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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

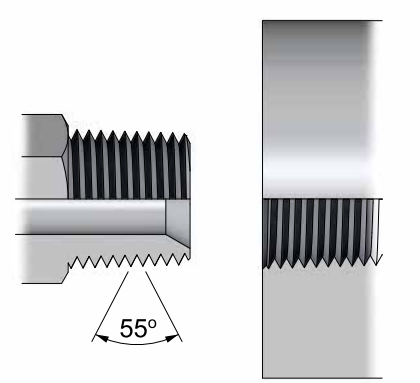
B.S.P.T. - BRITISH STANDARD PIPE TAPER

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°

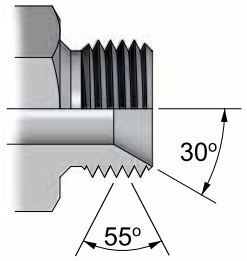
The British Standard Pipe Parallel (BSPP) male is typically coned 30° and will mate with either a BSPP swivel nut female or a BSPP female port.

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

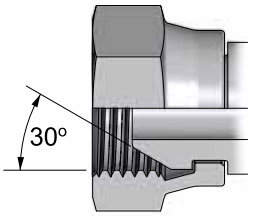
In some cases,the port is chamfered to accept an “O” ring seal. (Similar to the U.N.O. style).

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

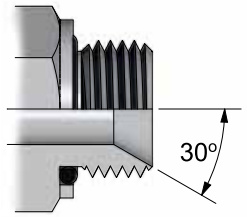
N.B. Torque values are nominal and supplied as a guide only.



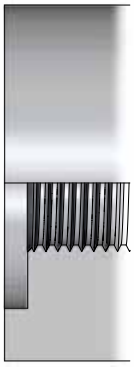
BSPP male



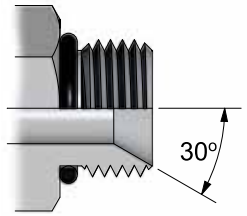
BSPP swivel nut female



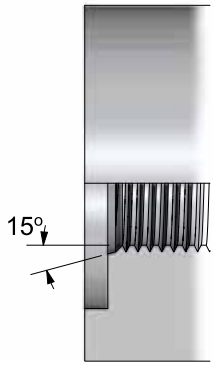
BSPP male with captive o-ring seal



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

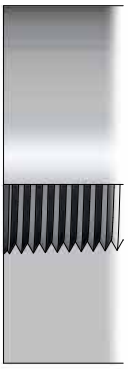
Taper: 1 in 16 by diameter.

Thread Angle: 60°

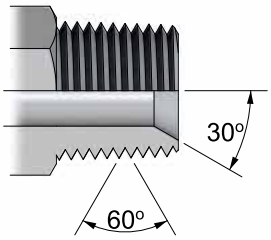
The National Pipe Taper Fuel (NPTF) male is coned 30° and will mate with the NPTF female port (taper), the National Pipe Straight Mechanical (NPSM) female (swivel nut female with 30° sealing cone), or the National Pipe Straight Fuel (NPSF) female port (parallel).

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

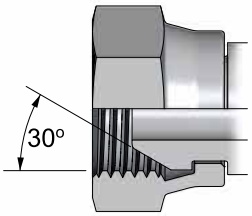
Thread Size & TPI	Male Thread O.D.	Female Thread I.D.	
	NPTF	NPTF	NPSF/SM
1/8-27	10.0	8.6	8.7
1/4-18	13.3	11.2	11.4
3/8-18	16.7	14.7	14.9
1/2-14	20.8	18.2	18.8
3/4-14	26.1	23.5	23.9
1-11.1/2	32.7	29.5	30.2
1.1/4-11.1/2	41.4	38.3	39.1
1.1/2-11.1/2	47.5	44.4	45
2-11.1/2	59.3	56.2	57



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

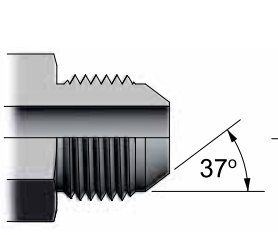
J.I.C. and U.N.“O”-Ring threads are both of the Unified National Form.

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.

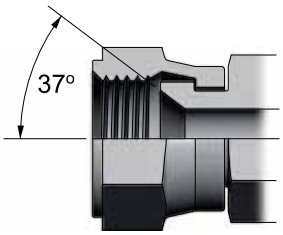
U.N.“O”-Ring refers to the thread type and “O”-Ring for sealing. The female U.N.O port has a chamfer to accept the o-ring.

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.

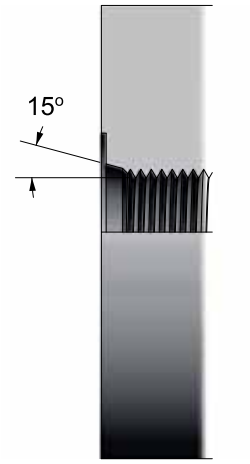


JIC male



JIC swivel nut female

UNO male



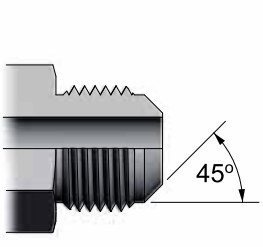
UNO female port (chamfered)

Hydraulink Hose and Fittings

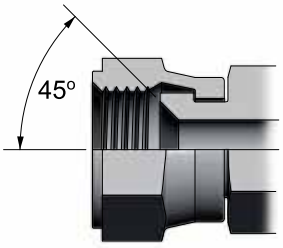
THREAD IDENTIFICATION

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



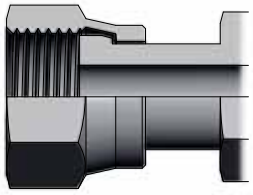
SAE swivel nut female

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

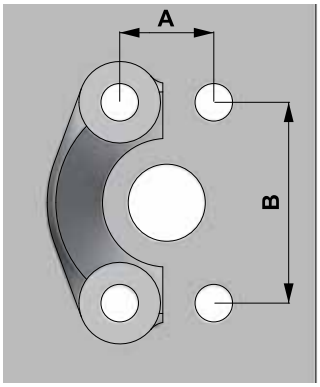
THREAD IDENTIFICATION

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

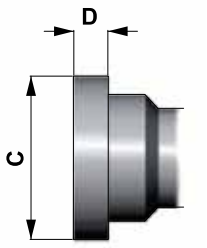
These connections utilise an “O”-Ring for sealing and are widely used for connecting to pump and motor parts as well as end terminations for pipe runs.

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

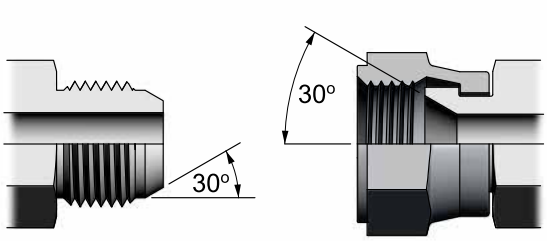
"O"-Ring Flanges:

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

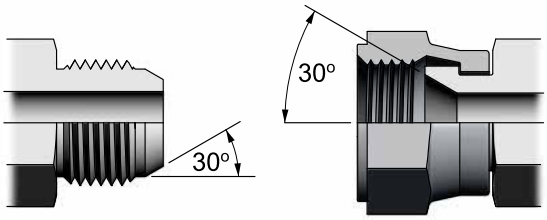
** denotes interchange sizes between JIS and Komatsu.*



Type F JIS male

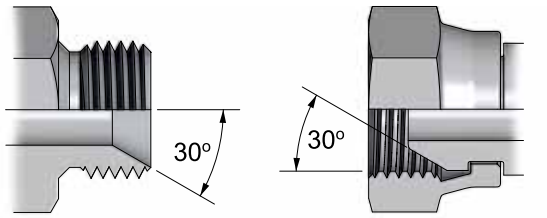
For thread data please refer to BSPP section

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:

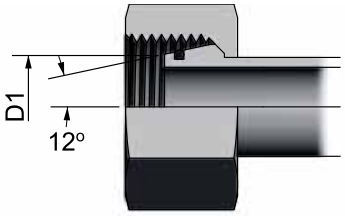
Series LL;	Extra Light, up to 100 bar
Series L;	Light up to 250 bar
Series S;	Heavy up to 640 bar

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.

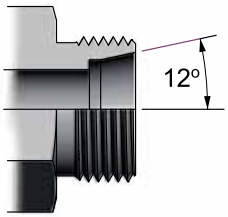
N.B: Rated coupling pressures are subject to the design pressures of the tube or hose being used.

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

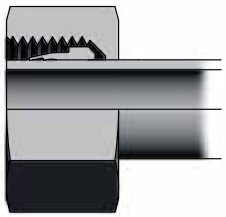
The male form will accept all three female styles shown (right).



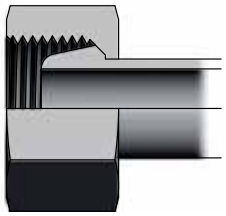
DIN 24° cone female with o-ring



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

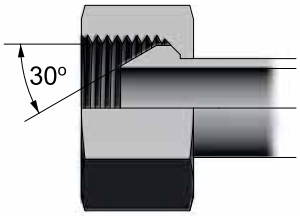
THREAD IDENTIFICATION

D.I.N. METRICS 60° CONE SYSTEM

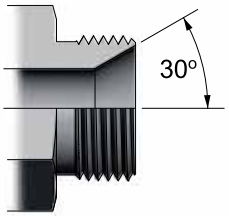
This series utilises a 60° cone seating angle and is used for the connection of hose assemblies and tube. It differs from the 24° series in that the threads are predominately 1.5mm pitch and there is no light or heavy pressure ranges.

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.

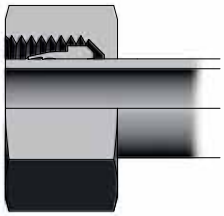
THREAD SPECIFICATIONS		
Thread O.D. & Pitch	Female Thread I.D.	Tube O.D.(mm)
M10-1.0	9.0	5
M12-1.5	10.5	6
M14-1.5	12.5	8
M16-1.5	14.5	10
M18-1.5	16.5	12
M22-1.5	20.5	15
M26-1.5	24.5	18
M30-1.5	28.5	22
M38-1.5	36.5	28
M45-1.5	43.5	35
M52-2.0	56.5	42



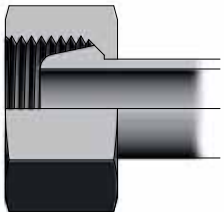
DIN 60° cone female



DIN 60° cone male



DIN cutiing ring and nut on tube

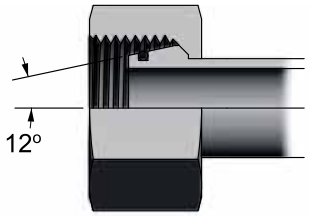


DIN female swivel nut with spherical seat

THREAD IDENTIFICATION

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

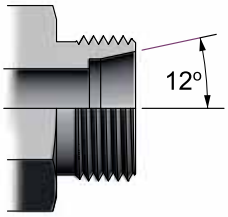
The I.S.O. series of couplings is similar to the D.I.N. light and heavy in function. The male has a 24° included angle sealing cone and a recessed counter bore for locating the tube when used in conjunction with a cutting ring and nut. The male will also accept a swivel nut female with either a cone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



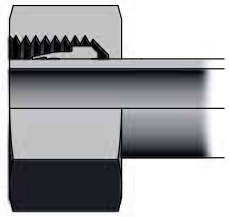
ISO (24° cone) female with o-ring

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

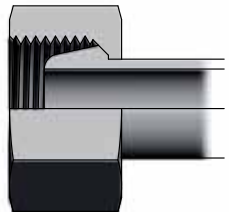
** Interchange with D.I.N. Light*
*** Interchange with D.I.N. Heavy*



ISO (24° cone) male



ISO cutting ring and nut on tube



ISO female swivel nut with spherical seat

Hydraulink Hose and Fittings

THREAD IDENTIFICATION

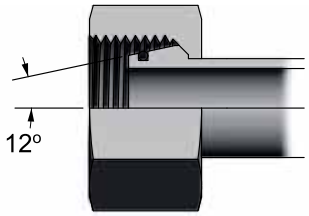
FRENCH METRICS (GAZ & MILLIMETRIQUE SERIES)

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.

