Lubrication

Hydraulink®

Technical Information

Section 1

Hydraulink Hose and Fittings

PRODUCT SELECTION

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.

Hydraulink Hose and Fittings

PRODUCT SELECTION

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 impulsing?
- ➢ 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 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 impulsing 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.

Hydraulink Hose and Fittings

THREAD IDENTIFICATION

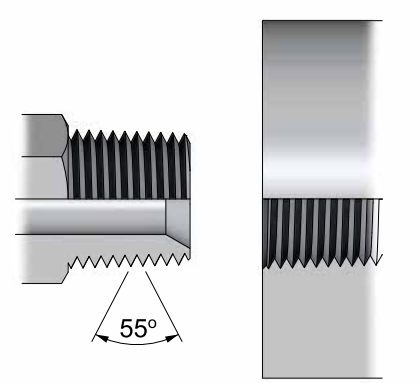
B.S.P.T. - BRITISH STANDARD PIPE TAPER

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
1/8-28	9.7	8.5
1/4-19	13.1	11.4
3/8-19	16.6	14.9
1/2-14	20.9	18.6
5/8-14	22.9	20.6
3/4-14	26.4	24.1
1-11	33.2	30.2
1.1/4-11	41.9	38.9
1.1/2-11	47.8	44.8
2-11	59.6	56.6

**Basic gauge plane diameter at basic gauge depth*

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

Thread Angle: 55°

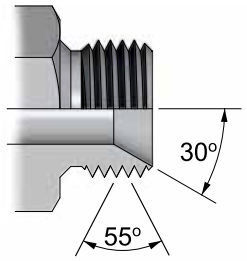
The British Standard Pipe Parallel (BSPP) male is typically coned 30° and will mate with either a BSPP swivel nut female or a BSPP female port.

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

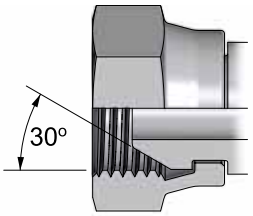
In some cases,the port is chamfered to accept an “O” ring seal. (Similar to the U.N.O. style).

Thread Size & TPI	Male Thread O.D. BSPP	Female Thread I.D. BSPP	Torque Settings BSPP nuts
1/8-28	9.7	8.5	12 Nm
1/4-19	13.1	11.4	26 Nm
3/8-19	16.6	14.9	47 Nm
1/2-14	20.9	18.6	79 Nm
5/8-14	22.9	20.6	104 Nm
3/4-14	26.4	24.1	128 Nm
1-11	33.2	30.2	160 Nm
1.1/4-11	41.9	38.9	200 Nm
1.1/2-11	47.8	44.8	270 Nm
2-11	59.6	56.6	350 Nm

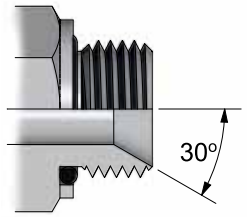
N.B. Torque values are nominal and supplied as a guide only.



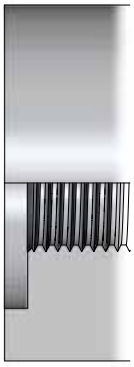
BSPP male



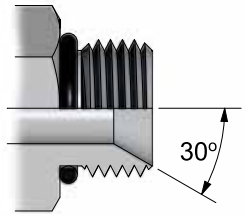
BSPP swivel nut female



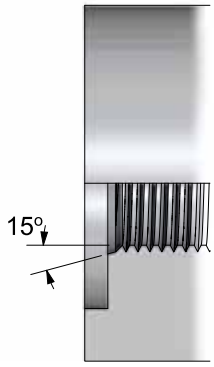
BSPP male with captive o-ring seal



BSPP female port (spot-faced)



BSPP male with o-ring seal



BSPP female port (chamfered)

Hydraulink Hose and Fittings

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

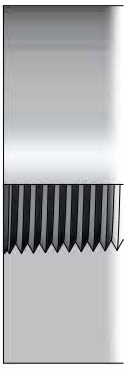
Taper: 1 in 16 by diameter.

Thread Angle: 60°

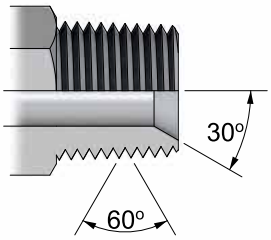
The National Pipe Taper Fuel (NPTF) male is coned 30° and will mate with the NPTF female port (taper), the National Pipe Straight Mechanical (NPSM) female (swivel nut female with 30° sealing cone), or the National Pipe Straight Fuel (NPSF) female port (parallel).

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

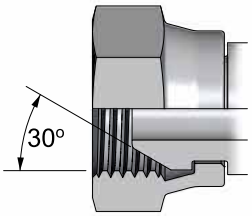
Thread Size & TPI	Male Thread O.D.	Female Thread I.D.	
	NPTF	NPTF	NPSF/SM
1/8-27	10.0	8.6	8.7
1/4-18	13.3	11.2	11.4
3/8-18	16.7	14.7	14.9
1/2-14	20.8	18.2	18.8
3/4-14	26.1	23.5	23.9
1-11.1/2	32.7	29.5	30.2
1.1/4-11.1/2	41.4	38.3	39.1
1.1/2-11.1/2	47.5	44.4	45
2-11.1/2	59.3	56.2	57



NPTF female port (taper)



NPTF male (taper)



NPSM swivel nut female

NPSF female port (parallel)

Hydraulink Hose and Fittings

THREAD IDENTIFICATION

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

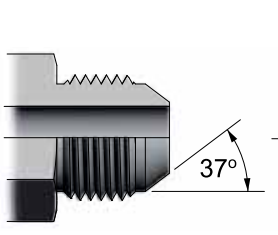
J.I.C. and U.N.“O”-Ring threads are both of the Unified National Form.

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.

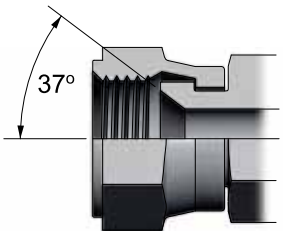
U.N.“O”-Ring refers to the thread type and “O”-Ring for sealing. The female U.N.O port has a chamfer to accept the o-ring.

