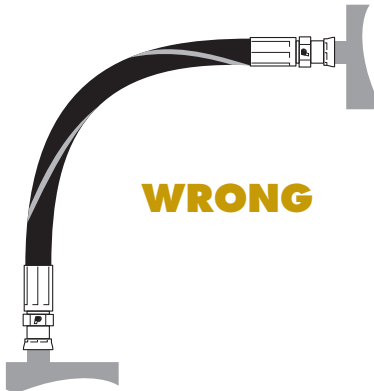
# GENERAL INFORMATION

## HOSE ASSEMBLY ROUTING AND INSTALLATION GUIDE

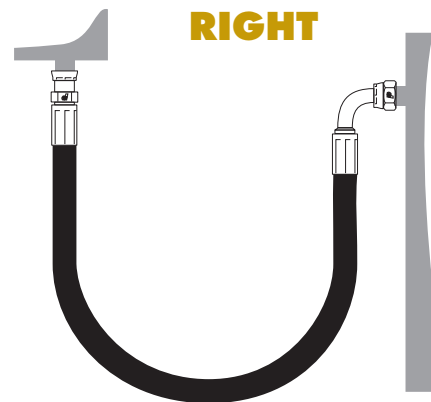
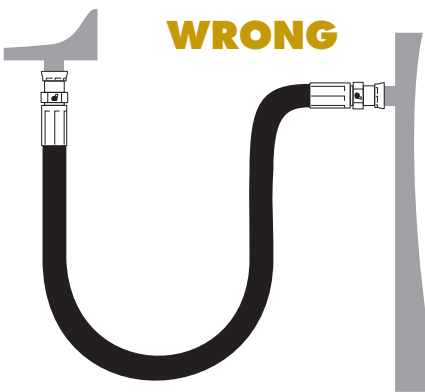
By keeping the following routing methods in mind, users can maximize hose performance and reduce premature failures.



Hose assemblies may change in length under pressure (from +2% to -4%). Always provide some slack in the hose to allow for contraction.



Avoid twists in the hose. Assemblies installed with a twist in the hose tend to loosen threaded connections and/or cause reinforcement separation.

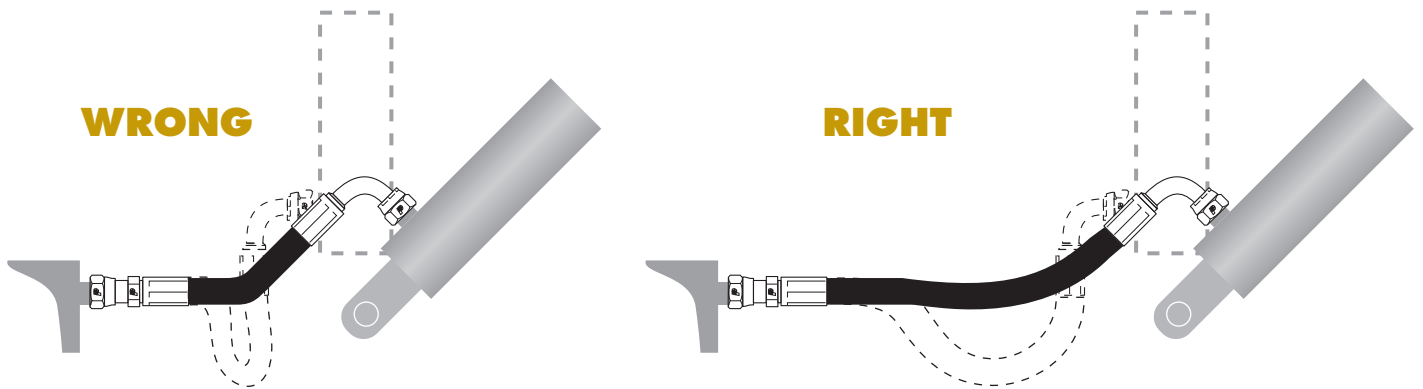


Always consider the minimum bend radius for the hose. Use adapters where necessary to avoid sharp bends.