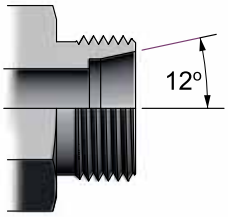
The Gaz and Millimetrique series are identical in all respects except for the O.D. of the tube:

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

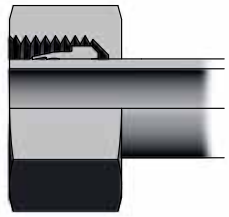


French 24° cone female with o-ring

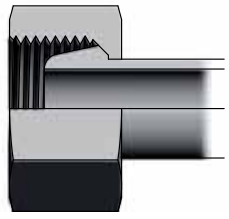
THREAD SPECIFICATIONS LIGHT (L) SERIES			
Thread O.D. & Pitch	Female Thread I.D.	Diameter GAZ	Diameter Millimetrique
M12-1.0	11.0	-	6
M14-1.5	12.5	-	8
M16-1.5	14.5	-	10
M18-1.5	16.5	-	12
M20-1.5	18.5	13.25	14
M22-1.5	20.5	-	15
M24-1.5	22.5	16.75	16
M27-1.5	25.5	-	18
M30-1.5	28.5	21.25	22
M33-1.5	31.5	-	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



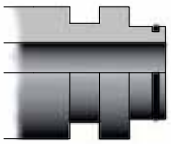
French female swivel nut with spherical seat

THREAD IDENTIFICATION

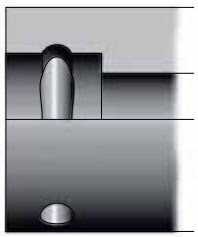
STAPLE-LOK COUPLINGS

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.

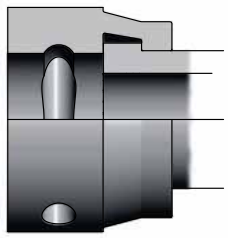


Staple-lok male



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

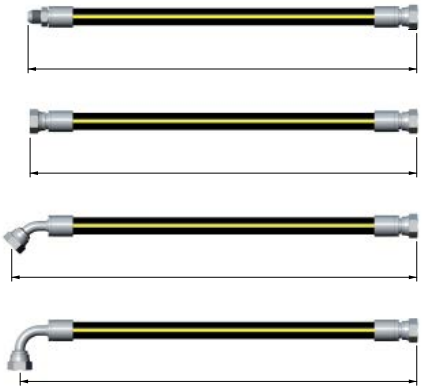
Hydraulink Hose and Fittings

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.



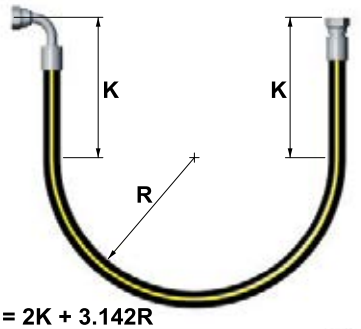
BENT HOSE ASSEMBLY LENGTH

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”.

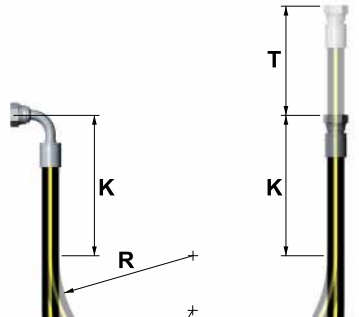
Hose I.D.	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	1.1/4	1.1/2	2
K (mm)	110	130	130	160	180	210	210	260	260	260	310



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

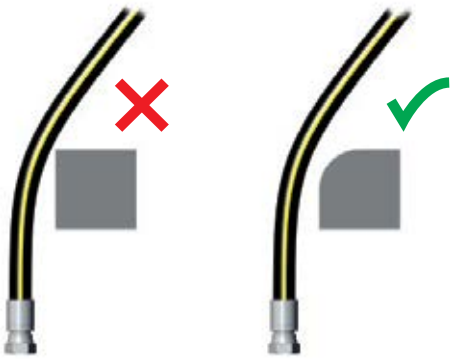
Place hose assembly in line of sight position with coupling furthest away facing upwards. Determine off-set angle by comparing relative position of closest coupling to the far coupling in a clockwise direction.

Hydraulink Hose and Fittings

HOSE INSTALLATION RECOMMENDATIONS

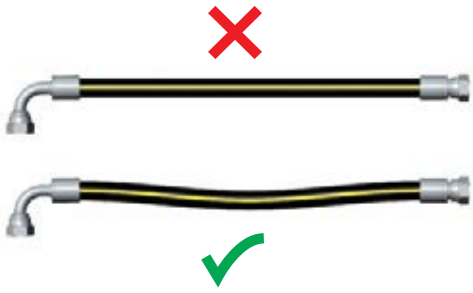
1. Hose Protection
Protect the hose cover from damage such as abrasion, erosion, snagging, and cutting. Where possible, route hose to reduce abrasion from hose rubbing other hose or objects that may abrade it (Fig. 1). Special abrasion-resistant hoses and hose guards are available for additional protection.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

Fig. 1



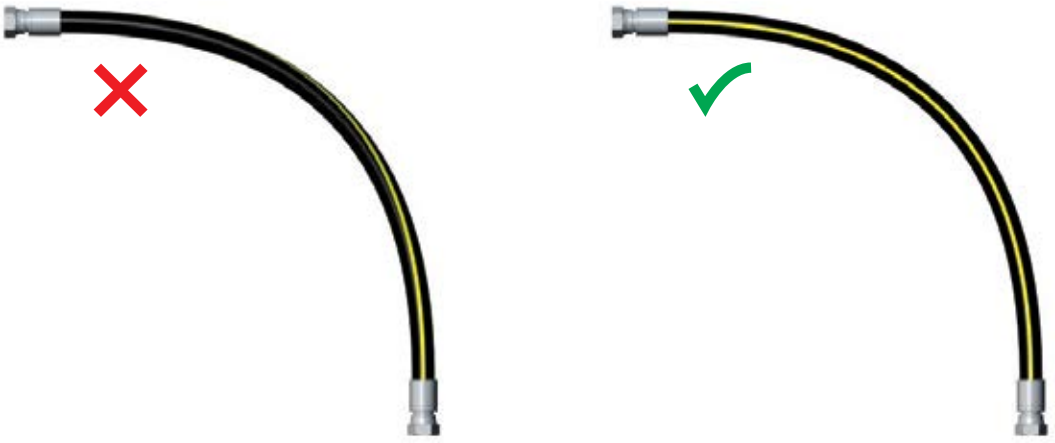
2. Hose And Machine Tolerances
Avoid tension on hose assemblies and adaptors. Design hose to allow for changes in length due to machine motion and tolerances (Fig. 2). Failure to do so may result in seal or assembly failure.

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

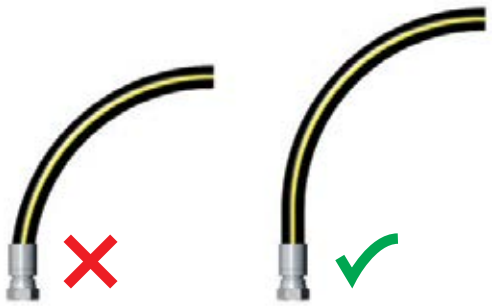


Fig. 4b

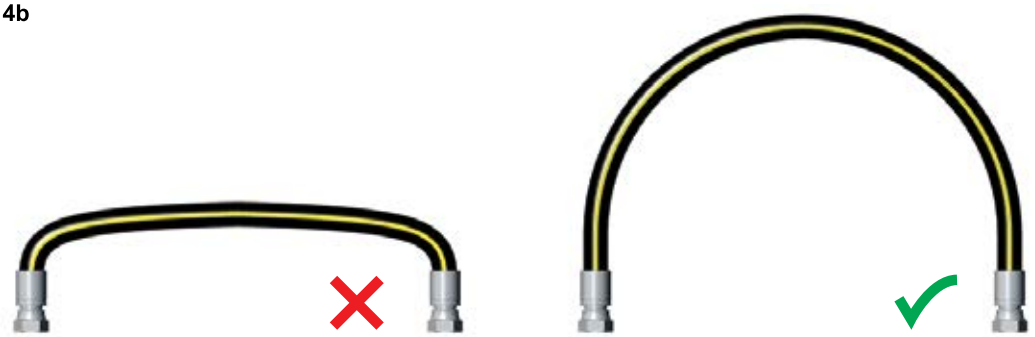


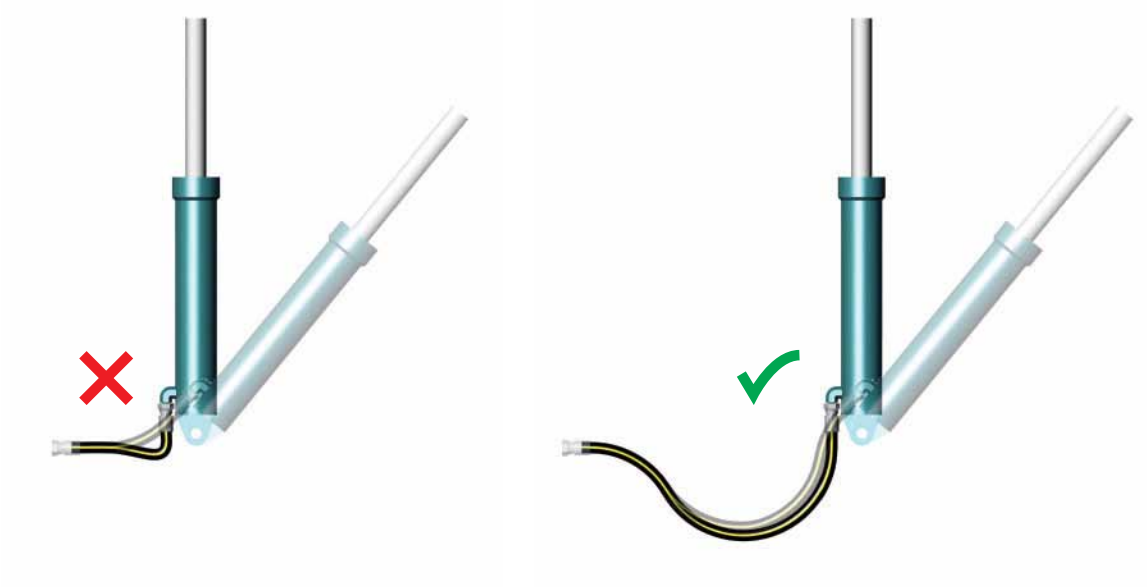
Fig. 4c

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®

Industrial Hoses

Section 21

Hydraulink

New Zealand

Hydraulink Fluid Connectors Ltd - Head Office

Email: sales@hydraulink.com
Phone: +64 9 525 2626

Street address
21 O'Rorke Rd
Penrose 1061
Auckland, New Zealand

Postal address
PO Box 12 826 Auckland 1642
New Zealand

Australia

Hydraulink Australia Pty Ltd

Email: customercare@hydraulink.com.au
Phone: +61 2 8785 4600

Street address
25 Davis Road
Wetherill Park
Sydney
Australia

Postal address
PO Box 6381
Wetherill Park
NSW 2164
Sydney
Australia

Hydraulink is a 100% New Zealand owned business with manufacturing roots dating back more than 65 years. Proudly setting the goal of being the easiest company to deal with, we are the partner of choice for many industry leaders. It is Hydraulink's policy and commitment to treat our employees', customers and suppliers with respect, fairness and honesty. Our team of professionals offer the highest quality customer service and product availability.

Hydraulink is an innovative market leader, is competitively priced and holds an extensive nationwide inventory, certain to meet your every need.

We provide an extensive range of products and services including hydraulic and industrial hose, hose assemblies, pipe fittings, tubing, fasteners, valves and other related industrial supplies. Our customers rely on us to meet their demands for quality products and come from the construction, civil infrastructure, transportation and military markets.

We are accredited to the ISO9001 standard.

Hydraulink products are the preferred choice for transferring water, air, food, fuel, oil, steam, welding gases, abrasive materials, acid and chemicals, compressed gases and many other materials. We stock a variety of hose types with covers resistant to chemicals, abrasion, oil, flame, heat, ozone, ultraviolet light and weathering.

Mobile Response 24/7
Our quick response mobile service vehicles provide emergency repair and we're well equipped to respond to today's increasingly varied and often unique field service demands. You can count on Hydraulink to have the right solution first time, every time. If you are involved in mining, agriculture, transport, forestry, the marine industry – any industry that needs fast, effective and reliable hose and hydraulic services – we can help you get the job done no matter how much pressure you're under, 24/7. Call us on 0800 80 66 66

Plumb Ups and Installations
Our dedicated team of sales and service technicians are experienced in plumb ups and new installations on large plant and equipment.
Hydraulink offers a one-stop service shop from start to finish. Many national account customers rely on our sales and service technicians to complete plumb ups on plant and machinery during planned repairs and maintenance. The fast that end users insist on Hydraulink hoses and fittings is a testament to the quality of our products. Mine sites, military applications, OEMs and a host of industrial customers know they can rely on the optimum performance of our product range. Hydraulink designs new hydraulic hose tails and ferrules to provide specialised solutions for OEM customers for both general and more demanding applications.

