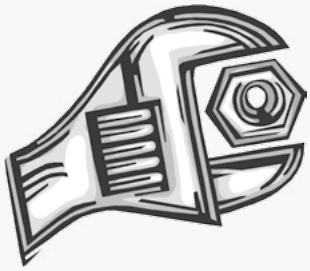


TECHNICAL DATA
HOSE STORAGE RECOMMENDATIONS

1.0 Storage

(With acknowledgements to "Recommendation regarding choice, storing, use and maintenance of rubber hoses" printed by Assogomma, January 1994 to which additional material has been added)

1. Recommendations for correct storage

Rubber is subjected, by nature, to changes in physical properties. These changes, which normally occur over the course of time, according to the kind of rubber used, can be accelerated by one particular factor or by a combination of these. Reinforcement materials are also adversely affected by unsuitable conditions of storage. The following recommendations give some precautions to be taken to ensure the minimum deterioration to stored articles.

1.1. Storage life

Storage time should be reduced to the minimum through programmed rotation. When it is not possible to avoid long term storage and when the recommendations in the points below have not been respected it is necessary to check the hose carefully prior to use.

1.2. Temperature and humidity

The best temperature for the storage of rubber hoses varies from 10 to 25 degrees centigrade. Hoses should not be stored at temperatures above 40°C or below 0°C. When the temperature is below -15°C it is necessary to take precautions when handling. Hoses should not be stored near sources of heat nor in conditions of high or low humidity. A humidity level of a maximum of 65% is recommended.

1.3. Light

Hoses must be stored in dark places, avoiding direct sun light or strong artificial light. Should store rooms have windows or glass openings, these must be screened.

1.4. Oxygen and ozone

Hoses should be protected from circulating air by suitable packing or by storage in air-tight containers. As ozone has a particularly aggressive action on all rubber products, the store house must not contain materials producing ozone like devices under high electrical tension, electric engines or other materials provoking sparks or electric arcs.

1.5. Contact with other materials

Hoses should not come into contact with solvents, fuels, oils, grease, volatile chemical mixtures, acids, disinfectants and other organic liquids in general. Furthermore direct contact with some metals (for example manganese, iron, copper and its alloys) and relative mixtures exercise harmful effects on some types of rubber. Contact with PVC and creosote impregnated timber or fabrics should be avoided.

1.6. Heat sources

The temperature limits given in point 2.2. must be respected. When this is impossible, it is necessary to use a thermal shield

1.7. Electric or magnetic, field

Variation in electric or magnetic fields must be eliminated in storehouses as these could provoke currents in metal couplings, heating them. Similar fields could be caused by high-tension cables or high frequency generators

1.8. Storage conditions

Hoses must be stored in a relaxed condition free from tension, compression or other deformation and contact with objects that could pierce or cut must be avoided. It is preferable to store hoses on special shelves or on dry surfaces. Coiled hoses must be stored horizontally avoiding piling. When this is not possible the height of the piles must be such to avoid permanent deformation of hoses stored underneath. The inside diameter of the coil must never be lower than twice the minimum bend radius stated by the manufacturer according to technical standards. It is advisable to avoid storing coiled hoses on poles or hooks. Furthermore it is advisable to store hoses to be delivered straight, horizontally, without bending.

1.9. Rodents and insects

Hoses must be protected from rodents and insects. When such a risk is probable adequate precautions must be taken

1.10. Marking of packaged items

It is advisable that hoses are always easy to identify even if packaged.

1.11. Exit from storage

Prior to delivery hoses must be checked for integrity and must correspond to the required use. After long storage if couplings are not clipped, swaged or built-in, it is necessary to check that locking collars are tight.

1.12. Return to storage

Hoses that have been used must be freed from all substances prior to storage. Particular attention must be paid when chemical, explosive inflammable, abrasive and corrosive substances have been conveyed. After cleaning, check whether the hose is suitable for use again.

2.0 Standards and method of use

2.1 Scope

Many situations encountered in the daily work environment can be satisfied by the use of several types of hose with no deleterious effects manifesting themselves. However there exist conversely many situations in modern industrial applications that require the use of a hose with specific design and performance characteristics to ensure an economical solution that will not endanger personnel or equipment.

These notes for selecting and using (including assembling, installing, and maintaining) hose and tube products are intended to supplement specific documentation and publications relating to Pirtek hose and tubing products. They are intended to alert the reader to the more commonly encountered situations that require an informed and intelligent choice of hose, together with sound principles of hose use and installation. They should not be taken in isolation when considering products for specific applications. It is recommended that the user consult Pirtek for assistance with making sound choices of hose and fittings combinations for specific applications where safety issues may be present.

2.2 Fail-safe & consequences of failure

Hose, fittings, and assembly failures can occur without warning for many reasons. A fail-safe design is recommended so that any failure will not endanger persons or property. The hose assembly should be routed in such a manner that if a failure does occur, the escaping media will not cause personal injury or property damage. In addition, if fluid media comes in contact with hot surfaces, open flame, or sparks, a fire or explosion may occur. See sections 2.11 and 4.0

2.3 Distribution

These guidelines should be made available to each person that is responsible for selecting or using hose related products. Never select or use Pirtek hose or fittings products without thoroughly researching this guide as well as the specific Pirtek recommendations for the products being considered

2.4 User responsibility

Due to the wide variety of operating conditions and applications for hydraulic and industrial hose assemblies Pirtek and its distributors do not represent or warrant that any particular hose or fitting is suitable for any specific end use application. This safety guide does not analyse all technical parameters that must be considered in selecting a product. The user, through analysis and testing, is solely responsible for:

• Making the final hose and fitting selection

• Assuring that the user's requirements are met and that the application presents no health or safety hazard

• Providing all appropriate health and safety warnings on the equipment on which the hose and fittings are used

• Assuring compliance with all applicable government and industry standards

2.5 Additional questions

Call the appropriate Pirtek Service Centre if you have any questions or require any additional information. Consult the Pirtek publication for the product being considered or used

2.6 Preassembly checks

Prior to installation it is necessary to check the characteristics of the hose carefully to verify that type, diameter and length conform to the required specifications. Moreover a visual check must be effected to make sure that there are no obstructions, cuts, damaged cover or any other evident imperfections.

2.7 Handling

Hoses must be moved with care avoiding knocks, dragging over abrasive surfaces and compression. Hoses must not be pulled violently when twisted or knotted. Heavy hoses, normally delivered in a straight line, must be laid on special supports for transport. Should wood supports be used these must not be treated with creosote or painted with substances which could damage the rubber. Care must be taken to protect hose from wear, snagging, kinking, bending smaller than the minimum bend radius, and cutting, any of which can cause premature hose failure. Any hose that has been kinked or bent to a radius smaller than the minimum bend radius, and any hose that has been cut or is cracked or is otherwise damaged, should be removed and discarded

2.8 Pressure and seal test

The working pressure generally indicated on hoses must be respected. Published burst pressure ratings for hose are for manufacturing test purposes only and do not infer that a product can be safely used in applications exceeding the published maximum recommended working pressure.

Surge pressures or peak transient pressures in a system must always be below the maximum working pressure for the hose. Surge pressures and peak pressures can usually only be determined by sensitive electrical instrumentation that measures and indicates pressures at millisecond intervals. Conventional Bourdon tube mechanical pressure gauges indicate only average pressures and cannot be used to determine surge pressures or peak transient pressures.

Following installation, all air entrapment must be eliminated and the system pressurised gradually to the maximum system pressure (at or below the hose maximum working pressure) and checked for proper function and freedom from leaks. This test must be appropriately carried out and under conditions that will avoid potential hazards to personnel and equipment

2.9 Suction

Hoses used for suction applications must withstand the vacuum and pressure of the system. Improperly selected hose may collapse in suction application, causing failure of supply to the pump and resultant danger to machinery and / or personnel. Suction lines should be routed to provide a gradual rise along the hose towards the pump to prevent air entrapment at high spots

2.10 Size (Diameter)

The amount of power transmitted by means of pressurised fluid varies proportionally with pressure and flow rate. The size of the components must be adequate to keep pressure losses to a minimum and avoid damage due to heat generation or excessive fluid velocity. Flow velocity guidelines for specific products are provided at relevant parts of the Pirtek Catalogue, and should be adhered to. Examples are to be found in the Industrial Hose Section I (convoluted metallic hoses) and Section E (Tube and Pipe). A Flow Nomograph for hydraulic hoses appears on page Q 19. Where provided, always follow specific manufacturer's guidelines regarding the size of flow conduits

2.11 Temperature

Hoses must always be used within the temperature limits generally indicated in product specifications. Fluid and ambient temperatures, both steady and transient, must not exceed the published limitations of the hose. Temperatures below and above the recommended limits can degrade hose to a point where a failure may occur and release fluid. Properly insulate and protect any hose assembly when routing near hot objects (e.g. manifolds or splashing liquids). Do not use any hose in any application where failure of the hose could result in the conveyed fluids (or vapours or mist from the conveyed fluids) contacting any open flame, molten metal, or other potential fire ignition source that could cause burning or explosion of the conveyed fluids or vapours. In case of doubt refer to Pirtek

TECHNICAL DATA
STANDARDS AND METHOD OF USE

2.12 Conveyed products

Hoses must be used exclusively to convey substances for which they were manufactured. In case of doubt it is always advisable to contact Pirtek. As far as possible, hoses must not remain under strain when not in use. Where any risks are involved special precautions must be taken to avoid bursts. Hose assembly selection must assure compatibility of the hose tube, cover, reinforcement, and fittings with the fluid media used, as well as the external environment. This Technical Section incorporates a comprehensive chemical compatibility chart for a wide range of chemical and material combinations commonly encountered by hose and fittings supplied by Pirtek. This information is offered only as a guide. Actual service life can only be determined by the end user by testing under all extreme conditions and other analysis. Hose that is chemically compatible with a particular fluid must be assembled using fittings and adapters containing likewise compatible seals

2.13 Environment

Hoses must be used exclusively in the environment conditions for which they were manufactured. Care must be taken to insure that the hose and fittings are either compatible with or protected from the environment (that is, surrounding conditions) to which they are exposed. Environmental influences such as ultraviolet radiation, sunlight, heat, ozone, moisture, water, salt water, chemicals, and air pollutants can cause degradation and premature failure

2.14 Bending radius

Installations that violate the minimum bending radius will reduce the life of the hose considerably. Moreover it is necessary to avoid bending at fitting ends.

2.15 Twist (Torsion)

Hoses are not manufactured to work in torsion, except for specific purposes

2.16 Tensile Load

The tensile load must be within limits specified by the manufacturer. Consult Pirtek when tensile load may be a factor of importance

2.17 Vibration

Vibrations subject hoses to stress from heat and fatigue, particularly near couplings. Premature bursting may occur. It is therefore advisable to check that hoses have been manufactured to resist such stresses

2.18 Kinking

Some users tend to obstruct the flow of liquids by kinking the hose. This system is not advised by manufacturers because the reinforcement is subjected to excessive stress and could lead to bursting

2.19 Choice and application of couplings

Provided that the manufacturer's instructions are met, it is always necessary to check the compatibility between the working pressure of couplings and hoses. Couplings with too large diameters cause abnormal stress which can split the hose reinforcement, whilst too small dimensions can create clamping difficulties and leakage. Furthermore couplings must be free from sharp and cutting edges which could damage the hose. Water or soap and water can be used to fit couplings. Do not use products containing oils or solvents except for the kind of hoses destined to be used with the latter. Softening hoses with mallet or similar tools is forbidden. Take care to avoid external collars or other tightening tools. The use of makeshift collars (for example wire) with sharp edges or too tight clamping leads to damage of cover and reinforcement

2.20 Electrical conductivity properties

Some applications require that electrical conductivity or non-conductivity be taken into account. The conduit may need to be non-conductive to prevent current flow, or sufficiently conductive to safely dissipate static electricity generated as a result of fluid within the hose. In these cases, manufacturers instructions must be met, and tests (for example "Quick Test") must be performed to check the continuity between the coupling and the assembly. Extreme care must be exercised when selecting hose and fittings for these or any other applications in which electrical conductivity or non conductivity is a factor. The electrical conductivity or non conductivity of hose and fittings is dependent upon many factors and may be susceptible to change. These factors include but are not limited to the various materials used to make the hose and the fittings, type of corrosion protection (some fitting finishes are electrically conductive while others are non conductive), manufacturing methods (including moisture control), how the fittings engage with the hose, age and amount of deterioration or damage or other changes, moisture content of the hose at any particular time, and other factors. Following are application examples where electrically non conductive or conductive hose may be called for. Industry regulatory requirements and specific hose technical data will provide more examples of where electrical conductivity or otherwise is to be heeded.

2.20.1 Electrically non-conductive hose

An application (as an example, but not limited to, hoses designed to supply hydraulic tools in use near high voltage power lines) may require that the hose be non conductive to prevent electrical current flow or to maintain electrical isolation. For these applications requiring hose to be electrically non conductive, only special non conductive hose can be used. The manufacturer of the equipment in which the non conductive hose is to be used must be consulted to be certain that the hose and fittings that are selected are proper for the application. Do not use any Pirtek hose or fitting for any such application requiring non conductive hose, including but not limited to applications near high voltage electric lines, unless:

- the application is expressly approved in the Pirtek technical data for the product
- the hose is marked "non-conductive"
- the manufacturer of the equipment on which the hose is to be used specifically approves the particular Pirtek hose and fitting for such use

2.20.2 Electrically conductive hose (Anti-static hose)

Pirtek distributes special hose for some applications that require electrically conductive hose, including but not limited to hose for conveying paint in airless paint spraying applications. Airless paint spray hose is labelled "Airless Paint Spray Hose" on its lay line and packaging. Only qualified personnel are to manufacture Airless Paint Spray hose assemblies using appropriate fittings and test and reporting procedures to provide proper earthing for dissipation of dangerous static charge build-up. Do not use any other hose type for airless paint spraying, even if electrically conductive. Use of any other hose or failure to properly assemble the fittings can cause a fire or an explosion resulting in death, personal injury, and property damage

Pirtek also supply a special thermoplastic hose for certain liquid petroleum gas ("LPG") applications where static electricity build-up may occur. Pirtek LPG hose assemblies comply with AS 1869 Class D requirements, and are so identified on the lay line. This hose must be properly connected to the appropriate Pirtek fittings. Use of other hoses in LPG applications or failure to properly connect or ground this hose can cause a fire or an explosion resulting in death, personal injury, and property damage. Care must also be taken to protect against gas permeation through the hose wall. See section 2.23, Diffusion, for more information

2.20.3 Aerospace hoses

Pirtek have currently no hoses in their product range approved for aerospace in-flight applications. Such applications employing hose to transmit fuel, lubricating fluids and hydraulic fluids require a special

design incorporating an electrically conductive inner tube, which is available only from suppliers catering to the aviation industry. Such hose assemblies for in-flight applications must meet all applicable aerospace industry, aircraft engine, and aircraft requirements. Substitution of other hoses for in-flight applications or failure to properly connect or ground these hose can cause a fire or an explosion resulting in death, personal injury, and property damage.