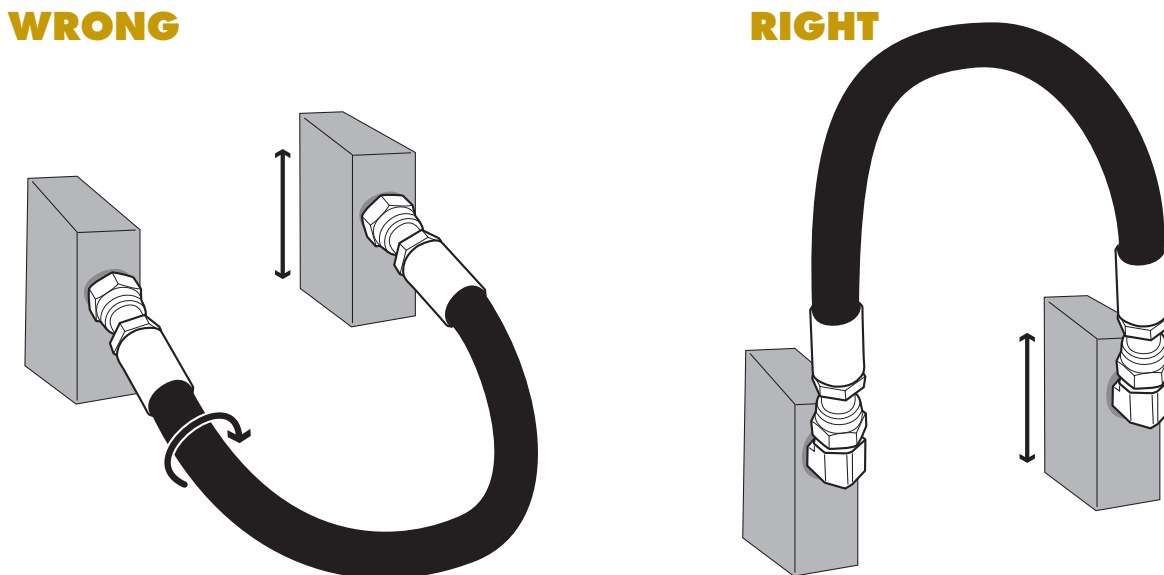
# GENERAL INFORMATION

## HOSE ASSEMBLY ROUTING AND INSTALLATION GUIDE

By keeping the following routing methods in mind, users can maximize hose performance and reduce premature failures.



Where hoses flex, be sure to allow adequate hose length for all positions to avoid kinking or exceeding the minimum bend radius

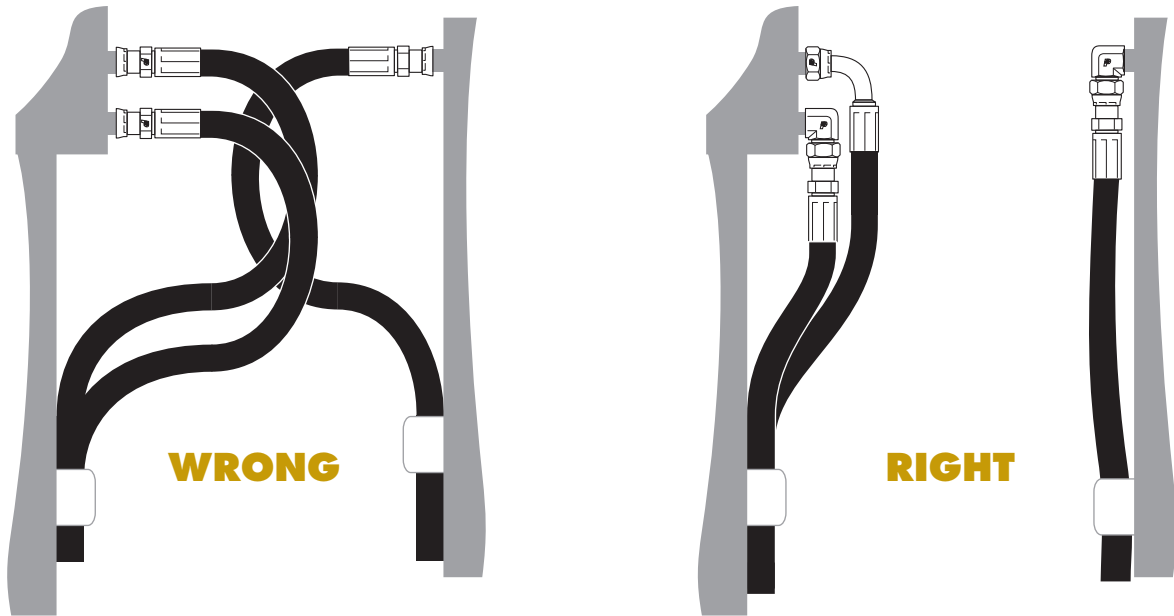


Design installations so that machine motion produces bending rather than twisting

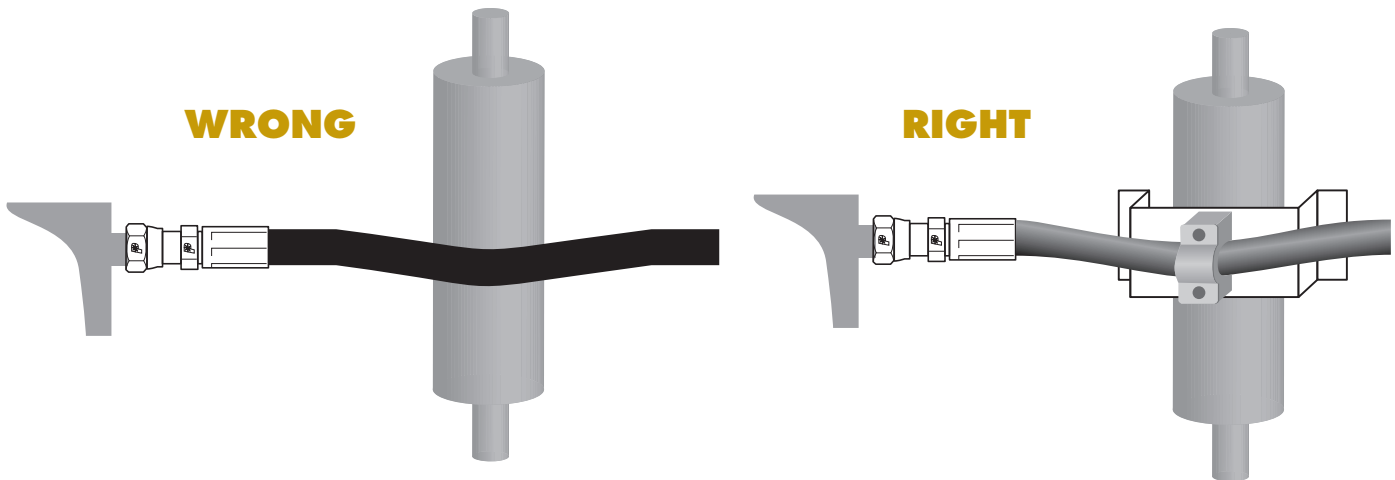
# GENERAL INFORMATION

## HOSE ASSEMBLY ROUTING AND INSTALLATION GUIDE

By keeping the following routing methods in mind, users can maximize hose performance and reduce premature failures.