Lubrication Systems
Hydraulink offers both automatic and manual lubrication systems via the Lincoln Lubrication brand, to all sizes of plant and equipment. These systems ensure continuous lubrication of a machine when running, reducing costly, unplanned downtime.
Hydraulink Industrial are the New Zealand agents for high quality Lincoln Lubrication Pumps and components. We offer two main system types: Lincoln Centro-Matic and Lincoln Quicklub. Automated lubrication systems typically dispense small measured amounts of lubricant at frequent intervals while production machines are running. Our systems are commonly used in mining and heavy industrial applications. Wherever you are, whenever a problem hits, we'll fix it so you can get your job done on time.

Fire Suppression
With health and safety procedures top of mind, Hydraulink Fire Suppression provides systems designed and installed on large fixed or mobile plant to protect people, the investment, loss of production and protect the environment.
Our Fire Suppression systems have an automated detection system with the option for manual actuation by the operator in the cabin or at an appropriate external location on the equipment via the remote actuator. Hydraulink's Fire Suppression systems are commonly used in mining, forestry, waste management, transport, construction, railway, agriculture and defence industries. Our network of service vehicles offers an on-site repair, service and replacement of worn or damaged fire suppression systems.

FACTORS

Product Selection

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 indicate the products have been incorrectly specified originally.
A simple method to assist in remembering the key selection criteria is the word:

F A C T O R S

F = Fluid
A = Application
C = Connections
T = Temperature
O = Operating Pressures
R = Rate of Flow
S = Size

Fluid

Some applications require specialized oils or chemicals to be conveyed through the system. Hose selection must ensure compatibility of the hose tube, cover, couplings and O-rings with the fluid used.
Additional caution must be exercised in hose selection for gaseous applications where permeation can occur. Permeation, or effusion, is seepage through the hose resulting in loss of fluid.
This may occur when hose is used with fluids such as (but not limited to):

- liquid and gas fuels
- helium
- natural gas
- refrigerants
- fuel oil

Consider whether there are potential hazardous effects of permeation through the hose, such as explosions, fires, and toxicity.

Refer to applicable standards for specific applications such as fuels and refrigerants.
If gas permeates through the tube, consider pin-perforated covers to prevent gas build-up under the cover.
Also consider the compatibility of the system fluid not only with the tube, but also with the braid, cover, fittings, and other components since permeation may expose the entire hose assembly to the system fluid.

NOTE: Some couplings contain nitrile O-rings, which must be compatible with the fluids being used.

Application

Determine where or how the replacement hose or assembly is to be used. Most often, only a duplicate of the original hose will have to be made, provided the original hose assembly gave acceptable service life.
To fulfil the requirements of the application, additional questions may need to be answered such as:

- Where will the hose be used?
- Working and surge pressures?
- Fluid and/or ambient temperature?
- Environmental conditions?
- Government and industry standards being met?
- Hose construction?
- Permanent or field attachable couplings?
- Minimum bend radius?
- Excessive abrasion?
- Equipment type?
- Suction application?
- Fluid compatibility?
- Routing requirements?
- Unusual mechanical loads?
- Thread end connection type?
- Thread type?
- Non-conductive hose required?
- Expected service life?

FACTORS (Continued)

Connections
When replacing an existing hose assembly match the existing end connections with the new ones.
When 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

Some accessory products are only available with a limited range of connection options (e.g. BSPP or 'O'-ring boss). This needs to be checked and where necessary a conversion adaptor specified which will allow integration with the existing or proposed thread.

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. 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 cool store, may exhibit cracking on the cover.

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

Operating Pressure
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, as 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 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.

FACTORS (Continued)

Rate 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 hear build up in systems.
Velocity is stated as; feet per second (imperial) or metres per second (metric).

Size

The size (flow area) of the product is a 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.
The attached Nomograph on the next page is the easiest method of determining fluid velocity for any given volume versus product size.

Note.

- 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.

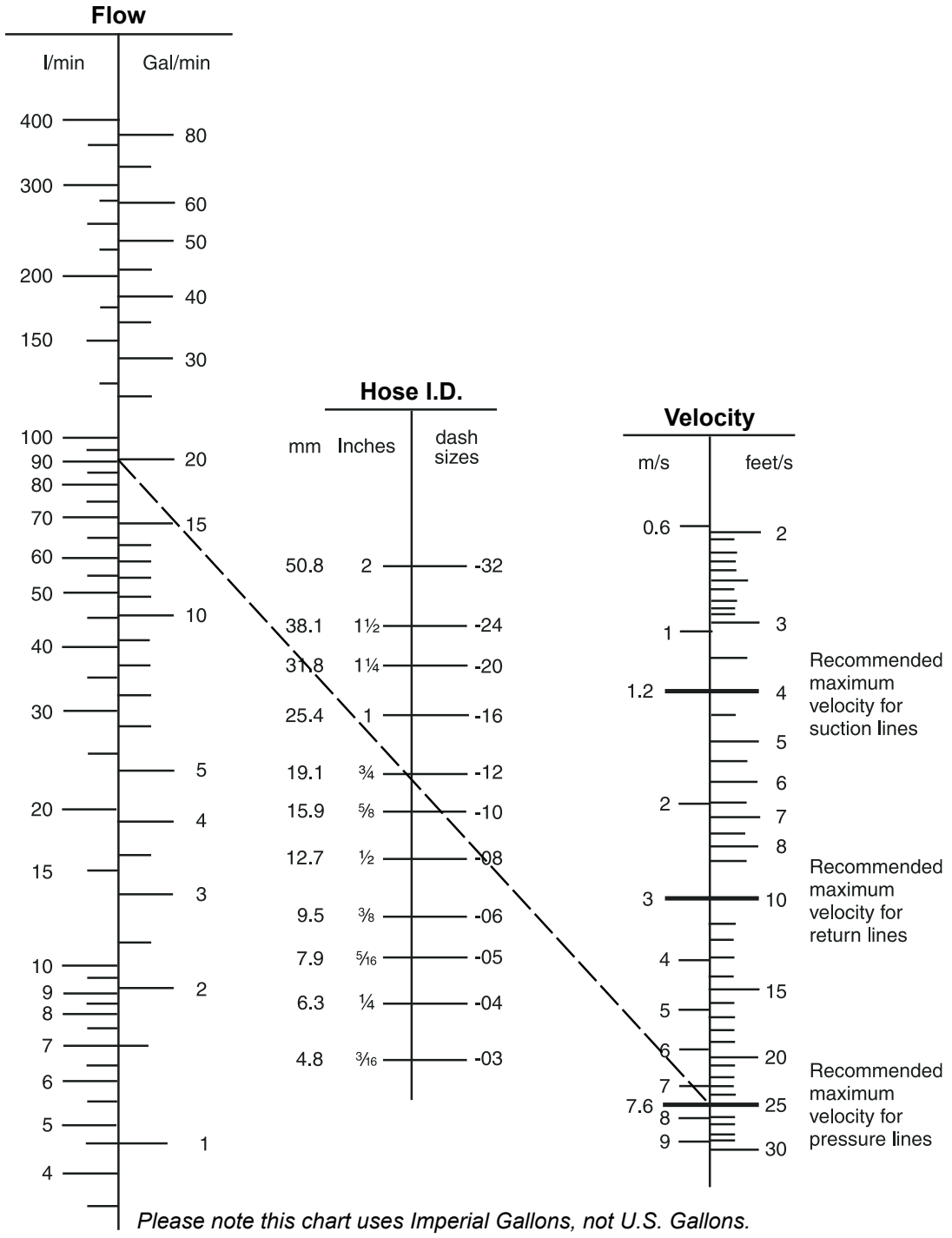
FACTORS (Continued)

Flow Rate Nomograph

Flow Capacity of Hose Assemblies Recommended Flow Velocities

Use the chart below to determine Hose I.D. based on Flow and Velocity. Conversely, it can be used to determine Velocity, based on Flow and Hose I.D., or Flow based on Velocity and Hose I.D.

Example: To determine the Hose I.D. needed to transport 20 gallons per minute (Gal/min)...
Draw a straight line from 20 Gal/min on the left to recommended maximum velocity for pressure lines on the left.
The line intersects the middle column indicating that a 3/4" I.D. (-12) hose should be the smallest hose used.



Please note this chart uses Imperial Gallons, not U.S. Gallons.

Chemical Guide

The chemical guide in this section is offered as a general indication of the compatibility of the various materials used in hose with the chemicals and fluids listed. The basis for the ratings in this guide includes actual service experience, the advice of various polymer suppliers, and the considered opinion of our rubber chemists. When in doubt, a sample of the compound should always be tested with the particular chemical it is to handle. Some of the variables that come into play in the resistance of a compound to chemical attack are:

1. Temperature of the Material Transmitted:

Higher temperatures increase the effect of chemicals on rubber compounds. The increase varies with the polymer and the chemical. A compound quite suitable at room temperature might fail very quickly at higher temperatures.

2. Service Conditions:

A rubber compound usually swells when exposed to a chemical. With a given percent of swell, a hose tube may function satisfactorily if the hose is in a static condition, but fail quickly if the hose is subject to flexing.

3. The Grade or Blend of the Rubber Compound:

Basic rubber polymers are sometimes mixed or blended together to enhance a particular property for a specific service. The reaction to a particular chemical blend of polymers may, therefore, be somewhat different from the reaction to the single ones. When in doubt, a sample of the compound should always be tested with the particular chemical it is to handle.

CHEMICAL RESISTANCE OF HOSE COMPOUNDS

COMMON NAME	ASTM Designation D1418-93	COMPOSITION	GENERAL PROPERTIES
Natural rubber	NR	Isoprene rubber	Excellent physical properties, including abrasion resistance. Not oil resistant.
SBR	SBR	Styrene-butadiene rubber	Good physical properties, including abrasion resistance. Not oil resistant.
Butyl rubber	IIR	Isobutene-isoprene rubber	Very good weathering resistance. Low permeability to air. Good physical properties. Poor resistance to petroleum based fluids.
EPDM	EPDM	Ethylene-propylene-diene-terpolymer	Good general purpose polymer. Excellent heat, ozone and weathering resistance. Not oil resistant.
Cross linked polyethylene	XLPE	Cross linked polyethylene	Excellent resistance to most solvents, oils and chemicals. Do not confuse with chemical properties of standard polyethylene.
Ultra high molecular weight polyethylene	UHMWPE	Ultra high molecular weight polyethylene	Excellent resistance to most solvents, chemicals and hydrocarbons. Excellent abrasion and wear resistance. Inert and suitable for food contact. Do not confuse with chemical properties of standard polyethylene.
Nitrile rubber	NBR	Acrylonitrile-butadiene	Excellent oil resistance. Good physical properties.
Neoprene	CR	Chloroprene rubber	Excellent weathering resistance. Flame retardant. Good oil resistance. Good physical properties.
Hypalon®	CSM	Chloro-sulfonated	Excellent ozone, weathering and acid resistance. Good abrasion and heat resistance. Can be compounded for good oil resistance.

Chemical Resistance Chart

The following data is based on tests and believed to be reliable; however, we emphasise that the tabulation should be used as a guide only, since it does not take into consideration all variables such as elevated temperatures, fluid contamination, concentration, etc. that may be encountered in actual use. All critical applications should be tested.

Note: All data based on 20°C (68°F) unless otherwise noted.