Thread Size & TPI	Female Thread I.D.	Tube O.D.	Torque Settings JIC	Torque Settings 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

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

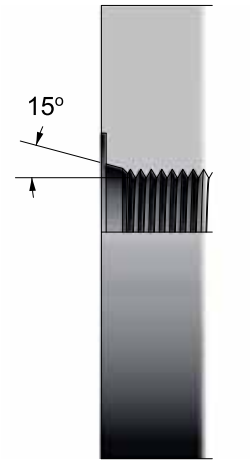


JIC male



JIC swivel nut female

UNO male



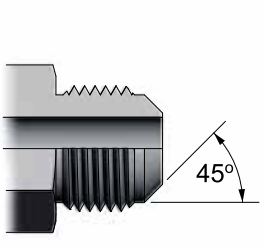
UNO female port (chamfered)

Hydraulink Hose and Fittings

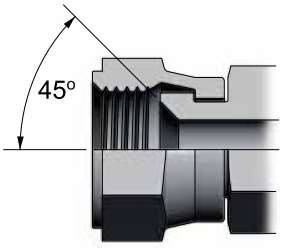
THREAD IDENTIFICATION

S.A.E. - SOCIETY OF AUTOMOTIVE ENGINEERS

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



SAE male



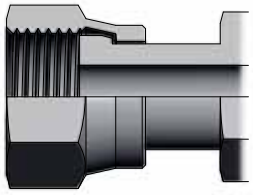
SAE swivel nut female

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

O.R.F.S. - O-RING FACE SEAL

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.

ORFS male



ORFS swivel nut female

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.

Hydraulink Hose and Fittings

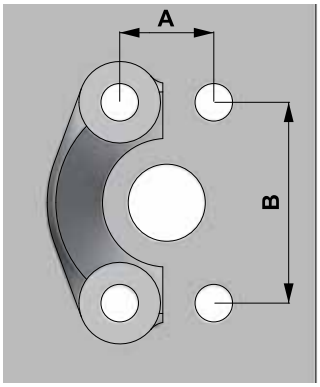
THREAD IDENTIFICATION

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

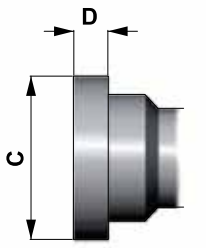
These connections utilise an “O”-Ring for sealing and are widely used for connecting to pump and motor parts as well as end terminations for pipe runs.

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) Code 61	A (mm) Code 62	B (mm) Code 61	B (mm) Code 62	C (mm) Code 61	C (mm) Code 62	D (mm) Code 61	D (mm) 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 Code 61	Pressure Rating Code 62	"O"-ring size Code 61 and 62	"O"-ring size AS568A number	UNC Bolt size Code 61	UNC Bolt size Code 62	Bolt torque Code 61	Bolt torque 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

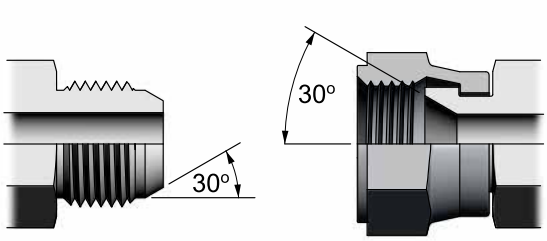
"O"-Ring Flanges:

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

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

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

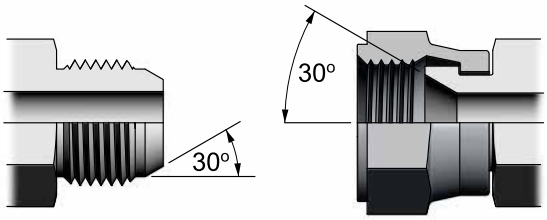
** denotes interchange sizes between JIS and Komatsu.*



Type F JIS male

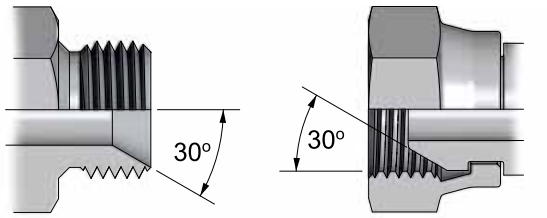
For thread data please refer to BSPP section

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

Hydraulink Hose and Fittings

THREAD IDENTIFICATION

D.I.N. METRICS 24° CONE SYSTEM

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

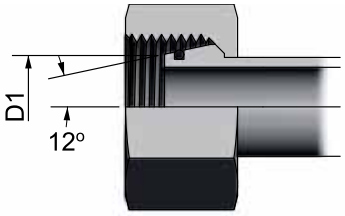
Series LL;	Extra Light, up to 100 bar
Series L;	Light up to 250 bar
Series S;	Heavy up to 640 bar

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.

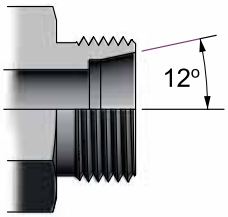
N.B: Rated coupling pressures are subject to the design pressures of the tube or hose being used.

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 cuttting ring and nut. Hose can also be connected directly to tube by use of a hose tail with the D.I.N. Male form

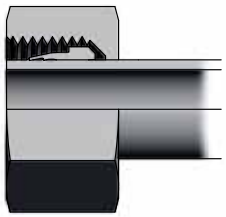
The male form will accept all three female styles shown (right).



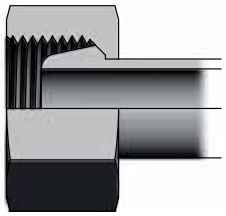
DIN 24° cone female with o-ring



DIN 24° cone male



DIN cutting ring and nut on tube



DIN female swivel nut with spherical seat

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.*

Hydraulink Hose and Fittings

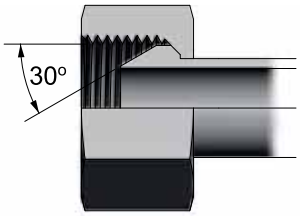
THREAD IDENTIFICATION

D.I.N. METRICS 60° CONE SYSTEM

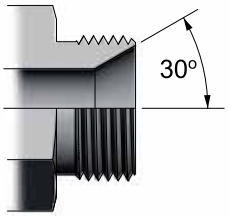
This series utilises a 60° cone seating angle and is used for the connection of hose assemblies and tube. It differs from the 24° series in that the threads are predominately 1.5mm pitch and there is no light or heavy pressure ranges.

