

## **Stainless Steel Fittings**

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# Technical Information

## Section 1



### GENERAL INFORMATION

An essential step in ensuring that a hydraulic system is safe and delivers optimum performance and service life is selecting the correct fluid conveying components.

Although a lot of the work undertaken in this industry is the replacement of existing components with a duplicate it is still good practice to check the product against the application especially if the service life of the product to be replaced was not acceptable or when fault finding on an existing system.

In some cases a problem with a hose assembly or other fluid conveying products can point to an underlying problem with the system itself or possibly the products have been incorrectly specified originally.

A simple method to assist in remembering the key selection criteria is the anagram:

#### **F.A.C.T.O.R.S.**

**F** = Fluid

**A** = Application

**C** = Connections

**T** = Temperature

**O** = Operating Pressures

**R** = Rate(s) of Flow

**S** = Size

#### **F - FLUID**

The materials in the products selected must be compatible with the fluid that is to be conveyed. Compatibility considerations will vary between products depending on the fluid in question.

When checking product fluid compatibility the following should be taken into account;

*Hose;* where the application requires the use of chemicals or special oils it is advisable to ensure that the cover is also resistant. For gaseous applications it is possible that permeation could occur. Permeation, sometimes referred to as effusion, is the migration of fluid through the pores of the tube polymer resulting in gradual fluid loss. Where permeation occurs it is important to ensure that as well as the hose tube the reinforcement and cover are compatible. When conveying gaseous liquids it is advisable to pin-prick the cover to prevent fluid build-up under the cover causing blistering. Continual build-up of fluid in this blistering could eventually cause the cover to split resulting in potential hazards such as the release of toxic fumes, fire or even explosions.

*Couplings & other products;* As well ensuring the body material is compatible any seals in hose connectors, positional adaptors, quick release couplings, ball Valves, live swivels etc are also compatible.

### A - APPLICATION

When selecting products it is important to check how and where they are going to be used as this will help to assess the likely demands that will be placed on the products.

Some of the aspects to consider are;

- Is the product going to be installed on mobile equipment or industrial plant?
- Is the application static or dynamic?
- Any installation constraints?
- Any mechanical loadings? Care should be taken not subject products to tension or torsional loads.
- Will it be subjected to constant impulsive?
- What fluid lines best suit the application? Flexible or rigid?
  - ❖ Flexible (hose). Hose has advantages such as;
    - *Easier to route around obstacles*
    - *Helps to dampen sound*
    - *Can absorb pressure spikes*
    - *Less prone to damage from vibration or movement*
    - *Generally easier to replace in the field*
  - ❖ Rigid (pipe or tube). Advantages of rigid lines;
    - *Less susceptible to mechanical damage*
    - *Good heat dissipation*
    - *Tube can be bent to tight radii*
    - *Does not breakdown through ageing*
- If selecting hose consider the following:
  - ❖ Does the cover need to be abrasion resistant?
  - ❖ Does it need to be non-conductive?
  - ❖ Any requirement for the hose to meet any specific Industry specifications? Such as mining, marine, military etc.
  - ❖ O.D of hose if it to run over pulleys (forklift application)
  - ❖ Composition of hose, rubber or thermoplastic? Note; Thermoplastic hose types are excellent for use in the marine and food industries.

Taking the time to get a good overview of the application will help when considering other aspects in the selection process, some of which are interrelated (such as pressure, flow & size).

Some accessory products such as Quick Release Couplings & Ball valves have specific selection requirements that need to be considered. These are discussed in detail in the relevant training modules.

### C - CONNECTIONS

When replacing an existing hose assembly match the existing end connections with the new ones. If a new assembly is being specified consider what interface (thread/sealing face) type would best suit the application. In most cases the type of connection is determined by the exit thread of the adaptor fitted to the port machined into the component to which the assembly is being fitted.

Confirm what style of hose connection is required (or preferred by the customer), where wire braided hose is being used it is possible to fit either Crimp or Re-usable (field attachable) and in low pressure applications a Push-On.

For 90° hose connections check the configuration required e.g. compact or swept bend style.

#### *Rigid lines: pipe or tube*

For pipe the most common connection is the welded type, this can be either a socket or butt weld style. Of these the butt weld should be preferred for high pressure however the socket style is the most commonly used due to the ease of assembly.

For tube there are three main options;

1. Flareless type
2. Flare type
3. Socket weld

### T - TEMPERATURE

Two aspects of temperature must be considered when selecting products;

1. Fluid temperature; Check capability of product to withstand system fluid temperature, both minimum and maximum. Hydraulic systems can generate heat but this should not be excessive in well designed systems. The most common causes of excessive heat are undersized components or flow restrictions within the system.

#### 2. Ambient temperature;

The exposure to high or low ambient temperatures should also be considered. Generally there are not many issues associated with this.

Hose is most likely to be affected, some situations where a problem could occur are;

When an installation requires hose to be run near a hot manifold it may be advisable to use a heat shield or sleeving.

Where a hose is subjected to a high ambient temperature in conjunction with an elevated fluid temperature the service life may be reduced.

Hose used in a cold environment, such as hoses on a forklift working in a coolstore, may have exhibit cracking on the cover.

#### Notes;

1. The viscosity rating of most hydraulic oils is set at a temperature of 40° Celsius.
2. Rubber polymers are affected differently by hot air than hot oil.
3. Rubber stores heat

### O - OPERATING PRESSURES

Determine maximum system or circuit pressures, this may vary depending on the circuit function. Always take into account the possibility of pressure spikes when establishing the maximum pressures that could be generated in a system.

Remember to look at the application or function, this will help to visualise the possible loadings on the product.

For example, the crowd cylinder circuit on an excavator is more likely to be subjected to spike pressure than the slew circuit.

Always ensure that the product is working within a 4:1 safety factor. That is; the maximum pressure the product will be exposed to is less than 25% of the products minimum burst pressure. Where pressure spikes or impulsive can occur it is good practice, where this is possible, to specify a product that will be working at 75% of its pressure rating for normal system pressure, this will give a safety buffer to absorb spikes.

#### Note;

Any product fitted between the pump and valve will always be exposed to the highest pressures of the system.

### R - RATES OF FLOW

There are two areas to look at with regards to fluid flow.

#### Volume;

This is the amount of fluid that will be flowing through the product in a given time. When selecting product it is best to look at the maximum flow that is to be conveyed. Maximum pump output is a good starting point but consideration should also be given to return flow from the piston side of cylinders, this can be high depending on the bore to annulus ratio of the cylinder.

Volume is usually measured in Gallons (imperial) or Litres (metric) per minute.

#### Velocity;

This is the speed of the fluid through the product and is directly related to the fluid volume and the product size. Fluid speed is a key factor in determining pressure drops and heat build up in systems.

Velocity is stated as; feet per second (imperial) or metres per second (metric)

### S - SIZE

The size (flow area) of the product is key part in ensuring the system functions efficiently.

The flow area of the product and the volume of fluid determines the velocity of the fluid in the system. If the fluid velocity is too high then in some cases excessive pressure drop or heat generation can occur. A Nomograph is the easiest method of determining fluid velocity for any given volume versus product size.

#### Notes;

The potential service life of products can be significantly reduced if they are constantly operating at maximum limits.

Some areas of the selection process are interrelated however the key to correct product selection is the understanding of the application and what is required of the product.

## THREAD IDENTIFICATION

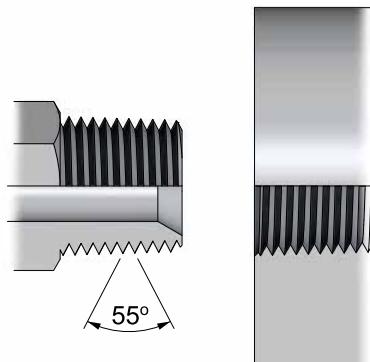
### B.S.P.T. - BRITISH STANDARD PIPE TAPER

**Taper:** 1 in 16 by diameter

**Thread Angle:** 55°

The BSPT (British Standard Pipe Taper) male is intended to mate with the BSPT female only. Although the taper male will screw into BSP Parallel fixed female sockets, this is not recommended practice where avoidable as a reliable seal cannot be guaranteed.

While many BSPT males are coned 30° and will mate with BSP Parallel swivel nut females, this is not recommended practice as the taper form can deform the parallel thread and reduce the integrity of the seal.



Thread Size & TPI	Male Thread O.D. BSPT*	Female Thread I.D. BSPT
<b>1/8-28</b>	9.7	8.5
<b>1/4-19</b>	13.1	11.4
<b>3/8-19</b>	16.6	14.9
<b>1/2-14</b>	20.9	18.6
<b>5/8-14</b>	22.9	20.6
<b>3/4-14</b>	26.4	24.1
<b>1-11</b>	33.2	30.2
<b>1.1/4-11</b>	41.9	38.9
<b>1.1/2-11</b>	47.8	44.8
<b>2-11</b>	59.6	56.6

\*Basic gauge plane diameter at basic gauge depth

## THREAD IDENTIFICATION

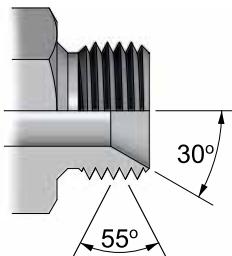
### B.S.P.P. - BRITISH STANDARD PIPE PARALLEL

#### Thread Angle: 55°

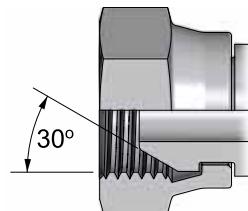
The British Standard Pipe Parallel (BSPP) male is typically coned 30° and will mate with either a BSPP swivel nut female or a BSPP female port.

BSPP female ports are normally spot faced, sealing is by either a soft metal washer, a bonded seal or a captive "O" ring.

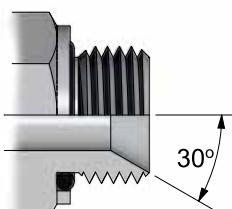
In some cases, the port is chamfered to accept an "O" ring seal. (Similar to the U.N.O. style).



**BSPP male**



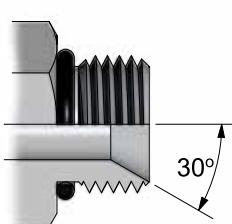
**BSPP swivel nut female**



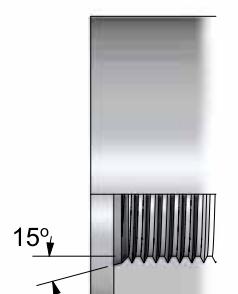
**BSPP male with captive o-ring seal**



**BSPP female port (spot-faced)**



**BSPP male with o-ring seal**



**BSPP female port (chamfered)**

**N.B. Torque values are nominal and supplied as a guide only.**

## THREAD IDENTIFICATION

### N.P.T. - NATIONAL PIPE THREAD

**N.P.T.F.:** National Pipe Taper Fuel  
**N.P.S.M.:** National Pipe Straight Mechanical  
**N.P.S.F.:** National Pipe Straight Fuel

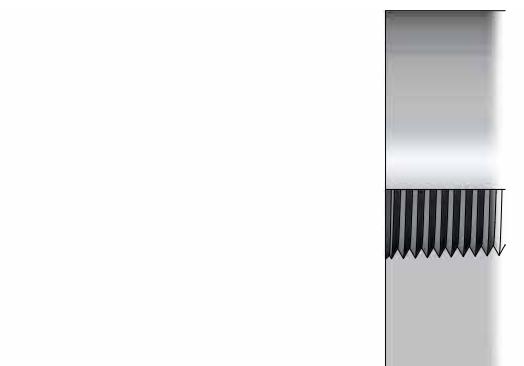
**Taper:** 1 in 16 by diameter.