Key: • Blank = No Data • E = Excellent • G = Good • F = Fair • C = Conditional • X = Unsatisfactory

CHEMICAL OR MATERIAL CONVEYED / COMPOUND	NR	SBR	IIR	EPDM	XLPE	UHMWPE	NBR	CR	CSM
Acetaldehyde	F	X	E	E	E	E	X	C	F
Acetic Acid, Glacial	C	X	G	G	E	E	X	F	C
Acetic Acid, 10%	G	F	G	E	E	E	E	E	E
Acetic Acid, 50%	X	F	G	E	E	E	E	F	E
Acetic Anhydrlde	F	X	C	G	E	E	X	G	E
Acetic Oxide	F	X	G	G	E	E	X	G	E
Acetone	C	C	E	E	E	E	X	C	X
Acetone Cyanohydrin	F		E	E			X	G	F
Acetonitrile	G		E	E			X	E	G
Acetophenone	G	X	G	E	E	E	X	X	X
Acetyl Acetone	X	X	E	E			X	X	X
Acetyl Chloride	X	X	X	X			X	X	X
Acetyl Oxide	F		G	G	E	E	X	G	E
Acetylene	C	F	E	E	E	E	E	E	C
Acetylene Dichloride	X	X	F	C			X	X	X
Acetylene Terachlorlde	X		X	C			X	C	X
Acrolein	G	F	E	E			F	G	G
Acrylonitrite	C	F	X	E	E	E	X	X	C
Acrylic Acld	X			X			X	X	G
Adipic Acid	E		X	C	E	E	E	E	G
Air, +300 °F	X	X	G	G			G	G	G
Alk-Tri	X		X	X			X	X	X
Allyl Alcohol	E		E	E	E	E	E	E	E
Allyl Bromide	X		X	X			X	X	X
Allyl Chloride	X	E	C	X	E	F	G	X	X
Alum	E		E	G	E	E	C	E	E
Aluminium Acetate	E	X	G	E			C	C	F
Aluminium Chloride	E	E	E	E	E	E	E	E	E
Aluminium Flouride	E	E	E	E	E	E	E	E	E
Aluminium Formate	X		G	E			X	E	X
Aluminium Hydroxide	E	G	E	E	E	E	E	E	E
Aluminium Nitrate	E	E	E	E			E	E	E
Aluminium Sulfate	E	G	A	E	E	E	E	G	E
Amines-Mixed	C	G		G			X	C	X
Aminobenzene	X	X	E	C	E	E	X	X	C
Aminodimethilbenzene	X		G	C			C	X	F
Aminoethane	C	X	G	E	E	E	C	C	F
Aminoxylene	X		G	E			C	X	X
Ammonium Carbonate	E	E	E	E			C	E	C
Ammoolum Chloride	E	E	E	E	E	E	G	E	E
Ammonium Hydroxide	G	X	G	E	E	E	C	E	E
Ammonium Nitrate	E	E	E	E	E	E	E	E	E
Ammonium Phosphate, Dibasic	E	E	E	E	E	E	E	E	E
Ammonium Sulfate	E	G	E	E	E	E	E	E	E
Ammonium Sulfide	E	G	E	E	E	E	C	E	E
Ammonium Thiosulfate	E		E	E			C	E	E
Amyl Acetate	C	X	G	C	E	E	X	X	X
Amyl Acetone	X		G	G			X	X	X
Amyl Alcohol	C	G	E	E	E	E	C	C	E
Amyl Bromide	X		X	C			X	X	X
Amyl Chloride	X	X	X	X	E	E	X	X	X
Amyl Ether	X		X	X			C	X	F
Amylamine	F		G	X			F	C	F
Anethole	X		X	X			X	X	X
Aniline	X	X	E	C	E	E	X	X	C

CHEMICAL OR MATERIAL CONVEYED / COMPOUND	NR	SBR	IIR	EPDM	XLPE	UHMWPE	NBR	CR	CSM
Aline Dyes	C	G	G	C	E	E	X	C	G
Aline Oil	X	X	G	C	E	E	X	X	C
Animal Fats	X	X	C	C	E	E	E	C	F
Antimony Pentachloride	X			C	E	E	X	C	X
Aqua Regia	X	X	C	C	X	X	X	X	C
Argon	X	C	C	E			E	G	X
Arsenic Acid	E	E	E	E	E	E	E	E	E
Asphalt	X	X	X	X	E	E	C	C	F
Asim Fuel A	X	X	X	X			E	C	C
Asim Fuel B	X	X	X	X			C	X	X
Asim Fuel C	X	X	X	X			C	X	X
Asim Oil No. 1	X	X	X	X	E	E	E	E	C
Asim Oil No. 2	X	X	X	X	E	E	E	C	X
Asim Oil No. 3	X	X	X	X	E	E	E	C	C
Asim Oil No. 4	X	X	X	X			C	X	X
Automatic Transmission Fluid	X	X	X	X			E	C	C
Banana Oil	X		C	C			X	X	C
Barium Chloride	E	E	E	E	E	E	E	E	E
Barium Hydroxide	E	E	E	E	E	E	E	E	E
Barium Sulphide	E	G	E	E	E	E	E	E	E
Beer	E	E	E	E	E	E	E	E	E
Beet Sugar Liquors	E	E	E	E	E	E	E	C	E
Benzal Chloride			G				X		
Benzaldehyde	X	X	G	E	E	E	X	X	X
Benzene	X	X	X	C	E	F	X	C	C
Benzene Carboxylic Acid	X		E	C			X	E	C
Benzine		X	X	X	E	E	E	C	C
Benzoic Acid	X	X	C	C			X	E	C
Benzol	X	X	X	C	E	F	X	C	C
Benzotrichloride	X			E			X	X	X
Benzyl Acetate	X		E	E			X	E	G
Benzyl Alcohol	X	X	E	C			X	C	C
Benzyl Chloride	X	X	X	X			X	X	X
Benzyl Ether	X	X	G	C			X	X	X
Black Sulfate Liquor	G	G	G	G	E	E	G	G	G
Bleach	C	X	E	E	G	F	X	C	E
Borax Solution	C	G	E	E	E	E	C	E	E
Boric Acid	E	E	E	E	E	E	E	E	E
Brake Fluid (Hd-557) 12 Days	X	E	E	E			C	C	C
Brine	E		E	E	E	E	E	E	E
Bromobenzene	X	X	X	X			X	X	X
Bromochlorometane	X		C	G	F	F	X	X	X
Bromoethane	C	X	X	X	E	E	C	X	X
Bromotoluene	X		X				X		X
Bunker Oil	X	X	X	X			E	G	C
Butadiene	X	X	X	X	E	E	X	X	G
Butane	X	X	X	X	E	E	E	E	C
Butanoic Acid	C		X	C			C	X	C
Butanol	E	E	C	C	E	E	E	E	E
Butanone	X	X	E	E	E	E	X	X	X
Butoxyethanol	X		C	E			C	X	G
Butyl Acetate	X	X	C	C	E	E	X	X	X
Butyl Acrylate	X	X	X	C	E	E	X	X	X
Butyl Alcohol	E	E	C	C	E	E	E	E	E
Butyl Aldehyde	X	X	C	C	E	E	X	X	X

Chemical Resistance Chart (Continued)

CHEMICAL OR MATERIAL CONVEYED / COMPOUND	NR	SBR	IIR	EPDM	XLPE	UHMWPE	NBR	CR	CSM
Butyl Benzyl Phthalate	X		E	E	E	E	X	E	X
Butyl Carbitol	X	X	E	E			X	X	C
Butyl Cellosolve	X	X	C	C	E	E	C	X	C
Butyl Chloride	X		F	X			X	X	X
Butyl Ether	X	X	C	C	E	E	X	C	X
Butyl Ether Acetaldehyde	X		G	X			X	X	X
Bulyl Ethyl Ether	X		X	F			G	X	C
Botyl Oleate	X	X	C	C			X	X	X
Butyl Phthalate	X	X	G	E	E	E	X	X	X
Butyl Stearate	X	X	C	X	E	E	C	X	X
Butylene	X	X	X	X			C	C	C
Butyraldehyde	X	X	C	C	E	E	X	X	X
Butyric Acid	C	X	X	C	E	E	C	X	C
Butyric Anhydride	F		F	E			C	G	G
Cadmium Acetate	X		E				X		E
Calcium Aluminate	C	G	C	E	E	E	E	E	E
Calcium Bichromate			E	E			C	E	F
Calcium Bisulfide	X	G	X	E			C	E	F
Calcium Chloride	E	E	E	E	E	E	E	E	E
Calcium Hydroxide	E	E	E	E	E	E	E	E	E
Calcium Hypochlorite	C	X	E	E	E	E	C	C	E
Calcium Nitrate	E	E	E	E			E	E	E
Calcium Sulfide	C	X	E	E			E	E	E
Calcium Acetate	E	X	E	E			C	C	C
Caprylic Acid	C		F				F		G
Carbamide	E		E	E	E	E	G	G	E
Carbitol	C	E	C	C	E	E	C	C	C
Carbolic Acid Phenol	C		C						C
Carbon Dioxide	G	G	E	G	E	E	E	G	E
Carbon Disulfide	X		X	X	C	C	X	X	X
Carbon Monoxide	C	G	E	E	E	E	E	C	C
Carbon Tetrachloride	X		X	X	E	E	X	X	X
Carbonic Acid	E	G	E	E	E	E	C	E	E
Castor Oil	E	E	C	C	E	E	E	E	E
Caustic Soda	E	E	E	G	E	E	C	G	E
Cellosolve Acetate	C	X	C	G	E	E	X	X	X
Celluguard	E	E	E	E			E	E	E
Cetylic Acid	C	G	C	C	E	E	E	G	C
China Wood Oil	X	X	C	X	E	E	E	C	C
Chlorinated Solvents	X	X	X	X	E	E	X	X	X
Chloro-2-Propanone	X		C						X
Chloroacetone Acid	X	X	C	C	E	E	X	X	G
Chloroacetone	X	X	C	E	E	E	X	X	X
Chlorobenzene	X	X	X	X	E	E	X	X	X
Chlorobutane	X		F	X			X	X	X
Chlorodane	X	X	X	X			C	C	C
Chloroethyl Benzene	X		X	X			C	X	X
Chloroform	X	X	X	X	F	F	X	X	X
Chloropentane	X		X	X			X	X	X
Chlorosulfonic Acid	X	X	X	X	F	X	X	X	X
Chlorotoluene	X	X	X	X			X	X	X
Chlorox	X	X	C	G			C	C	C
Chrome Plating Solutions	X	X	C	C			X	X	X
Chromic Acid	C	X	C	C	E	E	X	X	E
Chromium Trioxide	X	X	G	C			X	X	E
Cinnamene	X	X	X	X			C	X	X
Cis-9-Octadecenoic Acid	X	X	X	C	E	E	G	C	C
Citric Acid	E	E	E	E	E	E	E	E	E
Coal Tar Oil	X	X	X	X	E	E	E	G	F
Coal Tar	X	X	X	X	E	E	C	C	C
Coal Tar Naphtha	X		X	X	E	E	X	X	X
Coconut Oil	X	X	C	C	E	E	E	C	C
Coke Oven Gas	C	X	C	X	E	E	X	X	C
Coolanol	X	X	X	X			E	C	C
Copper Chloride	E	E	E	E	E	E	E	C	C

CHEMICAL OR MATERIAL CONVEYED / COMPOUND	NR	SBR	IIR	EPDM	XLPE	UHMWPE	NBR	CR	CSM
Copper Cyanide	E	E	E	E	E	E	E	E	E
Copper Hydrate	F		E				G		G
Copper Hydroxide	F		E				G		G
Copper Sulfate	C	G	C	E	E	E	E	E	E
Corn Oil	X	X	C	C	E	E	E	C	C
Cottonseed Oil	X	X	C	C	E	E	E	C	C
Creosote	X	X	X	X	E	E	C	C	X
Cresols	X	X	X	X	E	E	X	X	X
Cresylic Acid	X	X	X	X	E	E	X	X	X
Crolonaldehyde	X	F	E	E	E	E	X	X	X
Crude Oil	X	X	X	X	E	E	C	C	C
Cumano	X	X	X	X			X	X	X
Cupric Hydroxide	F		E				G		G
Cupric Nitrate	G		E	C	E	E	C	E	E
Cupric Sulfate	C	C	C	E	E	E	E	E	E
Cuttlng Oil	C	X	X	X			E	C	C
Cyclohoxane	X	X	X	X	E	E	E	X	C
Cyclohexanol	C	X	X	X	E	E	G	C	C
Cyclohexanone	X	X	C	C	E	E	X	X	X
Cyclopentane	X		X	X			G	C	X
Cyclopentanone	X		X				X		X
Cyclopentil Alcohol				C			X	F	
D-Furaldehyde	X		C	E			G	F	C
Ddt In Kerosene	X	X	X	X			E	C	C
Decahydronaphthalene	X	E	X	X	E	E	X	X	X
Decalin	X	E	X	X	E	E	X	X	X
Decyl Alcohol	X		X	X			E	X	C
Decyl Aldehyde	X		F	X			X		X
Decyl Butyl Phthalate	X		E				X		X
Detergent, Water Solution	E	G	E	E	E	E	E	C	C
Developing Fluid	E	G	C	C			E	E	E
Dextron	X	X	X	X			E	C	X
Di (2Ethylhexyl) Adipate	X		E	G	G	G	X	X	X
DI (2Ethylhexyl) Phthalate	X	X	C	C	E	E	X	X	X
Di-iso-Butylene	X	X	X	X	E		C	C	X
Di-iso-Decyl Phthalate	X		E	E			X	X	X
Di-iso-Propanolamine	G		E	E			G	G	F
Di-iso-Propyl Ether	X		X	X	E	E	G	C	C
Di-iso-Propyl Ketone	X	X	E	E	E		X	X	X
Di-P-Mentha-1,8-Diene	X		X	X			C	X	X
Diacetone Alcohol	X	X	E	E	E	E	X	F	C
Diacetylmethane		X	E	E			X	X	X
Diammonium Orthophosphate				E			E	E	
Diamyl Naphthalene	X		E		E	E			X
Diamylamine	G	X	E	E			G	C	C
Diamylene	X		X	X				X	X
Diamylphenol	X		X		E	E	X		X
Dibenzyl Ether	X	X	C	C			X	X	X
Dibromobenzene	X		X	X			X	X	X
Dibromomethane	X		X	C			X	X	X
Dibutyl Ether	X	X	C	C	E	E	X	C	X
Dibutyl Phthalate	X	X	C	C	E	E	X	X	X
Dibutyl Sebacate	X	X	C	C	E	E	X	X	X
Dibutylamine	X	X	X	F			X	C	C
Diacalcium Phosphate	E		E	E			E	E	E
Dichloroethylene	X		C	C	F	F	X	X	X
Dichloroacetic Acid	X	X	C	X	E	E	X	X	X
Dichlorobenzene	X	X	X	X			X	X	X
Dichlorobutane	X	X	X	X			C	X	X
Dichlorodifluoromethane	C	E	C	C	E	G	C	C	C
Dichlorothane	X	X	C	X	E	E	X	X	X
Dichloroethyl Ether	X		X	X			X	X	X
Dichlorohexane	X		X	X			X	X	X
Dichloromethane	X	X	X	X			X	X	X
Dichloropentane	X	X	X	X			X	X	X