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.

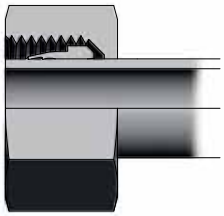
THREAD SPECIFICATIONS		
Thread O.D. & Pitch	Female Thread I.D.	Tube O.D.(mm)
M10-1.0	9.0	5
M12-1.5	10.5	6
M14-1.5	12.5	8
M16-1.5	14.5	10
M18-1.5	16.5	12
M22-1.5	20.5	15
M26-1.5	24.5	18
M30-1.5	28.5	22
M38-1.5	36.5	28
M45-1.5	43.5	35
M52-2.0	56.5	42



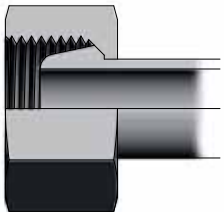
DIN 60° cone female



DIN 60° cone male



DIN cutiing ring and nut on tube

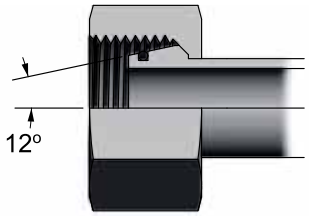


DIN female swivel nut with spherical seat

THREAD IDENTIFICATION

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

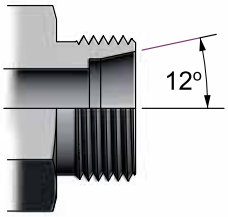
The I.S.O. series of couplings is similar to the D.I.N. light and heavy in function. The male has a 24° included angle sealing cone and a recessed counter bore for locating the tube when used in conjunction with a cutting ring and nut. The male will also accept a swivel nut female with either a cone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



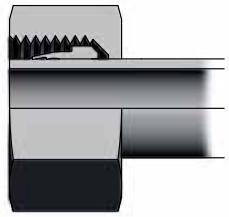
ISO (24° cone) female with o-ring

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

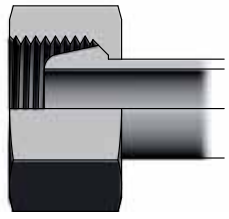
** Interchange with D.I.N. Light*
*** Interchange with D.I.N. Heavy*



ISO (24° cone) male



ISO cutting ring and nut on tube



ISO female swivel nut with spherical seat

Hydraulink Hose and Fittings

THREAD IDENTIFICATION

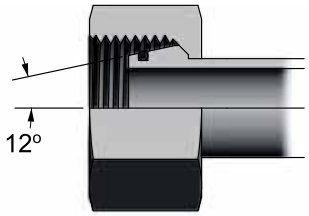
FRENCH METRICS (GAZ & MILLIMETRIQUE SERIES)

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.

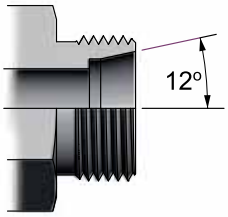
The Gaz and Millimetrique series are identical in all respects except for the O.D. of the tube:

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

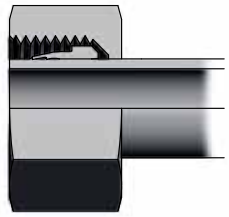


French 24° cone female with o-ring

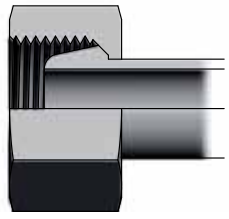
THREAD SPECIFICATIONS LIGHT (L) SERIES			
Thread O.D. & Pitch	Female Thread I.D.	Diameter GAZ	Diameter Millimetrique
M12-1.0	11.0	-	6
M14-1.5	12.5	-	8
M16-1.5	14.5	-	10
M18-1.5	16.5	-	12
M20-1.5	18.5	13.25	14
M22-1.5	20.5	-	15
M24-1.5	22.5	16.75	16
M27-1.5	25.5	-	18
M30-1.5	28.5	21.25	22
M33-1.5	31.5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



French 24° cone male



Cutting ring and nut on tube



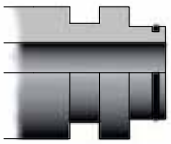
French female swivel nut with spherical seat

THREAD IDENTIFICATION

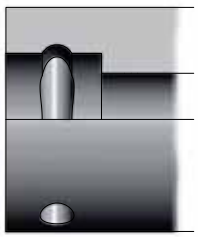
STAPLE-LOK COUPLINGS

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.

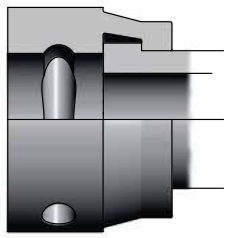


Staple-lok male



Staple-lok fixed female

THREAD SPECIFICATIONS					
Coupling Dash Size	Imperial Size	Male O.D. inch	Male O.D. mm	Female I.D. inch	Female I.D. 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



Staple-lok swivel female

Staple-lok staple

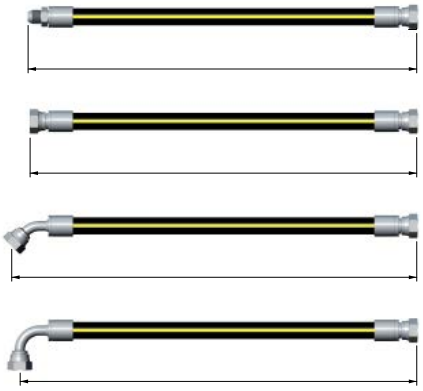
Hydraulink Hose and Fittings

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.