Use adapters and elbows to reduce tight hose bends and produce a tidy installation

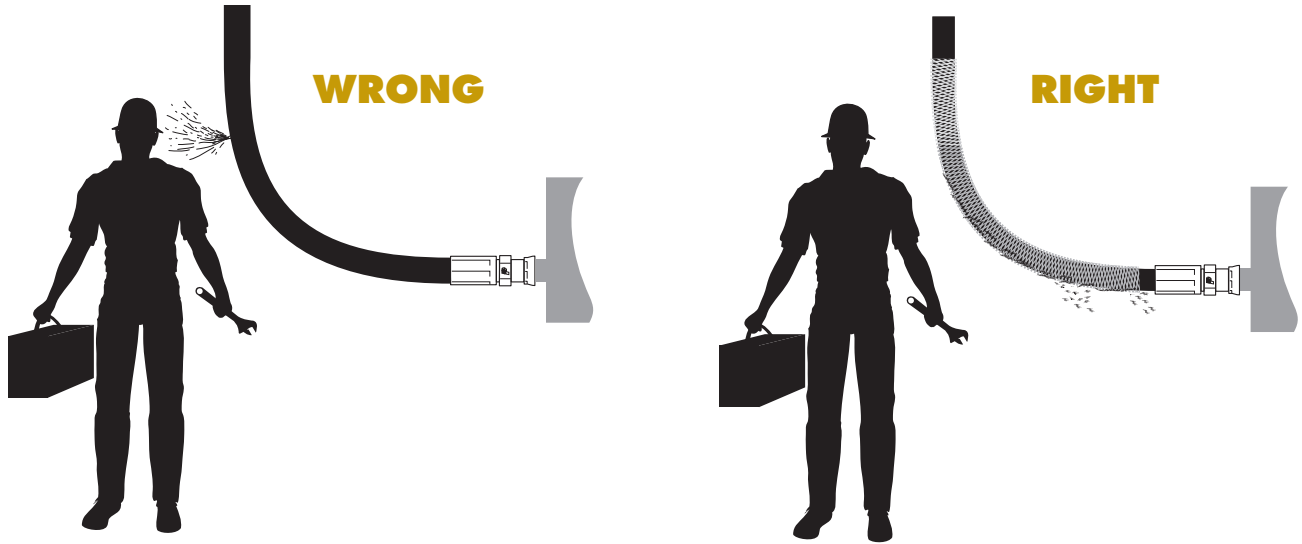


Use support clamps to reduce damage from heat or abrasion. Where clamps cannot be used, install a protective spring or sleeve.

# GENERAL INFORMATION

## HOSE ASSEMBLY ROUTING AND INSTALLATION GUIDE

By keeping the following routing methods in mind, users can maximize hose performance and reduce premature failures.



Where a leaking hose may result in injury from oil spray and skin injection, install a woven sleeve to absorb the impact of the oil stream.

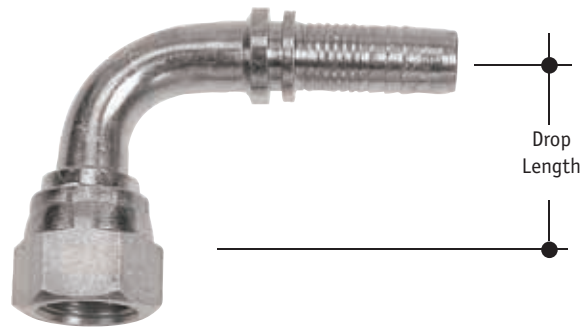
# GENERAL INFORMATION

## Thread Designations

00 ..... Hose Mender	36 ..... BSPP Parallel Male
01 ..... ORB Port Female or Standpipe	38 ..... BSPT Tapered Male
02 ..... Inverted Flare Female	60 ..... Compression/Bite Type
04 ..... SAE 45° Female	61 ..... Metric Standpipe
05 ..... JIC 37° Female	63 ..... DIN 24°/60° Light Female
06 ..... NPSM Female Swivel	64 ..... DIN 24° Heavy Female
08 ..... NPTF Solid Female	65 ..... DIN L. O-Ring Female
09 ..... SAE Code 61 Flange	66 ..... DIN H. O-Ring Female
09C ..... Cat Style Flange	67 ..... French GAZ Female
09H ..... SAE Code 62 Flange	68 ..... Komatsu Metric Female
09K ..... Komatsu Flange	69 ..... JIS 30° Flare Female
11 ..... O-Ring Boss Male	70 ..... Compression Air Brake
12 ..... Inverted Flare Male	71 ..... French Standpipe
14 ..... SAE 45° Male	72 ..... DIN 60° Male
15 ..... JIC 37° Male	73 ..... DIN 24° Light Male
16 ..... NPTF Male	74 ..... DIN 24° Heavy Male
20 ..... Staple Lock Female	75 ..... Metric Banjo
25 ..... BSPP Banjo	77 ..... French GAZ Male
26 ..... BSPP Female	78 ..... Komatsu Metric Male
27 ..... BSP Flat Seat Female	79 ..... JIS 30° Flare Male
28 ..... BSP Non-Swivel Female	83 ..... ORFS Female
29 ..... Grease Fitting Female	93 ..... ORFS Male
30 ..... Staple Lock Male	

### Drop Length

The drop lengths listed in this catalog are the distance from the fitting seat to the center of the stem:



Dash sizes are always designated so that the last dash size given is the end closest to the hose.