**Thread Angle:** 60°

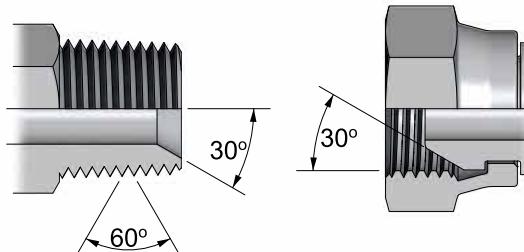
The National Pipe Taper Fuel (NPTF) male is coned 30° and will mate with the NPTF female port (taper), the National Pipe Straight Mechanical (NPSM) female (swivel nut female with 30° sealing cone), or the National Pipe Straight Fuel (NPSF) female port (parallel).

As NPTF is a “dryseal” thread, no sealing medium is required. However a sealing medium can be used to prevent thread galling.

Thread Size & TPI	Male Thread O.D. NPTF	Female Thread I.D.	
		NPTF	NPSF/SM
1/8-27	10.0	8.6	8.7
1/4-18	13.3	11.2	11.4
3/8-18	16.7	14.7	14.9
1/2-14	20.8	18.2	18.8
3/4-14	26.1	23.5	23.9
1-11.1/2	32.7	29.5	30.2
1.1/4-11.1/2	41.4	38.3	39.1
1.1/2-11.1/2	47.5	44.4	45
2-11.1/2	59.3	56.2	57



**NPTF female port (taper)**



**NPTF male (taper)**

**NPSM swivel nut female**



**NPSF female port (parallel)**

## THREAD IDENTIFICATION

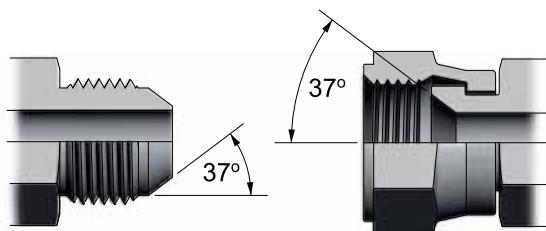
### J.I.C / U.N. O-RING THREAD

J.I.C. and U.N.“O”-Ring threads are both of the Unified National Form.

J.I.C. refers to the 37° flare type sealing face. The J.I.C. female is usually a swivel nut, but can also be a fixed socket (port) with a 37° sealing face in the base of the socket.

U.N.“O”-Ring refers to the thread type and “O”-Ring for sealing. The female U.N.O port has a chamfer to accept the o-ring.

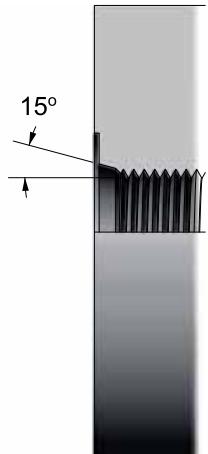
Thread Size & TPI	Female Thread I.D.	Tube O.D.	Torque Settings	
			JIC	UN“O”
7/16 x 20 UNF	9.8	1/4"	14 Nm	21 Nm
1/2 x 20 UNF	11.5	5/16"	19 Nm	25 Nm
9/16 x 18 UNF	13.0	3/8"	30 Nm	34 Nm
3/4 x 16 UNF	17.4	1/2"	50 Nm	72 Nm
7/8 x 14 UNF	20.3	5/8"	80 Nm	100 Nm
1 1/16 x 12 UN	24.8	3/4"	130 Nm	176 Nm
1 3/16 x 12 UN	28.2	7/8"	140 Nm	220 Nm
1 5/16 x 12 UN	31.2	1"	156 Nm	290 Nm
1 5/8 x 12 UN	39.2	1.1/4"	188 Nm	350 Nm
1 7/8 x 12 UN	45.5	1.1/2"	268 Nm	460 Nm
2 1/2 x 12 UN	61.5	2"	346 Nm	540 Nm



JIC male

JIC swivel  
nut female

UNO male

UNO female  
port  
(chamfered)

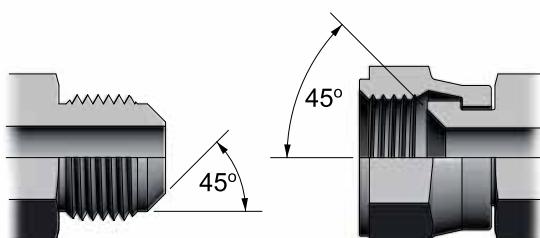
**N.B. Torque values are nominal and supplied as a guide only.**

## THREAD IDENTIFICATION

### S.A.E. - SOCIETY OF AUTOMOTIVE O.R.F.S. - O-RING FACE SEAL ENGINEERS

This system utilises the U.N. thread series and a 45° flare sealing face. Primarily used in the automotive and refrigeration industries.

This system uses an "O"-Ring for sealing. The "O"-Ring is housed in the face of the male and is compressed by the face of the female on connection. Connecting threads are U.N. form.

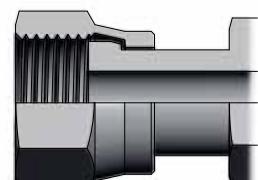


SAE male

SAE swivel nut female



ORFS male



ORFS swivel nut female

Thread Size & TPI	Tube O.D.	Female Thread I.D.
7/16-20	1/4"	9.8
1/2-20	5/16"	11.4
5/8-18	3/8"	14.3
11/16-16	7/16"	16
3/4-16	1/2"	17.5
7/8-14	5/8"	20.5
1.1/16-14	3/4"	24.8
1.1/4-12	7/8"	30.1
1.3/8-12	1"	33.2

Thread Size & TPI	Female Thread I.D.	Tube O.D.	"O"-ring size	Torque Settings *
9/16-18 UNF	12.8	1/4"	5/16x1/16	14-16 Nm
11/16-16 UN	16.0	3/8"	3/8x1/16	24-27 Nm
13/16-16 UN	19.1	1/2"	1/2x1/16	43-47 Nm
1-14 UN	23.5	5/8"	5/8x1/16	60-69 Nm
1.3/16-12UN	26.1	3/4"	3/4x1/16	90-95 Nm
1.7/16-12 UN	34.2	1"	15/16x1/16	125-135 Nm
1.11/16-12 UN	40.6	1.1/4"	1.3/16x1/16	170-190 Nm
2-12 UN	48.0	1.1/2"	1.1/2x1/16	200-225 Nm

**N.B. Torque values are nominal and supplied as a guide only.**

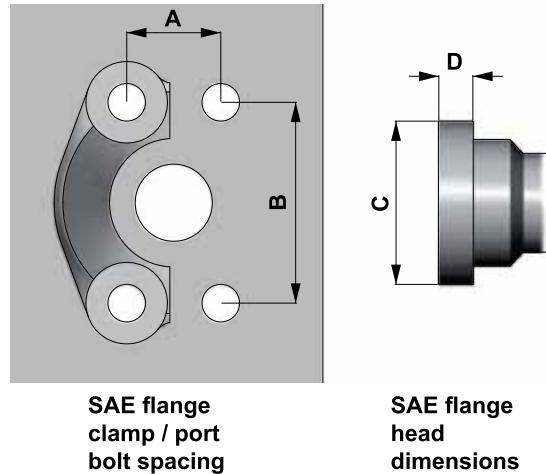
## THREAD IDENTIFICATION

### S.A.E. O-RING FLANGES (SAE - J518)

These connections utilise an "O"-Ring for sealing and are widely used for connecting to pump and motor parts as well as end terminations for pipe runs.

The "O"-Ring is housed in the flange head face and seals on a flat face female port, the flange is held in place by two clamp halves (or a one piece clamp) which are secured by four bolts.

SAE flanges are available in two pressure classes: **Standard Series, Code 61**, which goes to 5000 psi (dependent on size), and the **High Pressure Series, Code 62**, which is rated to 6000 psi for all sizes.



**SAE flange clamp / port bolt spacing**

**SAE flange head dimensions**

Nominal Flange Size	A (mm)		B (mm)		C (mm)		D (mm)	
	Code 61	Code 62						
1/2	17.48	18.24	38.1	40.49	30.18	31.75	6.75	7.75
*5/8	19.8	-	42.90	-	34.0	-	6.73	-
3/4	22.23	23.80	47.63	50.80	38.10	41.28	6.73	8.76
1	26.19	27.76	52.37	57.15	44.45	47.63	8.0	9.53
1.1/4	30.18	31.75	58.72	66.68	50.80	53.98	8.0	10.29
1.1/2	35.71	36.50	69.85	79.38	60.33	63.50	8.0	12.57
2	42.88	44.45	77.77	96.82	71.42	79.38	9.53	12.57

Nominal Flange Size	Pressure Rating		"O"-ring size		UNC Bolt size		Bolt torque	
	Code 61	Code 62	Code 61 and 62	AS568A number	Code 61	Code 62	Code 61	Code 62
1/2	5000 psi	6000 psi	3/4x1/8	210	5/16x1.1/4	5/16x1.1/4	20-25 Nm	20-25 Nm
3/4	5000 psi	6000 psi	1x1/8	214	3/8x1.1/4	3/8x1.1/2	28-40 Nm	34-45 Nm
1	5000 psi	6000 psi	1.5/16x1/8	219	3/8x1.1/4	7/16x1.3/4	37-48 Nm	56-68 Nm
1.1/4	4000 psi	6000 psi	1.1/2x1/8	222	7/16x1.1/2	1/2x1.3/4	48-62 Nm	85-102 Nm
1.1/2	3000 psi	6000 psi	1.7/8x1/8	225	1/2x1.1/2	5/8x2.1/4	62-79 Nm	158-181 Nm
2	3000 psi	6000 psi	2.1/4x1/8	228	1/2x1.1/2	3/4x2.3/4	73-90 Nm	271-294 Nm

\*The 5/8\* size flange is not part of the SAE standard. It is included in the J.I.S. standards and is used by Komatsu and other O.E.M's.

**N.B. Torque values are nominal and supplied as a guide only**

Caterpillar flanges used on XT3 hose are the same as the SAE Code 61, XT5 flanges have the same diameter as the SAE Code 62 but are thicker in the flange head.