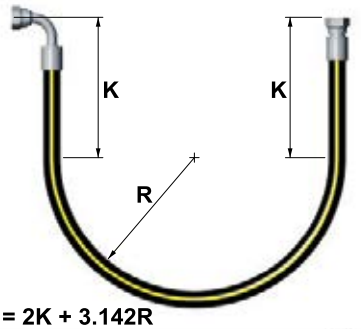
BENT HOSE ASSEMBLY LENGTH

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”.

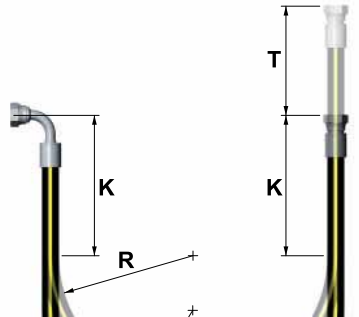
Hose I.D.	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	1.1/4	1.1/2	2
K (mm)	110	130	130	160	180	210	210	260	260	260	310



Length = 2K + 3.142R

Dynamic Installations

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



Length = 2K + 3.142R + T

Off-Set Angle Measurement

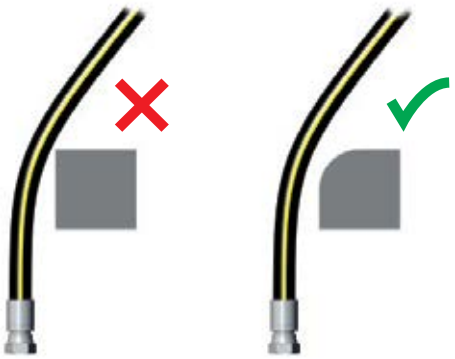
Place hose assembly in line of sight position with coupling furthest away facing upwards. Determine off-set angle by comparing relative position of closest coupling to the far coupling in a clockwise direction.

Hydraulink Hose and Fittings

HOSE INSTALLATION RECOMMENDATIONS

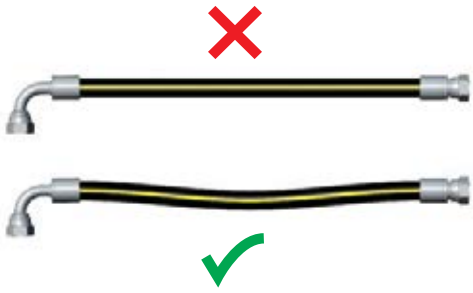
1. Hose Protection
Protect the hose cover from damage such as abrasion, erosion, snagging, and cutting. Where possible, route hose to reduce abrasion from hose rubbing other hose or objects that may abrade it (Fig. 1). Special abrasion-resistant hoses and hose guards are available for additional protection.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

Fig. 1



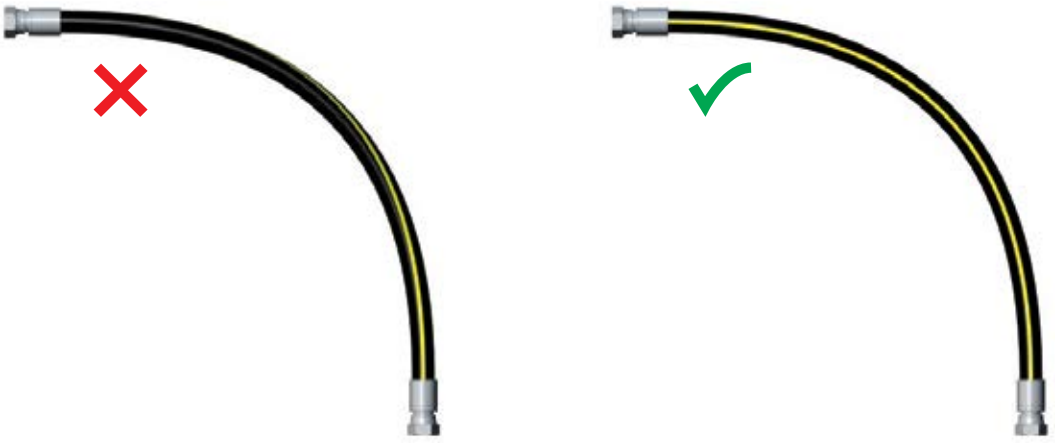
2. Hose And Machine Tolerances
Avoid tension on hose assemblies and adaptors. Design hose to allow for changes in length due to machine motion and tolerances (Fig. 2). Failure to do so may result in seal or assembly failure.