## Pipe Thread Dimensions

### Pipe Thread (NPTF, NPSM)

Dash Size	Pipe Size	Pitch (threads per inch)	Male Thread O.D.	Female Thread I.D.
-02	1/8	27	0.41	0.37
-04	1/4	18	0.54	0.49
-06	3/8	18	0.68	0.62
-08	1/2	14	0.84	0.76
-12	3/4	14	1.06	0.98
-16	1	11 1/2	1.31	1.24
-20	1 1/4	11 1/2	1.66	1.58
-24	1 1/2	11 1/2	1.90	1.82
-32	2	11 1/2	2.38	2.28

### British Pipe Thread (BSP)

Dash Size	Pipe Size	Pitch (threads per inch)	Male Thread O.D.	Female Thread I.D.
-02	1/8	28	0.38	0.35
-04	1/4	19	0.52	0.47
-06	3/8	19	0.65	0.60
-08	1/2	14	0.82	0.75
-10	5/8	14	0.88	0.80
-12	3/4	14	1.04	0.97
-16	1	11	1.30	1.22
-20	1 1/4	11	1.65	1.56
-24	1 1/2	11	1.88	1.79
-32	2	11	2.35	2.26

# GENERAL INFORMATION

## Flange Dimensions

	Port Size	Working Pressure	Flange O.D.	Flange Thickness	Bolt Hole Spacing	Bolt Size	Bolt Torque (in-lb)
<b>Code 61 Flange</b>							
-08	1/2	5000 psi	1.19	0.265	1.50	5/16-18 x 1 1/4	175-225
-12	3/4	5000	1.50	0.265	1.88	3/8-16 x 1 1/4	250-350
-16	1	5000	1.75	0.315	2.06	3/8-16 x 1 1/4	325-425
-20	1 1/4	4000	2.00	0.315	2.31	7/16-14 x 1 1/2	425-550
-24	1 1/2	3000	2.38	0.315	2.75	1/2-13 x 1 1/2	550-700
-32	2	3000	2.81	0.375	3.06	1/2-13 x 1 1/2	650-800
-40	2 1/2	2500	3.31	0.375	3.50	1/2-13 x 1 3/4	950-1100
-48	3	2000	4.00	0.375	4.19	5/8-11 x 1 3/4	1650-1800
-64	4	500	5.00	0.442	5.13	5/8-11 x 2	1400-1600
<b>Code 62 Flange</b>							
-08	1/2	6000	1.25	0.305	1.59	5/16-18 x 1 1/4	175-225
-12	3/4	6000	1.63	0.345	2.00	3/8-16 x 1 1/2	300-400
-16	1	6000	1.88	0.375	2.25	7/16-14 x 1 3/4	500-600
-20	1 1/4	6000	2.13	0.405	2.62	1/2-13 x 1 3/4	750-900
-24	1 1/2	6000	2.50	0.495	3.12	5/8-11 x 2 1/4	1400-1600
-32	2	6000	3.13	0.495	3.81	3/4-10 x 2 3/4	2400-2600
<b>Komatsu Flange</b>							
-10	5/8	5000	1.34	0.265		Metric	
<b>Cat Flange</b>							
-12	3/4	6000	1.62	0.560	2.00	3/8-16 x 1 1/2	300-400
-16	1	6000	1.88	0.560	2.25	7/16-14 x 1 3/4	500-600
-20	1 1/4	6000	2.13	0.560	2.62	1/2-13 x 1 3/4	750-900

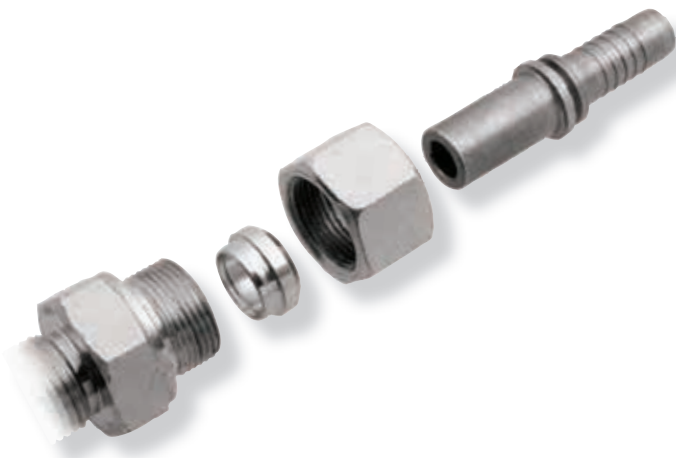
## Thread Dimensions

Male thread outside diameters in inches, and pitch in threads per inch.