2.21 Permanent installation

The hoses must be supported in a suitable way, so as the normal movement when the hose is under pressure (variation in length, diameter etc.) is allowed. Optimum routing in accordance with the requirements of SAE J1273 (hydraulic hoses) and Section A of this Catalogue must be employed

2.22 Mobile installations & mechanical loads

When the hose connects to non-static equipment, it is necessary to check that the length of the hose is sufficient and that the movement does not subject the hose to shock or chafing and that abnormal stress, bending, traction or torsion does not occur. SAE J1273 and Section A routing provisions again apply.

External forces can significantly reduce hose life or cause failure. Mechanical loads which must be considered include excessive flexing, twist, kinking, tensile or side loads, bend radius, and vibration. Use of swivel type fittings or adapters may be required to insure no twist is put into the hose. Unusual applications may require special testing prior to hose selection. Hoses suspended vertically should be supported by means of a cable or other means

2.23 Diffusion (Permeation)

Diffusion (that is, seepage through the hose liner) will occur from inside the hose to outside when hose is used with gases, liquid and gas fuels, and refrigerants (including but not limited to such materials as helium, diesel fuel, gasoline, natural gas, or LPG). This diffusion may result in high concentrations of vapours which are potentially flammable, explosive, or toxic, and in loss of fluid. Dangerous explosions, fires, and other hazards can result when using the wrong hose for such applications. The system designer must take into account the fact that this diffusion will take place and must not use hose if it could be hazardous. The system designer must take into account all legal, government, insurance, or any other special regulations which govern the use of fuels and refrigerants. Never use a hose even though the fluid compatibility is acceptable without considering the potential hazardous effects that can result from diffusion through the walls of the hose assembly. Diffusion of moisture from outside the hose to inside the hose will also occur in hose assemblies, regardless of internal pressure. If this moisture penetration would have detrimental effects (particularly, but not limited to refrigeration and air conditioning systems), incorporation of sufficient drying capacity in the system or other appropriate system safeguards should be selected and used.

Not all diffusion is necessarily hazardous. Some loss of air from pneumatic systems as a result of diffusion may create no more harm than a blistering of the outer cover of the hose as the entrapped air seeks to escape, and the use of pin-pricking of the outer cover is a valid manufacturing ploy to avoid unsightly blisters on the cover

2.24 Identification

If further marking is necessary, self-adhesive tape may be used. When the use of paint is unavoidable check compatibility of the cover with Pirtek.

3.0 Maintenance

3.1 Maintenance

Even with proper selection and installation, hose life may be significantly reduced without a continuing maintenance program. The severity of the application, risk potential from a possible hose failure, and the history of any hose failures in the application or in similar applications should determine the frequency of the inspection and the replacement for the products so that products are replaced before any failure occurs.. A maintenance program must be established and followed by the user and, at minimum, must include instructions 3.2 through 3.9

During regular checks special attention must be paid to couplings and to the appearance of the following irregularities which show deterioration of hose:

- cracks, cuts, or abrasions to the cover
- cover or liner separation
- tears in cover revealing reinforcement
- deformity, bubbles, local swelling under pressure
- sticky or soft or in any way degraded areas of the hose (either liner or cover)
- leaks at either the fitting or from the hose
- fitting slippage on hose
- hard, stiff, heat cracked, or charred hose
- cracked, damaged, or badly corroded fittings
- flattened or twisted hose

Such irregularities justify hose replacement. When the cover bears date of expiry this must be adhered to even if the hose shows no apparent sign of wear.

3.2 Repairs

Hose repairs are not advisable. However when deterioration occurs at an end section, and if the full length allows for such, the worn section may be eliminated

3.3 Cleaning

If cleaning instructions are not supplied by the manufacturer clean, if necessary, with soap and water avoiding use of solvents (petrol, paraffin, etc.) or detergents. Never use abrasive, pointed or cutting tools (eg wire brushes)

3.4 Visual inspection hose / fitting

Any of the following conditions require immediate shut down and replacement of the hose assembly:

- Fitting slippage on hose
- Damaged, cracked, cut or abraded cover (any reinforcement exposed)
- Hard, stiff, heat cracked, or charred hose
- Cracked, damaged, or badly corroded fittings
- Leaks at fitting or in hose
- Kinked, crushed, flattened or twisted hose
- Blistered, soft, degraded, or loose cover

3.5 Visual inspection all other

The following items must be tightened, repaired, corrected or replaced as required:

- Leaking port conditions
- Excess dirt build-up
- Worn clamps, guards or shields
- System fluid level, fluid type, and any air entrapment

3.6 Functional test

TECHNICAL DATA
MAINTENANCE

Operate the system at maximum operating pressure and check for possible malfunctions and leaks. Personnel must avoid potential hazardous areas while testing and using the system. See section 2.8

3.7 Replacement intervals

Hose assemblies and elastomeric seals used on hose fittings and adapters will eventually age, harden, wear and deteriorate under thermal cycling and compression set. They should be inspected and replaced at specific replacement intervals, based on previous service life, government or industry recommendations, or when failures could result in unacceptable downtime, damage, or injury risk.

3.8 Hose inspection- risk of injury through injection

Hydraulic power is accomplished by utilizing high-pressure fluids to transfer energy and do work. Hoses, fittings, and hose assemblies all contribute to this by transmitting fluids at high pressures. Fluids under pressure can be dangerous and potentially lethal and, therefore, extreme caution must be exercised when working with fluids under pressure and handling the hoses transporting the fluids. From time to time, hose assemblies will fail if they are not replaced at proper time intervals. Usually these failures are the result of some form of misapplication, abuse, wear, or failure to perform proper maintenance. When hoses fail, generally the high-pressure fluids inside escape in a stream which may or may not be visible to the user. Under no circumstances should the user attempt to locate the leak by "feeling" with their hands or any other part of their body. High-pressure fluids can and will penetrate the skin and cause severe tissue damage and possibly loss of limb. Even seemingly minor hydraulic fluid injection injuries must be treated immediately by a physician with knowledge of the tissue damaging properties of hydraulic fluid.

In the event of failure, immediately shut down the equipment and leave the area until pressure has been completely released from the hose assembly. Simply shutting down the hydraulic pump may or may not eliminate the pressure in the hose assembly. Many times check valves, etc., are employed in a system and can cause pressure to remain in a hose assembly even when pumps or equipment are not operating. Tiny holes in the hose, commonly known as pinholes, can eject small, dangerously powerful but hard to see streams of hydraulic fluid. It may take several minutes or even hours for the pressure to be relieved so that the hose assembly may be examined safely. Once the pressure has been reduced to zero, the hose assembly may be taken off the equipment and examined. It must always be replaced if a failure has occurred. Never attempt to patch or repair a hose assembly that has failed. Consult the nearest Pirtek Centre for hose assembly replacement information. Never touch or examine a failed hose assembly unless it is obvious that the hose no longer contains fluid under pressure. The high-pressure fluid is extremely dangerous and can cause serious and potentially fatal injury.

Treatment of fluid injection injuries

Treatment must be started as a matter of urgency, and generally involves surgical intervention. For more information, refer to New South Wales Department of Primary Industry Draft Publication 'Guideline for Fluid Power System Safety at Mines – August 2006'. It is recommended that an action plan be prepared for use in cases of fluid injection injuries

3.9 Elastomeric seals

Elastomeric seals will eventually age, harden, wear and deteriorate under thermal cycling and compression set. Elastomeric seals should be inspected and replaced.

When overhauling a machine that has been fire damaged, any fire-affected Viton® seals will be toxic if touched. Always use protective gloves when working with fire damaged machinery

3.10 Refrigerant gases

Special care should be taken when working with refrigeration systems. Sudden escape of refrigerant gases can cause blindness if the escaping gases contact the eye and can cause freezing or other severe injuries if it contacts any other portion of the body.

3.11 Compressed natural gas (CNG):

Pirtek currently have no hoses suited to use with compressed natural gas. Do not use LPG hose for fuel hose in vehicles using CNG (Compressed Natural Gas) The recommended procedure is to pressurise the hose and check for leaks and to visually inspect the hose for damage. Caution: Matches, candles, open flame or other sources of ignition shall not be used for hose inspection. Leak check solutions should be rinsed off after use.

3.12 Oil and Oxygen

Oil in the presence of pure oxygen can ignite spontaneously, creating a potentially dangerous situation. DO NOT use oil as part of the assembly process when manufacturing hose assemblies for use with oxygen, or when performing maintenance work on oxygen hoses

4.0 Hose safety – some specific concerns

Safety in the application and use of industrial hose is a major concern because of the many potentially dangerous products conveyed, and because so many people are involved. Handling these products can be accomplished safely if a few simple precautions are strictly observed. Some of the most important of these are:

• All operators must be thoroughly trained

• The correct hose must be selected to handle the application

• The couplings must be correct for the application and also must be securely attached using standardised operating procedures

• Both hose and couplings should be well maintained and inspected regularly.

Critical Items:

While many industrial hose applications are potentially dangerous, a few are of particular concern because their danger is not always so obvious or generally understood. This is particularly true for non-industrial applications where there is greater potential for operation by untrained personnel. A discussion of some of the more common of these follows.

Aircraft Refueling Hose

The critical nature of flexible hose used to refuel aircraft is obvious. Care should be taken that the hose is not kinked, dragged, run over by vehicles or otherwise abused. Frequent inspections for cover cuts, gouges, braid exposure, coupling movement or leakage should be regularly scheduled. Hydrostatic pressure testing at twice the normal working pressure should also be performed on a regular basis. Any leakage or damage to the hose reinforcement is cause for immediate replacement. DO NOT USE PETROL PUMP HOSE FOR REFUELING OF AIRCRAFT.

Petrol Pump Hose

Pirtek currently have no hoses suited to use with petrol as a bowser hose. The proliferation of self-service petrol stations has created a situation where millions of consumers are daily operators of petrol bowsers. This has greatly increased the concern of service station operators and suppliers for equipment safety. Petrol pump hoses in particular are subject to frequent abuse by daily wear and accidents. Hose selection must include consideration of the amount of use and abuse it must withstand during its service life. The proper hose plus constant inspection is the best protection against user accidents. DO NOT USE PETROL PUMP HOSE FOR FUELING OF AIRCRAFT

LP Gas Hose

Liquid Petroleum Gas has volatile characteristics that require special hose construction. The rubber compounds must be designed to handle LP Gas, and the cover must be perforated to prevent gas build-up among the various layers of the hose. Use of the wrong hose may lead to early and sudden failure. IN PARTICULAR, ANHYDROUS AMMONIA HOSE IS NOT RECOMMENDED FOR LP GAS SERVICE. This is important to emphasise because both types of hose are often used in the same area and care must be taken they do not become accidentally switched. Couplings are also a concern in this service; permanent crimp steel couplings are mandatory on Pirtek supplied assemblies, and only accredited people are to manufacture LP Gas hose assemblies within Pirtek. DO NOT USE WITH SCREW-TOGETHER FIELD ATTACHABLE FITTINGS

Anhydrous Ammonia (NH3) Hose

Contact with Anhydrous Ammonia will burn skin, and is especially damaging to the eyes and lungs. This is true for its liquid and gaseous (vapour) state. Many accidents involving NH3 have occurred through use of the wrong hose. NH3 hose must be specially compounded and constructed to handle the material, and other hoses may fail very quickly and suddenly. It is, therefore, especially important to make sure that only Anhydrous Ammonia hose is recommended and used for this service. In particular, LP Gas hose is not recommended for anhydrous ammonia service, and since the two are often used in close proximity, special care must be taken to ensure that the hoses are not accidentally interchanged. DO NOT USE ANHYDROUS AMMONIA HOSE FOR LP GAS OR REFRIGERATION SERVICE

Natural Gas

Pirtek currently have no hoses suited to use with natural gas. The molecules of natural gas are small, enhancing its ability to permeate through standard rubber or PVC hose constructions. The permeation process is more rapid as the working pressure increases, and natural gas accumulates with potentially dangerous consequences. Use pipe, non-permeable tubing or hose with barrier constructions to convey natural gas.

Do not use LPG hose for fuel hose in vehicles using CNG (Compressed Natural Gas)

In Natural Gas applications, copper, brass, or other copper-containing fittings should be in accordance to the AGA rating of the particular apparatus

Hose used with Natural Gas should be subjected to the same rigorous tests and inspection as if it were being used with LPG.

Welding Hose

Due to the extreme volatility of gases and the rough environment of many welding applications, selection of an appropriate welding hose is critical. The hose must be compatible with the fuel gas used to avoid hose degradation and eventual failure.

Pirtek currently have no hoses suited to use as welding hose.

Steam Hose

See pages Q 8 - Q 9

Danger of Whiplash

High pressure gaseous systems are very hazardous. Pressurised air expands when released to atmosphere by a factor equating to the original pressure in bar (air at 350 bar expands 350 times its initial volume), and releases energy in the process (see Table below). Hose lines should be adequately protected from external shock and mechanical or chemical damage, and should also be suitably protected to prevent whiplash action in the event of failure for any reasons.

It is recommended to increase the safety factor when dealing with gaseous fluid systems.

Initial restrained pressure	Energy release from 45 litres of compressed fluid (Nm)	
bar	air	oil
1	0	0
6	230	0
34	1505	1
68	3254	4
136	7050	15
204	10711	33
340	18981	87
680	37963 †	312

† By way of comparison, this figure corresponds to the energy released by detonation of a stick of dynamite

Braided or spiral hoses used to conduct compressed air above 17 bar (250 psi) should be pin pricked on the external cover unless the hose cover is specifically designed to be permeable. Additionally, the maximum permissible working temperature of the hose must be reduced for use with air (typically around 70°C.)

TECHNICAL DATA
STEAM HOSE / SAFETY ACCESSORIES

Steam Hose

The potential danger from steam in industrial hose applications is due to the great heat and pressures involved.

Warning

Water changes to hot water and phases of steam when subjected to heat and pressure. The greater the pressure, the higher temperature required to achieve and maintain a steam phase. If the steam escapes, dangerous quantities of heat are released very suddenly, and pose extreme danger to operators. Use only steam hose and fittings designed for the application. Be sure to select a hose identified as a saturated steam hose construction. Steam hose identification should be in the form of permanent branding on the hose outer cover, not just on the packaging

You must identify the type of service the steam hose is being asked to accomplish

- What is the actual pressure of the steam service?
- Is it subject to peak pressures?
- What is the temperature of the steam?
- Saturated (wet) or super heated (dry) steam?
- What is the anticipated frequency of use?
- What are the external conditions in the area where the hose will be used? Spillage or accumulation of corrosive chemicals or petroleum based materials externally can damage the hose cover

Steam hose installation & storage

Be certain to use hose couplings designed for steam hose service. Steam hose couplings use a bolt-on outside clamp which can be retightened as necessary over the service life of the hose. Follow the coupling manufacturer's instructions for coupling attachment.