French Gaz (Poclain) flanges are completely different to, and will not interchange with the SAE flanges.

## THREAD IDENTIFICATION

### J.I.S. - JAPANESE INDUSTRIAL STANDARDS

Japanese Industrial Standards (J.I.S.) incorporate B.S.P. and metric threads as well as flanges in their connection standards.

#### Taper Threads:

Type R; BSPT Male (*Identical to BSP standard*)

#### Parallel Threads:

Type G; BSPP Male (*Identical to BSP standard*)

Type C; BSPP Swivel Nut Female (*Identical to BSP standard - for thread data please refer to BSPP section*)

Type F; BSPP Swivel Nut Female, 30° Flare Seat

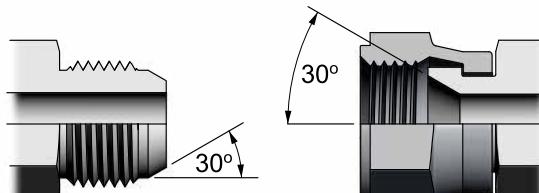
Type M; Metric, Male, 30° Cone

Type MF; Metric, Swivel Nut Female, 30° Flare Seat

#### “O”-Ring Flanges:

Type I; Equivalent to Code 61 (*Identical to SAE standard*)

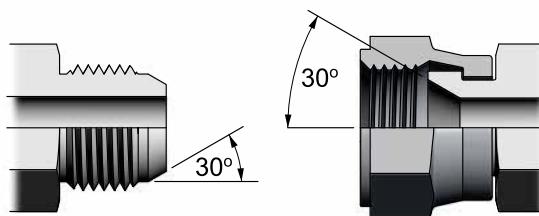
Type II; Equivalent to Code 62 (*Identical to SAE standard*)



Type F JIS male

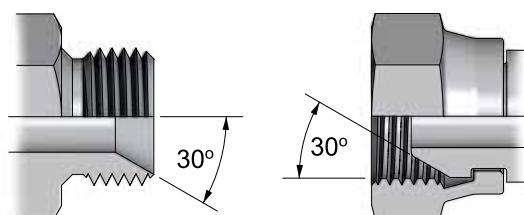
For thread data  
please refer to  
BSPP section

Type F JIS  
swivel nut  
female



Type MF JIS male

Type MF JIS  
swivel nut  
female



Type M JIS male

Type M JIS  
swivel nut  
female

THREAD SPECIFICATIONS			
Metric Threads (J.I.S)		Komatsu Threads (Metric)	
14-1.5*	12.5	14-1.5*	12.5
18-1.5*	16.5	18-1.5*	16.5
22-1.5*	20.5	22-1.5*	20.5
27-2.0	25	24-1.5	22.5
33-2.0	31	30-1.5	28.5
42-2.0	40	33-1.5	31.5
50-2.0	48	36-1.5	34.5
60-2.0	58	42-1.5	40.5

\* denotes interchange sizes between JIS and Komatsu.

## THREAD IDENTIFICATION

### D.I.N. METRICS 24° CONE SYSTEM

The D.I.N. System allows for the connection of hose assemblies and tube in three main pressure series:

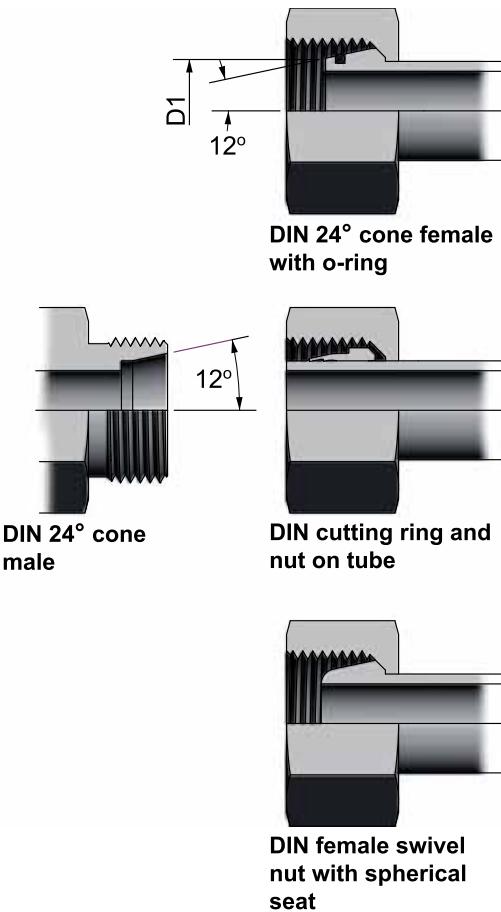
- Series LL; Extra Light, up to 100 bar
- Series L; Light up to 250 bar
- Series S; Heavy up to 640 bar

The pressure ranges are determined by the tube O.D. and the thread size e.g. a 12mm light coupling has an 18mm thread O.D. whereas a 12mm heavy coupling has a 20mm O.D. thread.

**N.B: Rated coupling pressures are subject to the design pressures of the tube or hose being used.**

Tubing is connected to the D.I.N. Male by the use of a cutting ring and nut. Hose assemblies can be connected by swivel nut females having either a spherical seal, 24° cone seal (can be fitted with "O"-Ring ), or a standpipe with cutting ring and nut. Hose can also be connected directly to tube by use of a hose tail with the D.I.N. Male form

The male form will accept all three female styles shown (right).



THREAD SPECIFICATIONS LIGHT (L) SERIES			
Thread O.D. & Pitch	Female Thread I.D.	Diameter D1 (mm)	Tube O.D.(mm)
M12-1.5	10.5	7.2	6
M14-1.5	12.5	9.2	8
M16-1.5	14.5	11.6	10
M18-1.5	16.5	13.8	12
M22-1.5	20.5	16.8	15
M26-1.5	24.5	19.8	18
M30-2.0	28	23.8	22
M36-2.0	34	29.8	28
M45-2.0	43	37.2	35
M52-2.0	50	44.2	42

THREAD SPECIFICATIONS HEAVY (S) SERIES			
Thread O.D. & Pitch	Female Thread I.D.	Diameter D1 (mm)	Tube O.D.(mm)
M14-1.5	12.5	7.2	6
M16-1.5	14.5	9.2	8
M18-1.5	16.5	11.6	10
M20-1.5	18.5	13.8	12
M22-1.5	20.5	15.8	14
M24-1.5	22.5	17.8	16
M30-2.0	28	22	20
M36-2.0	34	27	25
M42-2.0	40	32	30
M52-2.0	50	40	38

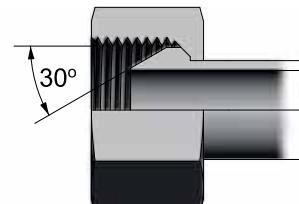
\* N.B. Diameter D1 is nominal and may vary between manufacturers.

## THREAD IDENTIFICATION

### D.I.N. METRICS 60° CONE SYSTEM

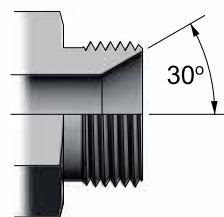
This series utilises a 60° cone seating angle and is used for the connection of hose assemblies and tube. It differs from the 24° series in that the threads are predominately 1.5mm pitch and there is no light or heavy pressure ranges.

The D.I.N. 60° male will accept the universal (spherical seat) female, a 60° coned female and tube fitted with a cutting ring and nut.

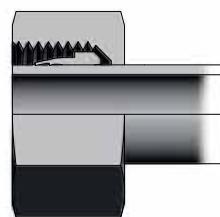


DIN 60° cone female

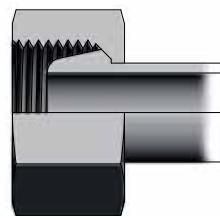
THREAD SPECIFICATIONS		
Thread O.D. & Pitch	Female Thread I.D.	Tube O.D.(mm)
<b>M10-1.0</b>	9.0	5
<b>M12-1.5</b>	10.5	6
<b>M14-1.5</b>	12.5	8
<b>M16-1.5</b>	14.5	10
<b>M18-1.5</b>	16.5	12
<b>M22-1.5</b>	20.5	15
<b>M26-1.5</b>	24.5	18
<b>M30-1.5</b>	28.5	22
<b>M38-1.5</b>	36.5	28
<b>M45-1.5</b>	43.5	35
<b>M52-2.0</b>	56.5	42



DIN 60° cone male



DIN cutting ring and  
nut on tube

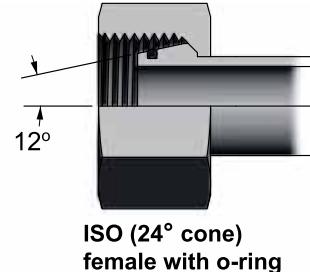


DIN female swivel  
nut with spherical  
seat

## THREAD IDENTIFICATION

### I.S.O. METRICS (INTERNATIONAL STANDARDS ORGANISATION)

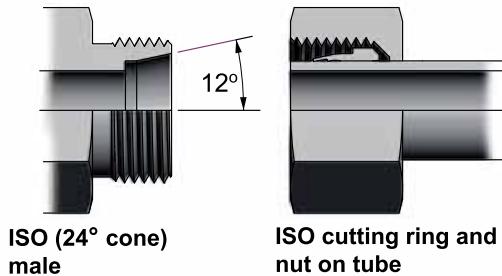
The I.S.O. series of couplings is similar to the D.I.N. light and heavy in function. The male has a 24° included angle sealing cone and a recessed counter bore for locating the tube when used in conjunction with a cutting ring and nut. The male will also accept a swivel nut female with either a cone or a spherical seal.



THREAD SPECIFICATIONS		
Thread O.D. & Pitch	Female Thread I.D.	Tube O.D.(mm)
M12-1.0	11.0	6
M14-1.5*	12.5	8
M16-1.5*	14.5	10
M18-1.5*	16.5	12
M20-1.5	18.5	14
M22-1.5*	20.5	15
M24-1.5**	22.5	16
M27-1.5	25.5	18
M30-1.5	28.5	22
M33-1.5	31.5	25
M36-1.5	34.5	28
M39-1.5	37.5	30
M42-1.5	40.5	32
M45-1.5	43.5	35
M48-1.5	46.5	38
M52-1.5	50.5	40

\* Interchange with D.I.N. Light

\*\* Interchange with D.I.N. Heavy



## THREAD IDENTIFICATION

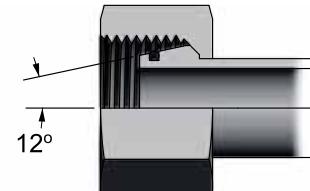
### FRENCH METRICS (GAZ & MILLIMETRIQUE SERIES)

The series are similar to the D.I.N. 24° type where the male has a 24° included angle sealing cone and a recessed counterbore for locating the tube.

The male will accept a cutting ring and nut for use with tube or a swivel nut female with either a cone or spherical seal.