Chemical Resistance Chart (Continued)

CHEMICAL OR MATERIAL CONVEYED / COMPOUND	NR	SBR	IIR	EPDM	XLPE	UHMWPE	NBR	CR	CSM
Dichloropropane	X		X	X	G	G	F	X	X
Dichloropropene	X		X	X	G	G	C	X	X
Diesel Oil	X	X	X	X	E	F	F	C	C
Diethanol Amino	G	X	E	G			C	G	F
Diethylbenzene	X	X	X						X
Diethyl Ether	X	X	X	X	E	E	X	X	X
Diethyl Ketone	X		G	G	E	E	X	X	X
Diethyl Oxalate	F		X	X			X	X	X
Diethyl Phthalate	X		X	F	E	E	X	X	X
Diethyl Sebacate	X	X	G	F			C	X	F
Diethyl Sulfate	X	E	C	E			X	E	X
Diethyl Amine	C	G	C	C	E	E	C	C	C
Diethylene Glycol	E	E	E	E	E	E	E	E	E
Diethylene Oxide	X		X	E			X	X	X
Diethylenetriamine	G	X	E	E			G	X	F
Dihydroxy Succinic Acid	E		G	G			G	G	E
Dihydroxydiethyl Ether	E		E	E	E	E	E	E	E
Diisobutyl Ketone	X	X	G	E	E	E	X	X	X
Diisodecyl Phthalate	X		E	E	E	E	X	X	X
Diisooctyl Adipate	X		E	E			X	X	X
Diisooctyl Phthalate	X		E	G	E	E	X	X	X
Dimethyl Carbinol	E		E	E	E	E	C	G	E
Dimethyl Ketone	C	F	E	E	E	E	X	C	X
Dimethyl Phthalate	X	X	C	C	E	E	X	X	X
Dimethyl Sulfate	X		G	X	E	E	X	X	X
Dimethyl Sulfide	X		F	X			X	X	X
Dimethylamine	G	X	G	E	E	E	F	X	X
Dimethylaniline	X	X	G	E			X	X	X
Dimethylbenzene	X	X	X	X			X	X	X
Dimethylbutane	X		X						X
Dioxane	X	X	C	C	E	E	X	X	X
Dipentene	X	X	X	X			C	X	X
Dipentylamine	G	X	E	E			G	C	C
Dipropylene Glycol	E		E	E			E	E	E
Disodium Phosphate	E		E	E			E	E	E
Divinyl Benzene	X	X	X	X			X	X	X
Dowthermn, AAnd E	X	X	X	X			X	X	C
Dry Cleaning Fluids	X	X	X	X			C	X	X
Ethanoic Acid		G		C	E	E	C	C	
Ethanol	E	F	E	E	E	E	C	E	E
Ethanolamine	C	X	X	E			C	C	C
Ethers	X	X	X	X	E	E	F	X	X
Ethyl Acetate	X	X	C	C	E	E	X	X	X
Ethyl Acetoacetate	C	F	C	C			X	X	X
Ethyl Acetone	X		G	G			X	X	X
Ethyl Acrylate	X	X	C	C			X	X	X
Ethyl Alcohol	E	E	E	E	E	E	C	E	E
Ethyl Aldehyde	C		E	E	E	E	X	X	F
Ethyl Aluminium Dichloride	X		X				X		X
Ethyl Benzene	X	X	X	X	E	E	X	X	X
Ethyl Bromide	C	X	X	X	E	E	C	X	X
Ethyl Butyl Acetate	X		E				X		G
Ethyl Butyl Alcohol	E		E						E
Ethyl Cellulose	C	G	C	C	E	E	C	C	C
Ethyl Chloride	C	G	E	E	E	E	E	X	C
Ethyl Dichloride	X	X	F	X	E	E	X	X	X
Ethyl Ether	X	X	X	X	E	E	X	X	X
Ethyl Formate	X	X	C	C			X	C	C
Ethyl Iodide	X		F	F	E	E	X	X	X
Ethyl Oxalate	E	X	X	E			X	X	X
Ethyl Phthalate	X		X	F	E	E	X	X	X
Ethyl Silicate	C	G	E	F			E	E	
Ethyl-N-Butyl Ketone	X	G	G				X	X	X
Ethyil-1-Butanol	E		E	E			E	E	E
Ethylamlne	C	X	C	E			C	C	F

CHEMICAL OR MATERIAL CONVEYED / COMPOUND	NR	SBR	IIR	EPDM	XLPE	UHMWPE	NBR	CR	CSM
Ethylene Chlorohydrin	C	G	C	C			X	C	C
Ethylene Diamine	C	G	E	E	E	E	C	E	C
Ethylene Dibromide	X	X	C	C	F	F	X	X	X
Ethylene Dichloride	X	X	C	X	F	F	X	X	X
Ethylene Glycol Monobutyl Ether	X	X	E	E	E	E	F	X	C
Ethytene Glycol Monoethyl Ether	X		C	C	E	E	C	X	X
Ethylene Glycol	E	E	E	E	E	E	E	E	E
Ethylene Oxide	X	X	C	C	E	E	X	X	X
Fatty Acids	X	X	C	X	E	G	C	C	C
Ferric Bromide	E		E				E		E
Ferric Chloride	E	E	E	E		E	E	C	C
Ferric Nitrate	E	E	E	E		E	E	E	E
Ferric Sulfate	E	E	E	E		E	E	E	E
Ferrous Acetate	X		E	G			X	X	X
Ferrous Chloride	E		E	E		E	E	E	E
Ferrous Sulfate	E	E	E	E		E	E	E	E
Fluoroborlc Acid	E	E	C	E	E	E	E	E	E
Fluorine	X		X	E	G	G	X	X	X
Fluorosilcic Acid	E	G	E	E	E	E	E	E	E
Formaldehyde	C	G	C	C	E	E	C	C	C
Formalin	C	G	C	E	E	E	G	G	C
Formic Acid	C	E	E	E	E	E	C	C	E
Freon 113	C	G	X	X			E	E	C
Freon 12	X	E	X	C	F	G	C	C	E
Freon 22	C	E	C	C	F	E	X	E	E
Fuel A	X		X	X			E	C	C
Fuel B	X		X	X			C	X	X
Fuel Oil	X	X	X	X	E	E	E	C	C
Furan	X	X	X	X	E	E	X	X	X
Furfural	X	X	C	C	E	E	X	X	C
Fuel A (Astm)	X	X	X	X			E	C	X
Fuel B (Astm)	X	X	X	X			C	X	X
Fuel Oil	X	X	X	X	E	E	E	C	C
Furun	X	X	X	X	E	E	X	X	X
Furfural	X	X	E	C	E	E	X	X	X
Furfuran	X	X	X	X	E	E	X	X	X
Furfuryl Alcohol	X	X	C	C	E	E	X	X	X
Gatic Acid	E	G	C	C	E	E	C	C	C
Gallotannic Acid	E		G	E				E	E
Gasoline	C	X	C	X	E	E	E	X	C
Glacial Acrylic Acid	X		X	X			X	X	G
Gluconic Acid	X		F	E			C	E	G
Glucose	E	E	E	E	E	E	E	C	E
Glycerine	E	E	E	E	E	E	E	E	E
Glycerol	E	E	E	E	E	E	E	E	E
Glycogenic Acid	X		F	E			F	E	G
Glycols	E	E	E	E	E	E	E	E	E
Glyconic Acid	X		F	E			F	E	G
Glyclyl Alcohol									
Grease	X	X	X	X			E	F	C
Green Sulphate Liquor	C	G	E	E			C	C	G
Helium	E	E	E	E			E	E	E
Heptaldehyde	X	X	C	C			E	C	X
Heptanal	X	X	C	C			E	C	X
Heptane	X	X	X	X		E	E	C	C
Heptanoic Acid	X		X	X			E	C	C
Hexadecanoic Acid	E	G	G	G	E	E	E	X	X
Hexaldehyde	X	X	C	C	E	E	X	C	C
Hexane	X	X	X	X	E	E	E	C	C
Hexanol	E	E	C	C	E	E	C	C	C
Hexene	X	X	X	X			C	C	C
Hexyl Alcohol	E	E	C	C	E	E	C	C	C
Hexyl Methyl Ketone	X		G	G			X	C	X
Hexylamine	F		G	G			F	G	F
Hexylene Glycol	E		E	F			C	E	E

Chemical Resistance Chart (Continued)

CHEMICAL OR MATERIAL CONVEYED / COMPOUND	NR	SBR	IIR	EPDM	XLPE	UHMWPE	NBR	CR	CSM
Histowax	X		X						C
Hydraulic & Motor Oil	X	X	C	C	E	E	C	C	C
Hydrazine	C	G	C	E			C	C	C
Hydrobromic Acid	E	X	E	E	E	E	X	C	E
Hydrocloric Acid	C	X	C	C	C	C	C	C	C
Hydrocyanic Acid	C	G	C	E			C	C	E
Hydrofluoric Acid	C	X	C	C	E	E	C	C	E
Hydrofluosillcic Acid	E	G	E	E	E	E	X	C	E
Hydrogen Chloride Anhydrous	X	X	E	E			X	C	E
Hydrogen Dioxide	G		G	G			F	F	C
Hydrogen Gas	C	G	E	E	E	E	E	E	E
Hydrogen Peroxide Over 10%	C	X	C	C	C	F	X	X	C
Hydrogen Peroxide 10%	C	X	G	G	F	F	C	X	X
Hydrogen Sulfide	X	X	E	E	E	E	X	E	G
Hydroxy Benzene	C		C	C			X	X	C
Hydroxyisobutyronirile	C		E	E			C	G	F
Hydroxytoluene	X	X	C	C			X	C	C
Iminodi-2-Propanol	G		E	E			G	G	F
Iminodiethanol	C	X	C	G			C	G	F
Iodine	X	G	C	C	E	E	C	C	C
Iodine Pentafluoride	X	X	X	X			X	X	X
Iodoform	X		X	E			E	X	X
Iso-Butanal	X	G		G	E	E	X	F	
Iso-Butylamine	F		E	G			X	X	F
Iso-Butylbromlde	X		X	X			X	X	X
Iso-Butylcarbinol	X		E	E			E	E	E
Isocyanates	F		G	G	E	E	C	X	F
Isooctane	X	X	X	X	E	E	E	C	C
Isopropyl Acetate	X	X	C	C	E	E	X	X	X
Isopropyl Alcohol	E	E	E	E	E	E	C	C	E
Isopropyl Ether	X	X	X	X	E	E	G	X	C
Jet Fuels	X	X	X	X	F	E	C	C	X
Jp-4 Oil	X	X	X	X			E	X	X
Kerosene	X	X	X	X	E	E	E	C	C
Ketones	C	E	G	E	E	E	C	C	C
Lacquer Solvents	X	X	X	E	E	X	X	X	X
Lactic Acid – Cold	E	G	E	C	G	G	C	C	E
Lactic Acid – Hot	E	X	E	C	G	G	C	C	E
Lard	X	X	C	C	E	E	E	C	C
Lavender Oil	X	X	X	X			C	X	X
Lead Acetate	E	X	E	E	E	E	C	C	X
Lead Nitrate	E	E	E	E			E	E	E
Lead Sulfate	E		E	E	E	E	E	E	E
Lime	E		E	E	E	E	G	G	G
Lime Bleach	C	E	E	E			C	C	E
Lime Sulfur	C	X	E	E	E	E	E	E	E
Limonene	X		X	X			C	X	X
Linoleic Acid	X	X	X	X			C	C	X
Linseed Oil	X	X	C	C	E	E	E	C	C
Liquid Petroleum Gas	X	X	X	X	E	E	E	G	C
Lubricating Oil	X	X	X	X	E	E	C	C	C
Lye Solutions	E	G	E	G			C	G	E
Mek	X	X	E	E	E	E	X	X	X
Magnesium Acetate	X	X	E	G			X	X	E
Magnesium Chloride	E	E	E	E	E	E	E	E	E
Magnesium Hydrate	C	G	E	E	E	E	C	C	E
Magnesium Hydroxyde	C	G	E	E	E	E	C	C	E
Magnesium Sulfate	C	G	E	E	E	E	E	E	E
Maleic Acid	X	X	X	C	E	E	X	X	X
Maleic Anhydride	X	X	C	C			X	X	X
Malic Acid	E	G	X	C	C	C	E	C	C
Manganous Sulfate	G		G	E			E	E	E
Mercury	E	E	E	E	E	E	E	E	E
Mercury Vapors	G	E	E	E			E	G	E
Mesityl Oxlde	X	X	F	C			X	X	X