- Check tightness with each use
- Avoid extreme bending of the hose near the coupling
- Provide a suitable means of storing the hose when not in use
- A permanent rack or tray will minimize the damage to the hose in storage
- Do not hang the hose on a hook, nail, or other device which could cut or damage the hose

Periodic maintenance and control of steam hose

All steam hoses are expected to wear out in time. It is important to continually be on the look-out for hose that has deteriorated to the point where it can no longer provide safe service. The operator should be aware of the following signs of trouble:

- Cover blisters or lumps
- Cuts in the outside of the hose which expose the reinforcement
- Steam leakages at the coupling ends or anywhere along the length of the hose
- Flattened or kinked areas which have damaged the hose
- A reduction of steam flow indicating that the tube is swelling

When any of the above abnormalities appear it is good safe practice to immediately remove the hose from service. Once removed, the hose can be carefully inspected before further use.

Safety with steam hose

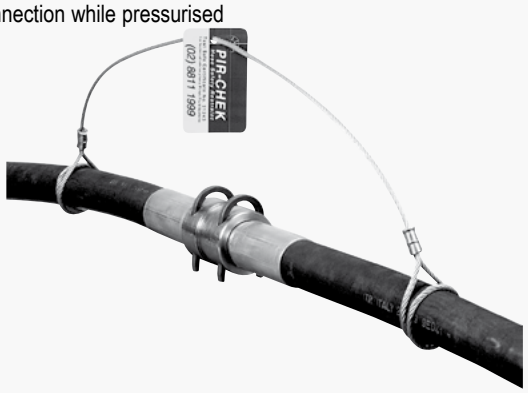
- Provide operators with adequate safety clothing. Include gloves, rubber boots, full length protective clothing, and eye protection. The objective is to provide protection from scalding burns resulting from splash-back of steam or hot water
- Ensure that the work area is free of hazards and other clutter
- Do not allow the hose to remain pressurized when not in service. Relieving pressure can dramatically increase hose service life

5.0 Safety Accessories

Pirtek offer a range of products designed to provide a greater degree of safety when personnel need to work in close proximity to hoses and fittings.

5.1 Pir-Chek

Pir-Chek cables are custom made for each application to prevent uncontrolled whipping of hose ends in the event of accidental disconnection while pressurised



5.2 Diffusion Abrasion Sleeve (DAS)

DAS is applied as a sleeve to dissipate the energy inherent in pressurised fluid in the event of its accidental escape. Can greatly reduce (but not eliminate) the risk of fluid injection into the body

5.3 Spiral-Guard (SSG)

Helps prevent chafing of hoses and aids in bundling assemblies together to provide a better working environment and longer service life of hoses. Can be added subsequent to hose installation if needed

5.4 Grip-Chek

The latest safety development from Pirtek involves the use of braided stainless steel stockings to fully envelop the hose and act like a Chinese Finger-Trap to grip the hose instantly and safely in the event of fitting blow off. Must be affixed to a secure mounting point

TECHNICAL DATA
PROPERTIES OF SATURATED STEAM

Properties of Saturated Steam (at Sea Level)

Temperature		Gauge Pressure	
°C	°F	bar	psi
212	100.0	0.00	0.0
214	101.1	0.04	0.6
216	102.2	0.08	1.2
218	103.3	0.12	1.8
220	104.4	0.17	2.5
222	105.6	0.22	3.2
224	106.7	0.27	3.9
226	107.8	0.32	4.6
228	108.9	0.37	5.3
230	110.0	0.42	6.1
232	111.1	0.48	6.9
234	112.2	0.53	7.7
236	113.3	0.59	8.5
238	114.4	0.65	9.4
240	115.6	0.71	10.3
242	116.7	0.77	11.2
244	117.8	0.83	12.1
246	118.9	0.90	13.1
248	120.0	0.97	14.1
250	121.1	1.04	15.1
252	122.2	1.12	16.2
254	123.3	1.19	17.3
256	124.4	1.27	18.4
258	125.6	1.35	19.6
260	126.7	1.43	20.7
261	127.2	1.48	21.4
262	127.8	1.52	22.0
263	128.3	1.56	22.6
264	128.9	1.60	23.2
265	129.4	1.65	23.9
266	130.0	1.69	24.5
267	130.6	1.74	25.2
268	131.1	1.78	25.8
269	131.7	1.83	26.5
270	132.2	1.88	27.2
271	132.8	1.92	27.9
272	133.3	1.97	28.6
273	133.9	2.02	29.3
274	134.4	2.07	30.0
275	135.0	2.12	30.8
276	135.6	2.17	31.5
277	136.1	2.23	32.3
278	136.7	2.28	33.0
279	137.2	2.33	33.8
280	137.8	2.38	34.5
281	138.3	2.43	35.3
282	138.9	2.49	36.1
283	139.4	2.54	36.9
284	140.0	2.60	37.7
285	140.6	2.66	38.6

Temperature		Gauge Pressure	
°C	°F	bar	psi
286	141.1	2.72	39.4
287	141.7	2.78	40.3
288	142.2	2.83	41.1
289	142.8	2.90	42.0
290	143.3	2.96	42.9
291	143.9	3.02	43.8
292	144.4	3.08	44.7
293	145.0	3.14	45.6
294	145.6	3.21	46.5
295	146.1	3.28	47.5
296	146.7	3.34	48.4
297	147.2	3.41	49.4
298	147.8	3.47	50.3
299	148.3	3.54	51.3
300	148.9	3.61	52.3
301	149.4	3.68	53.4
302	150.0	3.75	54.4
303	150.6	3.82	55.4
304	151.1	3.89	56.4
305	151.7	3.97	57.5
306	152.2	4.04	58.6
307	152.8	4.12	59.7
308	153.3	4.19	60.7
309	153.9	4.27	61.9
310	154.4	4.34	63.0
311	155.0	4.43	64.2
312	155.6	4.50	65.3
313	156.1	4.59	66.5
314	156.7	4.66	67.6
315	157.2	4.74	68.8
316	157.8	4.83	70.0
317	158.3	4.92	71.3
318	158.9	5.00	72.5
319	159.4	5.08	73.7
320	160.0	5.17	75.0
321	160.6	5.26	76.3
322	161.1	5.34	77.5
323	161.7	5.43	78.8
324	162.2	5.52	80.1
325	162.8	5.69	82.5
326	163.3	5.71	82.8
327	163.9	5.81	84.2
328	164.4	5.90	85.6
329	165.0	6.00	87.0
330	165.6	6.10	88.4
331	166.1	6.19	89.8
332	166.7	6.29	91.2
333	167.2	6.39	92.7
334	167.8	6.49	94.1
335	168.3	6.59	95.6

Temperature		Gauge Pressure	
°C	°F	bar	psi
336	168.9	6.70	97.1
337	169.4	6.81	98.7
338	170.0	6.91	100.2
339	170.6	7.02	101.8
340	171.1	7.12	103.3
341	171.7	7.24	105.0
342	172.2	7.34	106.5
343	172.8	7.46	108.2
344	173.3	7.57	109.8
345	173.9	7.69	111.5
346	174.4	7.80	113.1
347	175.0	7.92	114.8
348	175.6	8.03	116.5
349	176.1	8.15	118.2
350	176.7	8.27	119.9
352	177.8	8.52	123.5
354	178.9	8.77	127.1
356	180.0	9.02	130.8
358	181.1	9.28	134.5
360	182.2	9.54	138.3
362	183.3	9.81	142.3
364	184.4	10.08	146.2
366	185.6	10.37	150.3
368	186.7	10.65	154.4
370	187.8	10.94	158.7
372	188.9	11.24	163.0
374	190.0	11.54	167.4
376	191.1	11.86	171.9
378	192.2	12.17	176.4
380	193.3	12.49	181.1
382	194.4	12.81	185.8
384	195.6	13.14	190.6
386	196.7	13.49	195.6
388	197.8	13.83	200.6
390	198.9	14.19	205.7
392	200.0	14.54	210.9
394	201.1	14.91	216.2
396	202.2	15.28	221.5
398	203.3	15.66	227.0
400	204.4	16.04	232.6
402	205.6	16.41	238.0
404	206.7	16.83	244.0
406	207.8	17.24	250.0
408	208.9	17.66	256.0
410	210.0	18.07	262.0
412	211.1	18.48	268.0
414	212.2	18.97	275.0
416	213.3	19.38	281.0
418	214.4	19.86	288.0
420	215.6	20.28	294.0

TECHNICAL DATA
INDUSTRIAL RUBBER HOSE CONSTRUCTION TOLERANCES

Tolerances on Internal Diameter

ID		Tolerance	
mm	ins	mm	ins
10	25/64	±0.40	±0.015
13	1/2	±0.60	±0.024
16	5/8	±0.60	±0.024
19	3/4	±0.60	±0.024
25	1	±0.80	±0.030
32	1.1/4	±1.00	±0.040
40	1.37/64	±1.00	±0.040
51	2	±1.20	±0.047

ID		Tolerance	
mm	ins	mm	ins
63.5	2.1/2	±1.20	±0.047
80	3.5/32	±1.40	±0.055
102	4	±1.60	±0.063
127	5	±1.60	±0.063
152	6	±2.00	±0.079
203	8	±2.50	±0.098
254	10	±3.00	±0.118
315	12.13/32	±3.00	±0.118

Tolerances on Wall Thickness

Wall Thickness (mm)		Tolerance
from	to	
0	3	±0.5 mm
3.1	6	±0.6 mm
6.1	10	±0.8 mm
	>10.1	±10%

TECHNICAL DATA
USEFUL CONVERSIONS

Vacuum Conversion Table

ATM	PSI	Water		Mercury		Percentage
		metres	feet & ins	mm	ins	
0.1	1.4	1	3' 3-3/8"	73.6	2.99	10
0.2	2.8	2	6' 6-3/4"	147.1	5.80	20
0.3	4.2	3	9' 10-1/8"	220.7	8.70	30
0.4	5.7	4	13' 1-1/2"	294.2	11.6	40
0.5	7.1	5	16' 4-13/16"	367.8	14.5	50
0.6	8.5	6	19' 8-3/16"	441.3	17.4	60
0.7	10.0	7	22' 11-9/16"	514.9	20.3	70
0.8	11.4	8	26' 2-15/16"	588.4	23.2	80
0.9	12.8	9	29' 6-3/8"	662	26.0	90
1.0	14.2	10	32' 9-11/16"	735.5	29.0	100

Conversion of degrees Baumé to % of concentration by weight for Sulphuric, Nitric and Hydrochloric acids

degrees Baumé	% H_2SO_4	% HNO_3	% HCl
1	1.02	-	1.4
2	2.08	-	2.82
3	3.13	-	4.25
4	4.21	-	5.69
5	5.28	-	7.15
6	6.37	-	8.64
7	7.45	-	10.17
8	8.55	-	11.71
9	9.66	-	13.26
10	10.77	12.86	14.83
11	11.89	14.13	16.41
12	13.01	15.41	18.01
13	14.13	16.72	19.63
14	15.25	18.04	21.27
15	16.38	19.36	22.92
16	17.53	20.69	24.57
17	18.71	22.04	26.22
18	19.89	23.42	27.92
19	21.07	24.82	29.65
20	22.25	26.24	31.45
21	23.43	27.67	33.31
22	24.61	29.07	35.21
23	25.81	30.49	37.14
24	27.03	31.94	39.41
25	28.28	33.42	41.72

degrees Baumé	% H_2SO_4	% HNO_3	% HCl
25.1/2	-	-	43.4
26	29.53	34.94	-
27	30.79	36.48	-
28	32.05	38.06	-
29	33.33	39.66	-
30	34.63	41.3	-
31	35.93	43	-
32	37.26	44.78	-
33	38.58	46.58	-
34	39.92	48.42	-
35	41.27	50.32	-
36	42.63	54.36	-
37	43.99	54.36	-
38	45.35	56.52	-
39	46.72	58.82	-
40	48.1	61.38	-
41	49.47	64.2	-
42	50.87	67.18	-
43	52.26	70.33	-
44	53.66	73.67	-
45	55.07	77.17	-
46	56.48	81.08	-
47	57.9	85.7	-
48	59.32	91.35	-
48.1/2	-	95.11	-

degrees Baumé	% H_2SO_4	% HNO_3	% HCl
49	60.75	-	-
50	62.18	-	-
51	63.66	-	-
52	65.13	-	-
53	66.63	-	-
54	68.13	-	-
55	69.65	-	-
56	71.17	-	-
57	72.75	-	-
58	74.38	-	-
59	75.99	-	-
60	77.67	-	-
61	79.43	-	-
62	81.3	-	-
63	83.34	-	-
64	85.66	-	-
64.1/4	86.33	-	-
64.1/2	81.04	-	-
64.3/4	87.81	-	-
65	88.65	-	-
65.1/4	89.55	-	-
65.1/2	90.6	-	-
65.3/4	91.8	-	-
65	93.19	-	-

TECHNICAL DATA
TEMPERATURE CONVERSION TABLES

Temperature Conversion Table

°C	°F	°K
-273.15	-459.67	0
-273	-459.4	0.15
-270	-454	3.15
-265	-445	8.15
-260	-436	13.15
-255	-427	18.15
-250	-418	23.15
-245	-409	28.15
-240	-400	33.15
-235	-391	38.15
-230	-382	43.15
-225	-373	48.15
-220	-364	53.15
-215	-355	58.15
-210	-346	63.15
-205	-337	68.15
-200	-328	73.15
-195	-319	78.15
-190	-310	83.15
-185	-301	88.15
-180	-292	93.15
-175	-283	98.15
-170	-274	103.15
-165	-265	108.15
-160	-256	113.15
-155	-247	118.15
-150	-238	123.15
-145	-229	128.15
-140	-220	133.15
-135	-211	138.15
-130	-202	143.15
-125	-193	148.15
-120	-184	153.15
-115	-175	158.15
-110	-166	163.15
-105	-157	168.15
-100	-148	173.15
-95	-139	178.15
-90	-130	183.15
-85	-121	188.15
-80	-112	193.15
-75	-103	198.15
-70	-94	203.15
-65	-85	208.15
-60	-76	213.15
-55	-67	218.15
-50	-58	223.15
-45	-49	228.15
-40	-40	233.15
-35	-31	238.15

°C	°F	°K
-30	-22	243.15
-25	-13	248.15
-20	-4	253.15
-15	5	258.15
-10	14	263.15
-5	23	268.15
0	32	273.15
5	41	278.15
10	50	283.15
15	59	288.15
20	68	293.15
25	77	298.15
30	86	303.15
35	95	308.15
40	104	313.15
45	113	318.15
50	122	323.15
55	131	328.15
60	140	333.15
65	149	338.15
70	158	343.15
75	167	348.15
80	176	353.15
85	185	358.15
90	194	363.15
95	203	368.15
100	212	373.15
105	221	378.15
110	230	383.15
115	239	388.15
120	248	393.15
125	257	398.15
130	266	403.15
135	275	408.15
140	284	413.15
145	293	418.15
150	302	423.15
155	311	428.15
160	320	433.15
165	329	438.15
170	338	443.15
175	347	448.15
180	356	453.15
185	365	458.15
190	374	463.15
195	383	468.15
200	392	473.15
205	401	478.15
210	410	483.15
215	419	488.15