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

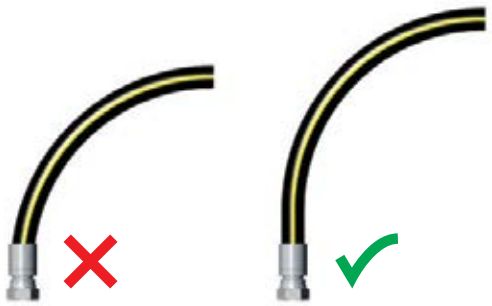


Fig. 4b

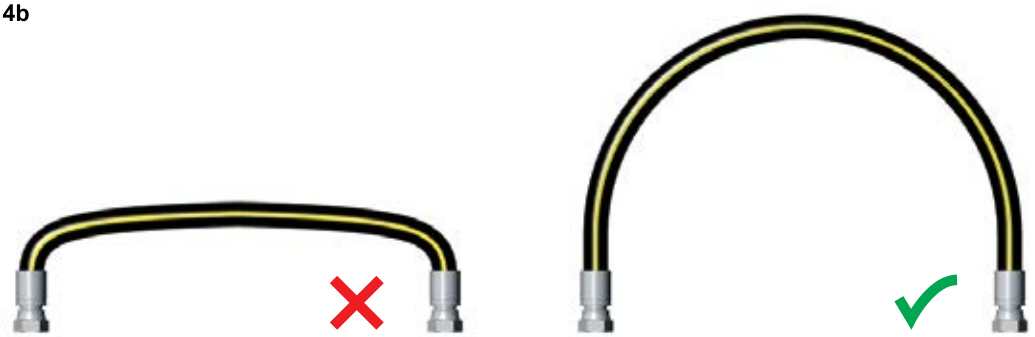


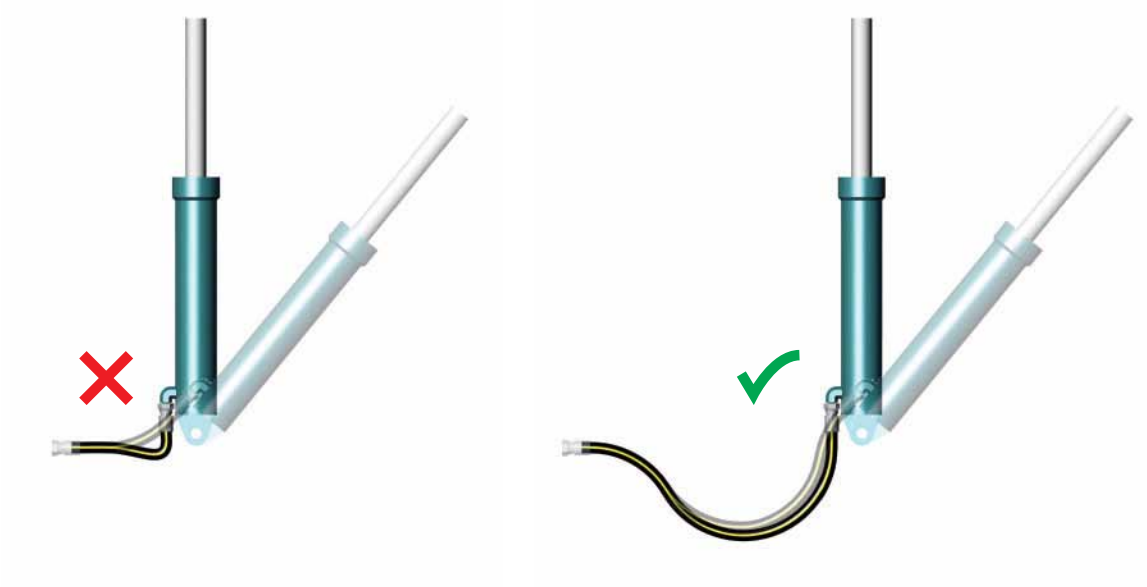
Fig. 4c

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 occuring that are smaller than the minimum bend radius (Fig. 6a).

Fig. 6a



Hydraulink®

Lubrication Systems

Section 26

The Lincoln QuickLub is an automated and centralised lubrication system that can improve productivity and extend the service life of your plant.

Suitable for all types of hydraulic and industrial applications undertaken across a diverse range of industries, the system automatically delivers lubricant through a single supply line to a network of metering valves.

Ideal for

- daily or weekly lubrications requirements
- Insufficient man power
- Hard to reach lubrication points

HOSE

HIGH PRESSURE HOSE

GREASE HOSE 4.1 ID GREASE FILLED
LUBRICATION HOSE 240 BAR

Part Number	Hose OD mm (da)	Hose ID mm (di)	Working Pressure (bar)	Bend Radius mm	Grease Filled
02-111-35114-1	8.6	4.0	240	20	No
02-504-36033-3	8.6	4.0	240	20	Yes

PLASTIC TUBE

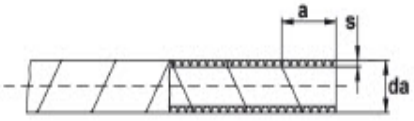
PLASTIC GREASE TUBE GREASE FILLED
LUBRICATION TUBE

Part Number	Hose OD mm (da)	Hose ID mm (di)	Wall Thickness (mm)	Working Pressure (bar)	Grease Filled
02-112-35127-2	6.0	3.0	1.5	89	No
02-112-35127-7	4.0	2.3	.85	36	No
02-504-36041-2	6.0	3.0	1.5	89	Yes

HOSE GUARD

PLASTIC HELIX

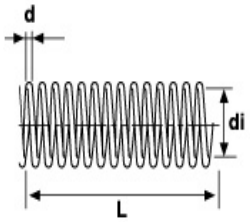
PLASTIC GREASE HOSE 12.6MM



Part Number	OD mm (da)	Wall Thickness mm (s)	Band Width mm
02-113-35075-3	11.5	1.0	10

SPRING GUARD

SPRING COIL SS 19X12

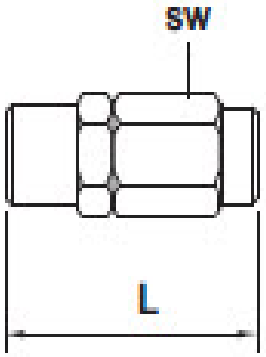


Part Number	Length mm (L)	ID mm (di)	Material Thickness mm (d)
02-111-35306-1	5000	10.6	1.2

SCREW SLEEVE

SCREW SLEEVE

28MM SCREW SLEEVE



Part Number	Sleeve Length mm	Hex A/F mm	Material
02-432-23031-1	28	12	Black Steel
02-432-23676-1	28	12	Stainless Steel

HOSE STUD

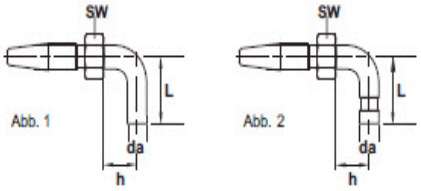
STRAIGHT HOSE STUD

6MM HOSE STUD SHORT
STRAIGHT HOSE STUD

Part Number	Length mm	Hex A/F mm (SW)	Material	OD mm (D1)
02-432-23067-1	30	10	Black Steel	6
02-432-23675-1	30	10	Stainless Steel	6
02-432-24162-1	21.5	6	Black Steel	6

90 HOSE STUD

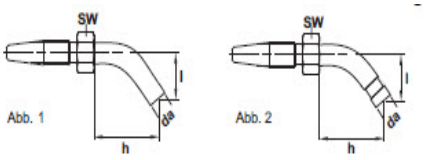
6MM HOSE STUD 90DEG SHORT
90 HOSE STUD



Part Number	Length mm	Hex A/F mm (SW)	Material	OD mm (da)	Drop mm (H)
02-532-30738-1	53	10	Black Steel	6	28
02-532-30739-1	37	10	Black Steel	6	28

45 HOSE STUD

6MM HOSE STUD 45DEG SHORT
45 HOSE STUD



Part Number	Length mm	Hex A/F mm (SW)	Material	OD mm (da)	Drop mm (H)
02-532-32183-1	25	10	Black Steel	6	35