Dash Size	JIC 37° Flare & O-Ring Boss	SAE 45° Flare	Inverted Flare	O-Ring Face Seal
-02	5/16 - 24	5/16 - 24	5/16 - 28	
-03	3/8 - 24	3/8 - 24	3/8 - 24	
-04	7/16 - 20	7/16 - 20	7/16 - 24	9/16 - 18
-05	1/2 - 20	1/2 - 20	1/2 - 20	
-06	9/16 - 18	5/8 - 18	5/8 - 18	1 1/16 - 16
-07			1 1/16 - 18	
-08	3/4 - 16	3/4 - 16	3/4 - 18	1 3/16 - 16
-10	7/8 - 14	7/8 - 14	7/8 - 18	1 - 14
-12	1 1/16 - 12	1 1/16 - 14	1 1/16 - 16	1 3/16 - 12
-14	1 3/16 - 12	1 1/4 - 12		
-16	1 5/16 - 12	1 3/8 - 12		1 7/16 - 12
-20	1 5/8 - 12			1 11/16 - 12
-24	1 7/8 - 12			2 - 12
-32	2 1/2 - 12			

# GENERAL INFORMATION

## Metric Thread Dimensions



Male thread outside diameters are in millimeters, and pitch is given in millimeters per thread. Dimension d reflects the tube size (mm) which will attach to the given thread. For example, a DIN 24° light male in size M18x1.5 will attach to a metric standpipe measuring 12mm outside diameter. The same female thread size in a DIN heavy pattern will connect to a 10mm O.D. standpipe.

Ferrules are installed as shown, with the longer taper facing the male thread.

Metric Size	DIN 60° Cone Superlight (LL)	DIN 24° Cone Light (L)	DIN 24° Cone Heavy (S)	DIN 3852-1 Port Sizes	ISO 6149 Port Sizes	French GAZ 24° Cone	30° Metric Komatsu
-08	M8x1.0				M8x1.0		
-10	M10x1.0d6				M10x1.0		
-12	M12x1.5d6	M12x1.5 d6		M12x1.5			
-14	M14x 1.5d8	M14x1.5 d8		M14x1.5			M14x1.5
-16	M16x1.5d10	M16x1.5 d10	M16x1.5 d8	M16x1.5			M16x1.5
-18	M18x1.5d12	M18x1.5 d12	M18x1.5 d10	M18x1.5			M18x1.5
-20			M20x1.5 d12	M20x1.5			
-22	M22x1.5d15	M22x1.5 d15	M22x1.5 d14	M22x1.5			M22x1.5
-24			M24x1.5 d16				M24x1.5
-26	M26x1.5d18	M26x1.5 d18					
-27				M27x2.0			
-28							
-30	M30x1.5d22	M30x2.0 d22	M30x2.0 d20			M30x1.5d21.25	M30x1.5
-33				M33x2.0			M33x1.5
-36		M36x2.0 d28	M36x2.0 d25			M36x1.5d26.75	M36x1.5
-38	M38x1.5d28						
-42			M42x2.0 d30	M42x2.0			M42x1.5
-45	M45x1.5d35	M45x2.0 d35				M45x1.5d33.5	
-48				M48x2.0			
-52	M52x1.5d42						
-60				M60x2.0			

## Fitting and Adapter Installation Torque

Torque in ft.lb. for:

Dash Size	JIC		O-Ring Face Seal		ORB		NPTF dry*
	Min	Max	Min	Max	Min	Max	Max
-02							20
-04	11	12	10	12	14	16	25
-05	14	15			18	20	
-06	18	20	18	20	24	26	35
-08	36	39	32	35	50	60	45
-10	57	63	46	50	72	80	
-12	79	88	65	70	125	135	55
-16	108	113	92	100	200	220	65
-20	127	133	125	140	210	280	80
-24	158	167	150	165	270	360	95
-32	245	258					120

- \* i) If thread sealant is used, maximum values should be decreased by 25%.
- ii) For male tapered threads coupled to NPSM parallel threads, maximum values should be decreased by 50%.
- iii) Use only enough torque to achieve a seal, since NPTF sealing torques vary greatly.

# GENERAL INFORMATION

## Custom Assembly Part Number Guide

Custom hose assemblies can be described accurately using the following instructions

**Sample assembly part number:**

**124-12 / 5005N-12 / 5095-16 / 144**  
1      2      3      4      5

1. The first element describes the hose type and SAE dash size
2. The second element describes the fitting style and thread size at one end (Note: the stem size of the fitting is omitted since it is defined by the hose size)
3. The third element describes the fitting on the other end
4. The fourth element is the overall assembly length in inches, except:
  - i) for ORFS female fittings, where the assembly is measured to the sealing face
  - ii) for elbows, where the assembly is measured to the centerline sealing surface of the elbow

If the customer specifies an assembly as 4 feet of hose with ends attached then the suffix CL will be added to the length to denote cut length

If adapters or quick couplings are to be part of the assembly but not in the length, then the additional part numbers are added after the length. For example...

**122-08/5005N-08/5016-08/48/C402P-08**

...denotes an assembly that is 4 feet long plus the length of the quick coupler

**122-08/5005N-08/5016-08/C402P-08/48**

...denotes an assembly that is 4 feet long including the quick coupler

5. The fifth element (if needed) describes the orientation of the fittings when both ends are elbows. Starting with either end as the far end, measure clockwise to describe the angle at the end closest. The example below shows an assembly that would have an orientation of 90°...



## Thread Identification

Throughout the world, a somewhat confusing array of thread styles are now being used. Where most local distributors used to see only domestic designs, they are now faced with supplying replacement hoses and fittings of a multitude of styles, dimensions, and sealing methods. To be more easily understood these can be broken down into the following groups.