°C	°F	°K
220	428	493.15
225	437	498.15
230	446	503.15
235	455	508.15
240	464	513.15
245	473	518.15
250	482	523.15
255	491	528.15
260	500	533.15
265	509	538.15
270	518	543.15
275	527	548.15
280	536	553.15
285	545	558.15
290	554	563.15
295	563	568.15
300	572	573.15
305	581	578.15
310	590	583.15
315	599	588.15
320	608	593.15
325	617	598.15
330	626	603.15
335	635	608.15
340	644	613.15
345	653	618.15
350	662	623.15
355	671	628.15
360	680	633.15
365	689	638.15
370	698	643.15
375	707	648.15
380	716	653.15
385	725	658.15
390	734	663.15
395	743	668.15
400	752	673.15
405	761	678.15
410	770	683.15
415	779	688.15
420	788	693.15
425	797	698.15
430	806	703.15
435	815	708.15
440	824	713.15
445	833	718.15
450	842	723.15
455	851	728.15
460	860	733.15
465	869	738.15

TECHNICAL DATA
TEMPERATURE CONVERSION TABLES

Temperature Conversion Table

°C	°F	°K
470	878	743.15
475	887	748.15
480	896	753.15
485	905	758.15
490	914	763.15
495	923	768.15
500	932	773.15
505	941	778.15
510	950	783.15
515	959	788.15
520	968	793.15
525	977	798.15
530	986	803.15
535	995	808.15
540	1004	813.15
545	1013	818.15
550	1022	823.15
555	1031	828.15
560	1040	833.15
565	1049	838.15
570	1058	843.15
575	1067	848.15
580	1076	853.15
585	1085	858.15
590	1094	863.15
595	1103	868.15
600	1112	873.15
605	1121	878.15
610	1130	883.15
615	1139	888.15
620	1148	893.15
625	1157	898.15
630	1166	903.15
635	1175	908.15
640	1184	913.15
645	1193	918.15
650	1202	923.15
655	1211	928.15
660	1220	933.15
665	1229	938.15
670	1238	943.15
675	1247	948.15
680	1256	953.15
685	1265	958.15
690	1274	963.15
695	1283	968.15
700	1292	973.15
705	1301	978.15
710	1310	983.15
715	1319	988.15

°C	°F	°K
720	1328	993.15
725	1337	998.15
730	1346	1003.15
735	1355	1008.15
740	1364	1013.15
745	1373	1018.15
750	1382	1023.15
755	1391	1028.15
760	1400	1033.15
765	1409	1038.15
770	1418	1043.15
775	1427	1048.15
780	1436	1053.15
785	1445	1058.15
790	1454	1063.15
795	1463	1068.15
800	1472	1073.15
805	1481	1078.15
810	1490	1083.15
815	1499	1088.15
820	1508	1093.15
825	1517	1098.15
830	1526	1103.15
835	1535	1108.15
840	1544	1113.15
845	1553	1118.15
850	1562	1123.15
855	1571	1128.15
860	1580	1133.15
865	1589	1138.15
870	1598	1143.15
875	1607	1148.15
880	1616	1153.15
885	1625	1158.15
890	1634	1163.15
895	1643	1168.15
900	1652	1173.15
905	1661	1178.15
910	1670	1183.15
915	1679	1188.15
920	1688	1193.15
925	1697	1198.15
930	1706	1203.15
935	1715	1208.15
940	1724	1213.15
945	1733	1218.15
950	1742	1223.15
955	1751	1228.15
960	1760	1233.15
965	1769	1238.15

°C	°F	°K
970	1778	1243.15
975	1787	1248.15
980	1796	1253.15
985	1805	1258.15
990	1814	1263.15
995	1823	1268.15
1000	1832	1273.15
1005	1841	1278.15
1010	1850	1283.15
1015	1859	1288.15
1020	1868	1293.15
1025	1877	1298.15
1030	1886	1303.15
1035	1895	1308.15
1040	1904	1313.15
1045	1913	1318.15
1050	1922	1323.15
1055	1931	1328.15
1060	1940	1333.15
1065	1949	1338.15
1070	1958	1343.15
1075	1967	1348.15
1080	1976	1353.15
1085	1985	1358.15
1090	1994	1363.15
1095	2003	1368.15
1100	2012	1373.15
1105	2021	1378.15
1110	2030	1383.15
1115	2039	1388.15
1120	2048	1393.15
1125	2057	1398.15
1130	2066	1403.15
1135	2075	1408.15
1140	2084	1413.15
1145	2093	1418.15
1150	2102	1423.15
1155	2111	1428.15
1160	2120	1433.15
1165	2129	1438.15
1170	2138	1443.15
1175	2147	1448.15
1180	2156	1453.15
1185	2165	1458.15
1190	2174	1463.15
1195	2183	1468.15
1200	2192	1473.15
1205	2201	1478.15
1210	2210	1483.15
1215	2219	1488.15

TECHNICAL DATA
USEFUL CONVERSIONS

Acceleration

To Convert	Into	Multiply by
ft/sec^2	metres/sec^2	0.3048
ft/sec^2	g (free fall)	0.0311
g (free fall)	metres/sec^2	9.8067
g (free fall)	ft/sec^2	32.1742
metres/sec^2	ft/sec^2	3.2809
metres/sec^2	g (free fall)	0.1020

Angle

To Convert	Into	Multiply by
degrees	minutes	60
degrees	grads	1.1111
degrees	revolution	0.0028
grads	degrees	0.9000
minutes	degrees	0.0167
revolution	degrees	360
minutes	seconds	60
seconds	minutes	0.0167

Area

To Convert	Into	Multiply by
cm^2	inch^2	0.1550
cm^2	mm^2	100
inch^2	cm^2	6.4516
mm^2	cm^2	0.0100
feet^2	inch^2	144

Concentration

To Convert	Into	Multiply by
micromole/cm^3	micromole/cm^3	1
micromole/cm^3	millimole/cm^3	0.0010
millimole/cm^3	micromole/cm^3	1000

Density

To Convert	Into	Multiply by
grams/cm^3	ozs/gall	133.5265
kg/m^3	pounds/ft^3	0.0624
ozs/gall	grams/cm^3	0.0075
pounds/ft^3	kg/m^3	16.0185

Distance

To Convert	Into	Multiply by
cm	inch	0.3937
feet	metres	0.3048
feet	inch	12
inch	cm	2.5400
inch	feet	0.0833
metres	feet	3.2808
metres	inch	39.370

Energy / Heat

To Convert	Into	Multiply by
BTU	joule	1055.0560
calorie	kilojoule	0.0042
joule	kilojoule	1000
kilocalorie	kilojoule	4.1868
kilowatt hour	kilojoule	3600
kilowatt hour	kilocalorie	859.8452
newton metre	kilojoule	0.0010

Flow Rate

To Convert	Into	Multiply by
cm^3/sec	ft^3/min	0.00212
ft^3/min	ft^3/sec	0.0167
ft^3/sec	ft^3/min	60
galls/min (Imp)	l/sec	0.0758
galls/min (US)	l/sec	0.0631
l/sec	galls/min (US)	15.8503
l/sec	galls/min (Imp)	13.1982
m^3/min	ft^3/min	35.3147
m^3/min	ft^3/hour	2118.88

Force

To Convert	Into	Multiply by
pounds force	kilonewton	0.00445
kilograms force	kilonewton	0.00981
newton	pounds force	0.22481
pounds force	kilogram force	0.4536
kilogram force	pounds force	2.2046
pounds force	newton	4.4482
kilonewton	kilogram force	101.9716
kilonewton	pounds force	224.8089

Mass

To Convert	Into	Multiply by
gram	kilograms	0.001
pound (avoirdupois)	kilograms	0.453592909
kilograms	pound (avoirdupois)	2.20462
pound (avoirdupois)	ozs (avoirdupois)	16
metric tonne	Kilograms	1000
metric tonne	pound (avoirdupois)	2204.623
ton (long)	pound (avoirdupois)	2240

TECHNICAL DATA
USEFUL CONVERSIONS

Power

To Convert	Into	Multiply by
Kilowatt	Horsepower	0.7457
Horsepower	Kilowatt	1.3410
Horsepower	Torque (ft lb/ min)	33000
Kilowatt	Torque (ft lb / min)	44253.73

Torque

To Convert	Into	Multiply by
foot pounds force	Newton metre	1.3558
kgf metre	Newton metre	9.8100

Pressure

cm Mercury (Hg)	inches Mercury (Hg)	0.3937008
kg/cm^2	bar	0.980665
bar	atmospheres	0.986923267
atmospheres	bar	1.01325
bar	kg/cm^2	1.019716213
inches Mercury (Hg)	cm Mercury (Hg)	2.539999919

Velocity

feet/min	metres/sec	0.0051
feet/sec	metres/sec	0.3048
metres/sec	feet/min	196.8504

Temperature

ºC	ºF	(9/5) and add 32
ºF	ºC	deduct 32 then *(5/9)
ºC	ºK	+273
ºK	ºC	-273

Volume

ins^3	litres	0.0164
litres	ft^3	0.0353
ounces	pint	0.0625
pints (UK)	Gallon (UK)	0.1250
litres	Galls (US)	0.2642
pints	litres	0.5683
Gallons (US)	Gallons (UK)	0.8327
Gallons (UK)	Gallons (US)	1.20096
litres	pints (UK)	1.7598
Gallons (US)	litres	3.7854
pints UK	ounces	16
ft^3	litres	28.3168
litres	ins^3	61.0237
litres	cm^3	1000.0000
litres	millilitres	1000
ft^3	ins^3	1728.0000

Time

millisecond	second	0.0010
minutes	seconds	60
hours	minutes	60
second	millisecond	1000

TECHNICAL DATA
VISCOSITY

The internal resistance to flow of a liquid is measured by a fluid characteristic termed viscosity. More precisely absolute viscosity (η) is defined in terms of the force between two parallel layers of fluid for a certain slip velocity between them. This is expressed by Newton's equation:

$$\tau = \eta \frac{\partial u}{\partial y} \quad \text{where } \tau = \text{shear sress, } \eta = \text{coefficient of viscosity } \frac{\partial u}{\partial y} = \text{velocity gradient}$$

The equation expresses that for straight, parallel and uniform flow, the shear stress, τ, between layers is proportional to the velocity gradient, in the direction perpendicular to the layers.

Very often a hydraulic fluid will be selected on the basis of its viscosity and the operating temperature of the system. A low viscosity fluid will flow more easily, since less energy is required to overcome the internal frictional forces, but any saving in energy must be balanced against an increase in fluid leakage due to the lower fluid viscosity.

There are two measures of viscosity: absolute (also known as dynamic) and kinematic. The S.I. unit for absolute viscosity is N s m^{-2} or Pa.s.
The non-S.I. unit is the *poise* (P), which is equivalent to 0.1 N s m^{-2} (not to be confused with the *poiseuille* (Pl), used in France, and equal to 10 *poise*) though the *centipoise* (cP) is more commonly used.

In the hydraulics industry, kinematic viscosity is more frequently used. Kinematic viscosity is the dynamic viscosity adjusted for differences in the fluid density. Thus:

$$\text{Kinematic Viscosity } (\nu) = \frac{\text{Dynamic Viscosity } (\eta)}{\text{Density } (\rho)}$$

The S.I. unit for kinematic viscosity (ν) is mm^2s^{-1} which corresponds to the older but still commonly used unit the centistoke (cSt).

Past measures of viscosity using arbitrary scales like Redwood No 1 seconds, Saybolt Universal Seconds (SUS), or degrees Engler should no longer be used. These units have been superseded by the empirical measures mentioned above. Whilst conversion tables do exist, they are only true at a fixed temperature.

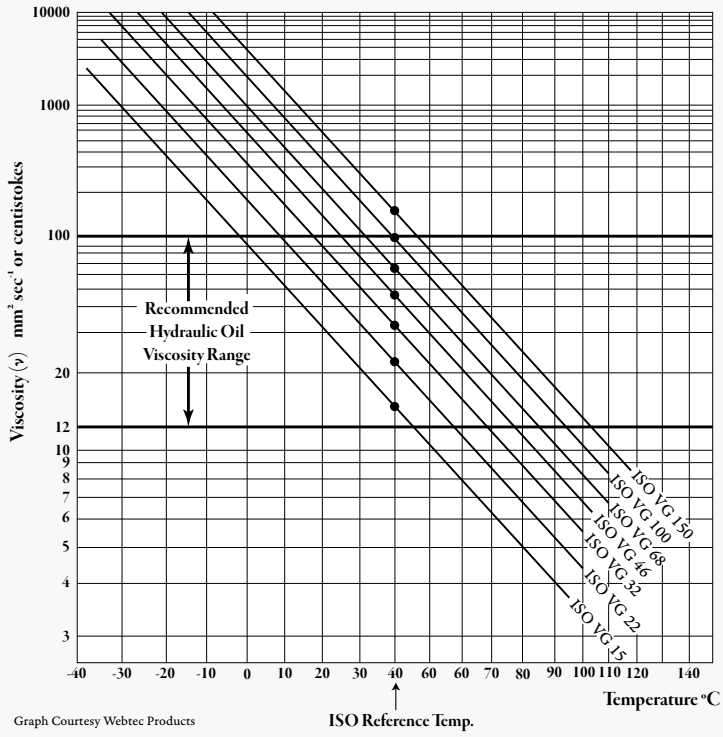
Effect of temperature on viscosity

The temperature and viscosity of hydraulic oil are inversely related; as temperature increases, viscosity decreases. In order to define the kinematic viscosity of oil, its viscosity is quoted at a set temperature (40°C for the ISO standard) and the oil is given a value according to the viscosity index (V.I.). For example an oil quoted as conforming to ISO 22 will have a viscosity of 22 mm^2s^{-1}/ cSt at 40°C.

Viscosity Index

The viscosity index is a single number representation of the viscosity temperature characteristics of a fluid. The greater the value of the V.I. the smaller the change in viscosity for a given change in temperature, and vice-versa. Oils with a V.I. of 80 or more are said to have a high V.I. value. Oils with a V.I. between 80 and 40 are said to have a medium value and those below 40 a low value. If temperature and kinematic viscosity are plotted to give a linear relationship (using logarithmic scales) then the V.I. is a measure of the gradient of the line. As the V.I. is increased the gradient is reduced. A typical temperature-viscosity curve for ISO oils of various viscosity gradients (VG) can be seen below.

In Australia, ISO 68 is the most commonly encountered grade of hydraulic oil, whilst ISO 46 is more the norm in Europe. A study of the temperature ranges over which the 2 grades fall within the recommended parameters should explain why that is the case.



Graph Courtesy Webtec Products

If a hydraulic system is operating within a small temperature range, the viscosity index will be of little significance, but if the operating parameters are such that the temperature range is difficult to control (a forklift operating either in a coldroom or outdoors, for example) then close attention to the chosen viscosity is needed.

