

## Saws And Swagers

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## 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.

### INFORMATION - HOSE

#### HOSE SELECTION & SERVICE LIFE RECOMMENDATIONS

Hydraulic hose (and hose assemblies) have a finite life span that is dependent upon the actual operating conditions the assembly is subjected to. An effective way to remember hose selection criteria is to remember the word STAMPED. STAMPED is an acronym for the following:

**S = Size**

**T = Temperature**

**A = Application**

**M = Medium or Media**

**P = Pressure**

**E = Ends**

**D = Delivery**

**1. Size** - Hose Internal Diameter can be determined using the Nomographic Chart found in this section.

The correct hose I.D. must be selected for the flow required. Too small an I.D. for a given volume will result in pressure drop, heat generation, fluid turbulence and possible internal tube damage. If in doubt, select the next size up.

**2. Temperature.** Hose selection is determined by two variables of temperature; the ambient (external) temperature and the fluid/material (internal) temperature. The hose should not be exposed to internal or external temperatures which exceed the manufacturer's stated maximum and minimum limits. Both continual and intermittent temperatures must be accommodated within the recommended limits. Extra care must be taken when specifying hoses that are routed near to (or terminate on) hot components such as engine manifolds.

**3. Application.** The determination of how the hydraulic hose or hose assembly will be used. Questions that may need to be answered to ensure correct hose selection could include: What is the suitable hose construction? What type of equipment is it used on? What are the end connections? Are there applicable Government or Industry standards to be satisfied? Questions that may need to be answered to ensure correct hose selection could include; What are the environmental conditions the hose will be used in? Does the hose require a special cover or armour? Are there unusual mechanical loads or excessive movement? What are the routing requirements? What are the required lengths and bend radius to satisfy those routing requirements? (Further data regarding Hose Installation Recommendation can be found in this section.)

**4. Medium** (or media, material) to be conveyed. Hose selection must ensure compatibility of the hose tube (liner) and outer cover with the oil, chemical or gas to be conveyed. A chemical resistance table to rubber compounds can be found in this section. Similar care to ensure compatibility should be taken when specifying end connections (hosetails and adaptors), especially those that contain o-rings.

**5. Pressure.** The pressure in a hydraulic system should not exceed the stated hose working pressure at any time. System pressure spikes and surges must be considered and accommodated within the stated working pressure limits. Minimum burst pressures are reference pressures, and are intended for destructive testing and design purposes only.

**6. Ends.** The thread portions of the hose assembly must of course, be compatible with what it is connecting to. Different thread types have different working pressures, always insure that the threaded ends selected meet or exceed the designed working pressure. Check the technical section of this catalogue for pressure ratings. Also the chemical compatibility of the end fittings must be checked as per the hose. Ensure that the ends chosen are of the type matched to the hose.

**7. Delivery.** When a product is actually needed is important. A decision of what product is used can need to be altered by what is available when needed. Always specify up, not down to meet a timeline. A simple change of adaptor may be all that is needed to meet a requirement.

Exposure of hose or hose assemblies to operating conditions which exceed recommended or stated limits will significantly reduce the expected service life. If in doubt, over-specify hose assemblies to ensure as much safety margin on the recommended limits as possible.

**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.

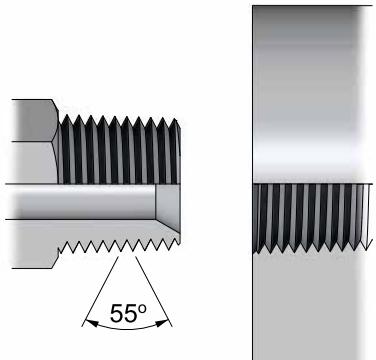
### B.S.P.T. - BRITISH STANDARD PIPE TAPER

**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

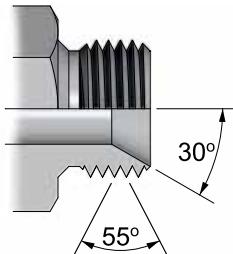
### B.S.P.P. - BRITISH STANDARD PIPE PARALLEL

#### Thread Angle: 55°

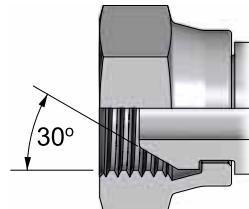
The British Standard Pipe Parallel (BSPP) male is typically coned 30° and will mate with either a BSPP swivel nut female or a BSPP female port.

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

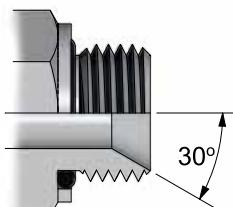
In some cases, the port is chamfered to accept an "O" ring seal. (Similar to the U.N.O. style).