### NPTF and NPSM Pipe Threads



Very common in North America is the NPTF tapered pipe thread, found in many industrial and agricultural applications. Tapered threads seal by an increasing interference of the threads as the fitting is tightened and the tapers engage. Pipe sealant is often used to ensure a good seal along the crests of the threads and to prevent galling (binding). NPSM threads are the same dimension but lack the taper, and so rely on a cone shaped seat on the female fitting to seal against a chamfered male. NPSM threads are typically used on female swivel adapters and are most common on farm equipment.

### British Standard Pipe (BSP)



BSP threads seal in the same ways as NPT threads but are different dimensions, just, it sometime seems, to make life complicated for the distributor. BSP is very common on many types of European equipment as well as some Japanese machinery. The differences between BSP and NPT threads are detailed in the chart at the end of this section. BSP threads may be tapered but more often are parallel threads, with females relying on a cone seat for sealing. Male parallel threads seal with a chamfered end on a female with a cone seat, or with a copper gasket on a flat seat, with an o-ring in a recessed port, or finally with a bonded seal in a machined face port.

### SAE and JIC Flare Fittings



In general, tube fittings were first designed to allow connections between components using steel or copper tubing. In North America the tubing was flared at the end and secured with a threaded nut and sometimes a back-up sleeve. Therefore this type of fitting is most commonly referred to as a flare fitting, either according to JIC (Joint Industrial Council) which called for a 37° flare for steel tubing, or SAE (Society of Automotive Engineers) which specified a 45° flare on the softer copper tubing most commonly found in low pressure automotive applications. Today JIC fittings are widespread in hydraulic applications, while SAE adapters are commonly brass and are usually confined to truck and plumbing markets. Flare fittings are called by the size of tubing they connect to, rather than the thread dimension. For example a JIC in size -08 is designed to connect to 1/2 O.D. tubing, but the fitting actually measures 3/4 on the outside of the thread. JIC and SAE thread dimensions match exactly in sizes -02, -03, -04, -05, -08, and -10, and so will often serve quite well when interchanged in low pressure applications, since only the seat angle varies. However in sizes -06, -12, and in larger sizes they will not interchange. Flare fittings can be readily identified by measuring the male thread dimension, the pitch (number of threads per inch), and the flare angle.



# GENERAL INFORMATION

## O-Ring Boss (ORB) Thread



O-Ring Boss and JIC 37° fittings use the same thread sizes, but the ORB seal occurs on the rubber o-ring of the male ORB connector. The ORB straight thread female port has a machined seat where the o-ring fits and seats when the threads are tightened.

## Inverted Flare



This connection is a compact design developed for automotive applications. Since the tubing is flared to 45° but fitted with a male threaded nut, it can attach directly into a port without an adapter.

## O-Ring Face Seal (ORFS) Thread



The O-Ring Face Seal connection is a recent coupling innovation designed to minimize leakage, especially in high pressure applications. The o-ring fits in a recessed groove on the face of the straight thread male and seals when compressed onto the flat face of the female as the threads are tightened.

## DIN 24° Cone



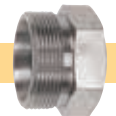
Unlike North American tube fittings, which rely on a flare for sealing, European fittings are designed with a ferrule which bites into the tubing when compressed by a threaded nut. They are generally referred to as bite type fittings. The most common is the German 24° cone DIN (Deutsches Institute fur Normung) fitting. The male fitting has a recessed 24° cone to accept either the metric sized tubing along with the bite ferrule and nut, or a female hose fitting with similar dimensions. For better sealing at high pressures, the female fitting may incorporate an o-ring. Styles with or without o-rings are interchangeable. Since fittings may be designed for light or heavy service, identification is obtained by measuring (in millimeters) the tube O.D., male thread O.D., and pitch expressed in distance from crest to crest.

## DIN 60° Cone



In European automotive and other low-pressure applications, a 60° cone seat is sometimes used. Female hose fittings are often designed to interchange with 24° and 60° male fittings in sizes up to 22 mm.

## French Metric Fittings



French metrics are very uncommon. They often are characterized by fractional tube sizes and fine threads.

## Japanese JIS 30° Flare Parallel Pipe Thread



The JIS 30° flare connector utilizes BSP threads but seals on a 30° female flare rather than a cone seat, much like the North American JIC 37° flare. This fitting is common on Toyota and other Japanese equipment.

## Komatsu Metric 30° Flare



This Japanese connector combines metric dimension threads with a 30° flare seat and is found primarily on Komatsu equipment. Komatsu style flange fittings are discussed in the flange identification section.

## Flange Connections



SAE 4-bolt flange connections are commonly used on mobile heavy equipment and other high pressure applications. There are two SAE series of flanges, code 61 standard series and code 62 high pressure series. Code 62 flanges have larger and thicker head diameters and use a different bolt size, bolt grade (8 instead of 5) and bolt hole pattern. Caterpillar style flanges are also available and feature a thicker 0.560 flange head and require special flange halves, but do conform to code 62 bolt hole patterns. Flange heads have a machined groove where the o-ring seats. The flange seal is achieved when the o-ring is compressed between the flange head and the smooth faced port. The flange head is secured to the port by two split flange clamp halves and four bolts. Other less common flanges include the Komatsu style flange in -10, and the very rare French Poclairn style flanges. The Komatsu flange is available in 5000 series couplings, and Poclairn flanges are listed with the 8600 series fittings.