A too low viscosity can result in:

- Lower film strength, and more wear on moving parts
- More leakage
- More pressure loss
- Lower volumetric efficiency of pumps and motors
- Less precise and slower responses
- Lower overall efficiency

A too high viscosity can result in:

- Higher pressure drop due to friction
- Excessive heat generation
- More pressure loss
- Higher power consumption
- Lower mechanical efficiency
- Pump inlet starvation and associated cavitation

Pressure and Viscosity

Varying pressure can lead to significant variations in viscosity. In a closed flow circuit at a fixed temperature, a change in pressure of 40 MPa (400 bar) can lead to a change of up to 8% in viscosity.

TECHNICAL DATA
FLUID POWER CALCULATIONS

The distribution of hydraulic power in a circuit involves the use of pipe, tubing, and hose assemblies. What combinations of these to use in any given system is largely a matter of economics in conjunction with the operating conditions and relative motion between the connected components.

Catalogue Section E (pages 2 through 6) details the strength calculations (using Barlow's formula) and recommended flow data associated with tube and pipe, but the underlying theory of flow rates and pressure drops merits greater discussion.

Pressure Drop

The energy capacity of a hydraulic system is determined by the combination of the flow rate and pressure of the hydraulic fluid. Bernoulli is credited as being first to document the main principles in the equation:

$$\frac{u^2}{2} + g\,h + \frac{p}{\rho} = constant$$

where:

u is the fluid velocity at a point on a streamline

g is the acceleration due to gravity

h is the height of the point above a reference plane

p is the pressure at the point

ρ is the density of the fluid at all points in the fluid

If we ignore the relatively small changes in height that normally occur in a system, and assume that the density of the fluid remains constant throughout, then it can be derived that the pressure at any point in a fluid will be inversely proportional to the square of the flow velocity.

As work is done at various points in the system, the pressure and velocity components of the system's energy are converted into other forms of energy - mainly kinetic energy - through the function of components like cylinders and hydraulic motors. By the time the fluid returns to the hydraulic oil reservoir, it has surrendered its total energy (both flow velocity and pressure) and awaits a new injection of energy from the external source (hydraulic pump) to begin a new cycle.

But other losses occur as well. As the fluid flows through the various connectors and regulating devices, the resistance of the fluid to flow (due to viscous drag) is manifested as frictional losses in the form of heat and/or small pressure losses.

Choosing a Conductor Diameter

The frictional losses above can be significant if a too small conductor diameter is chosen. The Pipe Friction Equation is generally used to evaluate the expected pressure loss (usually expressed as an equivalent head loss in meters). It draws on Bernoulli's and Newton's work , but makes an allowance for varying degrees of roughness in the conduit wall lining by incorporating a friction factor which is determined by experiment. The formula is generally attributed to Darcy, Weisbach and Fanning, and is sometimes termed the Darcy Formula. It applies to both laminar and turbulent flow, and continues to be widely used in fluid mechanics. More discussion of the Darcy Formula is given overleaf.

Laminar vs Turbulent Flow

Experiments by Osborne Reynolds determined that the head loss generated in a fluid is directly proportional to its velocity when the velocity does not exceed a critical point. If that point is exceeded, the flow changes from a smooth and steady state to a turbulent condition, and the head loss then becomes proportional to a relationship approaching the square of the velocity. The point at which turbulence begins was also found to be dependent on the diameter of the pipe and the kinematic viscosity of the fluid. His work is enshrined in the dimensionless value termed Reynolds Number (N_R).

$$N_R = \frac{du}{\nu} \qquad \text{where } d = \text{Diameter} \quad u = \text{Velocity} \quad \nu = \text{Kinematic Viscosity}$$

A Reynolds Number N_R of 2000 is considered generally to be the upper limit of laminar flow. If heat losses due to friction are to be minimised, it can be seen from Reynolds' work that designing a system to exhibit laminar flow would be very desirable, and especially so in the parts of the circuit where available head is limited (suction and return lines). The accepted ideal temperature in a static hydraulic system (*eg* a machine tool environment), is 50°- 60°C, at which point the Kinematic Viscosity of a VG 68 (VG = Viscosity Grade) oil from the graph opposite is around 45 mm^2s^{-1}. The two Tables below show the fluid velocity and the corresponding Reynolds Number over a wide range of flow rates and conductor diameters using a kinematic viscosity of 45 as a basis:

l/min / Ø mm	327.7	163.9	147.5	131.1	114.7	98.3	81.9	65.5	49.2	32.8	16.4	14.7	13.1	11.5	9.8	8.2	6.6	4.9	3.3	1.6
6.25	178.0	89.0	80.1	71.2	62.3	53.4	44.5	35.6	26.7	17.8	8.9	8.0	7.1	6.2	5.3	4.5	3.6	2.7	1.8	0.9
8.0	108.7	54.3	48.9	43.5	38.0	32.6	27.2	21.7	16.3	10.9	5.4	4.9	4.3	3.8	3.3	2.7	2.2	1.6	1.1	0.5
9.5	76.7	38.4	34.5	30.7	26.9	23.0	19.2	15.3	11.5	7.7	3.8	3.5	3.1	2.7	2.3	1.9	1.5	1.2	0.8	0.4
12.7	43.0	21.5	19.3	17.2	15.0	12.9	10.7	8.6	6.4	4.3	2.1	1.9	1.7	1.5	1.3	1.1	0.9	0.6	0.4	0.2
15.9	27.6	13.8	12.4	11.0	9.7	8.3	6.9	5.5	4.1	2.8	1.4	1.2	1.1	1.0	0.8	0.7	0.6	0.4	0.3	0.1
19.1	19.2	9.6	8.6	7.7	6.7	5.7	4.8	3.8	2.9	1.9	1.0	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1
25.4	10.8	5.4	4.9	4.3	3.8	3.2	2.7	2.2	1.6	1.1	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1
31.2	6.9	3.4	3.1	2.8	2.4	2.1	1.7	1.4	1.0	0.7	0.3	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.0
38.1	4.8	2.4	2.2	1.9	1.7	1.4	1.2	1.0	0.7	0.5	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.0	0.0
50.8	2.7	1.3	1.2	1.1	0.9	0.8	0.7	0.5	0.4	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0

Flow Velocities (m/sec) at various Flow Rates and Conductor Diameters. The shaded boxes represent ≤ 9 m/sec. Velocities of ≤ 5 m/sec allow better control of heat

l/min / Ø mm	327.7	163.9	147.5	131.1	114.7	98.3	81.9	65.5	49.2	32.8	16.4	14.7	13.1	11.5	9.8	8.2	6.6	4.9	3.3	1.6
6.25	24728	12364	11127	9891	8655	7418	6182	4946	3709	2473	1236	1113	989	865	742	618	495	371	247	124
8.0	19318	9659	8693	7727	6761	5796	4830	3864	2898	1932	966	869	773	676	580	483	386	290	193	97
9.5	16234	8117	7305	6494	5682	4870	4058	3247	2435	1623	812	731	649	568	487	406	325	244	162	81
12.7	12150	6075	5467	4860	4252	3645	3037	2430	1822	1215	607	547	486	425	364	304	243	182	121	61
15.9	9735	4868	4381	3894	3407	2921	2434	1947	1460	974	487	438	389	341	292	243	195	146	97	49
19.1	8113	4056	3651	3245	2839	2434	2028	1623	1217	811	406	365	325	284	243	203	162	122	81	41
25.4	6085	3042	2738	2434	2130	1825	1521	1217	913	608	304	274	243	213	183	152	122	91	61	30
31.2	4868	2434	2190	1947	1704	1460	1217	974	730	487	243	219	195	170	146	122	97	73	49	24
38.1	4056	2028	1825	1623	1420	1217	1014	811	608	406	203	183	162	142	122	101	81	61	41	20
50.8	3042	1521	1369	1217	1065	913	761	608	456	304	152	137	122	106	91	76	61	46	30	15

Corresponding Reynolds Number (N_R) using a Kinematic Viscosity of 45 mm^2s^{-1}. Shaded boxes ($N_R \leq 2000$) represent laminar flow conditions

TECHNICAL DATA
PIPE FRICTION EQUATION

Darcy, Weisbach et al showed that for the special case of a pipe flowing full, the head loss due to viscous friction can be expressed as :

$$h_L = f.\ \frac{L\ .\ u^2}{d\ .\ 2g}$$

where *:*

h_L = head loss

f = a dimensionless friction factor

L = length of pipe section being assessed

d = diameter of pipe

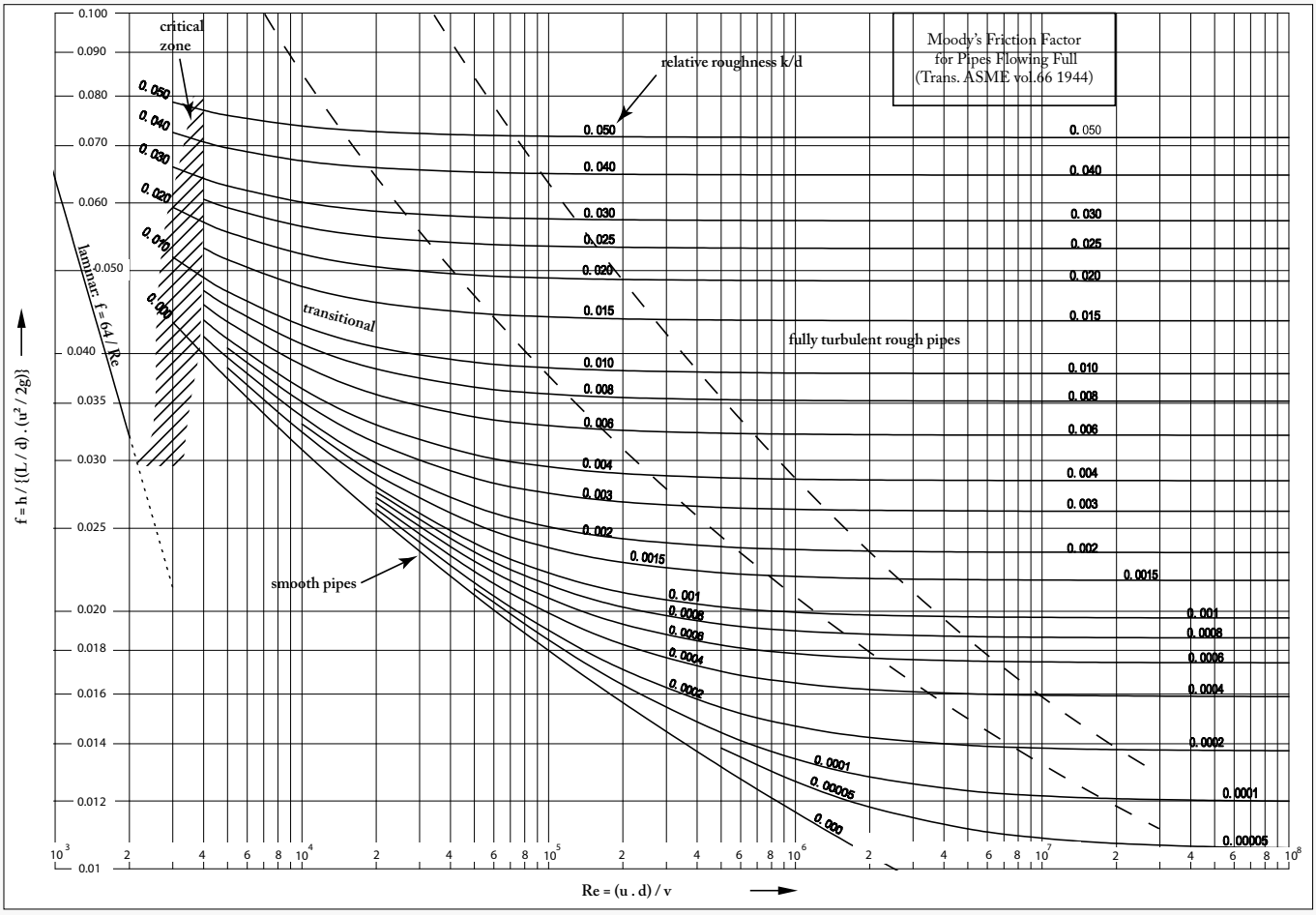
u = average fluid velocity across the pipe

g = gravitational acceleration

Any set of consistent mathematical units can be used with the equation

To determine what friction factor to apply, various empirical formulae have been developed, but they all fall back to a need to define the roughness of the pipe walls as well as having some dependence on the applicable Reynolds Number. Two charts prepared by Moody take these formulae into account and plot the various roughness factors for commercially available conduits. The graph for relative roughness is not reproduced here, since it covers a wide range of conduits not related to oil hydraulics applications. Suffice to say that the relative roughness for hydraulic type conduits ranges from .00003 to .00006 in the sizes up to 50 mm diameter. This range of values for relative roughness can be utilised in the Moody Diagram shown below to determine the relevant friction factor for the conduit in question.