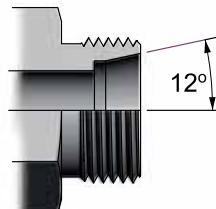
The Gaz and Millimetrique series are identical in all respects except for the O.D. of the tube:

- Gaz series uses fractional number O.D. metric tubing.
- Millimetrique series uses whole number O.D. metric tubing.

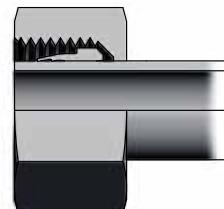


French 24° cone female with o-ring

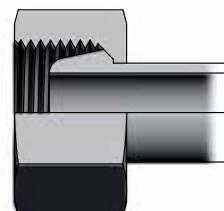
THREAD SPECIFICATIONS LIGHT (L) SERIES			
Thread O.D. & Pitch	Female Thread I.D.	Diameter	
		GAZ	Millimetrique
<b>M12-1.0</b>	11.0	-	6
<b>M14-1.5</b>	12.5	-	8
<b>M16-1.5</b>	14.5	-	10
<b>M18-1.5</b>	16.5	-	12
<b>M20-1.5</b>	18.5	13.25	14
<b>M22-1.5</b>	20.5	-	15
<b>M24-1.5</b>	22.5	16.75	16
<b>M27-1.5</b>	25.5	-	18
<b>M30-1.5</b>	28.5	21.25	22
<b>M33-1.5</b>	31.5	-	25
<b>M36-1.5</b>	34.5	26.75	28
<b>M39-1.5</b>	37.5	-	30
<b>M42-1.5</b>	40.5	-	32
<b>M45-1.5</b>	43.5	33.5	35
<b>M48-1.5</b>	46.5	-	38
<b>M52-1.5</b>	50.5	42.25	40
<b>M54-2.0</b>	52.0	-	45
<b>M58-2.0</b>	56.0	48.25	-



French 24° cone male



Cutting ring and nut on tube



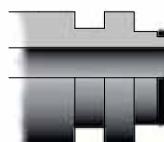
French female swivel nut with spherical seat

## THREAD IDENTIFICATION

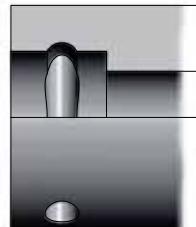
### STAPLE-LOK COUPLINGS

Originally designed in Germany for underground mining equipment, the Staple-lok requires no spanners for connection or disconnection. The male and female are pushed together and held with a retaining staple or "U" clip.

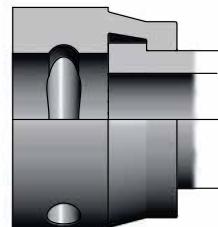
Sealing is achieved by the captive "O"-Ring located on the male spigot. The female can either be fixed or swivel type. The coupling is not designed to swivel under pressure.



Staple-lok male



Staple-lok fixed female



Staple-lok swivel female



Staple-lok staple

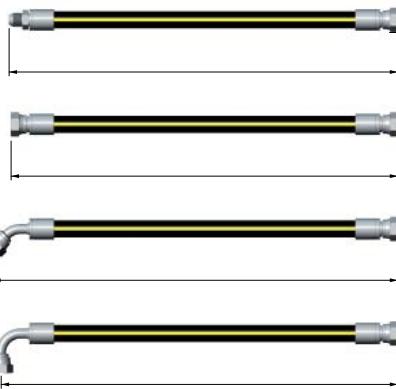
Coupling Dash Size	Imperial Size	THREAD SPECIFICATIONS		Female I.D.	
		Male O.D. inch	mm	inch	mm
-4	1/4	0.58	14.8	.59	15.0
-6	3/8	0.78	19.8	.79	20.0
-8	1/2	0.94	23.9	.95	24.1
-12	3/4	1.13	28.8	1.14	29.0
-16	1	1.53	38.9	1.54	39.1
-20	1.1/4	1.80	45.7	1.81	46.0
-24	1.1/2	2.16	54.9	2.17	55.1
-32	2	2.52	64.0	2.53	64.3

## HOSE ASSEMBLY MEASUREMENT

### STRAIGHT HOSE ASSEMBLY LENGTH

Overall hose assembly lengths are determined by measuring the centreline length between the coupling end faces for straight couplings, or through the sealing face centreline for angled couplings (examples to right).

Sufficient length allowance should be made to compensate for hose contraction and expansion under operating procedures.



### BENT HOSE ASSEMBLY LENGTH

For installations that require a 180° bend in the hose assembly, the overall length can be calculated as follows:

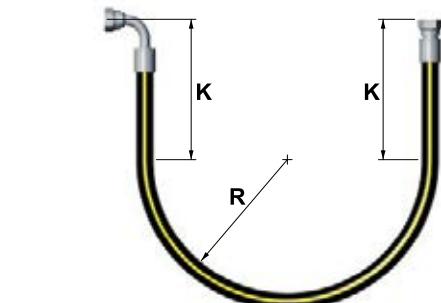
#### Static Installations

To avoid localised concentration of bending strain on the hose couplings, a free distance (K) of hose should be designed into the length of each assembly. Distance "K" includes length of coupling and adaptor (if used). Dimension "R" should not be less than the manufacturer's recommended bend radius for the hose used. Refer to chart below for "K" dimensions of hoses with I.D. from 3/16" to 2".

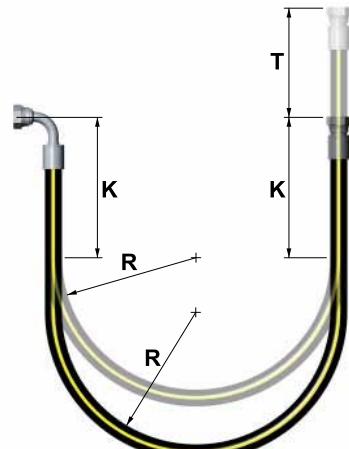
Hose I.D.	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	1.1/4	1.1/2	2
K (mm)	110	130	130	160	180	210	210	260	260	260	310

#### Dynamic Installations

When a hose assembly is subjected to relative motion between the two end couplings, additional hose length is required to accommodate the travel distance. In the diagram (right) "T" represents the amount of travel.



$$\text{Length} = 2K + 3.142R$$



$$\text{Length} = 2K + 3.142R + T$$

#### Off-Set Angle Measurement

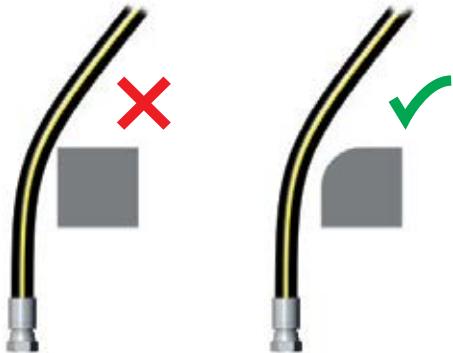
Place hose assembly in line of sight position with coupling furthest away facing upwards. Determine off-set angle by comparing relative position of closest coupling to the far coupling in a clockwise direction.



**1. Hose Protection**

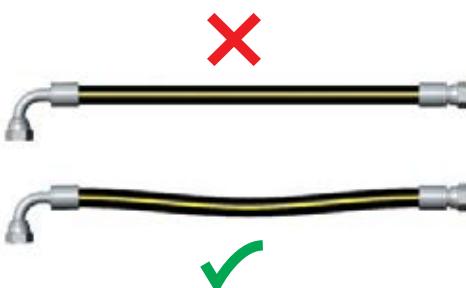
Protect the hose cover from damage such as abrasion, erosion, snagging, and cutting. Where possible, route hose to reduce abrasion from hose rubbing other hose or objects that may abrade it (Fig. 1). Special abrasion-resistant hoses and hose guards are available for additional protection. Special consideration may also need to be given to hose assemblies near heat sources.

Fig. 1


**2. Hose And Machine Tolerances**

Avoid tension on hose assemblies and adaptors. Design hose to allow for changes in length due to machine motion and tolerances (Fig. 2). Failure to do so may result in seal or assembly failure.

Fig. 2


**3. Torsional Twist**

Do not transfer torque to hose while installing. This transfer of torque can result in torsional twist, which may result in premature hose assembly failure. Use swivel type couplings or adaptors for ease of alignment as needed to prevent twisting during installation. Use the brand lay-line as a guide to ensure the hose is not pre-loaded with torsional twist when installed (Fig. 3).

Fig. 3



**4. Minimum Bend Radius**

The minimum bend radius for hose supplied by Hydraulink is detailed in this catalogue. Routing at less than minimum bend radius is not recommended and may reduce hose life.

Prevent sharp bending at the hose/fitting juncture (Fig. 4a). Unnecessary stress at this point may result in leaking, hose rupturing, or the hose assembly blowing apart.

Stress at this point can be minimised by ensuring adequate hose length (Fig. 4b), or by use of angled adaptors and couplings (Fig 4c).

Fig. 4a

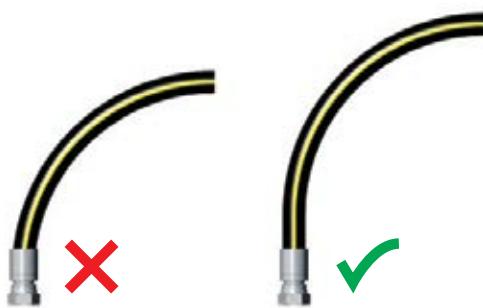


Fig. 4b



Fig. 4c



**5. Hose Length Change**

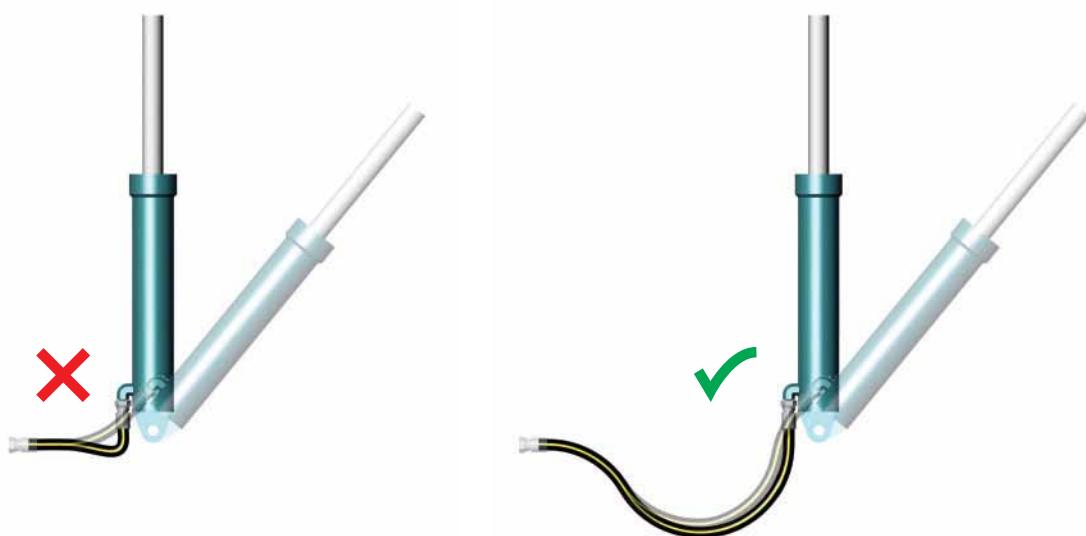
Hydraulic hose can expand longitudinally when pressurised, and this hose length change must be considered when specifying or installing hose assemblies (Fig. 5) When clamping hose lengths, always place clamps to avoid stressing the fitting end.