**BSPP male**



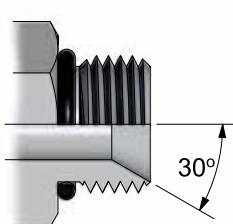
**BSPP swivel nut female**



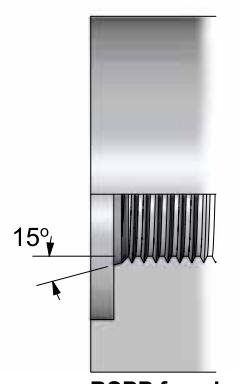
**BSPP male with captive o-ring seal**



**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.**

### 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

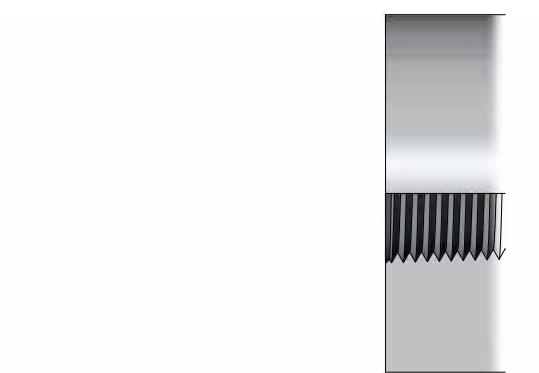
**Taper:** 1 in 16 by diameter.

**Thread Angle:** 60°

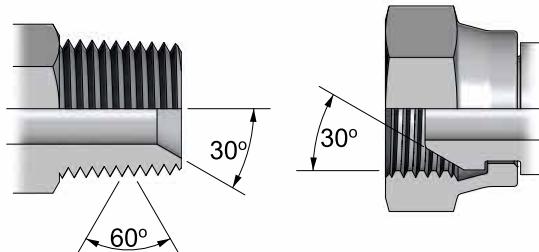
The National Pipe Taper Fuel (NPTF) male is coned 30° and will mate with the NPTF female port (taper), the National Pipe Straight Mechanical (NPSM) female (swivel nut female with 30° sealing cone), or the National Pipe Straight Fuel (NPSF) female port (parallel).

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	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)**

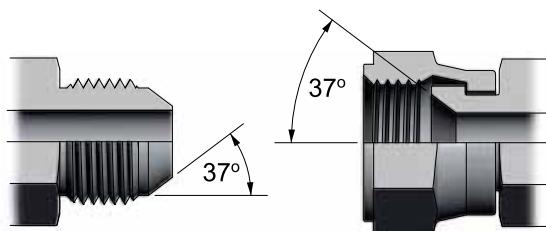
### J.I.C / U.N. O-RING THREAD

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

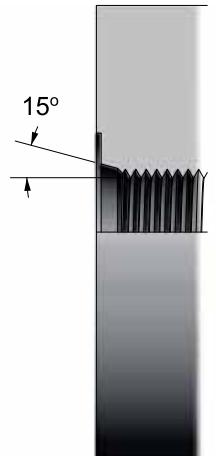


JIC male

JIC swivel  
nut female



UNO male



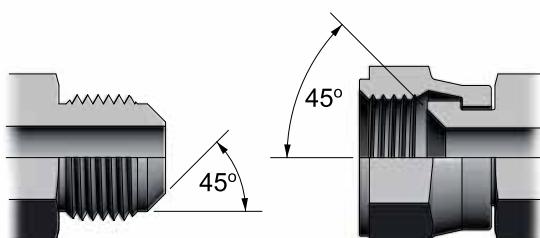
UNO female  
port  
(chamfered)

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

### 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.

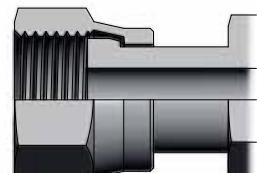
This system uses an "O"-Ring for sealing. The "O"-Ring is housed in the face of the male and is compressed by the face of the female on connection. Connecting threads are U.N. form.