Remember that our goal is to choose a viscosity and design parameters that will allow laminar flow or close to it. Reference to the Moody Diagram will soon show that the friction factor for hydraulic type conduits in the lower Reynolds Number ranges will vary only over a small range at about f = 0.04 to .06



Example Calculation:

Determine friction loss per 100 metres of conductor when internal diameter (d) is 25mm and flow rate is 65 liters / minute

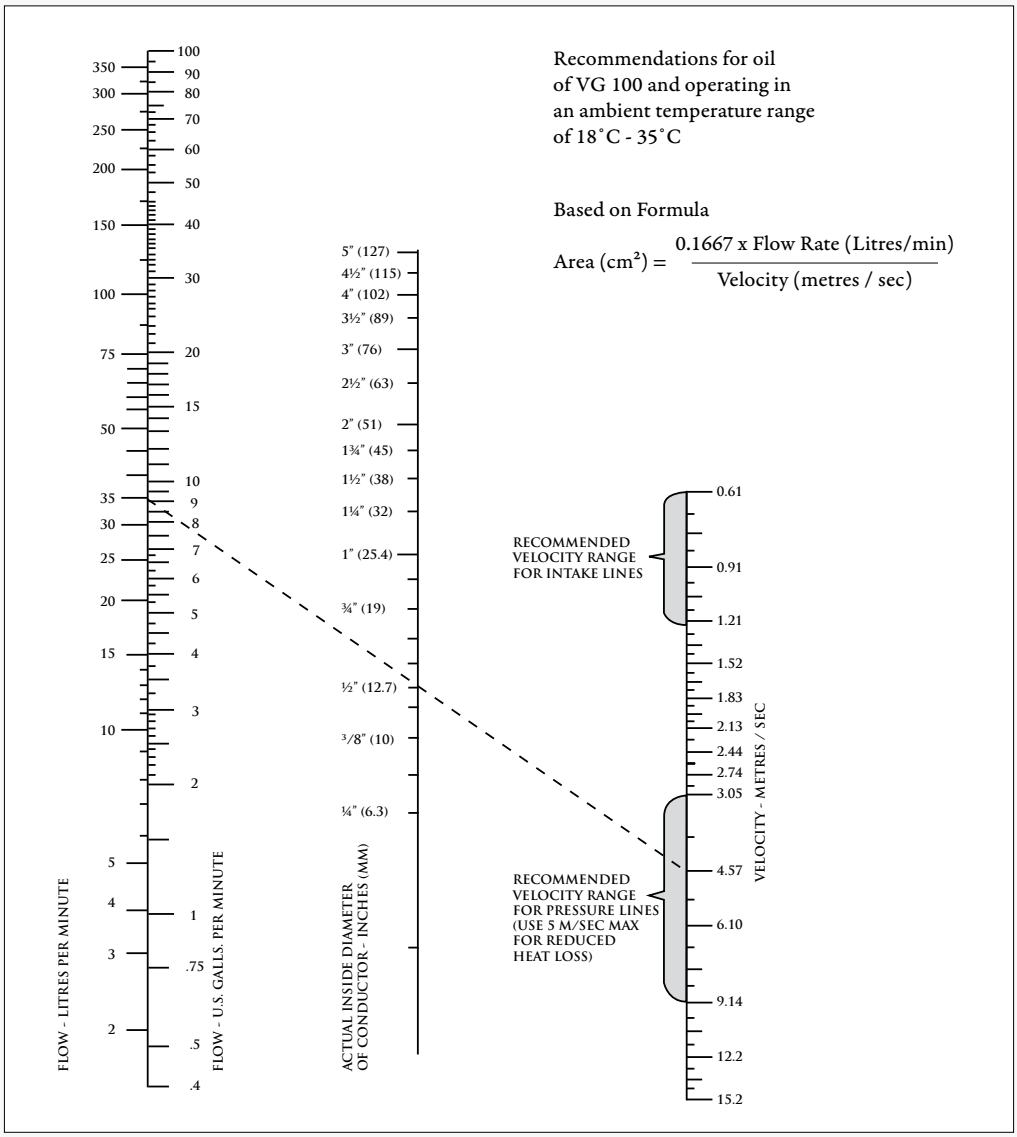
Calculation: Average velocity u is Flow rate / cross-sectional area of the conductor. ie 65,ooo cm^3 per minute / (π x 2.5 x 2.5 / 4) . This equals 2.21 m / sec and would yield a Reynolds Number of about 1220 for a Viscosity Index of 45 and conductor diameter (d) of 25 mm. Moody's graph above gives f = 0.050 under these conditions

Use g = 9.81m/sec^2 and a length (L) of 100 metres. L/Diameter = 100m /.025m = 4000

Substitution in the Pipe Friction Equation with a friction factor of .05 yields h_L = 0.05 x 4000 x (2.21 x 2.21) / (2 x 9.81) = 49.8 metres per 100 metres loss corresponding to about 4.18 bar pressure loss per 100 metres of conductor (assuming oil of specific gravity 0.87)

TECHNICAL DATA
FLOW NOMOGRAPH & MINOR LOSSES

To avoid the tedium of constantly calculating optimum conductor size, industry practice generally resorts to the use of a flow nomograph as shown below. It works by utilising standard recommended flow velocity ranges for both pressure and intake lines. The flow relationship between velocity and conductor cross-sectional area allows a simple derivation of any unknown third variable when two of the variables are known.
Care should be exercised in its use, because it applies only to a restricted range of temperatures and viscosities, and as evidenced on page 17, does not always preclude the possibility of undesirable turbulent flow conditions. A flow velocity greater than 10 metres per second can cause hose liner damage.



Minor pressure loss in pipe and tube systems can be expressed as:

$h_{minor\_loss} = K * v^2 / (2 * g)$

Where:

h_{minor_loss} = minor head loss (m)

K = minor loss coefficient (dimension-less)

v = flow velocity (m/s)

g = acceleration of gravity (m/s²) - use 9.806 m/s²

The ratio L/*d* is used where the designer wishes to express the losses as an equivalent length of pipe. Multiply the tabulated L/*d* ratio by the internal diameter of the component to determine the equivalent length of conduit that the component represents

Component	Loss coefficient *K*	Minor Loss Ratio L/*d*
Ball Valve fully open	0.05	1.75
Globe Valve fully open	10	350
Tee, through side outlet	2	70
Tee (Run)	0.9	31.5
Elbow - medium radius	1.5	52.5
Elbow - long radius	0.7	24.5
Elbow 45°	0.4	14

The term 'minor loss' is applied to friction losses caused by minor disturbances in a fluid system from items such as valves, bends, etc. They are usually allowed for in either of two ways (see at left)

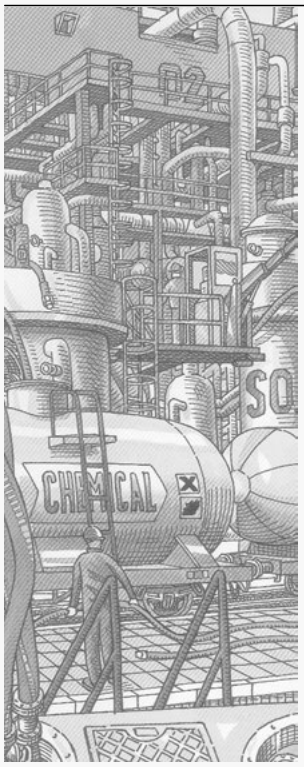
Technical Section A page A 08 offers a Table of expected pipe friction losses under varying conditions

TECHNICAL DATA

SUMMARY OF PIRTEK INDUSTRIAL HOSE ELASTOMERS

Product Code	Description	Liner Composition	Cover Composition
IPAF	Air-Flex	PVC	PVC
IPCF	Clear-Flex	PVC	PVC
IPHB	Helix-Blue	PVC	PVC
IPHG	Helix-Grey	PVC	PVC
IPML	Layflat	PVC	PVC
IPSF	Spring-Flex	PVC	PVC
IRAW	Air Water	SBR	EPDM
IRBD	Beverage Delivery	NR	EPDM
IRBF	Blue-Flex	Synthetic	NBR
IRCOSD	Corrugated Oil Suction	NBR	CR
IRC	Concrete	SBR/NR	SBR / NR
IRCS	Concrete Steel 80	SBR/NR	SBR / NR
IRDM	Dry Materials	NR/SBR	NR / SBR
IRFAW	FRAS Air Water	NBR	CR
IRFC	Pirtekflex	XLPE	Synthetic
IRHAB	Hot Air Blower	EPR	EPDM
IRLF	Liquid Food	NR	NR
IRME	Marine Exhaust	CR	CR
IROFSD	Oil Fuel Suction & Delivery	NBR	SBR
IRPAW	PremiumAir Water	SBR	EPDM
IRPC	Premium Chemical	UHMWPE	EPDM
IRPF	Premium Food	IIR	IIR
IRPWD	Premium Wash Down	IIR	PVC / NBR
IRR	Radiator Hose	Synthetic	EPDM
IRRF	Red-Flex	Synthetic	NBR
IRSA	Steel Air	SBR	EPDM
IRSB	Sandblast	SBR/NR	SBR/NR
IRSS	Steel Steam	EPDM	EPDM
IRWD	Water Delivery	SBR	EPDM
IRWDR	Wash Down Red	EPDM	EPDM
IRWDW	Wash Down White	EPDM	EPDM
IRWSD	Water Suction & Delivery	SBR	EPDM
IS1000	Code 1000	Polypropylene	PVC
IRYCAW	Yellow Air Water	Synthetic	Synthetic
IS1003	Code 1003	Polypropylene	PVC
IS901	Code 901	Polypropylene	PVC
IS951	Code 951	Polypropylene	PVC
IS952	Code 952	Polypropylene	PVC
IS969	Code 969	Polypropylene	PVC
ISAVION	Aviation Refuelling	Polypropylene	PVC
ISCHEMSS	Chemical	Polypropylene	PVC
ISVAP	Vapor Recovery	Polypropylene	PVC
MPH	Multipurpose Hose	Synthetic	Synthetic

TECHNICAL DATA
CHEMICAL RESISTANCE TABLE



CAUTION

The data in the following pages has been compiled from generally available sources and should not be relied upon without consulting and following the specific recommendations of the manufacturers of particular products

The data is considered valid at 20°C (70°F) except where specified otherwise. Chemical compatibility can vary greatly with temperature

A good rating does not necessarily indicate the suitability of a particular hose and fitting combination due to variables such as improper clamp and coupling application, special hose construction, gasket material etc

SOLVENT INFORMATION

Aromatic solvents: benzene, cumene, p-cumene, naphthalene, toluene, xylene, cresol, styrene, cyclohexane and combinations

Aliphatic solvents: propane, butane, pentane, hexane, heptane, dipetene, tripropylene

Halogenous solvents: chloroform, dichorobenzene, dichloroethylene, methylen bromide, methylen chloride, benzyl chloride, carbon tetrachloride, trichloroethylene, carbon disulphite, turpentine, perchloroethylene, dichloroethane

Ketonic solvents: acetone, methyl ketone, isobutyl ketone, methyl ethyl ketone, methyl isobutyl ketone

Esters solvents: butyl acetate, methyl acetate, anyl acetate, isobutyl acetate

Amines: aniline, ethylene diamine , diethanol amine, triethanolamine, dimethyl amine, monoethanolamine

Alcohols: methanol, ethanol, propanol, butanol, glycerol

Common Elastomers	ASTM Designation	Composition	General Properties
brominated butyl chlorinated butyl	**BIIR** **CIIR**	bromo isobutene-isoprene chloro isobutene-isoprene	excellent weathering resistance, low permeability to air and gases, good physical properties, resistant to heat poor resistance to petroleum based fluids, good resistance to fat
chlorinated polyethylene	**CM (CPE)**	chloro polyethylene	excellent ozone and weathering resistance, good oil and chemical resistance, excellent flame resistance
cross-linked polyethylene	**XLPE** **UHMWPE**	polyethylene and cross linking agent	excellent for a very wide range of solvents, chemicals, acids and oils
ethylene propylene	**EPDM**	ethylene propylene diene-terpolymer	excellent ozone, chemical and ageing resistance, poor resistance to petroleum based fluids, very good steam resistance
ethylene propylene	**EPM (EPR)**	ethylene propylene copolymer	excellent ozone, weathering, heat, chemical and aging resistance, poor resistance to petroleum products, very good steam resistance
hypalon ®	**CSM**	chloro-sulfonyl-polyethylene	excellent weathering, ozone and acid resistance, good heat and abrasion resistance, fair resistance to petroleum based fluids
natural	**NR**	isoprene natural	excellent physical properties, very good abrasion resistance, poor resistance to petroleum based fluids
neoprene	**CR**	chloroprene	good weathering and flame retardant resistance, good oil reistance, good physical properties
nitrile (buna-n)	**NBR**	Acrylonitrile-butadiene	excellent petroleum products resistance, moderate resistance to aromatics, good physical properties
buna-n / polyvinyl chloride	**PVC / NBR**	acrylonitrile-butadiene / polyvinyl-chloride	excellent petroleum products and weathering resistance, both for tube and cover
polyacrylic	**ACM**	acrylic monomer	excellent oil and tar resistance at high temperatures
sbr	**SBR**	styrene butadiene	good physical properties, good abrasion resistance, poor resistance to petroleum based fluids
viton ®	**FKM**	fluorocarbon rubber	excellent high temperature resistance, particularly in air and oil, very good chemical resistance