## Banjo Fittings



Banjo fittings are rare in modern hydraulic systems but still appear on diesel engines and automotive applications. Their advantage is that they make a very compact elbow where space is tight. Banjos are available in metric and BSP sizing. Identify the banjo by measuring the threads on the bolt. If it is BSP, the bolt will conform to BSP male parallel thread dimensions. If it is metric, the bolt will have a exact metric size O.D., with 1.5mm pitch, similar to DIN 24° male fittings.

# GENERAL INFORMATION

PULSAR adapters conform to SAE J514 and J1453 specifications for hydraulic tube fittings (where applicable), and to various ISO specifications depending on thread types. Pressure ratings given here are a general guide. We recommend that on jump size adapters or adapters with two thread styles, the lowest rating be used. Maximum working pressures are given in psi, based on a 4:1 ratio to minimum burst pressure.

## Fitting and Adapter Maximum Recommended Working Pressure (psi)

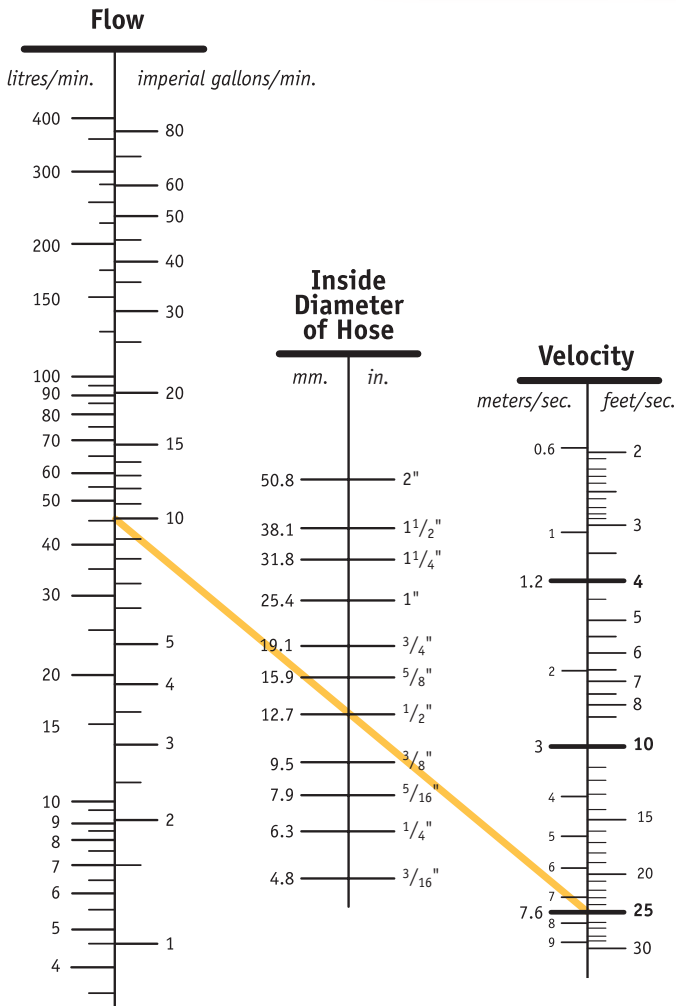
Dash Size	JIC Male Non Swivel	JIC Female Swivel	NPTF Male Pipe Swivel	NPTF Male Pipe Non Swivel	NPTF Female Pipe Non Swivel	NPSM Female Pipe Swivel	Flange Code 61	Flange Code 62	Flange Cat Style	ORB Male Solid	ORB With Adjustable Nut	ORFS Male or Female	SAE 45° Flare Female	Flare-less Byte Type J514
-04	5000	5000	3000	5000	5000	5000				5000	4500	6000	3000	5000
-05	5000	5000	3000							5000	4500			5000
-06	4000	4000	3000	4000	4000	4000				5000	4000	6000	3000	4000
-08	4000	4000	3000	4000	4000	4000	5000	6000		4500	4000	6000	3000	3500
-10	4000	4000	2750				5000	6000		4000	3000	6000	2750	2750
-12	4000	4000	2250	4000	2250	2250	5000	6000	6000	4000	3000	6000	2250	2250
-14														
-16	4000	4000	2000	4000	2000	2000	5000	6000	6000	4000	2500	6000	2000	2000
-20	3000	3000		3000	1625	1625	4000	6000	6000	3000	2000	4000	1625	1625
-24	3000	3000		2500			3000	6000	6000	3000	1500	4000	1250	
-32	3000	3000		2500			3000	6000	6000	3000	1125		1125	

Dash Size	BSPP O-ring Female Swivel	BSPT Male Non Swivel	BSPP Male Non Swivel	DIN 24 Light Female Swivel	DIN 24 Light Male Swivel	DIN 24 Heavy Female Swivel	Din 24 Heavy Male Swivel	JIS 30 Flare Female Swivel	Komatsu Metric Female Swivel
-04	5800	5800	5800	3625	3625			5000	5000
-05				3625	3625	5800	5800		
-06	5800	5800	5800	3625	3625	5800	5800	5000	5000
-08	5000	5000	5000	3625	3625	5800	5800	5000	5000
-10	5000	5000	5000	3625	3625	5800	5800		
-12	4500	4500	4500	2320	2320	5800	5800	4000	4000
-14									
-16	3500	3500	3500	2320	2320	5800	5800	3000	3000
-20	2850	2850	2850	1450	1450	5800	5800	2500	2500
-24	2250	2250	2250	1450	1450	3625	3625	1500	1500
-32	1800	1800	1800	1450	1450	3625	3625	1500	1500