Fig. 5


**6. Relative Movement**

When specifying or installing hoses that have movement relative to each other, provide adequate hose length to absorb the required movement and prevent bends occurring that are smaller than the minimum bend radius (Fig. 6a).

Fig. 6a



# Tube Fittings

## Section 12



## GENERAL INFORMATION

The Hydraulink range of tube fittings are available in two main series; “bite-type” compression fittings to suit tube, and socket-weld fittings to suit tube or pipe.

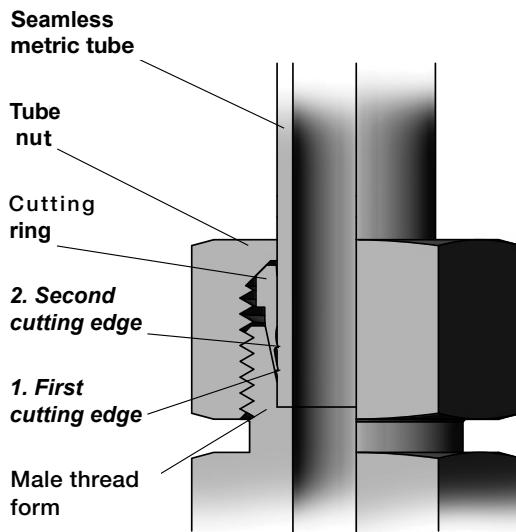
D.I.N. bite-type or compression tube fittings supplied by Hydraulink suit a wide range of sizes and working pressures, and are available with many variations of end type and configuration. Please refer technical section for further information regarding end types, thread forms and sealing methods. Hydraulink tube fittings are typically manufactured from high quality steel and finished with a silver trivalent chromium plating and clear sealant to further increase protection against corrosion. Other material types (such as AISI316 stainless steel) are available on request, as are fittings to suit imperial tube.

Socket-weld fittings are manufactured by Hydraulink to suit metric and imperial hydraulic tube, and to suit schedule pipe. Please refer to section twelve for further detail on pipe and tube. Hydraulink socket-weld fittings are available in a wide range of end types and are typically manufactured from high quality steel and supplied unfinished for ease of welding.

Hydraulink thread forms and sealing methods are manufactured to the relevant international standards where applicable. All dimensions shown are nominal, and subject to change due to ongoing product development. For critical applications, please contact Hydraulink to confirm dimensions.

Hydraulink Fluid Connectors Ltd. reserves the right to discontinue, or to alter the design and specification of any product listed in this catalogue.

**ASSEMBLY INSTRUCTIONS - DIN METRIC COMPRESSION FITTINGS**



The Hydraulink range of D.I.N. tube fittings are manufactured to ISO 8434-1/DIN 2353 norms and are a mechanical fitting with a double cutting ring for assembly onto metric tube. The cutting ring system provides fast assembly of removable tubes, avoids welding, tapping and flaring, and so can simplify hydraulic system installation and maintenance.

During tightening of the nut, the cutting ring is compressed according to the bore of the 24° internal cone of the male fitting and bites into the steel tube. This compression produces two

deep cuts which provide sealing and resistance to the assembly loosening. The first cut (1 - see left) is visible due to a lifting of the outer surface on the diameter of the tube, while the second cut is concealed by the cutting ring (2 - see left). The second cut balances the forces on the whole assembly and provides resistance to vibration loosening the assembly.

Please see below for nominal torque values for tightening light and heavy DIN series in Nm (Newton Metres). Please note the appropriate torque can vary according to material or tolerances.

Before assembling, ensure that the tube is cut square, and that the tube and fitting are aligned.

Lubricate all components before assembly. Use a mineral based oil for carbon steel fittings and a nickel based anti seizing compound for stainless fittings.

Ensure the tube is inserted as far as possible into the fitting before commencing tightening.

When tightening, ensure the tube does not turn with the nut.

Once tightened, the cutting ring may still turn on the tube, but it is critical that the first cutting edge of the cutting ring has indentation on a minimum of 80% of the diameter of the tube.

TIGHTENING TORQUES LIGHT (L) SERIES			
Tube O.D.	Thread O.D. & Pitch	Carbon Steel (Nm)	Stainless Steel (Nm)
6	M12-1.5	20	30
8	M14-1.5	25	55
10	M16-1.5	30	85
12	M18-1.5	40	120
15	M22-1.5	60	130
18	M26-1.5	90	220
22	M30-2.0	170	320
28	M36-2.0	210	500
35	M45-2.0	360	970
42	M52-2.0	490	1110

TIGHTENING TORQUES HEAVY (S) SERIES			
Tube O.D.	Thread O.D. & Pitch	Carbon Steel (Nm)	Stainless Steel (Nm)
6	M14-1.5	25	45
8	M16-1.5	30	55
10	M18-1.5	40	90
12	M20-1.5	50	105
14	M22-1.5	70	150
16	M24-1.5	80	180
20	M30-2.0	140	340
25	M36-2.0	230	530
30	M42-2.0	300	610
38	M52-2.0	430	850

**N.B. Torque values are nominal and supplied as a guide only.**

Our product range is constantly evolving and Hydraulink reserve the right to change technical specifications without notice

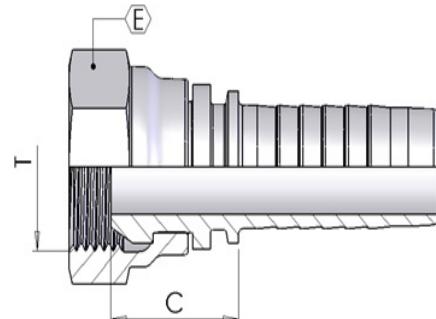
## SWAGETAILS

### SS01

BSP FEMALE STRAIGHT

BSP 60° CONE FEMALE SWIVEL NUT STRAIGHT

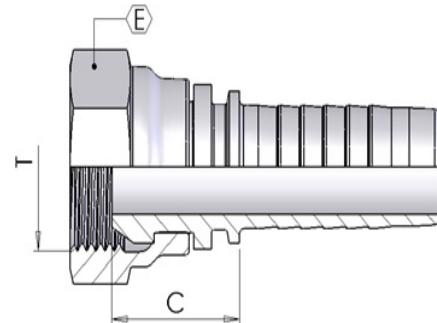
- ISO 12151-6



Part Number	BSPP Female Thread (T)	Hose I.D (Inches)	Hose I.D (mm)	Dash size	Hex A/F (E)	Cutoff - C
SS01-0204	1/8-28	1/4-19	6.4	04	14	15
SS01-0403	1/4-19	3/16	4.8	03	19	15.5
SS01-0404	1/4-19	1/4	6.4	04	19	16
SS01-0406	1/4-19	3/8	9.5	06		
SS01-0604	3/8-19	1/4	6.4	04	22	17.5
SS01-0606	3/8-19	3/8	9.5	06	22	18
SS01-0806	1/2-14	3/8	9.5	06	27	19
SS01-0808	1/2-14	1/2	12.7	08	27	19
SS01-1010	5/8-19	5/8	15.9	10	30	20.8
SS01-1208	3/4-14	1/2	12.7	08	32	22.5
SS01-1212	3/4-14	3/4	19	12	32	24
SS01-1616	1-11	1	25.4	16	41	27.5

**SS05****JIC FEMALE STRAIGHT****JIC 37° FLARE FEMALE SWIVEL NUT STRAIGHT**

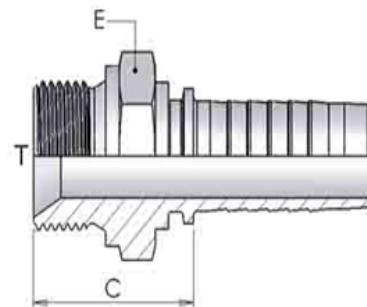
- ISO 12151-5/SAE J516



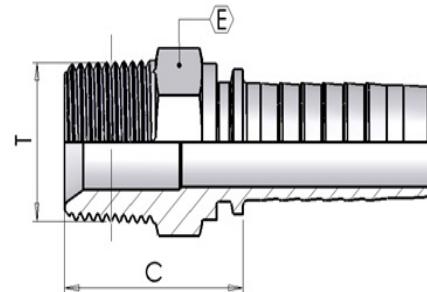
Part Number	JIC Female Thread (T)	Hose I.D (Inches)	Hose I.D (mm)	Dash size	Hex A/F (E)	Cutoff - C
SS05-0703	7/16-20	3/16	4.8	03	14	14.5
SS05-0704	7/16-20	1/4	6.4	04	14	15
SS05-0804	1/2-20	1/4	6.4	04	17	16
SS05-0904	9/16-18	1/4	6.4	04	19	17
SS05-0906	9/16-18	3/8	9.5	06	19	17
SS05-1206	3/4-16	3/8	9.5	06	24	19
SS05-1208	3/4-16	1/2	12.7	08	24	19.5
SS05-1408	7/8-14	1/2	12.7	08	27	20.5
SS05-1410	7/8-14	5/8	15.9	10	27	20.5
SS05-1712	1.1/16-12	3/4	19.0	12	32	23
SS05-2116	1.5/16-12	1	25.4	16	38	24.5

**SS12****BSP Male Straight****BSP 60° Cone Male Straight**

- ISO 12151-6



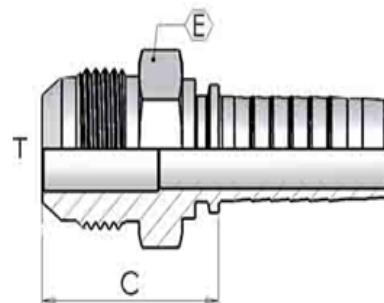
Part Number	BSPP Male Thread (T)	Hose I.D (Inches)	Hose I.D (mm)	Dash size	Hex A/F (E)	Cutoff - C
SS12-0606	3/8-19	3/8	9.5	06	22	29.5
SS12-0808	1/2-14	1/2	12.7	08	27	29.5