TECHNICAL DATA
CHEMICAL RESISTANCE TABLE

Legend:
G = Good
C = Conditional
U = Unsatisfactory
- No Data

AGENT	RUBBER COMPOSITION												PVC		METALS					GASKET MATERIALS									
	SBR	NR	EPDM	EPR	IIR	CR	NBR	CPE	HYP	VITON	XLPE	UHMW PE	20° C	60° C	316L St. Steel	304 / 321 St. Steel	Carbon Steel	Bronze	Aluminium	Ductile Iron	Buna	Viton	Teflon	EPT	Neoprene	Nitrile	EPDM	Fluorosilicon	Delrin	Ryton
1-Chloro 1-Nitro Ethane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	U	-	-
Acetaldehyde	U	C	C	G	C	C	U	C	U	U	G	G	-	-	G	-	-	U	C	C	U	U	G	G	C	U	G	U	G	G
Acetarnide	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	C	G	G	G	-	-
Acetic Acid 30%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	G	G	C	G	C	-	-
Acetic Acid 50%	U	U	C	G	C	C	U	G	C	C	G	G	G	C	G	G	U	U	C	U	C	U	G	C	-	C	C	-	-	G
Acetic Acid, Glacial	U	U	C	G	C	U	U	C	U	U	G	G	U	U	G	-	-	C	G	U	C	U	G	C	U	C	C	U	-	G
Acetic Anhydride	U	U	C	C	C	U	U	G	C	U	G	G	U	U	G	G	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Acetone	U	U	G	G	G	U	U	G	U	U	G	G	U	U	G	G	U	G	C	G	U	U	G	G	C	U	G	U	C	G
Acetophenone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	G	U	U	G	U	-	-
Acetyl Chloride	U	U	C	C	C	U	U	G	U	G	G	C	-	-	C	C	U	C	-	-	U	-	-	U	U	U	U	G	-	-
Acetylene	G	G	G	G	G	C	G	G	G	G	G	G	-	-	G	G	G	U	-	-	C	-	-	G	C	C	G	-	-	-
Acrylonitrile	-	-	U	U	U	-	-	G	-	U	G	C	-	-	G	-	G	G	C	C	U	C	G	U	C	U	U	U	-	G
Adipic Acid	C	-	C	G	C	C	-	-	-	-	G	G	-	-	-	-	-	-	-	-	G	-	-	-	-	G	-	G	-	-
Air - < 300°F & < 290 psi or 2000 kPa	G	G	G	G	G	G	G	G	G	G	G	G	G	G	-	-	-	-	-	-	C	-	-	C	C	C	C	G	-	-
Air - > 300°F	U	U	C	G	C	C	U	C	U	U	U	U	U	U	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Alkazene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Allyl Alcohol	G	G	G	G	G	-	G	G	G	G	G	G	U	U	C	-	C	C	C	C	G	-	G	-	-	G	-	-	-	G
Allyl Chloride	-	-	-	-	-	-	-	C	-	C	G	C	U	U	C	-	C	C	U	C	G	-	G	-	-	G	-	-	-	G
Aluminium Acetate	C	C	G	G	C	C	U	G	C	-	G	G	-	-	G	G	U	U	-	-	C	-	-	G	C	C	G	U	-	-
Aluminium Chloride	G	G	G	G	G	G	G	G	G	G	G	G	-	-	C	U	U	U	U	U	G	G	G	G	G	G	G	G	-	G
Aluminium Fluoride 20%	G	C	G	G	G	G	G	G	G	C	G	G	-	-	U	U	U	U	-	-	G	-	-	G	G	G	G	G	-	-
Aluminium Nitrate	G	G	G	G	G	G	G	G	G	G	G	G	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	-	-	-
Aluminium Phosphate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	-	-	-
Aluminium Sulphate	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	C	U	U	U	U	G	G	G	G	G	G	G	G	-	G
Alum-NH3-Cr-K	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	-	-	-
Ammonia sol'n. 10%	C	C	G	G	G	G	-	G	G	-	G	G	-	-	G	-	G	U	C	C	C	U	G	G	-	C	G	-	-	G
Ammonia sol'n. 50%	C	C	G	G	-	G	-	G	G	-	G	G	-	-	G	-	G	U	C	C	C	U	G	G	-	C	G	-	-	G
Ammonia, Gas, Cold	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Ammonia, Gas, Hot	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	U	U	U	-	-	U	-	-	C	C	U	C	U	-	-
Ammonia, Liquid (Anhydrous)	U	U	U	U	U	U	U	C	U	-	C	C	-	-	G	G	G	G	C	C	C	U	G	G	G	C	G	U	U	G
Ammonium Carbonate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	C	U	C	C	U	G	G	G	G	U	G	-	-	G
Ammonium Chloride	G	G	G	G	G	G	G	G	G	C	G	G	-	-	G	C	C	U	C	C	G	G	-	G	G	G	G	-	-	G
Ammonium Hydroxide, 34%	C	C	C	G	-	G	-	G	C	U	G	G	G	-	G	G	C	U	C	C	U	U	G	G	-	U	G	-	-	G
Ammonium Hydroxide, Conc.	C	C	C	G	-	G	-	G	C	U	G	G	G	-	G	G	C	U	-	-	U	-	G	G	U	G	C	-	-	-
Ammonium Nitrate	C	C	G	G	G	G	G	G	G	-	G	G	-	-	G	G	U	U	C	U	G	C	G	G	C	G	G	-	-	G
Ammonium Nitrite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	-	-	-
Ammonium Persulphate Solution	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	G	G	U	G	-	-	-
Ammonium Phosphate	C	C	G	G	G	G	G	G	G	-	G	G	-	-	G	G	C	U	C	U	G	-	G	G	G	G	G	-	-	G
Ammonium Sulphate	C	C	G	G	G	G	G	G	G	-	G	G	-	-	G	G	U	U	C	C	G	U	G	G	G	G	G	G	-	G
Ammonium Sulphide	-	-	-	-	-	-	-	-	-	-	-	-	G	U	-	-	-	-	-	-	G	-	-	G	G	G	G	-	-	-
Amyl Acetate (Banana Oil)	U	U	U	U	C	C	-	-	-	-	G	G	-	-	G	G	C	G	C	C	U	U	-	G	U	U	G	U	-	G
Amyl Alcohol	C	C	C	G	C	-	-	G	-	-	G	G	-	-	G	-	C	C	G	C	C	C	G	G	G	C	G	G	-	G
Amyl Borate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	U	G	G	U	-	-	-
Amyl Chloride	U	U	C	C	-	-	-	C	-	-	G	G	-	-	G	G	U	C	-	-	-	-	-	U	U	-	U	C	-	-
Amyl Chloronapthalene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Amyl Napthalene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	G	-	-
Anhydrous Ammonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	G	G	C	G	U	-	-
Aniline	U	U	C	G	C	-	-	C	-	C	G	G	U	U	G	G	C	U	C	C	U	C	G	C	U	U	C	C	G	G
Aniline Dyes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	C	U	C	C	-	-
Aniline Hydrochloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	U	-	U	-	-	C	-	-	C	U	C	C	C	-	-
Aniline Oil	U	U	C	G	C	-	-	C	-	C	G	G	U	U	G	G	C	U	-	-	U	-	-	C	U	U	C	C	-	-
Animal Fats	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	C	C	G	C	G	-	-
Animal Oil (Lard Oil)	U	U	U	U	C	C	G	G	C	G	G	G	G	-	-	-	-	-	-	-	G	-	-	C	C	G	C	G	-	-
Ansul Ether	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	C	U	C	C	C	-	-
Aqua Regia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Aroclor,1248	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	C	U	C	C	C	-	-
Aroclor,1254	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Aroclor,1260	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	-	G	G	-	G	-	-
Arsenic Acid	C	C	G	G	G	C	C	G	G	G	G	G	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Arsenic Trichloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	-	G	G	-	-	-	-

TECHNICAL DATA
CHEMICAL RESISTANCE TABLE

AGENT	RUBBER COMPOSITION												PVC		METALS						GASKET MATERIALS									
Legend: G = Good C = Conditional U = Unsatisfactory - No Data	SBR	NR	EPDM	EPR	IIR	CR	NBR	CPE	HYPALON - CSM	VITON	XLPE	UHMW PE	20° C	60° C	316L St. Steel	304 / 321 St. Steel	Carbon Steel	Bronze	Aluminium	Ductile Iron	Buna	Viton	Teflon	EPT	Neoprene	Nitrile	EPDM	Fluorosilicon	Delrin	Ryton
Askarel	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	U	U	C	U	C	-	-
Asphalt up to 80°C	-	-	-	-	-	-	G	-	-	G	U	C	-	-	G	-	G	G	C	G	C	C	G	U	C	C	U	C	-	-
Asphalt up to 130°C	-	-	-	-	-	-	U	-	-	C	U	U	-	-	G	-	G	G	C	G	C	C	G	U	C	C	U	C	-	-
ASTM Oil No. 1	U	U	U	U	U	G	G	G	C	G	G	G	-	-	-	-	-	-	-	-	G	-	-	U	G	G	U	G	-	-
ASTM Oil, No. 2	U	U	U	U	U	C	G	G	C	G	G	G	-	-	-	-	-	-	-	-	G	-	-	U	C	G	U	G	-	-
ASTM Oil, No. 3	U	U	U	U	U	U	G	C	C	G	G	G	-	-	-	-	-	-	-	-	G	-	-	U	U	G	U	G	-	-
ASTM Oil, No. 4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	U	U	C	U	C	-	-
Automatic Transmission Fluid (ATF)	U	U	U	-	U	G	G	G	C	G	G	G	-	-	G	G	G	G	G	G	G	G	G	-	G	G	U	-	-	-
Barium Carbonate	G	G	G	G	G	G	G	G	G	G	G	G	-	-	C	G	G	C	C	C	G	G	G	G	-	G	G	-	-	G
Barium Chloride	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	G	U	C	-	-	-	-	-	-	-	-	-	-	-	-
Barium Hydroxide	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	G	C	C	U	C	G	G	G	G	G	G	G	G	-	G
Barium Sulphate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	G	C	G	U	C	G	G	G	G	G	G	G	G	-	G
Barium Sulphide	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	G	U	U	U	C	G	G	G	G	G	G	G	G	-	G
Beer	C	G	C	C	G	C	C	C	C	C	G	G	G	-	G	-	C	C	G	C	G	G	G	G	G	G	G	G	-	G
Beet Sugar Liquors	C	G	C	C	G	C	C	C	C	C	G	G	-	-	G	-	C	G	G	C	G	G	G	G	G	G	G	G	-	G
Benzaldehyde	U	U	C	G	C	-	U	-	-	-	G	G	U	U	G	-	G	G	G	G	U	-	G	G	U	U	G	U	-	G
Benzene Sulfonic Acid 10%	-	-	-	-	-	-	-	-	-	G	G	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benzene, Benzol	U	U	U	U	U	U	U	U	U	G	G	C	U	U	G	G	C	G	C	C	U	G	G	U	U	U	U	G	G	G
Benzoic Acid	U	U	U	U	U	U	-	G	C	G	G	G	-	-	G	G	G	G	C	U	U	G	G	U	U	U	U	C	-	G
Benzyl Alcohol	U	U	U	C	U	U	-	G	-	G	G	G	-	-	C	-	-	C	C	G	U	G	G	C	C	U	C	C	-	G
Benzyl Benzoate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	G	-	-
Benzyl Chloride	-	-	-	C	-	-	-	-	-	C	G	C	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	G	-	-
Black Sulphate Liquors	-	-	-	G	G	G	-	-	-	G	G	G	-	-	-	-	-	-	-	-	C	-	-	C	C	C	C	C	-	-
Blast Furnace Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Bleach (2-12% Chlorine)	-	-	-	C	-	-	-	-	-	C	G	C	-	-	U	U	U	C	-	-	U	-	-	G	C	U	G	C	-	-
Borax	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	G	-	-	-	-	C	-	-	G	G	C	G	C	-	-
Bordeaux Mixture	-	-	G	G	G	-	-	G	G	G	G	G	-	-	-	-	-	-	-	-	C	-	-	G	C	C	G	C	-	-
Boric Acid	G	-	G	G	G	G	-	G	G	G	G	G	-	-	G	-	U	C	C	U	G	G	G	G	G	G	G	G	-	G
Brine	G	G	G	G	G	G	-	G	G	G	G	G	G	G	-	-	-	-	-	-	G	-	-	G	G	G	G	-	-	-
Bromine Anhydrous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	-	-
Bromine Trifluoride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	U	-	-
Bromine Water	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	C	U	U	C	-	-
Bromobenzene	U	U	U	U	U	U	U	U	U	C	U	U	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	G	-	-
Bunker Oil	U	U	U	U	U	C	G	C	-	G	G	G	-	-	G	-	G	C	G	C	G	G	G	U	U	G	U	G	-	G
Butadiene	U	U	U	U	U	U	U	U	U	C	G	G	-	-	G	-	C	C	G	C	U	G	G	C	C	U	C	C	-	G
Butane	U	U	U	C	C	C	G	C	C	G	G	G	-	-	G	-	C	G	G	C	G	G	G	U	G	G	U	G	-	G
Butanol (Butyl Alcohol)	G	G	G	G	G	G	G	G	G	G	G	G	G	-	-	-	-	-	-	-	G	-	-	C	G	G	C	G	-	-
Butter	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	C	G	G	G	-	-
Butyl Acetate	U	U	-	C	C	-	-	C	-	U	G	G	U	U	G	G	C	C	C	G	U	U	G	C	U	U	C	U	-	G
Butyl Acetyl Ricinoleate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	G	C	C	G	C	-	-
Butyl Acrylate	U	U	U	U	U	U	-	C	U	U	G	C	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	U	-	-
Butyl Alcohol, Butanol	G	G	G	G	G	G	G	G	G	G	G	G	G	-	G	-	C	C	G	C	G	G	G	C	G	G	C	G	-	G
Butyl Amine	-	-	C	G	C	-	C	C	-	-	G	G	-	-	-	-	-	-	-	-	-	-	-	U	U	-	U	U	-	-
Butyl Benzoate	-	-	-	C	-	-	-	-	-	G	G	-	-	-	-	-	-	-	-	-	U	-	-	G	U	U	G	G	-	-
Butyl Carbitol	U	U	C	G	-	-	-	-	U	G	G	G	-	-	-	-	-	-	-	-	C	-	-	G	C	C	G	U	-	-
Butyl Cellosolve	U	U	C	G	C	C	U	G	C	U	G	G	-	-	G	-	G	G	G	G	C	U	G	G	C	C	G	U	-	-
Butyl Ether	U	U	-	-	-	C	U	C	-	-	G	G	-	-	-	-	-	-	-	-	C	-	-	C	U	C	C	C	-	-
Butyl Oleate	U	U	-	C	C	-	U	-	-	G	G	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Butyl Stearate	U	U	U	U	U	U	C	C	U	U	G	G	-	-	-	-	-	-	-	-	C	-	-	C	U	C	C	C	-	-
Butylene	-	-	U	U	-	U	C	U	-	G	-	-	-	-	G	-	G	G	G	G	C	G	G	U	C	C	U	C	-	G
Butyraldehyde	U	U	C	G	C	-	U	-	-	U	G	G	-	-	G	-	G	G	G	G	U	U	G	C	U	U	C	U	-	G
Butyric Acid	U	U	-	C	-	-	U	C	-	C	G	G	-	-	G	G	U	C	C	U	U	C	G	C	U	U	C	-	-	-
Cadmium Acetate	U	U	C	C	-	-	-	G	-	-	G	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calcium Acetate	U	U	C	G	C	C	-	G	U	U	G	G	-	-	-	-	-	-	-	-	G	-	-	G	C	G	G	U	-	-
Calcium Bisulphite	G	G	G	G	G	G	G	G	G	G	G	G	-	-	-	-	-	-	-	-	G	-	-	U	G	G	U	G	-	-
Calcium Carbonate	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	G	G	-	-	-	G	-	-	G	G	G	G	G	-	-
Calcium Chloride	G	G	G	G	G	G	G	G	G	G	G	G	-	-	C	C	U	C	U	U	G	G	G	G	G	G	G	G	-	G
Calcium Hydroxide	C	G	G	G	G	-	-	G	C	G	G	G	G	-	C	-	C	C	U	C	G	G	G	G	G	G	G	G	-	G
Calcium Hypochlorite	U	U	C	G	C	-	U	G	-	-	G	G	G	-	C	C	U	C	C	U	C	G	G	G	C	C	G	C	-	U
Calcium Nitrate	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	-	C	C	U	C	G	G	G	G	G	G	G	G	-	G
Calcium Sulphate	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	G	U	G	C	C	C	G	G	G	-	C	G	-	-	G