### Pressure Rating Hose Assemblies:

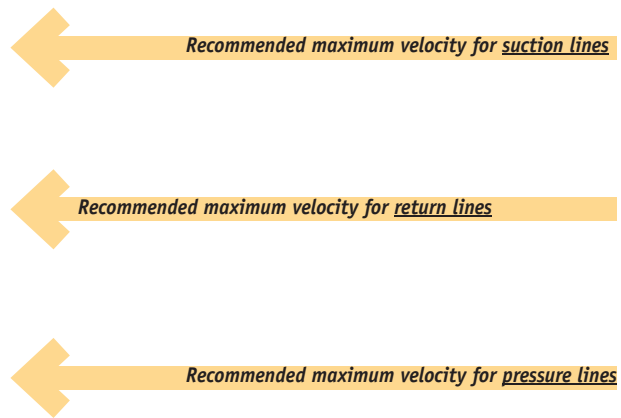
The maximum dynamic working pressure of the hose assembly is the LESSER of the rated working pressure of the hose and the fittings used.

# GENERAL INFORMATION



## VELOCITY CHART NOMOGRAPH

- Conversion Rates: gal/min x 4.546 = liters/min  
feet/sec x 0.3048 = meters/sec
- Recommended velocities are according to hydraulic fluids of maximum viscosity 315 S.S.U. at 38°C working at room temperatures within 18 to 68°C.
- The Yellow line represents a pressure hose at 10 gallons per minute. The minimum hose size should be 1/2



## TABLE OF EQUIVALENTS:

### Pressure:

- 1 psi = 2.307 ft of head (ft of water column)
- = 2.036 Hg
- = 0.06895 Bar
- = 0.006895 MPa (MegaPascals)
- = 0.07031 Kg/sq cm
- = 0.06805 Atmospheres

### Volume:

- 1 Cubic foot = 7.48 US Gallons
- 1 Imp Gallon = 1.201 US Gallons
- = 160 Imp oz.
- = 4.546 liters
- = 4546 milliliters (cc's)
- 1 US Gallon = 128 US oz
- = 3.785 liters
- 1 Barrel = 42 US Gallons

### Weight:

- 1 lb = 453.59 grams
- = 0.45359 Kg
- 1 Kg = 2.2046 lb

### Length:

- 1 inch = 2.54cm
- 1 meter = 3.28084 ft
- 1 Kilometer = 0.62137 Miles

### Power:

- 1 hp = 745.7 Watts

## USEFUL INFORMATION AND RULES OF THUMB

- 1 Cubic foot of water weighs 62.4 lb.
- 1 Imp Gallon of water weighs 10 lb.
- Each 1 HP of drive in a hydraulic system will produce the equivalent of 1 GPM (U.S. Gallon Per Minute) at 1500 psi.
- Each 1 HP on an electric air compressor produces 3.5 to 4.0 SCFM (Standard Cubic Feet Per Minute) of air at 100 psi.

### Optimum maximum flow velocity in hydraulic lines:

- Pump suction 2 to 4 feet per second
- Pressures to 500 psi 10 to 15 feet per second
- 500 to 3000 psi 15 to 20 feet per second

### Velocity of oil flow in pipe:

$$V = \text{GPM} \times 0.3208/A$$

V is oil velocity in feet per second, GPM is flow in U.S. gallons per minute, and A is the inside area of the pipe in square inches

# GENERAL INFORMATION

## Pressure Drop per 100 Feet of Hose (PSI)

These pressure reductions are typical for petroleum based hydraulic oils at 40°C (104°F) and are approximate values only. Differences in fluid temperature and viscosity can increase or decrease pressure drop significantly.

Flow/Minute		— Hose I.D. in inches —																
Litres	Imp.Gal.	0.19	0.25	0.31	0.38	0.41	0.50	0.63	0.75	0.88	1.00	1.13	1.25	1.38	1.50	1.81	2.00	
1	0.22	110	35															
2	0.44	210	65	30														
4	0.88	480	140	65	30													
8	1.76	1140	290	120	60	42												
11	2.42	1520	385	160	65	50	20											
15	3.30	1740	430	290	120	80	30	12										
19	4.18		780	440	180	120	45	16	7									
30	6.60		1200	930	380	260	100	35	14	6								
38	8.30				585	395	150	55	20	10								
45	10.10				800	520	200	70	25	15								
57	12.50					750	300	100	42	22	12	7	4					
68	14.50					1070	400	150	65	30	15	7	6	4				
76	16.80						500	200	85	35	20	12	7	5	3			
95	20.90						725	275	120	60	30	17	10	7	4			
114	25.10							350	150	75	40	25	15	8	6			
133	29.30							480	200	100	50	30	18	12	7	3	2	
150	33.00								240	115	65	33	21	14	9	4	3	
190	41.90								360	170	90	53	33	20	13	6	4	
227	50.00								500	230	120	75	45	28	18	8	5	
265	58.30									310	170	93	60	40	25	10	7	
300	66.00									375	200	120	70	45	30	12	8	
340	74.80									490	270	150	90	60	40	15	10	
380	83.50										330	190	120	70	50	20	13	
568	125.00										600	370	220	130	85	35	22	
757	167.00												360	230	150	60	40	
1136	250.00													450	290	120	75	
1514	333.00														510	210	140	
1893	417.00															320	200	