FILLING CONNECTION

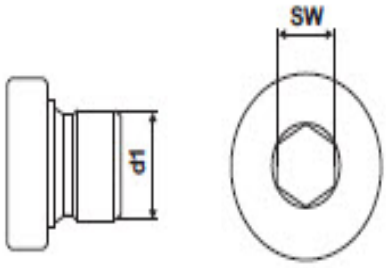
FILLING CONNECTION

M20 X 1.5 FILLING CONNECTION

Part Number	Thread (D)	Thread (d1)	Hex A/F (sw)	Material	Length (L1)	Length (L2)
02-538-36763-1	M22 x 1.5	M26 X 1.5	27	Steel	38	26
02-538-36763-2	M20 X 1.5	M26 X 1.5	32	Steel	38	26

CLOSURE PLUG

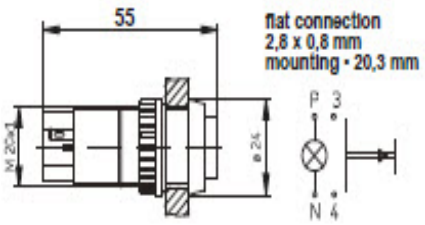
PLUG
CLOSURE PLUG M10 X1



Part Number	Thread (D)	Hex Socket mm
02-303-17499-3	M10 X 1	5

ACCESSORIES

PUSH BUTTON
PUSH BUTTON SWITCH 24V



Part Number	Button Colour	Voltage	Capacity	Length (mm)
02-664-34005-5	Red			
02-664-36070-6	Green	24	1.2 W	55

GREASE

ALUMINIUM ADAPTOR FOR GREASE GUN FILLER PUMP

Part Number	Material
03-000450-CAP	Aluminum

P CLAMP

LINCOLN P-CLAMP 10MM
P CLAMP

Part Number	Size (mm)
02-226-12557-1	6
02-226-12557-2	9
02-226-12557-3	12
02-226-12557-4	15
02-226-12557-6	20
02-226-12557-7	10

BATTERY

LINCOLN 14.4V BATTERY
LINCOLN 14.4 VOLT BATTERY

Part Number	Capacity (Volts)
01-001401	14.4

GREASE CARTRIDGE

450G GREASE CARTRIDGE

Part Number	Size (grams)
03-000450	450

WHIP HOSE

LINCOLN 30 WHIP HOSE

Part Number	Length (inch)	Working Pressure (psi)	Inlet Thread	Outlet Thread
01-001230	30	7500	7/16 UNF	1/8 NPTM

PUSH BUTTON

HELIOS SWITCH 12V

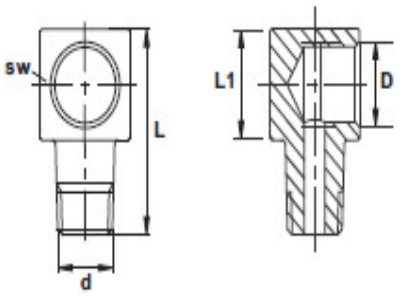
PUSH BUTTON SWITCH 12V

Part Number	Voltage
02-664-36070-5	12

ADAPTORS

90 DEG ADAPTOR

MALE ELBOW FOR HOSE STUD



Part Number	Thread 1 (D)	Thread 2 (d)	Hex A/F mm (sw)	Length mm (L)	Length mm (L1)
01-020023	M6 X 1	M6x1 taper	12	23	13
01-020026	1/8 BSPT	1/4-28 UNF	12	24	12
01-020029	1/8 BSP	1/8 BSPT	13	23	13
02-226-13756-9	1/8 BSPP	6mm Tube	12	23	12
02-226-14123-5	1/8 BSPP	6mm Tube	12	24	12

BANJO GREASE FITTING M10 X 1MM 3MM STEP

Part Number	Male Thread mm (G)	Female Thread mm (G1)	Step Length mm (L)	OD mm (D)
02-400-999-17	M10 X 1	M10 X 1	3	20

BANJO GREASE FITTING M10 X 1MM 8MM STEP

Part Number	Male Thread mm (G)	Female Thread mm (G1)	Step Length mm (L)	OD mm (D)
02-400-999-18	M10 X 1	M10 X 1	8	20

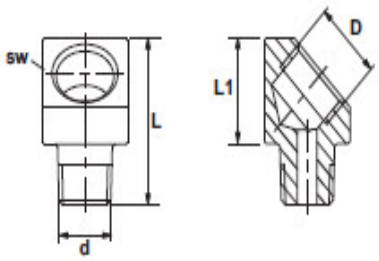
90 DEG SCREW FITTING

ELBOW 6MM X 1/8 NPT

Part Number	Tube Size (D)	Thread (d1)	Hex A/F (sw1)	Hex A/F (sw2)	Material
02-223-12380-6	6	1/4-28 BSPT	12	14	Galvanised Steel
02-223-12453-7	6	1/8-28 BSPT	11	12	Stainless Steel
02-223-12485-9	6	1/8-28 BSPT	11	12	Galvanised Steel
02-223-13021-3	6	M10 X 1 Taper	11	12	Galvanised Steel
02-223-13023-2	6	M6 X 1 Taper	11	12	Galvanised Steel
02-223-13023-3	6	M8 X 1 Taper	11	12	Galvanised Steel
02-223-13620-4	6	1/8-28 NPT	11	12	Galvanised Steel

45 DEG ADAPTOR

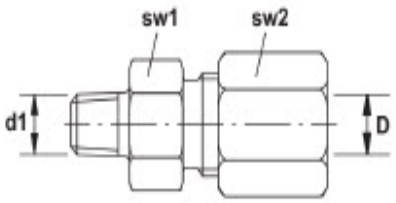
ELBOW M/F 1/8 NPT 1/8NPT 45 DEG



Part Number	Thread 1 (D)	Thread 2 (d)	Hex A/F mm (sw)	Length mm (L)	Length mm (L1)
01-020028	1/8-27 BSP	1/8-27 bsp taper	13	23	13