SAE male



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

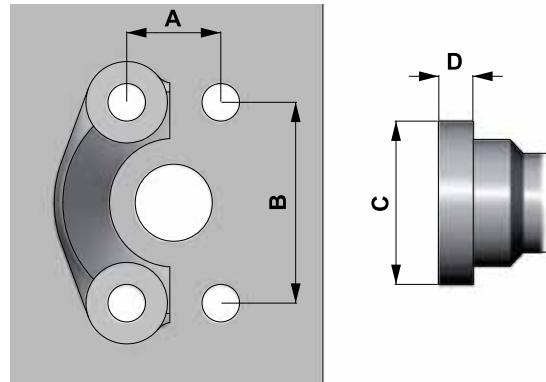
**N.B. Torque values are nominal and supplied as a guide only.**

### 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.

### 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

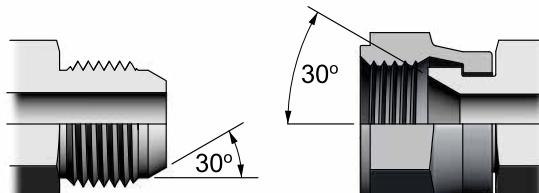
Type M; Metric, Male, 30° Cone

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

#### "O"-Ring Flanges:

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

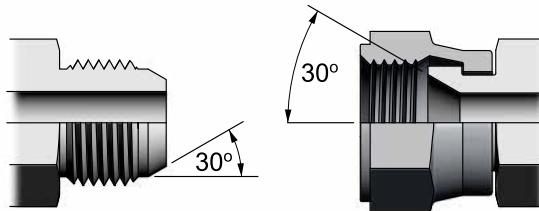
Type II; Equivalent to Code 62 (*Identical to SAE standard*)



Type F JIS male

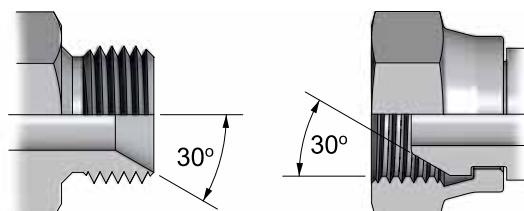
For thread data  
please refer to  
BSPP section

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.

### 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:

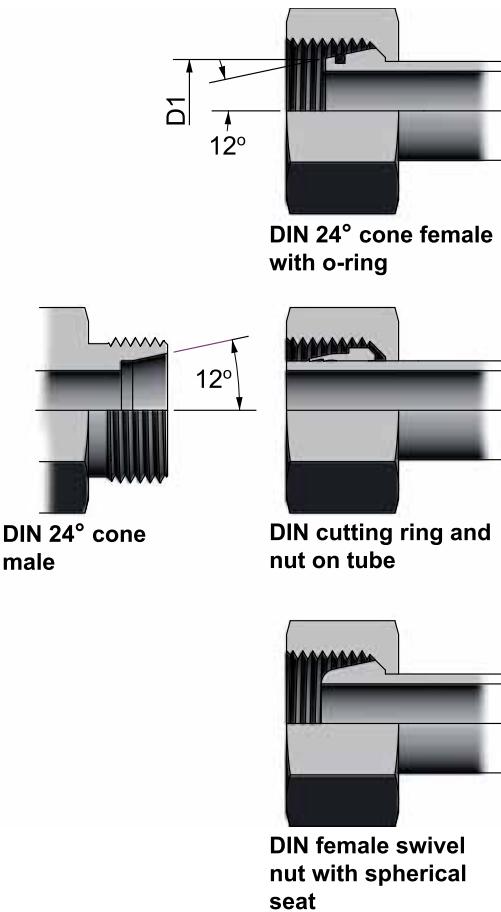
- Series LL;      Extra Light, up to 100 bar
- Series L;      Light up to 250 bar
- Series S;      Heavy up to 640 bar

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

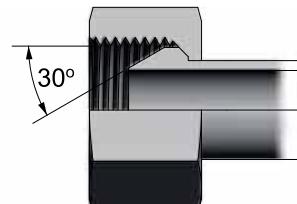
THREAD SPECIFICATIONS HEAVY (S) SERIES			
Thread O.D. & Pitch	Female Thread I.D.	Diameter D1 (mm)	Tube O.D.(mm)
M14-1.5	12.5	7.2	6
M16-1.5	14.5	9.2	8
M18-1.5	16.5	11.6	10
M20-1.5	18.5	13.8	12
M22-1.5	20.5	15.8	14
M24-1.5	22.5	17.8	16
M30-2.0	28	22	20
M36-2.0	34	27	25
M42-2.0	40	32	30
M52-2.0	50	40	38

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

### D.I.N. METRICS 60° CONE SYSTEM

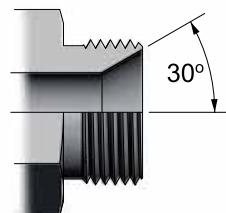
This series utilises a 60° cone seating angle and is used for the connection of hose assemblies and tube. It differs from the 24° series in that the threads are predominately 1.5mm pitch and there is no light or heavy pressure ranges.

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.