CHEMICAL OR MATERIAL CONVEYED / COMPOUND	NR	SBR	IIR	EPDM	XLPE	UHMWPE	NBR	CR	CSM
Methallyl Alcohol	E		E	E			E	E	E
Methallyl Chloride	X		X					X	X
Methane Carboxylic Acid (See Acetic Acid)					E	E			
Methanoic Acid	C	E	E	E	E	E	G	E	E
Methanol	E	E	C	E	E	E	C	E	E
Methoxy Ethanol	E		E	E	E	E	C	E	E
Methyl Acetate	C	X	C	C			X	C	X
Methyl Acetoacetate	X	X	C	C			X	X	X
Methyl Acetone	X	X	E	E	E	E	X	X	X
Methyl Allyl Chloride	X			X				X	X
Methyl Amyl Carbinol	G			G	E		E	G	E
Methyl Benzene	X	X	X	X	F	F	X	X	X
Methyl Bromide	X	X	C	X	F	F	C	X	X
Methyl Butane	X		X	X			E	X	X
Methyl Butyl Ketone	X	X	E	E	E	E	X	X	X
Methyl Carbitol				G			F	F	
Methyl Cellosolve	X	X	C	C	E	E	C	C	C
Methyl Chloride	X	X	C	C	F	F	X	X	X
Methyl Cyanide	G		E	E			C	E	G
Methyl Ethyl Ketone	X	X	E	E	E	E	X	X	X
Methyl Hexanol	E		E	E			E	E	E
Methyl Methacrilate	X	X	X	X	E	E	X	X	X
Methyl Normal Amyl Ketone	X			E			C	E	X
Methyl Propyl Ether	X		X	X			X	X	C
Methyl Salycilate	X		C	C	E	E	X	X	X
Methyl Styrene	X		X	X			X	X	X
Methyl Sulfide	X		F	X			X	X	X
Methyl-Iso-Amyl-Ketone	X		G						X
Methyl-2-Butanone	X	X	C	C			X	X	X
Methyl-2-Hexanone	X		G						X
Methyl-2-Pentanol	G		E	E			G	G	E
Melhyl-2-Pentanone	X		C	C			X	X	X
Methyl-4-Isopropyl Benzene	X		X	X			X	X	X
Methyl Amyl Acetate	X								X
Methyl Amyl Alcohol	G		E	E			G	G	E
Methylcyclohexane	X		X	X			X	X	C
Methylene Bromide	X		X	X	E	E	C	X	X
Methylene Chloride	X	X	X	C	F	F	X	X	X
Methylethyl Ketone	X	X	E	E			X	X	X
Methyl Hexyl Ketone	X		G	G	E		X	C	X
Methyl Isobutyl Carbinol	G		E	C			X	X	E
Methylisobutyl Ketone	X	X	C	C	E	E	X	X	X
Methylisopropyl Ketone	X	X	C	C			X	X	X
Methyllactonitrile	F		E	E			X	G	F
Methylpropyl Carbinol	E		E				E		E
Methylpropyl Ketone	X		G	G	E	E	X	X	X
Minerald Oil	X	X	C	X	E	E	E	C	C
Mineral Spirits	X	X	X	X			C	C	G
Mobile Hf A	X	X	X	X			E	C	X
Molten Sulfur	G		G	E			G	E	E
Mono-Chloroacetic Acid	C	X	G	G	E	E	X	C	G
Monobutyl Ether	X	X	C	C			G	C	C
Monochlorobenzene	X	X	X	X	F	F	X	X	X
Monochlorodifluoromethane	C	E	C	C	E	E	X	C	E
Monoethanol Amine	C	G	C	C			G	G	C
Monoethyl Amine	C	F	C	E			C	C	F
Morpholine	X		C	C			X	X	X
Motor Oil, 40W	X		X	X			E	C	C
Mtbe			G				X	X	
Muriatic Acid	G	X	C	F			C	C	C
N-Butanal	X	X	C	C	E	E	X	X	X
N-Butylamine	X	X	C	C			C	X	X
N-Butylbenzene	X		X	X			X	X	X
N-Butylbromide	X		X	X			X	X	X
N-Butylbulyrate	X	X	E	E			X	X	X

Chemical Resistance Chart (Continued)

CHEMICAL OR MATERIAL CONVEYED / COMPOUND	NR	SBR	IIR	EPDM	XLPE	UHMWPE	NBR	CR	CSM
N-Butylcarbinol	E		E	E	E	E	E	E	E
N-Nonyl Alcohol	E		E	E			E	E	E
N-Octane	X	X	X	X	E	E	C	G	X
Naphtha	X	X	X	X	E	E	C	X	C
Naphthalene	X	X	X	X	E	E	X	X	X
Naphthenic Acid	X	X	X	X			C	X	X
Natural Gas	C	F	X	X	E	E	E	E	E
Neohexane	X		X	X			E	G	X
Neon Gas	E	E	E	E			E	E	E
Neu-Tri	X		X				X		X
Nickel Acetate	E	X	E	E			C	G	X
Nickel Chloride	E	E	E	E	E	E	E	C	E
Nickel Nitrate	E		E	E	E	E	E	E	E
Nickel Sulfate	C	G	E	E	E	E	E	E	E
Nitric Acid, Conc	X		X	X			X	X	X
Nitric Acid, Red Fuming	X	X	X	X	X	X	X	X	X
Nitric Acid, 10%	X	X	E	E	E	E	X	G	E
Nitric Acid, 13N	X					X	X		
Nitric Acid, 13N +5%	X					X	X		
Nitric Acid, 20%	X	X	G	E	E	E	X	X	E
Nitric Acid, 30%	X	X	F	F	G	G	X	X	E
Nitric Acid, 30% – 70%	X	X	F	X	F	F	X	X	C
Nitrilotriethanol	C	G	E	E	E	E	F	C	C
Nitrobenzene	X	X	F	C	E	E	X	X	X
Nitroethane	G	G	G	C			X	C	C
Nitrogen	E	E	E	E	E	E	E	E	E
Nitromethane	G	C	G	C			X	C	C
Nitrous Oxide Gas				E			E	G	
Nonanoic Acid	X		E		E	E	E		X
Nonanol	E		E	E			E	E	E
Octanoic Acid	F		F				F		G
Octanol	C	E	C	C			C	C	C
Octyl Acetate	C	X	E	G	E	E	C	C	E
Octyl Alcohol	C	E	C	C			C	C	C
Octyl Aldehyde	X		F		E	E	X		X
Octyl Amine	F		E	G			F	G	F
Octyl Carbinol	E		E	E			E	E	E
Octylene Glycol	E		E	E			E	E	E
Oil-Petroleum		X			G	G			
Oleic Acid	X	X	X	X	E	E	G	F	C
Oleum	X	X	X	X	X	X	X	X	X
Olive Oil	X	X	C	G			E	G	C
Ortho-Dichlorobenzene	X	X	X	X			X	X	X
Ortho-Dichlorobenzol	X	X	X	X			X	X	X
Orthoxylene	X	X	X	X			X	X	X
Oxalic Acid	C	G	E	E	E	E	G	G	E
Ozone	X	X	G	E	E	E	X	F	G
P-Cymene	X		X	X			X	X	X
Paint Thinner	X	X	X	X			X	X	X
Palmitic Acid	C	G	C	C	E	E	E	G	C
Papermakers Alum									
Para-Dichlorobenzene	X	X	X	X			X	X	X
Paraffin Wax	X		X	X			E	G	E
Paraldehyde	F		E	E			C	G	X
Paraxylene	X		X	X			X	X	X
Pelargonic Alcohol	E		E	E	E	E	E	E	E
Pentachloroethane	X		X				X	X	X
Pentamethylene	X		X	X			G	C	X
Pentane	X	X	X	X	E	E	E	E	C
Pentanol	E		E		E	E			E
Pentanone	X		G	G			X	X	X
Pentasol	X	G	E	G	E	E	C	C	E
Pentyl Acetate	C	X	X	C	E	E	X	X	X
Pentyl Acohol	C	C	C	E	E	E	C	C	E
Pentyl Bromide	X		X	C			X	X	X

CHEMICAL OR MATERIAL CONVEYED / COMPOUND	NR	SBR	IIR	EPDM	XLPE	UHMWPE	NBR	CR	CSM
Pentyl Chloride	X	X	X	X	E	E	X	X	X
Pentyl Ether	X		X	X			C	X	F
Pentylamine	F		G	X			F	F	F
Perchloric Acid	C	X	C	G	E	E	X	E	C
Perchloroethylene	X	X	X	X	E	E	F	X	X
Perchloromethane	X		X	X			X	X	X
Petroleum Crude	X	X	X	X	E	E	G	G	E
Petroleum Ether	X	X	X	X			E	X	C
Petroleum Oils	X	X	X	X	E	E	X	G	G
Phenol	C	X	C	X	E	E	X	X	C
Phenolsulfonic Acid	C	X	G	E			C	C	C
Phenylamine	X		E	C	E	E	X	X	C
Phenylbromide	X		X						X
Phenylmethane	X		X	X	E	E	X	X	X
Phenylmethanol	X		E	C			X	C	C
Phosphate Esters	X	X	E	E			X	X	X
Phosphoric Acid 10%	E	E	E	E	E	E	E	E	E
Phosforic Acid 10% – 85%	G	G	E	E	E	E	G	G	E
Phosphorus Trichloride	X	X	E	E	E	E	X	X	X
Picric Acid, H20 Solution	C	G	G	E			E	E	E
Pine Oil	X	X	X	X	E	E	E	X	X
Pinene	X	X	X	X			C	C	X
Polyethylene Glycol E-400	E		E	E			C	G	E
Polyol Ester				X			G	X	
Polypropylene Glycol	E		E		E	E	E	E	E
Potassium Acetate	E	X	E	E			C	E	E
Potassium Bisulfate	E	G	E	E			E	E	E
Potassium Bisulfite	E	G	E	E			E	E	E
Potassium Carbonate	E	E	E	E	E	E	E	E	E
Potassium Chloride	E	E	E	E	E	E	E	E	G
Potassium Chromate	G	G	E	E			G	E	F
Potassium Cyanide	E	E	E	E	E	E	E	E	E
Potassium Dichromate	C	G	E	E	E	E	E	E	G
Potassium Hydrate	C	G	E		E	E			E
Potassium Hydroxide	C	G	E	E	E	E	G	G	E
Potassium Nitrate	E	E	E	E	E	E	E	E	E
Potassium Permanganate, 5%	E	G	E	E	E	E	F	E	G
Potassium Silicate	E	E	E	E			E	E	E
Potassium Sulfate	C	G	E	E	E	E	E	E	E
Potassium Sulfide	G	G	E	E			C	E	E
Potassium Sulfite	C	G	E	E	E	E		E	C
Prestone Antifreeze	E	E	E	E			E	E	E
Producer Gas	X	X	X	X			E	G	C
Propane	X	X	X	X	E	E	E	E	C
Propanediol	E	E	E	E	E	E	E	G	E
Propanetriol	E	E	E	E	E	E	E	E	E
Propanol	E	E	E	E	E	E	E	E	E
Propanone	C	G	E	E	E	E	X	X	C
Propenol	E		E						E
Propanediamine	G		E			G			F
Propene Nitrite	G		X		E	E	X	X	
Propenyl Alcohol	E		E	E	E	E	E	E	E
Propenyl Anisole	X		X		E	E	X		X
Propionic Acid	E	X	E	E			C	C	G
Propionitrite	E		E	C			E	C	
Propyl Acetate	X	X	C	C	E	E	X	X	X
Propyl Alcohol	E	E	E	E	E	E	E	E	E
Propyl Aldehyde	F		G	G			X	X	X
Propyl Benzene	X		X					X	X
Propyl Chloride	X		F	F			X	F	X
Propyl Nitrate	X	X	C	C			X	X	X
Propylene	X	X	X	X			X	X	X
Propylene Diamine	G		E				G		F
Propylene Glycol	E	E	E	E	E	E	E	E	E
Pydraul, 'E' Series	X	X	C	C			X	X	X

Chemical Resistance Chart (Continued)