STRAIGHT ADAPTOR

MALE CONNECTOR GE6-LLM8 X 1KC



Part Number	ID mm (D)	Thread (d1)	Hex A/F (sw1)	Hex A/F (sw2)
02-223-12270-7	6	1/8 BSPT	12	14
02-223-12271-7	6	M10 X 1 Taper	11	12
02-223-12273-6	6	1/8 NPT	11	12
02-223-12477-8	6	1/4 BSPT	12	14
02-223-12533-9	6	M6 X 1 Taper	12	14
02-223-13023-1	6	M8 X 1 Taper	11	12

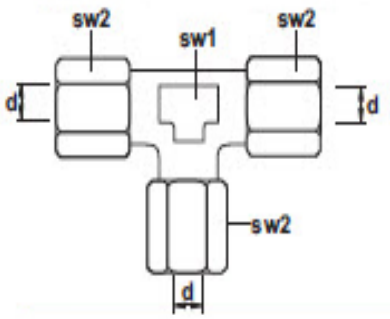
UNION

CONNECTOR HIGH PRESSURE SMOOTH COLLAR

Part Number	Fitting OD mm (D1)	Fitting ID mm (D2)	Length mm (L1)	Working Pressure (Bar)
02-223-12482-9	12	6	26	80
02-226-13773-4	12	6	33.5	80

UNION TEE

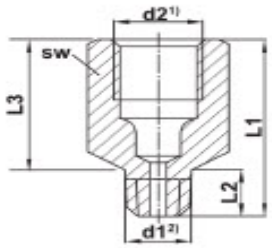
EQUAL TEE UNION T6 LLC



Part Number	Thread
02-223-12484-9	M6 X 1

EXTENSION ADAPTOR

EXT ADPTR M10X1 1/8BSP



Part Number	Male Thread (D1)	Female Thread (D2)	Length mm (L1)	Length mm (L2)	Length mm (L3)	Hex A/F (sw)	Tube OD mm
02-304-19230-1	1/8 BSPT	M10 X 1 Female	18	7	11	13	6

BANJO SWIVEL 1/8 BSP M10

Part Number	Thread (D)	Thread (d1)	Hex A/F (sw1)	Hex A/F (sw2)	Drop mm (H)	Length mm (L)	Tube OD mm
02-223-12478-9	M10 X 1	1/8-28 BSPT	15	14	30	26.5	6

BANJO SWIVEL 1/8 BSP M10

Part Number	Thread (D)	Thread (d1)	Hex A/F (sw1)	Hex A/F (sw2)	Drop mm (H)	Length mm (L)	Tube OD mm
02-223-12479-9	M10 X 1	1/8-28 BSPT	15	40	30	29	6

BULK HEAD

BULK HEAD NIPPLE M12 X 1.5

Part Number	Thread
01-03552-00	M12 X 1.5

CONNECTOR HIGH PRESSURE 1/8 BSPPM 6MM TUBE

Part Number	Thread 1	Thread 2
02-226-14111-1	1/8 BSPPM	6mm Tube

PUSH IN CONNECTOR

STRAIGHT PUSH IN

PUSH IN FITTING GEK 6510 6MM M6

Part Number	Thread (D1)	Connection OD (D)	Connection ID (D2)	Hex A/F (sw1)	Thread Length (L1)	Fitting Length (L2)
02-226-13752-6	M10 x 1 Taper	9	4	10	8	20
02-226-13752-8	M6 X 1 Taper	9	4	10	7.5	18.5
02-226-13752-9	1/8-28 BSPT	9	4	11	8	20

90 DEG PUSH IN

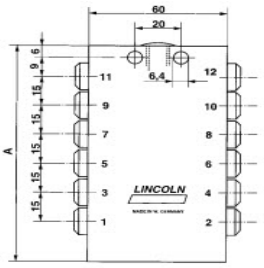
PUSH IN FITTING ELBOW M8 X 1

Part Number	Thread (D1)	Connection OD (D)	Connection ID (D2)	Hex A/F (sw1)	Thread Length (L1)	Fitting Length (L2)	Fitting Length (L3)
02-226-13753-4	1/8-28 BSPT	12	6	10	8	15	21
02-226-13756-7	M6 X 1 Taper	12	6	13	8	20.5	21.5
02-226-13756-8	1/2-28 BSPT	12	6	13	7.5	20.5	21.5

METERING DEVICE

SSV BLOCK

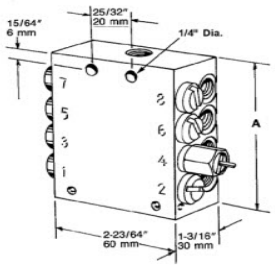
SSV 14 PORT DIVIDER BLOCK



Part Number	Ports
02-619-25730-2	8
02-619-25731-2	12
02-619-26473-1	6
02-619-26841-1	10
02-619-28862-1	14

SSVD BLOCK

SSVD METERING BLOCK 14 SCREWS



Part Number	Ports
02-649-29485-1	6
02-649-29486-1	8
02-649-29487-1	10
02-649-29488-1	12
02-649-29489-1	14

METERING SCREW 0.08 SSVD USE ONLY
METERING SCREW

Part Number	Thread	Flow Rate (cm3)
02-549-34254-1		.08

METERING SCREW 0.14 SSVD USE ONLY
METERING SCREW

Part Number	Thread	Flow Rate (cm3)
02-549-34254-2		.14

METERING SCREW 0.2 SSVD USE ONLY
METERING SCREW

Part Number	Thread	Flow Rate (cm3)
02-549-34254-3		.2

METERING SCREW 0.3 SSVD USE ONLY
METERING SCREW

Part Number	Thread	Flow Rate (cm3)
02-549-34254-4		.3

METERING SCREW 0.4 SSVD USE ONLY
METERING SCREW

Part Number	Thread	Flow Rate (cm3)
02-549-34254-5		.4

METERING SCREW 0.6 SSVD USE ONLY
METERING SCREW

Part Number	Thread	Flow Rate (cm3)
02-549-34254-6		0.6

METERING SCREW 0.8 SSVD USE ONLY
METERING SCREW

Part Number	Thread	Flow Rate (cm3)
02-549-34254-7		.8

METERING SCREW 1 SSVD USE ONLY
METERING SCREW

Part Number	Thread	Flow Rate (cm3)
02-549-34254-8		1

METERING SCREW 1.4 SSVD USE ONLY
METERING SCREW

Part Number	Thread	Flow Rate (cm3)
02-549-34254-9		1.8

METERING SCREW 1.8 SSVD USE ONLY
METERING SCREW

Part Number	Thread	Flow Rate (cm3)
02-549-34255-1		1.8

OUTLET FITTING

OUTLET FITTING ASSEMBLY M10 X 1

Part Number	Thread (G)	Thread (G1)	Tube OD mm (D)	Hex A/F (SW)	Hex A/F (SW1)
02-504-30344-4	M10 X 1 Male	M10 X 1 Female	6	11	12