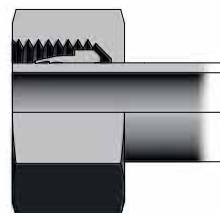


DIN 60° cone female

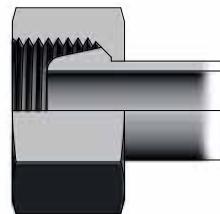
THREAD SPECIFICATIONS		
Thread O.D. & Pitch	Female Thread I.D.	Tube O.D.(mm)
<b>M10-1.0</b>	9.0	5
<b>M12-1.5</b>	10.5	6
<b>M14-1.5</b>	12.5	8
<b>M16-1.5</b>	14.5	10
<b>M18-1.5</b>	16.5	12
<b>M22-1.5</b>	20.5	15
<b>M26-1.5</b>	24.5	18
<b>M30-1.5</b>	28.5	22
<b>M38-1.5</b>	36.5	28
<b>M45-1.5</b>	43.5	35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



DIN 60° cone male



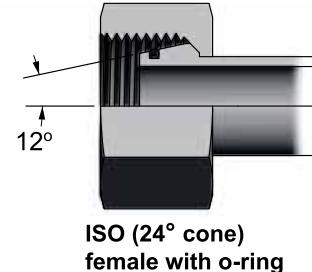
DIN cutting ring and  
nut on tube



DIN female swivel  
nut with spherical  
seat

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

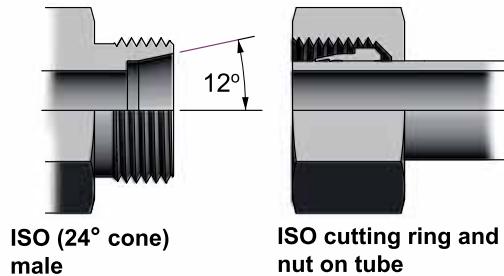
The I.S.O. series of couplings is similar to the D.I.N. light and heavy in function. The male has a 24° included angle sealing cone and a recessed counter bore for locating the tube when used in conjunction with a cutting ring and nut. The male will also accept a swivel nut female with either a cone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



THREAD SPECIFICATIONS		
Thread O.D. & Pitch	Female Thread I.D.	Tube O.D.(mm)
<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	14
<b>M22-1.5*</b>	20.5	15
<b>M24-1.5**</b>	22.5	16
<b>M27-1.5</b>	25.5	18
<b>M30-1.5</b>	28.5	22
<b>M33-1.5</b>	31.5	25
<b>M36-1.5</b>	34.5	28
<b>M39-1.5</b>	37.5	30
<b>M42-1.5</b>	40.5	32
<b>M45-1.5</b>	43.5	35
<b>M48-1.5</b>	46.5	38
<b>M52-1.5</b>	50.5	40

\* Interchange with D.I.N. Light

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



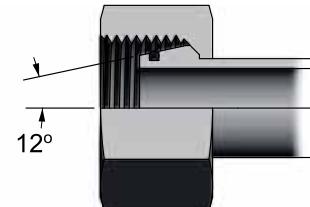
### FRENCH METRICS (GAZ & MILLIMETRIQUE SERIES)

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.

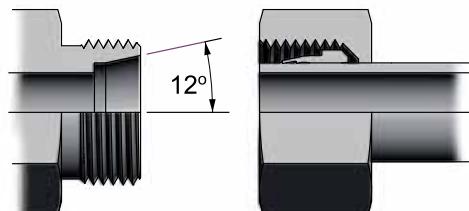
The male will accept a cutting ring and nut for use with tube or a swivel nut female with either a cone or spherical seal.

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

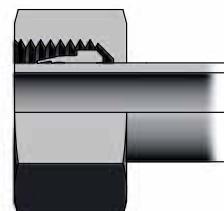
- Gaz series uses fractional number O.D. metric tubing.
- Millimetrique series uses whole number O.D. metric tubing.



French 24° cone female with o-ring

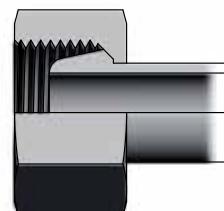


French 24° cone male



Cutting ring and nut on tube

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	-

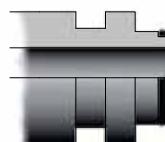


French female swivel nut with spherical seat

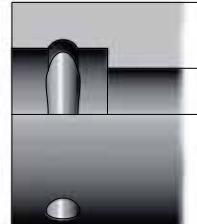
### STAPLE-LOK COUPLINGS

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.

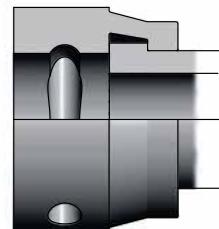
Sealing is achieved by the captive "O"-Ring located on the male spigot. The female can either be fixed or swivel type. The coupling is not designed to swivel under pressure.