CHEMICAL OR MATERIAL CONVEYED / COMPOUND	NR	SBR	IIR	EPDM	XLPE	UHMWPE	NBR	CR	CSM
Pydraullc 'C'	X	X	X	X			X	X	X
Red Oil	X	X	X	F	E	E	E	F	C
Refrigerant 11	X	X	X		E	E			E
Refrigerant 12	X	E	X		E	E			E
Refrigerant 22	C	E	X		E	E			E
Resorcinol	E	G	E	G			C	A	G
Sae No. 10 Oil	X	X	X	X			E	C	X
Sal Ammoniac	E	E	E	E	E	E	E	E	E
Sea Water	E	E	E	E	E	E	E	E	E
Sewage	G	G	G	G	E	E	E	C	E
Silicate Esters	X	C	X	X			G	E	G
Silicate Of Soda	E	E	E	E			E	E	E
Silicone Grease	E	E	E	E	E	E	E	E	E
Silicone Oil	E	E	E	E	E	E	E	E	E
Silver Nitrate	E	G	E	E	E	E	C	E	E
Skydrol 500 Type 2	X	X	G	E			X	X	X
Skydrol 500B	X	X	G	E			X	X	X
Skydrol 500C	X	X	G	E			X	X	X
Skydrol 7000 Typo 2	E	X	E	E			X	X	X
Soap Solutions	F	X	E	E	E	E	E	G	E
Soda Ash	E	X	E	E	E	E	E	E	E
Soda Lime	E		E	E			G	G	G
Soda Niter	G	G	E	E	E	E	E	G	E
Sodium Acetate	F	X	F	E	E	E	G	C	G
Sodium Aluminate	E	G	E	E			E	E	E
Sodium Bicarbonate	E	E	E	E	E	E	E	E	E
Sodium Bisulfate	E	G	E	E	E	E	E	E	E
Sodium Bisulfite	E	G	E	E	E	E	E	E	E
Sodium Borate	E	E	E	E	E	E	E	E	E
Scdum Carbonate	E	E	E	E	E	E	E	E	E
Sodium Chloride	E	E	E	E	E	E	E	E	E
Sodium Cyanide	E	E	E	E	E	E	E	E	E
Sodium Dichromate	X	G	E	E			E	F	G
Sodium Hydrate	E	G	E	E	E	E	X	G	C
Sodium Hydrochlorite	F	G	G	G			F	F	E
Sodium Hydroxide	E	G	E	E	E	E	X	G	C
Sodium Hypochlorite	X	F	C	E	E	E	C	C	G
Sodium Metaphosphate	E	E	G	E	E	E	E	E	C
Sodium Nitrate	G	G	E	E	E	E	C	G	E
Sodium Perborate	G	G	E	E			C	G	E
Sodium Peroxide	C	G	E	E	E	E	C	G	G
Sodium Phosphate	E	E	E	E	E	E	E	G	E
Sodium Silicate	E	E	E	E	E	E	E	E	E
Sodium Sulfate	C	G	E	E	E	E	E	E	E
Sodium Sulfide	G	G	E	E	E	E	E	E	E
Sodium Sulfite	G	G	E	E	E	E	E	E	E
Sodium Thiosulfate	G		E	E	E	E	C	E	E
Soybean Oil	X	X	G	C			E	E	G
Stannic Chloride	E	E	E	E	E	E	E	G	E
Stannic Sulfide	E		E	E			E	E	E
Stannous Chloride	E	E	E	G	E	E	E	E	E
Stannous Sulfide	E		E	E			E	E	E
Steam, Below 350 Deg F	C	X	G	E	X	X	X	X	C
Stearic Acid	C	G	C	G	E	E	G	G	G
Stoddard Solvent	X	X	X	X	E	E	E	G	X
Styrene	X	X	X	X	F	F	X	X	X
Sulfamic Acid	G		E	E			C	G	E
Sulfur	X	X	E	E	E	E	X	E	E
Sulfur Chloride	X	X	X	E			C	E	
Sulfur Dioxide	C	G	C	E		G	X	C	C
Sulfur Trioxide, Dry	C	X	G	E	X	X	X	X	X
Sulfuric Acid 60%	X	X	E	E	X	X	G	X	G
Sulfuric Acid, Conc.	X	X	X	X	F	F	X	X	X
Sulfuric Acid, Fuming	X	X	X	X	X	X	X	X	X
Sulfuric Acid, 25%	E	F	G	E	E	E	C	C	E

CHEMICAL OR MATERIAL CONVEYED / COMPOUND	NR	SBR	IIR	EPDM	XLPE	UHMWPE	NBR	CR	CSM
Sulfuric Acid, 25%–50%	G	F	G	E	E	E	C	X	G
Sulfuric Acid, 25%–96%	C	X	C	X	G	G	X	X	C
Sulfurous Acid. 10%	G	G	E	E	E	E	E	C	E
Sulfurous Acid, 10%–75%	G	G	E	E	E	E	F	C	E
T-Butyl Amine	X		C	C			C	X	X
Tall Oil	X	X	X	X			E	C	F
Tallow	X	X	X	E	E	E	E	G	F
Tannic Acid	E	G	E	E	E	E	E	E	E
Tar	X	X	X	X	X	F	X	X	
Tar Bituminous	X	X	X	X			G	C	X
Tartaric Acid	E	G	G	G	E	E	E	E	E
Tellone 2	C								
Tertiary Butyl Alcohol	C	G	C	C			C	C	C
Terpineol	X	X	C						X
Tertiary Butyl Amine	X		C	C			C	X	X
Tertiary Butyl Mercaptan	X	X	X	X			X	X	X
Tetrachlorobenzene	X		X	X			X	X	X
Tetrachloroethane	X	X	X	X	F	F	X	X	X
Tetrachloroethylene	X	X	X	X	F	F	C	X	X
Tetrachloromethane	X		X	X	E	E	X	X	X
Tetrachloronaphthalene	X		X	X	E	E	X	X	X
Tetraethylene Glycol	E		E	E			E	E	E
Tetraethylorthosilicate	X		E	E			E	E	
Tetrahydrofuran	X	X	C	X			X	X	X
Tin Chloride	E		E	E	E	E	E	C	C
Titanium Tetrachloride	X	X	X	X			C	C	X
Toluene	X	X	X	X	E	E	X	X	X
Toluidine	X		X	X	E	F	C	X	X
Toluol	X	X	X	X	E	E	X	X	X
Transformer Oil	X	X	X	X	E	E	C	C	C
Transmission 'A' Oil	X		X	X			E	C	C
Tri-Amine	C		E	E			G	C	C
Tributyl Phosphate	C	X	G	C			F		X
Tributylamine	G		E				G		F
Trichloroacetic Acid	C	X	C	C			C	C	X
Trichlorobenzene	X	X	X	X	F	F	C	X	X
Trichloroethane	X	X	X	X			X	X	X
Trichloroethylene	X	X	X	X	F	F	X	X	X
Trichloromethane	X	X	X	X	F	F	X	X	X
Trichlorotoluene	X			E			X	X	X
Tricresyl Phosphate	X	X	E	E			X	X	X
Triethanolamine	C	G	E	E	E	E	C	C	C
Triethylamine	G	X	G	E			E	G	E
Triethylene Glycol	E		E	E	E	E	C	E	E
Trihydroxybenzoic Acid	E		C	C			C	C	G
Trimethyl Pentane	X	X	X	X			E	G	C
Trimethylamine	E		E	C			C	E	E
Trisodium Phosphate	E	E	E	E	E	E	E	E	E
Tritoyl Phosphate	X	X	E	E	X	C	C		
Tung Oil	X	X	C	X	E	E	E	C	C
Tung Oil	X	X	C	X	E	E	E	C	C
Turpentine	X	X	X	X	E	E	E	X	X
Unsymetrical Dimethyl Hydrazine	E	X	E	E			C	C	E
Undecyl Alcohol	E		E	E			E	E	E
Urea	E		E	E	E	E	G	G	E
Uric Acid	E		E	E			C	E	E
Varnish	X	X	X	X	E	E	G	X	X
Vegetable Oils	X	X	C	F	F	E	E	C	C
Versilube F44	E	E	E	E			E	E	E
Versilube F55	F	F	F	X			E	E	E
Vinegar	G	G	E	E	E	E	G	G	E
VInegar Acid	G		E		E	E			E
Vinyl Acetate	X	X	E	G	E	E	C	C	F
Vinyl Benzene	X	X	X	X	F	F	C	X	X
VInyl Chloride	X	X	C	E	E	E	X	X	C

Chemical Resistance Chart (Continued)

CHEMICAL OR MATERIAL CONVEYED \ COMPOUND	NR	SBR	IIR	EPDM	XLPE	UHMWPE	NBR	CR	CSM
Vinyl Cyanide	G	F	X	X	E	E	X	X	G
Vjnyl Ether	X		X				G		G
Vinyl Toluene	X		X	X			X	X	X
Vinyl Trichloride	X		X	X			X	X	X
Vm & Naphtha	X	X	X	X			G	F	X
Water	E	C	E	E	E	E	E	G	E
Water, Boiling	E		E	F			G	G	E
Water, Soda					E	E			
Wemco C	X	X	X	X			E	C	X
Whiskey	E	E	E	E	E	E	E	E	E
White Oil	X	X	X	X	E	E	E	G	C
White Pine Oil	X	X	X	X			C	X	X
Wines	E	E	E	E	E	E	E	E	E
Wood Alcohol	E	E	C	E	E	E	C	E	E
Wood Oil	X	X	C	X	E	E	E	C	C
Xenon	E	E	E	E			E	E	E
Xylene, Xylon	X	X	X	X	F	F	X	X	X
Xylidine	X	X	G	G			C	X	X
Zeolites	E	E	E	E			E	E	E
Zinc Acetate	E	X	E	E			G	C	
Zinc Carbonate	E		E	E			E	E	E
Zinc Chloride	E	E	E	E	E	E	E	E	E
Zinc Chromate	E		E	E			C	E	G
Zinc Sulfate	E	G	E	E	E	E	E	E	E
0-Aminotoluene	X		C	C			X	X	X
1 Undecanol	E	E	E	E	E	G	E	E	E
1-Amino-2-Propanol	G		E	E			C	E	F
1-Amlnobutane	X	X	C	C			C	X	X
1-Aminopentane	F		G	X			F	C	F
1-Bromo-2-Methyl Propane	X		X	X			X	X	X
1-Bromo-3-Methyl Butane	X		X	X			X	X	X
1-Bromobutane	X		X	X			X	X	X
1-Chloro-2-Methyl Propane	X		X	X			X	X	X
1-Chloro-3-Methyl Butane	X		X	X			X	X	X
1-Decanol	X		X	X	E	E	E	X	C
1-Hendecanol	E		E	E			E	E	E
1,4-Dioxane	X		C	C	E		X	X	X
2(2Aminoethytamino) Ethanol	G		E						G
2(2Ethoxyethoxy) Ethanol	C	G	C	C			C	C	C
2(2Ethoxyethoxy) Ethyl Acetate	X	X	G	X			X	X	G
2-Aminoethano	C	F	C	E			C	C	C
2-Chloro-1-Hydroxy-Benzene	X		X	X			X	X	X
2-Chlorophenol	X	X	X	X			X	X	X
2-Chloropropane	X	X	X	X			X	X	X
2-Ethoxyethanol	X	X	C	C	E	E	C	X	X
2-Ethoxyethyl Acetate	C		C	G	E	E	X	X	X
2-Ethyl	X		G				X		X
2-Ethyl-1-Hexanol	G	G	C	C	E	E	C	C	C
2-Ethylhexanoic Acid	F		F				F		G
2-Ethylhexyl Acetate	X		E	C	C		X		G
2-Octanone	X		G	G			X	C	
3-Bromopropene	X		X	X			X	X	X
3-Chloropropene	X	E	C	X	F	G	C	X	X
3-Coal Oil	X		X	X			E	G	F
4-Hydroxy-4-Methyl-2-Pentanone	X	X	E	E	E	E	X	F	C

HAND PROTECTION

HYFLEX OIL REPELLENT
LIGHT DUTY

- Features: The first light weight HyFlex® glove to combine a 3/4 dip geometry, oil repellence and oil grip in a single flexible glove.
- The HyFlex® 11-926 features a durable coating for secure grip in oily environments. The liner is made with one of the finest gauge nylon fiber dipped in a 3/4 design to ensure full back of finger protection.

Part Number	Size
HHP-11-926-L	L
HHP-11-926-M	M
HHP-11-926-XL	XL

HYFLEX GENERAL PURPO
LIGHT DUTY

- Features: Tough 1.1 mm FORTIX® nitrile foam coating (patent pending) offers EN Abrasion Level 4 protection, with up to two times the abrasion performance of other lightweight, knit-dipped gloves
- The FORTIX® coating is 20% more breathable than earlier formulations, for cooler, drier hands and less sweat
- Matching the natural contours of the hand, the snug, second-skin liner is tailored to create a more comfortable wearing experience: at the base of the little finger (added comfort), across the fingertips (superior tactility), and through the palm (greater dexterity)
- With its balance of robust abrasion performance, enhanced comfort and high dexterity the HyFlex® 11-840 is an ideal solution for workers who move between tasks
- Silicone-free material means no transfer of silicone contaminants to metal parts prior to painting

Part Number	Size
HHP-11-840-L	L
HHP-11-840-M	M
HHP-11-840-XL	XL

ALPHATEC CHEMICAL GL

WITH GRIP PERFORMANCE

- Features: AlphaTec® 58-535 gloves incorporate ANSELL GRIP™ Technology™ to enable users to handle wet or oily objects with less grip force. A perfect combination of chemical resistance with grip and flexibility allows for more controlled, confident and safer handling. This helps to reduce stress and hand fatigue while improving productivity.