**SS15****BSPT MALE STRAIGHT****BSP TAPERED MALE STRAIGHT**

Part Number	BSPT Male Thread (T)	Hose I.D (Inches)	Hose I.D (mm)	Dash size	Hex A/F (E)	Cutoff - C
SS15-0404	1/4-19	1/4	6.4	04	17	28
SS15-0604	3/8-19	1/4	6.4	04	19	28
SS15-0606	3/8-19	3/8	9.5	06	19	29.5
SS15-0806	1/2-14	3/8	9.5	06	22	29.5
SS15-0808	1/2-14	1/2	12.7	08	22	29.5
SS15-1208	3/4-14	1/2	12.7	08	22	29.5
SS15-1212	3/4-14	3/4	19	12	30	39
SS15-1616	1-11	1	25.4	16	36	47

**SS18****JIC MALE STRAIGHT****JIC 37° FLARE MALE STRAIGHT**

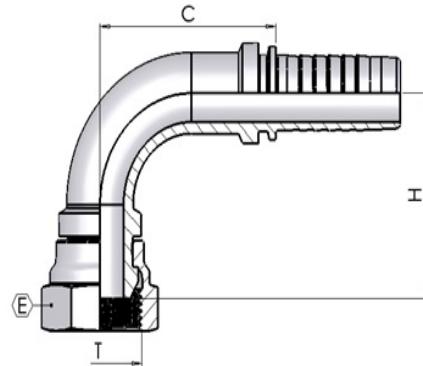
- ISO 12151-5/SAE J516



Part Number	JIC Male Thread (T)	Hose I.D (Inches)	Hose I.D (mm)	Dash size	Hex A/F (E)	Cutoff - C
SS18-0704	7/16-20	1/4	6.4	04	14	30
SS18-1206	3/4-14	3/8	9.5	06	22	29.5

**SS51****BSP FEMALE 90° ELBOW****BSP 60° CONE FEMALE SWIVEL NUT 90° ELBOW**

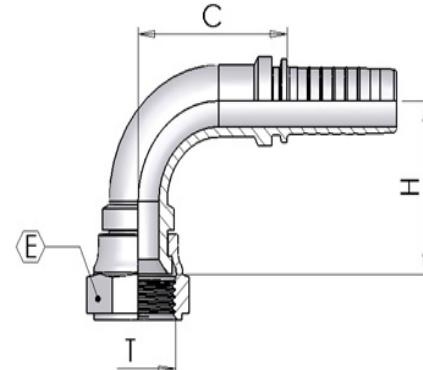
- ISO 12151-6



Part Number	BSPP Female Thread (T)	Hose I.D (Inches)	Hose I.D (mm)	Dash size	Hex A/F (E)	Drop - H	Cutoff - C
SS51-0403	1/4-19	3/16	4.8	03	19	31.5	32
SS51-0404	1/4-19	1/4	6.4	04	19	31.5	28
SS51-0606	3/8-19	3/8	9.5	06	22	39	38.5
SS51-0808	1/2-14	1/2	12.7	08	27	44	42.5
SS51-1212	3/4-14	3/4	19	12	32	63	66
SS51-1616	1-11	1	25.4	16	41	79.5	79

**SS55****JIC FEMALE 90° ELBOW****JIC 37° FLARE FEMALE SWIVEL NUT 90° ELBOW**

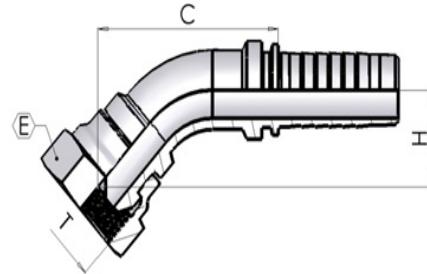
- ISO 12151-5/SAE J516



Part Number	JIC Female Thread (T)	Hose I.D (Inches)	Hose I.D (mm)	Dash size	Hex A/F (E)	Drop - H	Cutoff - C
SS55-0703	7/16-20	3/16	4.8	03	14		
SS55-0704	7/16-20	1/4	6.4	04	14	30.5	28
SS55-0904	9/16-18	1/4	6.4	04	19	32	28
SS55-0906	9/16-18	3/8	9.5	06	19	38	38.5
SS55-1206	3/4-16	3/8	9.5	06	24	40	38.5
SS55-1208	3/4-16	1/2	12.7	08	24	44	42.5
SS55-1408	7/8-14	1/2	12.7	08	27	45.5	43
SS55-1712	1.1/16-12	3/4	19	12	32	62	66
SS55-2116	1.5/16-12	1	25.4	16	38	76	79

**SS60****BSP FEMALE 45° ELBOW****BSP 60° CONE FEMALE SWIVEL NUT 45° ELBOW**

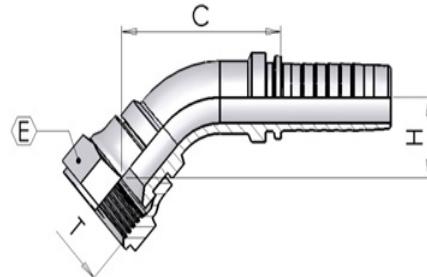
- ISO 12151-6



Part Number	BSPP Female Thread (T)	Hose I.D (Inches)	Hose I.D (mm)	Dash size	Hex A/F (E)	Drop - H	Cutoff - C
SS60-0403	1/4-19	3/16	4.8	03	19	19.5	34.5
SS60-0404	1/4-19	1/4	6.4	04	19	15.5	46.5
SS60-0606	3/8-19	3/8	9.5	06	22	20.6	62.1
SS60-0808	1/2-14	1/2	12.7	08	27	22.3	67.8
SS60-1212	3/4-14	3/4	19.0	12	32	27.1	102.1
SS60-1616	1-11	1	25.4	16	41	36.6	125.6

**SS64****JIC FEMALE 45° ELBOW****JIC 37° FLARE FEMALE SWIVEL NUT 45° ELBOW**

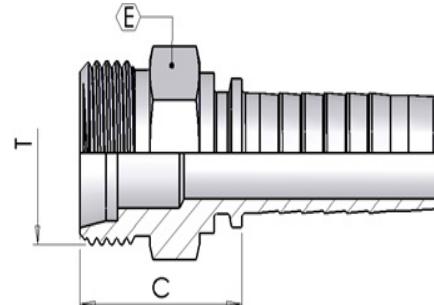
- ISO 12151-5/SAE J516



Part Number	JIC Female Thread (T)	Hose I.D (Inches)	Hose I.D (mm)	Dash size	Hex A/F (E)
SS64-0703	7/16-20	3/16	4.8	03	
SS64-0704	7/16-20	1/4	6.4	04	14
SS64-0904	9/16-18	1/4	6.4	04	19
SS64-0906	9/16-18	3/8	9.5	06	19
SS64-1206	3/4-16	3/8	9.5	06	24
SS64-1208	3/4-16	1/2	12.7	08	24
SS64-1408	7/8-14	1/2	12.7	08	27
SS64-1712	1.1/16-12	3/4	19	12	32
SS64-2116	1.5/16-12	1	25.4	16	38

**SS78****MET HEAVY MALE STRAIGHT****METRIC 24° CONE HEAVY MALE STRAIGHT**

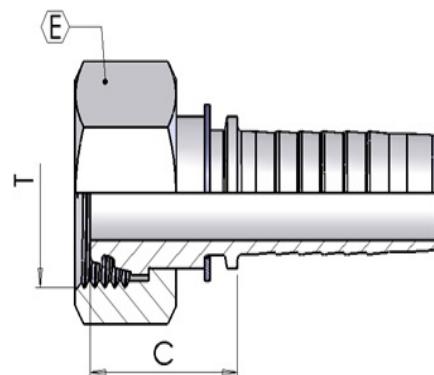
- ISO 12151-5



Part Number	Metric Male Thread (T)	Hose I.D (Inches)	Hose I.D (mm)	Dash size	Tube Size	Hex A/F (E)	Cutoff - C
SS78-M1604	M16-1.5	1/4	6.4	04	8	17	26.5
SS78-M1806	M18-1.5	3/8	9.5	06	10	19	29.5
SS78-M2006	M20-1.5	3/8	9.5	06	12	22	29.5
SS78-M2206	M22-1.5	3/8	9.5	06	14	24	29.5
SS78-M2408	M24-1.5	1/2	12.7	08	16	27	29.5
SS78-M3012	M30-2	3/4	19	12	20	32	39
SS78-M3616	M36-2	1	25.4	16	25	41	47

**SS79****MET HEAVY FEMALE STRAIGHT****METRIC 24° CONE HEAVY FEMALE SWIVEL NUT STRAIGHT**

- ISO 12151-5

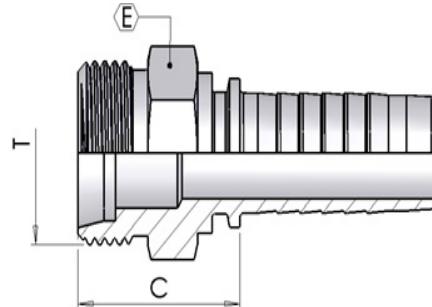


Part Number	Metric Female Thread (T)	Hose I.D (Inches)	Hose I.D (mm)	Dash size	Tube Size	Hex A/F (E)	Cutoff - C
SS79-M1604	M16-1.5	1/4	6.4	04	8	19	25
SS79-M1804	M18-1.5	1/4	6.4	04	10	22	26
SS79-M2006	M20-1.5	3/8	9.5	06	12	24	23
SS79-M2206	M22-1.5	3/8	9.5	06	14	27	33
SS79-M2408	M24-1.5	1/2	12.7	08	16	30	35
SS79-M3010	M30-2	5/8	15.9	10	20	36	36.8
SS79-M3012	M30-2	3/4	19	12	20	36	33.6
SS79-M3612	M36-2	3/4	19	12	25	46	43

**SS80**

MET LIGHT MALE STRAIGHT  
METRIC 24° CONE LIGHT MALE STRAIGHT

- ISO 12151-5

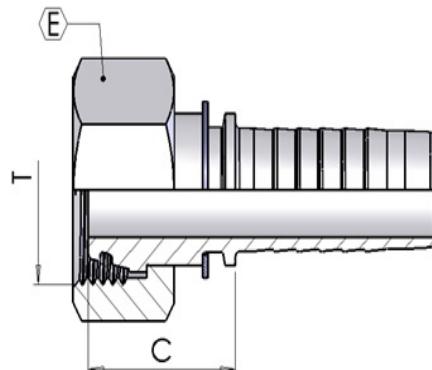


Part Number	Metric Male Thread (T)	Hose I.D. (Inches)	Hose I.D. (mm)	Dash size	Tube Size	Hex A/F (E)	Cutoff - C
SS80-M1604	M16-1.5	1/4	6.4	04	10	17	28
SS80-M1606	M16-1.5	3/8	9.5	06	12	17	29.5
SS80-M1806	M18-1.5	3/8	9.5	06	12	19	29.5
SS80-M2208	M22-1.5	1/2	12.7	08	15	24	29.5