Staple-lok male



Staple-lok fixed female



Staple-lok swivel female

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

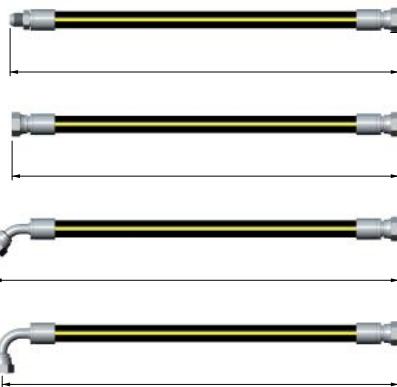


Staple-lok staple

### 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.



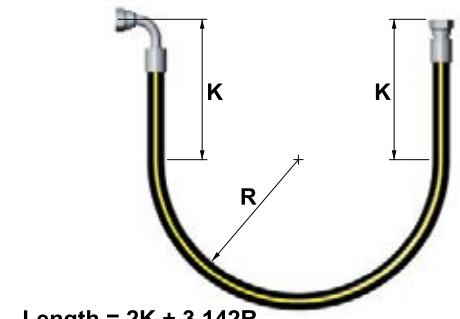
### BENT HOSE ASSEMBLY LENGTH

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

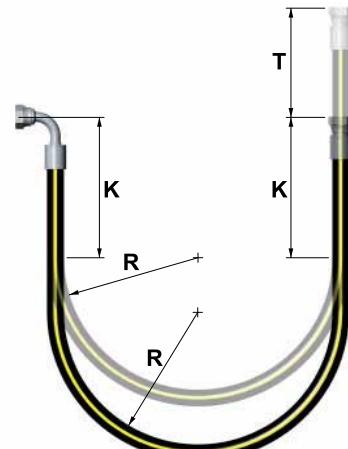
#### Static Installations

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



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



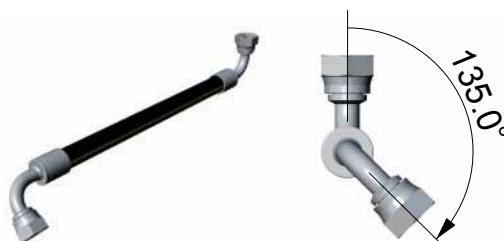
$$\text{Length} = 2K + 3.142R + T$$

#### 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.

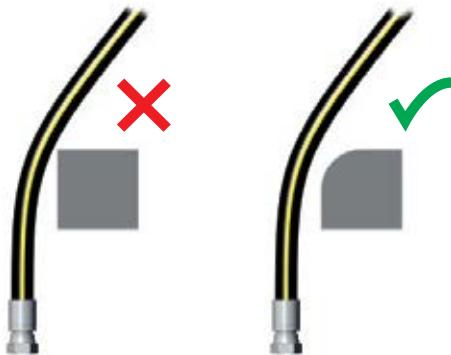
#### Off-Set Angle Measurement

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.