Part Number	Size
HHP-58-535-L	L
HHP-58-535-M	M
HHP-58-535-XL	XL

HYFLEX CUT RESIST OI

MEDIUM DUTY

- Features: The first HyFlex® glove to combine advanced cut resistance, oil repellence and oil grip in a single flexible glove. Ideal for handling sharp metal components coated in oil or lubricant
- Patented Ansell Grip™ technology uses microscopic channels to wick away oil & moisture from part surfaces and tools, providing industry-leading wet and oil grip for added safety and efficiency
- The design combines a 3/4 nitrile dip with grip. This ensures EN Level 4 abrasion protection and long-lasting EN Level 3 cut resistance
- The 3/4 dip geometry means extra protection against oil exposure and knuckle abrasion
- A new former shape offers superior fit. Together with a highly flexible polymer and a wide range of sizes, this enables more agility in medium-duty applications
- Greys and blacks mask dirt in oily, grimy and gritty environments

Part Number	Size
HHP-11-927-L	L
HHP-11-927-M	M
HHP-11-927-XL	XL

HEIGHT SAFETY

11mm STATIC ROPE

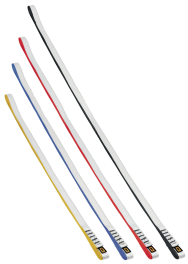
25MTR COIL

- Features: Type A rope - low stretch kernmantel rope designed for general use in rope access (including all kinds of work positioning and restraint), in rescue and in caving
- Meets requirements that the rescuers, firemen, specialists in working at height and other professionals require when working every day
- Rope-braiding technology ROUTE 44
- Ultrasonic ending

Part Number	Length (m)
HHS-ROPE 11	25

SLING

SLING FOR AN ANCHOR POINT
VARIOUS LENGTHS



- Material: Polyamide
- Strength: 22 kN
- Width: 16mm
- Lengths: 600mm, 800mm, 1500mm
- Features: Light and strong
- Sewn sling - much stronger than an ordinary tying with knot
- Climbers use slings straps for resting at belay stations and as protection under many different circumstances

Part Number	Length (mm)
HHS-SLING 1500	1500
HHS-SLING 600	600
HHS-SLING 800	800

HARNESS

FULL BODY
FULLY ADJUSTABLE

- Features: SPEED buckles on the leg loops for easy putting the harness on
- Two fall arrest attachment points (EN 361)
- Compact and lightweight
- Intended for working in places with the risk of fall
- Two gear loops with max. load 5 kg
- Shoulder and leg loops webbings are color distinguished for easy manipulation

Part Number	Size
HHS-HARNESS M/L	M/L

HELMET

IMPACT & PENETRATION PROTECTION
MEETS & EXCEEDS AS/NZS 1801 & EN397

- Conforming Standards: AS/NZS 1801 & EN397
- Features: Size adjustment system and up-n-down adjustment system for perfect fit
- 10 air intakes, vents mesh covered to prevent debris entry
- Inner lining fully detachable and washable
- Head lamp holder clips
- Impact tested to crown: 100 joules
- Impact tested to sides,front,rear: 90 joules
- Dimensions 51 - 62cm
- Weight 410gm
- Application: Designed to mountaineering impact certification, for industrial use, with a collation of the best design features for an industrial quality helmet for work at height and general site safety. Quality construction ensures the helmet is built to last and has provision for all the standard accessory types are needed on the job.

Part Number
HHS-HELM

SCAF HOOK

ALUMINIUM ALLOY

- Material: Aluminium Alloy
- Strength major axis: 28kN
- Features: Double trigger automatic locking
- Large gate opening
- Intended as a rope terminal which forms a flexible anchoring line
- Application: Intended as a rope terminal which forms a flexible anchoring line
- Suitable for metal constructions, girders, poles and the suchlike

Part Number
HHS-SCAF HOOK

GEAR BAG

35L

100% WATERPROOF

- Features: 100% waterproof heat welded seams
- Padded adjustable shoulder straps with adjustable chest straps
- Large waterproof zipper pocket
- Lightweight reinforced PVC fabric

Part Number
HHS-BAG 35

ROPE GRAB

Part Number
HHS-ROPE GRAB

CARABINER

ZINC PLATED STEEL

- Material: Steel (Zinc plated)
- Strength major axis: 30kN
- Strength minor axis: 9kN
- Strenght open gate: 8kN
- Features: Triple lock gate
- Keylock
- Oval shape
- Designed especially for industrial use
- Ideal for pulleys, tackles, ascenders or descenders

Part Number
HHS-CARABINER

SPILL RESPONSE

35L VEHICLE SPILL KI

FOR OIL - ALSO SUITABLE FOR PETROL AND DIESEL

- Contains specially treated polypropylene absorbents that repel water but absorb hydrocarbon based liquids including oil, petrol and diesel. Absorbs up to 35L.
- Kit components: 10 x SpillTech® Oil Pads 400gsm
- 1 x SpillTech® Oil Sock 3m
- 1 x SpillFix Bag 15L
- 2 x SpillTech® Waste Disposal Bags
- 2 x Pair Nitrile Gloves XL
- 1 x Nitrile Drain Mat 0.6 x 0.8m
- 2 x Cable Ties
- 1 x SpillTech® Instruction Card

Part Number	Size (L)
SKO-35LVK	35

135L VEHICLE SPILL K

FOR OIL - ALSO SUITABLE FOR PETROL AND DIESEL

- Contains specially treated polypropylene absorbents that repel water but absorb hydrocarbon based liquids including oil, petrol and diesel. Absorbs up to 135L.
- Kit components: 50 x SpillTech® Oil Pads 400gsm
- 2 x SpillTech® Oil Socks 1.2m
- 2 x SpillTech® Oil Socks 3m
- 1 x SpillFix Bag 50L
- 2 x SpillTech® Waste Disposal Bags
- 2 x Pair Nitrile Gloves XL
- 1 x Nitrile Drain Mat 0.6 x 0.8m
- 2 x Cable Ties
- 1 x SpillTech® Instruction Card

Part Number	Size (L)
SKO-135LWK	135

ABSORBENT SOCK

OIL ONLY

- Description: Polypropylene oil socks are designed to stop hydrocarbon spills from spreading
- Features: Specially treated polypropylene absorbent socks are designed for use with hydrocarbon spills such as oil, petrol and diesel
- Socks can be used to ring a spill to keep it contained
- 3m sock absorbs up to 15L
- 1.2m sock absorbs up to 6L

Part Number	Length (M)
SKO-SOCK3M	3
SKO-SOCK1.2M	1.2

ORGANIC ABSORBENT

100% RENEWABLE COIR PEAT

15L & 50L

- Description: Industrial absorbent made from 100% renewable Coir peat.
- Features: Absorbs spills immediately and completely
- Provides safe and non hazardous work site
- No carcinogens or dust
- Landfill and incinerator safe
- Requires less product
- 50L bag absorbs up to 26L of spilled material
- Suitable for hazardous spills including: oils, fuels, lubricants, paints and most chemicals and mild corrosives
- No floor or equipment damage

Part Number	Size (L)
SK-OA15L	15
SK-OA50L	50

PLUG & DIKE

LEAK SEALER

650G

- Description: Plug n Dike is a Non-toxic, non-flammable Epoxy blend forms an immediate seal when applied
- Features: Seals and sticks to dirty and crumpled surfaces even with liquid flowing from them
- No surface preparation is required
- Apply Plug n Dike paste directly over leaks, punctures and holes to form an immediate seal

Part Number	Size (G)
SK-PND	650

MINERAL SPONGE

ZEOLITE

22L

- Description: Mineral Sponge is a tried and tested industrial absorbent that can be used for oils, fuels, paints and a wide range of chemicals
- Features: Mineral Sponge is made from Zeolite a naturally occurring volcanic mineral that has a 3D-lattice structure giving it a large internal surface area
- Mineral Sponge will absorb up to 75% of its own weight of liquid
- Fumes and odours are also suppressed by Mineral Sponge
- Non-toxic
- Non-hazardous
- 22L bag weighs approximately 15Kg and will absorb up to 16L of spilled material

Part Number	Size (L)
SK-MIN22L	22

ABSORBENT PAD

OIL ONLY
400GSM

- Description: Polypropylene pads specifically treated to absorb hydrocarbons such as oil, petrol, and diesel while repelling water.
- Features: Thermally bonded with dimpled surface to allow fast wicking and easy clean up
- Each pad absorbs up to 1.4L
- Bulk cartons have a perforated opening that allows cartons to be quickly turned into a deck top dispenser
- Dimensions: 40cm x 50cm, 400GSM

Part Number	Width (cm)	Length (cm)
SKO-PAD100H	40	50
SKO-PAD10H	40	50

DRAIN MAT

NITRILE
60 X 80cm

- Description: Nitrile drain mat to temporarily seal stormwater drains in the event of a spill
- Features: Constructed of 1.5mm thick nitrile rubber that is suitable for use with a wide range of chemical and hydrocarbon spills
- Fits standard stormwater drains
- Recommended use with a gravel bag or sand bag to weigh nitrile mat down and create a better seal
- Nitrile drain mat can quickly be placed over stormwater drain to temporarily stop or slow liquid spills from entering stormwater
- Dimensions: 60cm x 80cm

Part Number	Width (cm)	Length (cm)
SK-DRAIN	60	80

WASTE BAG

CLEAR
60 X 120cm 70MU

- Description: SpillTech® Clear Waste Bag
- Dimensions: 60cm x 120cm x 70mu

Part Number	Width (cm)	Length (cm)
SK-WASTE BAG	60	120

ABSORBENT PILLOW

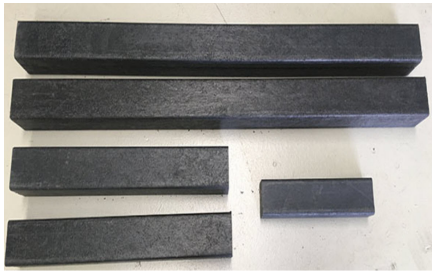
OIL ONLY

- Description: Polypropylene pillow for use absorbing hydrocarbon spills or placing under leaking machinery
- Features: Polypropylene absorbent pillow absorbs hydrocarbons such as oil, petrol and diesel
- Absorbs up to 9L
- Dimension: 50cm x 40cm

Part Number	Width (cm)	Length (cm)
SKO-PILLOW	50	40

FORKLIFT SAFETY

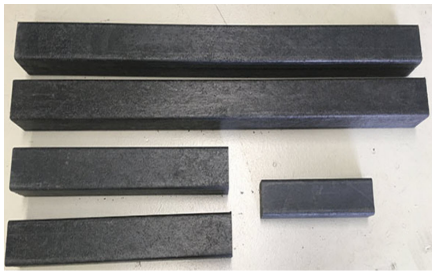
MAST BLOCKS



- Description: dura crib® cribbing blocks optimise safety when stabilising heavy loads after they have been lifted for maintenance and access
- Features: dura crib® plastic blocking systems offer more stable, longer lasting and easily cleaned alternates to wood blocks. They have a smooth slip resistant surface for stable cribbing, chocking, bracing and shoring.
- dura crib® products have been tested under the guidance of AS1170.0.2002 and AS2498.3.19998 to obtain the Working Load Limits(WLL) capabilities.

Part Number	Height (mm)	Width (mm)	Length (mm)
HFS-MB1220	100	100	1220
HFS-MB560	100	100	560

REACH BLOCKS



- Description: dura crib® cribbing blocks optimise safety when stabilising heavy loads after they have been lifted for maintenance and access
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- dura crib® products have been tested under the guidance of AS1170.0.2002 and AS2498.3.19998 to obtain the Working Load Limits(WLL) capabilities.

Part Number	Height (mm)	Width (mm)	Length (mm)
HFS-RB330	63	89	330

TAKE 5

TAKE 5
HEALTH & SAFETY BOOKLET

- Description: Our Take 5 booklet is designed to assist workers assess hazardous tasks prior to undertaking them. They will be able to do a quick fire risk assessment, complete a Job Safety Analysis (task analysis) and complete a near-miss report for a minor incident. It is small enough to fit in a pocket and as part of your tool-kit it is an essential part of the health and safety for the workplace.

Part Number
TAKE 5 BOOKLET

LOCK-OUT TAG

LOCK-OUT TAG

Part Number
LOCK-OUT TAGS