**SS81**

MET LIGHT FEMALE STRAIGHT  
METRIC 24° CONE LIGHT FEMALE SWIVEL NUT  
STRAIGHT

- ISO 12151-5

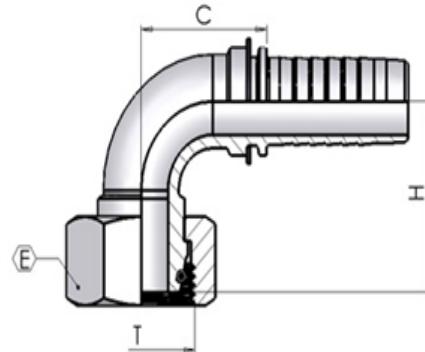


Part Number	Metric Female Thread (T)	Hose I.D. (Inches)	Hose I.D. (mm)	Dash size	Tube Size	Hex A/F (E)	Cutoff - C
SS81-M1204	M12-1.5	1/4	6.4	04	6	14	18.5
SS81-M1404	M14-1.5	1/4	6.4	04	8	17	24
SS81-M1604	M16-1.5	1/4	6.4	04	10	19	22
SS81-M1606	M16-1.5	3/8	9.5	06	10	19	24
SS81-M1806	M18-1.5	3/8	9.5	06	12	22	23
SS81-M2208	M22-1.5	1/2	12.7	08	15	27	29
SS81-M2608	M26-1.5	1/2	12.7	08	18	32	27.5
SS81-M2610	M26-1.5	5/8	15.9	10	18	32	30.5
SS81-M3012	M30-2	3/4	19	12	22	46	32.5
SS81-M3616	M36-2	1	25.4	16	28	41	33.5

**SS83**

MET HEAVY FEMALE 90° ELBOW  
METRIC 24° CONE HEAVY FEMALE SWIVEL NUT  
90° ELBOW

- ISO 12151-5

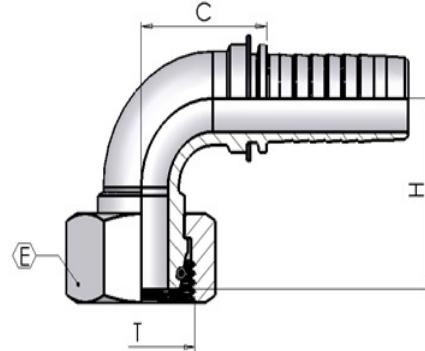


Part Number	Metric Female Thread (T)	Hose I.D (Inches)	Hose I.D (mm)	Dash size	Tube Size	Hex A/F (E)	Drop (H)	Cutoff - C
SS83-M2006	M20-1.5	3/8	9.5	06	12	24	34	33.5
SS83-M2408	M24-1.5	1/2	12.7	08	16	30	41	40
SS83-M3612	M36-2	3/4	19	12	25	46	58.5	56.2

**SS86**

MET LIGHT FEMALE 90° ELBOW  
METRIC 24° CONE LIGHT FEMALE SWIVEL NUT 90°  
ELBOW

- ISO 12151-5

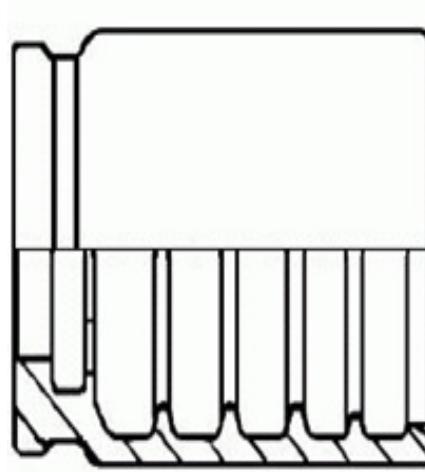


Part Number	Metric Female Thread (T)	Hose I.D (Inches)	Hose I.D (mm)	Dash size	Tube Size	Hex A/F (E)	Drop (H)	Cutoff - C
SS86-M1606	M16-1.5	3/8	9.5	06	10	19	45	38.5
SS86-M1806	M18-1.5	3/8	9.5	06	12	22	41	38.5
SS86-M2208	M22-1.5	1/2	12.7	08	15	27	47.5	42.5
SS86-M3012	M30-2	3/4	19	12	20			

## FERRULES

### SSCN

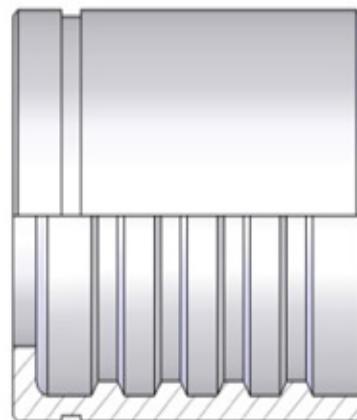
BRAIDED HOSE SWAGE FERRULE  
NON-SKIVE SWAGE FERRULE FOR ONE & TWO-  
WIRE HOSE



Part Number	Hose I.D inches	Hose I.D (mm)	Dash size	O.A Length	I.D - mm	O.D - mm
SSCN-04	1/4	6.4	04	30.0	15.6	23.0
SSCN-06	3/8	9.5	06	31.0	19.7	26.0
SSCN-08	1/2	12.7	08	32.0	23.0	29.0
SSCN-10	5/8	15.9	10	36.0	26.3	33.0
SSCN-12	3/4	19	12	42.5	30.2	37.0
SSCN-16	1	25.4	16	51.0	39.2	46.0

### SSCNT

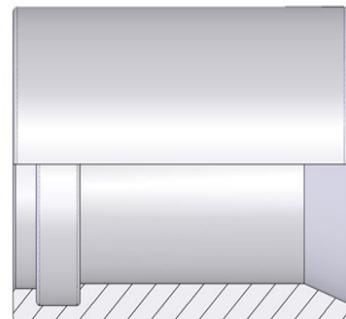
THERMOPLASTIC HOSE FERRULE  
NON-SKIVE SWAGE FERRULE FOR  
THERMOPLASTIC HOSE



Part Number	Hose I.D inches	Hose I.D (mm)	Dash size	O.A Length	I.D - mm	O.D - mm
SSCNT-03	3/16	4.8	03	26.5	11.3	14.0
SSCNT-04	1/4	6.4	04	30.5	14.0	18.0
SSCNT-06	3/8	9.5	06	33.0	17.8	22.0
SSCNT-08	1/2	12.7	08	34.0	21.0	26.0

**SSMS****SPIRAL HOSE SWAGE FERRULE****SKIVE SWAGE FERRULE FOR GATES SPIRAL 4****WIRE HOSE**

Part Number	Hose I.D inches	Hose I.D (mm)	Dash size	O.A Length	I.D - mm	O.D - mm
SSMS12-08	1/2	12.7	08	32.0	22.2	30.0
SSMS12-10	5/8	15.9	10	36	25.4	33.0
SSMS12-12	3/4	19	12	42.5	29.2	38.0
SSMS12-16	1	25.4	16	51.0	36.4	46.0

**SSP1****PTFE SWAGE FERRULE****SWAGE FERRULE FOR PTFE SMOOTH TRUE BORE****HOSE**

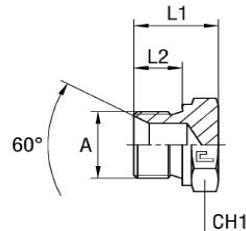
Part Number	Hose I.D inches	Hose I.D (mm)	Dash size	O.A Length	I.D - mm	O.D - mm
SSP1-04	1/4	6.4	04	30.0	11.0	15.0
SSP1-06	3/8	9.5	06	30.0	14.0	18.0
SSP1-08	1/2	12.7	08	32.0	19.0	24.0
SSP1-12	3/4	19	12	33.5	24.9	30.0
SSP1-16	1	25.4	16	45.0	30.3	36.0

## ADAPTORS

### SB

BSPP MALE PLUG

BSPP MALE HEX PLUG WITH 60° CONE

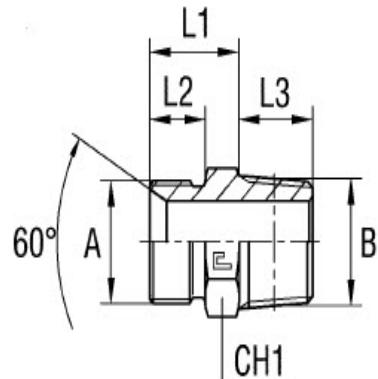


Part Number	Minimum Final I.D - mm	Minimum Final I.D - inches	Maximum Final I.D - mm	Maximum Final I.D - inches
SB15	12.7	0.5	17.46	0.69
SB19	17.46	0.69	20.64	0.81
SB22	20.64	0.81	23.81	0.94
SB25	23.81	0.94	26.99	1.06
SB29	26.99	1.06	30.16	1.19
SB34	33.34	1.31	38.10	1.50
SB41	38.1	1.5	44.45	1.75
SB48	44.45	1.75	50.8	2
SB54	50.8	2	57.15	2.25
SB60	57.15	2.25	63.5	2.5
SB67	63.5	2.5	69.85	2.75
SB73	69.85	2.75	76.2	3
SB-04	1/4-19	19	11	
SB-06	3/8-19	20.5	12	
SB-08	1/2-14	24	14	
SB-12	3/4-14	28	16	
SB-16	1-11	32	19	

**SA-B**

BSPT MALE X BSP MALE

BSPT MALE X BSP 60° CONE MALE STRAIGHT

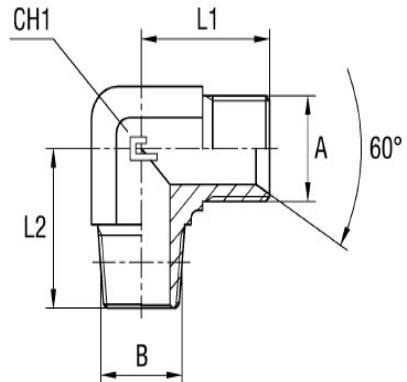


Part Number	BSPT Male Thread (B)	BSPP Male Thread (A)	Length mm (L1)	Thread Length - mm (L2)	Thread Length - mm (L3)	Hex A/F (CH1)
SA-B-0404	1/4-19	1/4-19	17	11	15	14
SA-B-0606	3/8-19	3/8-19	18	12	15	17
SA-B-0808	1/2-14	1/2-14	21	14	19	22
SA-B-1212	3/4-14	3/4-14	25	16	19	27
SA-B-1616	1-11	1-11	29	19	24	36