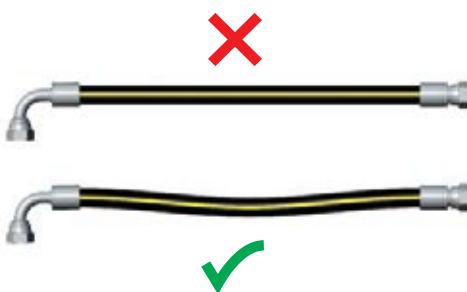


**1. Hose Protection**

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

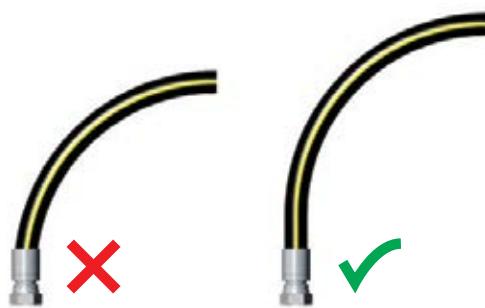


Fig. 4b



Fig. 4c

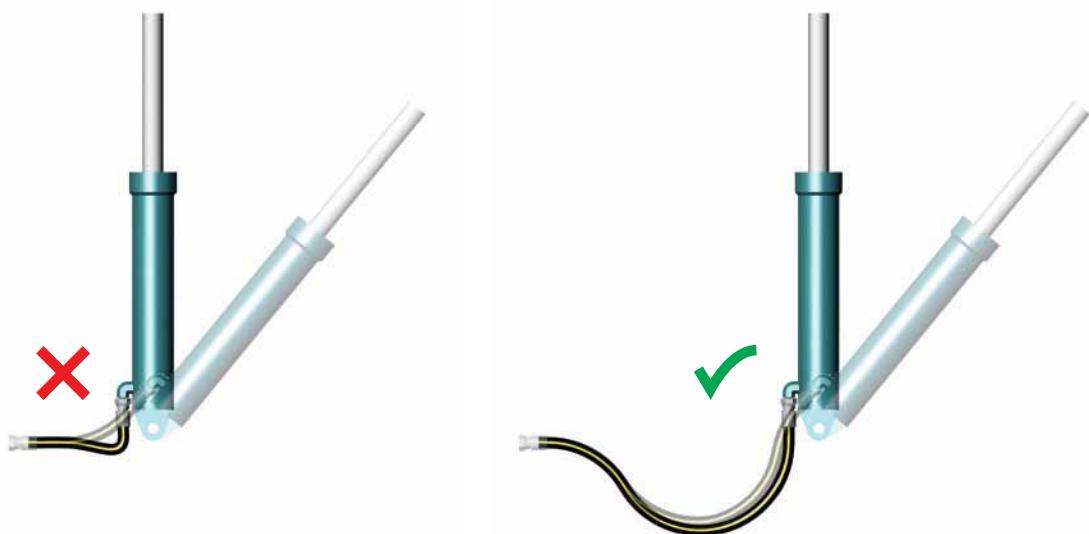


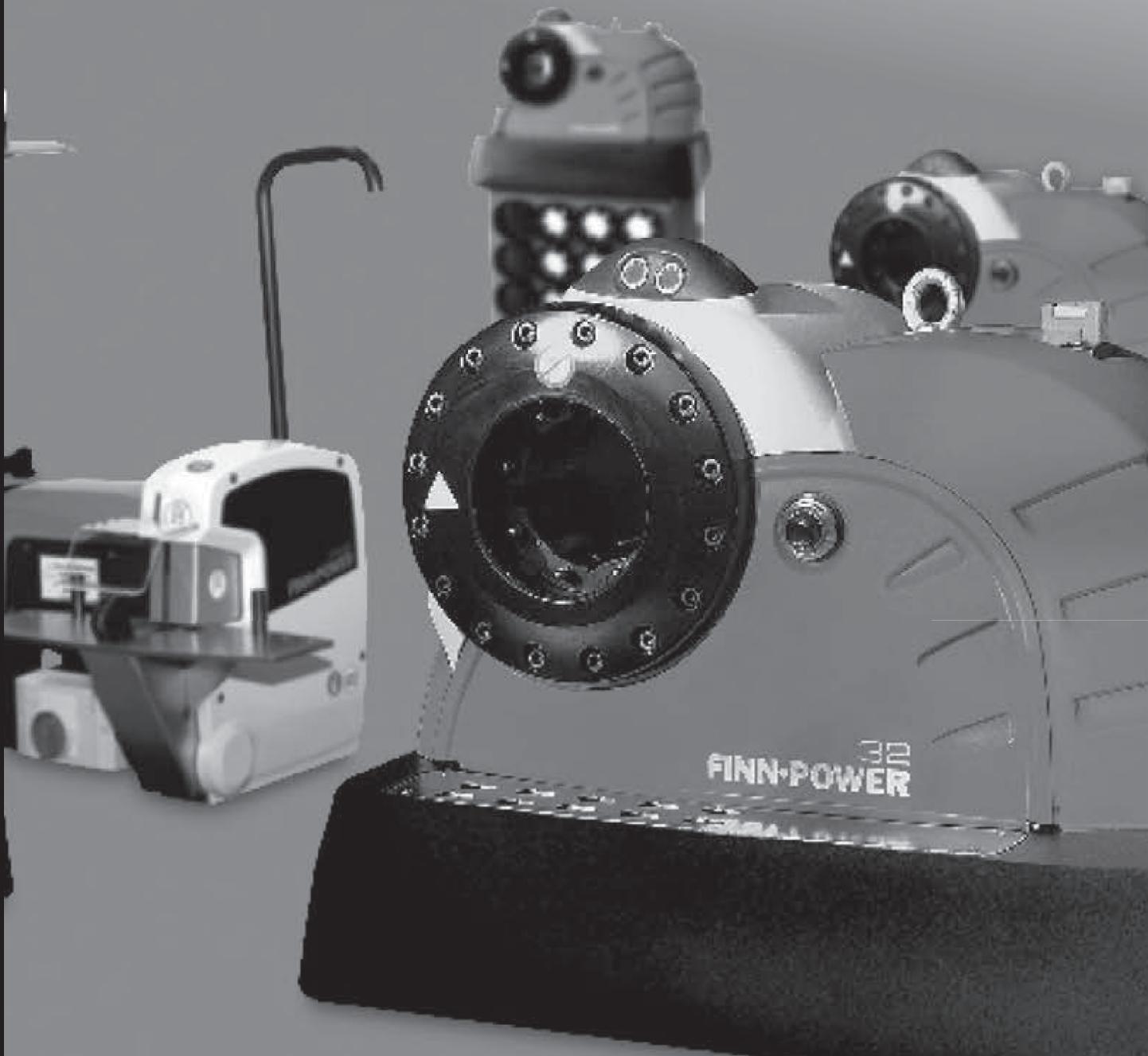
**5. Hose Length Change**

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**



## GENERAL INFORMATION

Hydraulink Fluid Connectors Ltd. are authorised distributors for Finn-Power swagers and cut-off saws. Finn-Power produce high-quality, extremely durable machines that are compact and ergonomically designed.

The swagers available through Hydraulink range from hand-operated portable machines for hoses up to 1" I.D. to large-scale production models with capacity up to 190mm. For more information regarding Finn-Power swagers not detailed in this section, visit <http://www.lillbacka.com/powerco/> or contact Hydraulink.

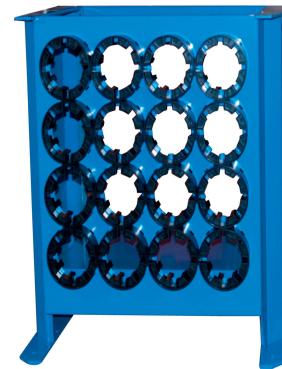
The most common machines are listed in this section, and the larger models are typically available in one of three control solutions, dependent upon the main type of application. Also listed are tool bases and die-change racks that further improve the ergonomics of the machines and can make them more productive.