EXTERNAL OUTLET

LINCOLN OUTLET COMBINING SSV ELEMENT

Part Number	Thread (1)	Thread (2)	Height (mm)	Hex A/F (mm)
02-519-31826-1	M10 X 1	M10 X 1	36	12

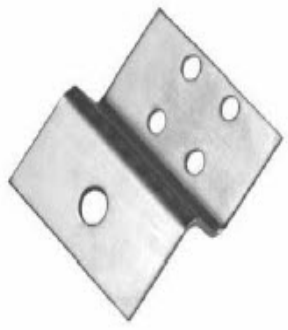
TUBE CLAMPS

TUBE CLAMP
TUBE CLAMP ST-Z D 6 (6X) 512

Part Number	Clamp ID (mm)	Tube Size (mm)	Tube Capacity
02-226-12336-1	6	6	1
02-226-12336-2	12	6	2
02-226-12336-3	18	6	3
02-226-12336-4	24	6	4
02-226-12336-5	30	6	5
02-226-12336-6	36	6	6

COMPONENTS

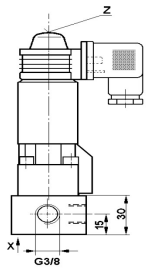
VALVE BRACKET
SSV\EOE MOUNTING BRACKET



Part Number	Length mm	Plate Thickness mm	Width mm
02-307-19543-1	80	3	30

VENT VALVE

2 WAY VALVE 1/2 BSPP 24V



Part Number	Height mm	Width mm	Thread	Voltage
02-525-32083-1	162	45	1/2 BSPP	24

RELIEF VALVE

RELIEF VALVE NUT AND OLIVE STYLE

Part Number	Thread 1	Thread 2
02-624-28894-1	1/4 BSPPM	M14 x 1.5

DIVIDER VALVE

LINCOLN SSV 18K DIVIDER VALVE

Part Number	Port OD mm	Closure Plug	Number of Ports
02-619-26474-3	6.4	M11 X 1	6
02-619-28871-1	6.4	M11 X 1	14
02-619-28872-1	6.4	M11 X 1	16
02-619-28863-1	6.4	M11 X 1	16
02-619-28864-1	6.4	M11 X 1	18

ACCESSORIES

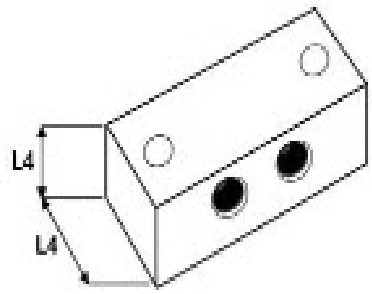
LINCOLN GREASE FILTER 1/4BSPPF

Part Number	Thread 1	Thread 2
02-628-36062-3	1/4 BSPPF	M10 x 1

MANIFOLD BLOCK

MULTI POINT BLOCK

8 PORT MANIFOLD BLOCK



Part Number	Ports
01-01BLOCK-2-P	2
01-01BLOCK-3-P	3
01-01BLOCK-4-P	4
01-01BLOCK-5-P	5
01-01BLOCK-6-P	6
01-01BLOCK-8-P	8

PUMP

PUMP

PRESSURE SWITCH 50-300BAR

Part Number	Type	Reservoir Size (L)	Voltage	Circuit Board
02-644-40599-9	P203	4	24	Y
02-644-40613-2	P203	2	24	N
02-644-40657-3	P203	2	24	Y
02-644-40683-4	P203	8	24	Y
02-644-40753-5	P203	4	24	Y
02-644-40753-6	P203	4	12	Y
02-644-41077-2	P203	2	24	Y
02-644-41077-5	P203	2	24	Y
02-644-46112-1	P203	4	24	Y

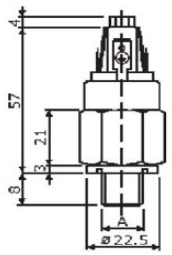
PUMP ELEMENT

LINCOLN 203CS C7 PUMP ELEMENT

Part Number	Type	Piston OD (mm)	Thread (male)	Thread (female)	Output cm³/min
02-600-26875-2	K5	5	M22 X 1.5	1/4 BSPP	2.0
02-600-26876-2	K6	6	M22 X 1.5	1/4 BSPP	2.8
02-600-26877-2	K7	7	M22 X 1.5	1/4 BSPP	4.0
02-600-28750-1	C7	7	M22 X 1.5	1/4 BSPP	4.0

PRESSURE SWITCH

PRESSURE SWITCH 50-300BAR



Part Number	Pressure (bar)	Height mm	Hex A/F
03-000037-1	50 / 300	57	31

FILLING PUMP

LINCOLN P203 FAST FILL PUMP

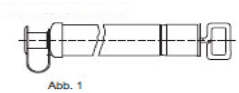


Abb. 1

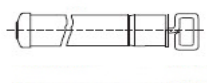


Abb. 2

Part Number	Connection Type
02-638-37549-2	Stub

RESERVOIR LID

LINCOLN 4/8 LITER LID BLACK

Part Number	Suits Reservior Size (L)	Colour
02-444-70641-1	4/8	Black

RESERVOIR

LINCOLN P203CS 2L RESEVOIR

Part Number	Reservoir Size (L)
02-544-31996-1	2
02-544-31998-1	4
02-544-31999-1	8
02-544-32028-1	2