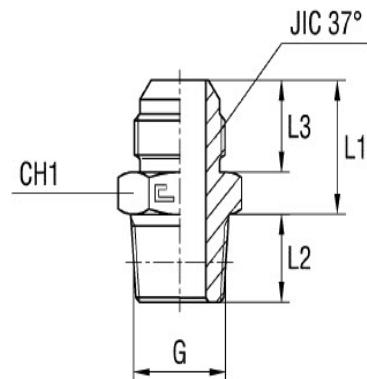
**SA-B-90**

BSPT MALE X BSP MALE

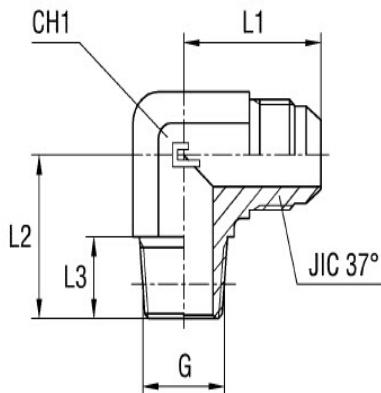
BSPT MALE X BSP 60° CONE MALE STRAIGHT



Part Number	BSPT Male Thread (B)	BSPP Male Thread (A)	L1 - mm	L2 - mm	Hex A/F (CH1)
SA-B-90-0606	3/8-19	3/8-19	29	31	19
SA-B-90-1212	3/4-14	3/4-14	41	40	27

**SA-G**
**BSPT MALE X JIC MALE**
**BSPT MALE X JIC 37° FLARE MALE STRAIGHT**


Part Number	BSPT Male Thread (G)	JIC Male Thread (JIC)	Length mm (L1)	Thread Length - mm (L2)	Thread Length - mm (L3)	Hex A/F (CH1)
SA-G-0207	1/8-28	7/16-20	21	10	14	14
SA-G-0407	1/4-19	7/16-20	21	15	14	14
SA-G-0409	1/4-19	9/16-18	22	15	14	17
SA-G-0609	3/8-19	9/16-18	22	15	14	17
SA-G-0612	3/8-19	3/4-16	25	15	17	22
SA-G-0812	1/2-14	3/4-16	25	19	17	22
SA-G-0814	1/2-14	7/8-14	29	19	20	24
SA-G-1621	1-11	1.5/16-12	35	24	23	36

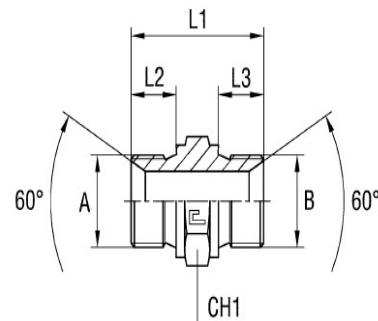
**SA-G-90**
**BSPT MALE X JIC MALE**
**BSPT MALE X JIC 37° FLARE MALE 90° ELBOW**


Part Number	BPST Male Thread (G)	JIC Male Thread (JIC)	L1 - mm	L2 - mm	L3 - mm	Hex A/F (CH1)
SA-G-90-0609	3/8-19	9/16-18	30	31	15	19
SA-G-90-0612	3/8-19	3/4-16	32	31	14.5	19
SA-G-90-0812	1/2-14	3/4-16	32	37.5	19	22

**SB-B**

BSP MALE X BSP MALE  
BSP 60° CONE MALE X BSP 60° CONE MALE  
STRAIGHT

- ISO 8434-6

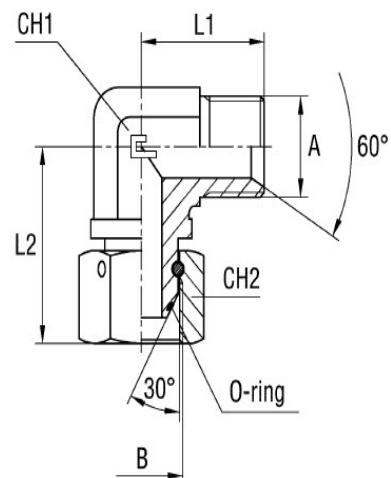


Part Number	BSPP Male Thread (A)	BSPP Male Thread (B)	Length mm (L1)	Thread Length - mm (L2)	Thread Length - mm (L3)	Hex A/F (CH1)
SB-B-0404	1/4-19	1/4-19	32	11	11	19
SB-B-0406	1/4-19	3/8-19	34	11	12	22
SB-B-0606	3/8-19	3/8-19	35	12	12	22
SB-B-0608	3/8-19	1/2-14	39	12	14	27
SB-B-0808	1/2-14	1/2-14	41	14	14	27
SB-B-0812	1/2-14	3/4-14	45	14	16	32
SB-B-1212	3/4-14	3/4-14	47	16	16	32
SB-B-1616	1-11	1-11	54	19	19	41

**SB-C-90**

BSP MALE X BSP FEMALE  
BSP 60° CONE MALE X BSP 60° CONE FEMALE  
SWIVEL NUT 90° ELBOW

- ISO 8434-6



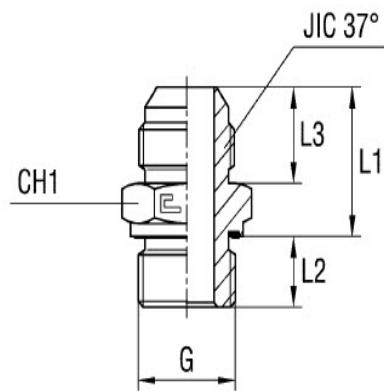
Part Number	BSPP Male Thread (A)	BSPP Female Thread (B)	L1 - mm	L2 - mm	Hex A/F (CH1)	Hex A/F (CH2)
SB-C-90-0404	1/4-19	1/4-19	26	33	14	19
SB-C-90-1212	3/4-14	3/4-14	41	54	27	32

**SB-G**

BSP MALE X JIC MALE

BSP 60° CONE MALE X JIC 37° FLARE MALE

STRAIGHT



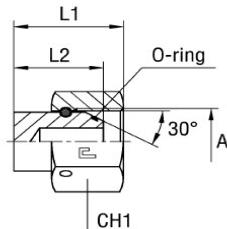
Part Number	BSPP Male Thread (G)	JIC Male Thread (JIC)	Thread (L1)	Thread Length mm (L2)	Thread Length - mm (L3)	Hex A/F (CH1)
SB-G-0407	1/4-19	7/16-20	23	12	14	19
SB-G-0409	1/4-19	9/16-18	23	12	14	19
SB-G-0609	3/8-19	9/16-18	24	12	14	22
SB-G-0612	3/8-19	3/4-16	27	12	17	22
SB-G-0812	1/2-14	3/4-16	29	14	17	27
SB-G-0814	1/2-14	7/8-14	31	14	19	27
SB-G-1217	3/4-14	1.1/16-12	35	16	22	32
SB-G-1621	1-11	1.5/16-12	38	18	23.1	41

**SC**

BSP FEMALE

BSP 60° CONE FEMALE SWIVEL NUT CAP

- ISO 8434-6

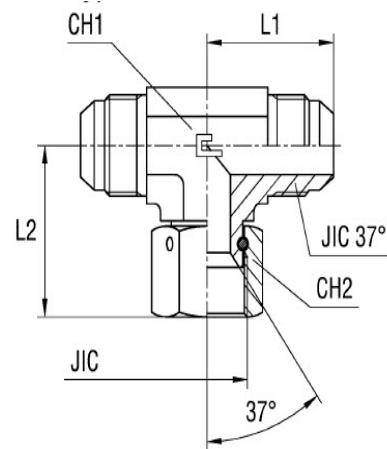


Part Number	BSPP Female Thread (A)	Length (L1)	Hex A/F (CH1)
SC-04	1/4-19	19	15
SC-08	1/2-14	24	19
SC-12	3/4-14	30	21

**SG-G-J**

JIC MALE X JIC MALE X JIC FEMALE  
JIC 37° FLARE MALE X JIC 37° FLARE MALE X JIC  
37° FLARE FEMALE SWIVEL NUT TEE

- ISO 8434-2

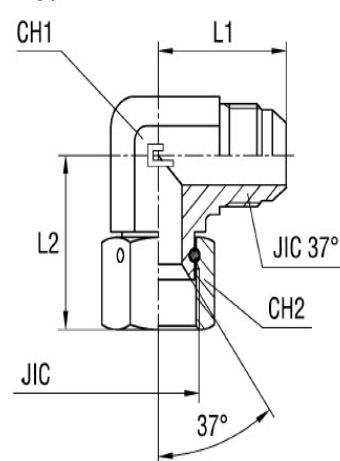


Part Number	JIC Male Thread (JIC 37)	JIC Female Thread (JIC)	L1 - mm	L2 - mm	Hex A/F (CH1)	Hex A/F (CH2)
SG-G-J-070707	7/16-20	7/16-20	23	27	11	14

**SG-J-90**

JIC MALE X JIC FEMALE  
JIC 37° FLARE MALE X JIC 37° FLARE FEMALE  
SWIVEL NUT 90° ELBOW

- ISO 8434-2

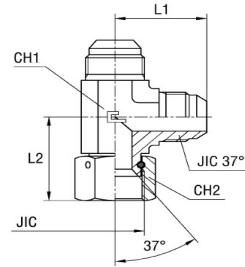


Part Number	JIC Male Thread (JIC 37)	JIC Female Thread (JIC)	L1 - mm	L2 - mm	Hex A/F (CH1)	Hex A/F (CH2)
SG-J-90-0707	7/16-20	7/16-20	23	27	11	14
SG-J-90-0909	9/16-18	9/16-18	28	31	14	19
SG-J-90-1212	3/4-16	3/4-16	32	36	19	22

**SG-J-G**

JIC MALE X JIC FEMALE X JIC MALE  
JIC 37° FLARE MALE X JIC 37° FLARE FEMALE  
SWIVEL NUT X JIC 37° FLARE MALE TEE

- ISO 8434-2



Part Number	JIC Male Thread (JIC 37)	JIC Female Thread (JIC)	L1 - mm	L2 - mm	Hex A/F (CH1)	Hex A/F (CH2)
SG-J-G-070707	7/16-20	7/16-20	23	27	11	14
SG-J-G-090909	9/16-18	9/16-18	28	31	14	19
SG-J-G-121212	3/4-16	3/4-16	32	36	19	22
SG-J-G-171717	1.1/16-12	1.1/16-12	42	44	27	32

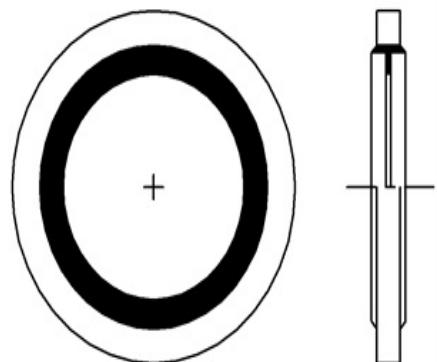
## REPLACEMENT SEALS

**SD**

BONDED SEAL

SELF CENTERING BONDED (DOWTY) SEAL

STAINLESS STEEL



Part Number	Internal dimension - mm	Suits thread
SD-04	13.7	1/4-19 BSPP
SD-06	17.3	3/8-19 BSPP
SD-08	21.5	1/2-14 BSPP
SD-10	23.5	5/8-14 BSPP
SD-12	27.1	3/4-14 BSPP
SD-16	33.9	1-11 BSPP
SD-20	42.9	1.1/4-11 BSPP
SD-24	48.4	1.1/2-11 BSPP