Also included in this section are Finn-Power hose cut-off saws, which are manufactured to the same high standards as their swagers.

## SWAGER BASES

### XP20-QCB

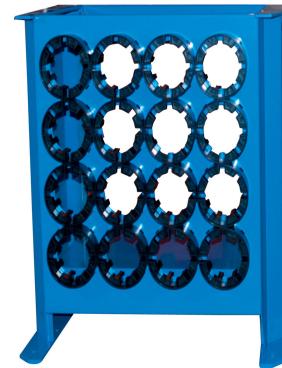
QUICK-CHANGE BASE FOR P20  
FLOOR STANDING BASE AND QUICK-CHANGE DIE  
RACK



Part Number	Suits number of dies	Includes quick change tool
XP20-QCB	12	Yes

### XP32-QCB

QUICK-CHANGE BASE FOR P32  
FLOOR STANDING BASE AND QUICK-CHANGE DIE  
RACK



Part Number	Suits number of dies	Includes quick change tool
XP32-QCB	16	Yes

**SWAGERS****XP16**

**FINNPOWER P16 SWAGER**  
**SWAGER FOR HOSE ASSEMBLIES TO 1 INCH**



Part Number	Swaging Range (mm)	Swaging Force (kN)	Power Source	Swage Control	Length - mm	Width - mm	Height - mm	Weight - kg
XP16-AP	10 - 45	955	Air Pump	manual	390	331	271	26
XP16-HP	10 - 45	955	Handpump	manual	390	331	271	26
XP16-HPZ	10 - 45	955	Handpump	manual	331	386	271	26

**XP20**

**FINNPOWER P20 SWAGER**  
**SWAGER FOR HOSE ASSEMBLIES TO 1 1/4INCH**



Part Number	Swaging Range (mm)	Swaging Force (kN)	Power Source	Swage Control	Length - mm	Width - mm	Height - mm	Weight - kg
XP20-CS-12 V	10 - 61	1370	12V DC	MS*	571	533	387	83
XP20-CS-24 V	10 - 61	1370	24V DC	MS*	571	533	387	83
XP20N-MS-1PH	10 - 61	1370	1 Phase	MS*	800	630	626	157
XP20-AP	10 - 61	1370	Air Pump	MS*	583	477	345	57
XP20-HPL	10 - 61	1370	Handpump	MS*	487	442	389	63

**XP32**

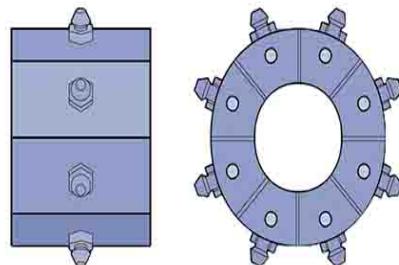
FINNPOWER P32 SWAGER  
SWAGER FOR HOSE ASSEMBLIES TO 2 INCH



Part Number	Swaging Range (mm)	Swaging Force (kN)	Power Source	Swage Control	Length - mm	Width - mm	Height - mm	Weight - kg
XP32-CS-24 V	10 - 87	2000	24V DC	MS*	630	610	425	125
XP32N-MS-3PH	10 - 87	2000	3 phase	MS**	800	630	637	205

**DS16**

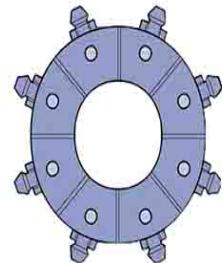
SWAGE DIES SUIT XP16 H16 CRIMPERS  
SWAGE DIE SET TO SUIT XP16 H16 CRIMPER



Part Number	Suits crimper	Size range-mm
DS16-6	XP16	6 - 7.9mm
DS16-8	XP16	8 - 9.9mm
DS16-10	XP16	10 - 11.9mm
DS16-12	XP16	12 - 13.9mm
DS16-14	XP16	14 - 15.9mm
DS16-16	XP16	16 - 18.9mm
DS16-19	XP16	19 - 22.9mm
DS16-23	XP16	23 - 26.9mm
DS16-27	XP16	27 - 30.9mm
DS16-31	XP16	31 - 38mm

**DS20**

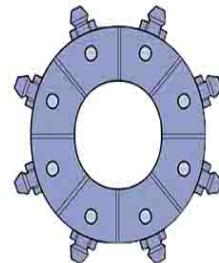
SWAGE DIES SUIT XP20 H20 CRIMPERS  
SWAGE DIE SET TO SUIT XP20 H20 CRIMPER



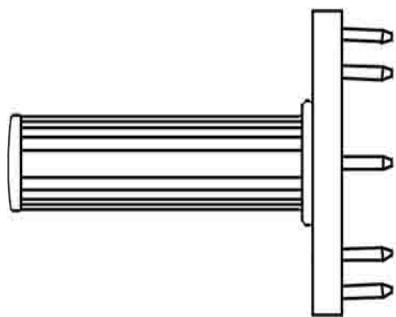
Part Number	Suits crimper	Size range-mm
DS20-6	XP20	6 - 7.9mm
DS20-10	XP20	10 - 11.9mm
DS20-12	XP20	12 - 13.9mm
DS20-14	XP20	14 - 15.9mm
DS20-16	XP20	16 - 18.9mm
DS20-19	XP20	19 - 22.9mm
DS20-23	XP20	23 - 26.9mm
DS20-27	XP20	27 - 30.9mm
DS20-31	XP20	31 - 35.9mm
DS20-36	XP20	36 - 40.9mm
DS20-41	XP20	41 - 46.9mm
DS20-47	XP20	47 - 53.9mm
DS20-54	XP20	54 - 61mm

**DS32**

SWAGE DIES SUIT XP32 CRIMPERS  
SWAGE DIE SET TO SUIT XP32 CRIMPER



Part Number	Suits crimer	Size range-mm
DS32-6	XP32	6 - 7.9mm
DS32-10	XP32	10 - 11.9mm
DS32-12	XP32	12 - 13.9mm
DS32-14	XP32	14 - 15.9mm
DS32-16	XP32	16 - 18.9mm
DS32-19	XP32	19 - 21.9mm
DS32-22	XP32	22 - 25.9mm
DS32-26	XP32	26 - 29.9mm
DS32-30	XP32	30 - 33.9mm
DS32-34	XP32	34 - 38.9mm
DS32-39	XP32	39 - 44.9mm
DS32-45	XP32	45 - 50.9mm
DS32-51	XP32	51 - 56.9mm
DS32-57	XP32	57 - 62.9mm
DS32-63	XP32	63 - 68.9mm
DS32-69	XP32	69 - 73.9mm
DS32-74	XP32	74 - 77.9mm
DS32-78	XP32	78 - 87mm

**CS TOOL**  
QUICK CHANGE TOOL

Part Number	Suits Crimper
CS-691043	XP20
CS-701049	XP32

## CUTTING SAWS

### HASC

CUTOFF SAW

CUTOFF SAW WITHOUT BLADE



Part Number	Voltage
HASC-12V	12V DC
HASC-24V	24V DC
HASC-240V	240V AC
HASC-415V	415V AC

### BLADE

CUTOFF SAW

CUTTING BLADE SUIT HASC RANGE



Part Number	Diameter-mm	Thickness-mm	Shaft-mm
BLADE	250	2.5	40