TECHNICAL DATA
CHEMICAL RESISTANCE TABLE

Legend:
G = Good
C = Conditional
U = Unsatisfactory
- = No Data

AGENT	RUBBER COMPOSITION												PVC		METALS						GASKET MATERIALS									
	SBR	NR	EPDM	EPR	IIR	CR	NBR	CPE	HYP	VITON	XLPE	UHMW PE	20° C	60° C	316L St. Steel	304 / 321 St. Steel	Carbon Steel	Bronze	Aluminium	Ductile Iron	Buna	Viton	Teflon	EPT	Neoprene	Nitrile	EPDM	Fluorosilicon	Delrin	Ryton
Calcium Sulphide	G	G	G	G	G	G	-	G	G	G	G	G	-	-	-	-	-	-	-	-	C	-	-	G	G	C	G	G	-	-
Cane Sugar Liquors	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Caprylic Acid	U	U	-	C	-	-	-	C	-	-	G	G	-	-	G	-	U	C	G	U	C	G	G	C	-	C	C	-	-	-
Carbamate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	C	C	C	C	G	-	-
Carbitol	-	-	C	G	C	C	-	G	-	-	G	G	-	-	G	-	G	G	G	G	C	C	G	C	C	C	C	C	-	G
Carbolic Acid (Phenols)	-	-	-	C	C	-	-	G	-	G	G	G	-	-	G	G	U	C	G	U	U	G	G	C	C	U	C	G	-	-
Carbon Bisulphide	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	G	C	C	-	-	C	-	-	U	U	C	U	G	-	-
Carbon Dioxide, Dry	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	-	G	G	G	G	G	C	G	C	C	G	C	C	-	-
Carbon Dioxide, Wet	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	-	G	G	G	G	G	C	G	C	C	G	C	C	-	-
Carbon Disulphide	U	U	U	U	-	-	-	-	-	G	C	C	U	U	G	-	C	C	G	C	U	G	G	U	U	U	U	G	-	G
Carbon Monoxide Gas	-	-	-	-	-	-	-	-	-	-	-	-	G	G	G	G	G	U	-	-	G	-	-	G	G	G	G	C	-	-
Carbon Tetrachloride	U	U	U	U	U	U	-	-	-	G	G	C	U	U	G	G	C	G	C	C	C	G	G	U	U	C	U	G	G	G
Carbonic Add	G	G	G	G	G	-	-	G	G	-	G	G	-	-	G	G	U	G	G	C	C	G	G	G	G	C	G	G	G	-
Castor Oil	C	-	-	-	C	G	G	G	G	G	G	G	-	-	G	-	G	G	G	G	G	G	G	C	G	G	C	G	-	G
Caustic Soda (Sodium Hydroxide)	C	G	G	G	G	C	C	G	-	-	G	G	-	-	G	-	G	G	U	G	C	C	G	G	C	C	G	C	C	G
Cellosolve	-	-	C	G	G	-	C	-	-	-	G	G	-	-	G	-	G	G	G	G	U	U	G	C	U	U	C	U	-	-
Cellosolve Acetate	U	U	-	C	C	-	-	-	-	-	G	G	-	-	G	-	G	G	G	G	U	U	G	C	U	U	C	U	-	G
Cellulube A60 (Fyrquel)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	G	U	U	G	C	-	-
Chlorine Dioxide	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Chlorine Trifluoride	U	U	U	U	U	U	U	U	U	G	C	C	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Chlorine, Dry	U	U	U	U	U	U	U	U	U	G	C	C	-	-	C	U	C	G	U	C	U	G	G	G	C	U	G	G	-	U
Chlorine. Wet	U	U	U	U	U	U	U	U	U	G	C	C	-	-	U	U	U	U	-	-	U	-	-	C	U	U	C	C	-	-
Chloroacetic Acid	U	U	C	G	C	-	-	-	-	U	G	G	-	-	U	-	U	U	U	U	-	U	G	C	G	-	C	-	-	G
Chloroacetone	U	U	C	G	C	-	-	-	-	U	G	G	-	-	-	-	-	-	-	-	U	-	-	G	C	U	G	U	-	-
Chlorobenzene	U	U	U	U	U	U	U	U	-	G	G	G	U	U	C	-	C	C	C	C	U	G	G	U	U	U	U	C	-	C
Chlorobromo Methane	-	-	-	-	-	-	-	-	-	-	G	G	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Chlorobutadiene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Chlorododecane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	G	-	-
Chloroform	U	U	-	-	-	-	-	-	-	G	C	C	U	U	G	G	G	G	U	C	U	G	G	U	U	U	U	C	-	G
Chlorosulphonic Acid	U	U	U	U	U	U	U	U	U	U	C	U	U	U	C	-	C	C	C	C	U	U	G	U	U	U	U	U	-	U
Chlorotoluene	U	U	U	U	U	U	U	U	U	C	C	U	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Chrome Plating Solutions	U	U	-	C	-	-	-	-	-	G	G	C	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Chromic Acid	U	U	-	C	-	U	U	C	-	G	G	G	-	-	C	U	U	U	U	U	U	G	G	C	U	U	C	C	-	U
Citric Acid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	U	U	C	U	G	G	G	G	G	G	G	G	-	G
Cobalt (Aq)	-	-	-	-	-	-	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	-	-	-	-	-
Coconut Oil	U	U	U	U	C	U	G	-	-	-	G	G	-	-	G	-	C	C	C	C	G	G	G	C	C	G	C	G	-	G
Cod Liver Oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	U	G	G	U	G	G	G	G	C	G	G	G	-	G
Coke Oven Gas	U	U	U	U	U	U	C	U	-	G	G	G	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Copper Acetate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	-	C	C	G	U	-	-
Copper Chloride	C	C	G	G	G	G	C	G	G	G	G	G	-	-	U	U	U	U	-	-	G	-	-	G	G	G	G	G	-	-
Copper Cyanide	C	C	G	G	G	G	-	G	G	G	G	G	-	-	G	G	-	U	-	-	G	-	-	G	G	G	G	G	-	-
Copper Nitrate 5-50%	G	C	G	G	G	G	-	G	G	G	G	G	-	-	G	G	U	U	U	U	-	-	G	-	-	-	-	-	-	G
Copper Sulphate	G	C	G	G	G	G	-	G	G	G	G	G	-	-	G	G	U	U	C	U	G	G	G	G	G	G	G	G	-	G
Corn Oil	U	U	U	U	G	C	G	-	-	G	G	G	-	-	C	-	C	C	C	C	G	G	G	C	C	G	C	G	-	G
Cottonseed Oil	U	U	U	U	U	-	-	-	-	G	G	G	-	-	C	-	C	C	C	C	G	G	G	C	C	G	C	G	-	G
Creosote	U	U	U	U	U	-	C	-	-	G	G	G	-	-	G	G	C	G	C	C	C	G	G	U	C	C	U	G	-	G
Creosote Coal Tar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	U	C	G	U	G	-	-
Cresols	U	U	U	U	U	U	-	C	-	G	G	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cresylic Acid	U	U	U	U	U	U	-	-	-	G	G	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cumene	U	U	U	U	U	U	C	U	U	G	G	G	-	-	C	-	C	C	C	G	U	G	G	U	U	U	U	C	-	U
Cutting Oil	U	U	U	U	-	C	G	-	-	G	G	G	-	-	G	-	C	G	G	C	G	G	G	U	C	G	U	G	-	G
Cyclohexane	U	U	U	U	-	-	G	G	-	-	G	G	-	-	G	-	G	G	G	G	G	G	G	U	U	G	U	G	-	G
Cyclohexanol	U	U	-	C	-	-	-	G	-	G	G	G	U	U	-	-	-	-	-	-	C	-	-	U	C	C	U	G	-	-
Cyclohexanone	U	U	U	C	U	U	U	C	U	U	G	G	U	U	C	-	U	C	C	C	U	U	G	C	U	U	C	U	-	G
Decalin	U	U	U	U	U	U	U	U	U	G	G	G	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	G	-	-
Decane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	U	U	C	U	G	-	-
Decyl Alcohol	G	G	G	G	G	-	-	G	-	-	G	G	-	-	G	-	G	G	G	G	-	-	G	-	-	-	-	-	-	G
Denatured Alcohol	G	G	G	G	G	G	-	G	G	C	G	G	-	-	G	-	G	G	G	G	G	G	G	G	G	G	G	G	-	G
Detergent Solutions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	C	G	G	G	-	-
Developing Fluids (Photo)	C	C	-	-	C	G	G	-	G	-	G	G	G	G	-	-	-	-	-	-	G	-	-	C	G	G	C	G	-	-

TECHNICAL DATA
CHEMICAL RESISTANCE TABLE

AGENT	RUBBER COMPOSITION												PVC		METALS						GASKET MATERIALS									
Legend: G = Good C = Conditional U = Unsatisfactory - No Data	SBR	NR	EPDM	EPR	IIR	CR	NBR	CPE	HYP	VITON	XLPE	UHMW PE	20° C	60° C	316L St. Steel	304 / 321 St. Steel	Carbon Steel	Bronze	Aluminium	Ductile Iron	Buna	Viton	Teflon	EPT	Neoprene	Nitrile	EPDM	Fluorosilicon	Delrin	Ryton
Diacetone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	G	U	U	G	U	-	-
Diacetone Alcohol	C	C	-	G	G	-	-	G	C	C	G	G	-	-	G	-	C	C	G	C	U	U	G	G	U	U	G	U	-	G
Dibenzyl Ether	U	U	U	C	C	-	-	-	-	-	G	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	-	-	-
Dibenzyl Sebacate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Dibutyl Amine	U	U	-	C	U	U	-	G	U	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dibutyl Ether	U	U	-	C	C	-	-	G	-	-	G	G	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Dibutyl Phthalate	U	U	-	C	C	-	U	-	U	-	G	G	-	-	G	-	C	C	C	C	U	C	G	G	U	U	G	C	-	G
Dibutyl Sebacate	U	U	-	G	C	-	-	G	U	-	G	G	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Dichloroethyl Ether	U	U	U	-	U	U	U	C	U	-	G	G	-	-	G	-	G	G	G	G	U	C	G	C	-	U	C	-	-	-
Dichlorohexylamine	-	-	-	-	-	-	U	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	G	U	U	C	U	U	-	-
Dichloro-Isopropyl Ether	-	-	-	-	-	-	U	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Diesel Oil	U	U	U	U	U	U	G	C	-	G	G	G	G	G	-	-	-	-	-	-	G	-	-	U	C	G	U	G	-	-
Diethanol Amine	C	C	G	G	G	C	C	G	C	-	G	G	-	-	G	-	G	U	G	G	C	U	G	C	-	C	C	-	-	-
Diethyl Ether	U	U	-	C	-	-	-	G	-	U	G	G	U	U	-	-	-	-	-	-	U	-	-	U	C	U	U	C	G	-
Diethyl Ketone	U	U	C	G	C	U	-	-	-	U	G	G	-	-	G	-	G	G	G	G	U	U	G	G	-	U	G	-	-	G
Diethyl Sebacate	U	U	-	G	C	U	-	C	-	-	G	G	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Diethyl Sulphate	-	-	-	C	-	-	-	G	-	-	G	-	-	-	G	-	G	G	G	G	G	G	G	-	-	G	-	-	-	-
Diethylamine	C	C	C	G	C	-	-	G	-	-	G	G	-	-	-	-	-	-	-	-	C	-	-	C	C	C	C	U	-	-
Diethylene Glycol	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	-	G	G	G	G	G	G	G	G	G	G	G	G	-	G
Di-Isobutyl Ketone	-	-	C	G	-	-	-	-	-	-	G	G	-	-	G	-	G	G	G	G	U	U	G	G	-	U	G	-	-	G
Diisobutylene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	U	U	C	U	C	-	-
Diisopropyl Benzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Diisopropyl Ketone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	G	G	G	U	U	G	G	U	U	G	U	-	G
Dimethyl Aniline (Xylidine)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	U	-	C	U	-	-
Dimethyl Formamide	-	-	-	C	C	-	-	C	-	-	G	G	-	-	G	-	G	U	U	G	C	C	G	C	U	C	C	U	G	G
Dimethyl Phthalate	U	U	-	C	C	-	-	G	-	C	G	G	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Dinitro Toluene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	U	-	-
Di-octyl Adipate	U	U	-	G	G	-	C	-	-	C	G	G	-	-	G	-	G	U	U	G	U	C	G	C	-	U	C	-	-	G
Dioctyl Phthalate	U	U	-	G	G	-	-	-	-	C	G	G	-	-	G	-	C	G	C	C	U	C	G	C	U	U	C	C	-	G
Dioctyl Sebacate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Dioxane	U	U	C	C	C	-	U	C	-	U	G	G	-	-	G	-	G	G	C	G	U	U	G	C	U	U	C	U	G	G
Dioxolane	U	U	U	C	U	-	-	C	-	U	G	G	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	U	-	-
Dipentene	U	U	-	-	-	-	-	C	-	G	-	-	-	-	G	-	G	G	G	G	C	G	G	U	U	C	U	C	-	G
Diphenyl (Phenylbenzene)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Diphenyl Oxides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	U	U	G	U	C	-	-
Dipropylene Glycol	G	G	G	G	G	-	G	G	G	G	G	G	-	-	C	-	G	G	G	G	G	G	G	G	-	G	G	-	-	G
Dodecyl Benzene	U	U	U	U	U	U	U	U	U	G	G	G	-	-	G	-	G	G	G	G	U	G	G	U	-	U	U	-	-	G
Dowtherm A or E	U	U	U	U	U	U	U	U	-	G	G	G	-	-	G	-	C	G	G	C	U	G	G	U	U	U	U	C	-	-
Dowtherm Oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	U	-	U	G	-	-
Dry Cleaning Fluids	-	-	-	-	-	-	C	-	-	G	-	-	-	-	-	-	-	-	-	-	C	-	-	U	U	C	U	C	-	-
Epichlorohydrin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	U	-	-
Ethane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	G	G	G	G	G	G	U	C	G	U	C	-	G
Ethanol	G	G	G	G	G	G	G	G	G	C	G	G	-	-	-	-	-	-	-	-	C	-	-	G	G	C	G	G	G	-
Ethanol Amine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	C	U	G	C	C	U	G	C	C	C	C	U	-	G
Ethyl Acetate	U	U	-	C	C	U	U	C	U	U	G	G	U	U	G	G	C	G	-	-	-	-	-	-	-	-	-	-	-	-
Ethyl Acetoacetate	U	U	-	C	C	U	U	C	U	U	G	G	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	U	-	-
Ethyl Acrylate	U	U	-	C	C	U	U	C	U	U	C	G	-	-	G	-	G	G	G	G	U	U	G	C	U	U	C	U	-	G
Ethyl Alcohol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	C	C	C	C	C	C	G	G	G	C	G	G	-	G
Ethyl Amine	-	-	C	G	G	C	-	G	-	-	G	G	-	-	C	-	C	U	G	C	C	U	G	C	-	C	C	-	-	G
Ethyl Benzene	U	U	U	U	U	U	U	U	U	G	G	G	-	-	C	-	G	C	G	C	U	G	G	U	U	U	U	G	-	G
Ethyl Benzoate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	G	-	-
Ethyl Bromide	U	U	U	U	U	U	U	-	-	G	G	G	-	-	-	-	-	-	-	-	C	-	-	U	U	C	U	G	-	-
Ethyl Cellosolve	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	U	-	-
Ethyl Cellulose	C	C	C	C	C	C	-	C	C	U	G	G	-	-	-	-	-	-	-	-	-	-	-	C	C	-	C	U	-	-
Ethyl Chloride	U	U	U	U	U	-	-	U	-	C	G	G	-	-	G	G	C	C	-	-	G	-	-	G	C	G	G	G	-	-
Ethyl Chloride (Dry)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	C	C	C	C	G	G	G	G	-	G	G	-	-	G
Ethyl Chloride (Wet)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	U	C	U	U	G	G	G	G	-	G	G	-	-	G
Ethyl Chlorocarbonate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Ethyl Chloroformate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Ethyl Ether	U	U	-	C	-	-	-	C	-	U	G	G	-	-	G	-	G	C	C	C	C	C	G	C	U	C	C	C	-	G

TECHNICAL DATA
CHEMICAL RESISTANCE TABLE

Legend:
G = Good
C = Conditional
U = Unsatisfactory
- No Data

AGENT	RUBBER COMPOSITION												PVC		METALS						GASKET MATERIALS									
	SBR	NR	EPDM	EPR	IIR	CR	NBR	CPE	HYP	VITON	XLPE	UHMW PE	20° C	60° C	316L St. Steel	304 / 321 St. Steel	Carbon Steel	Bronze	Aluminium	Ductile Iron	Buna	Viton	Teflon	EPT	Neoprene	Nitrile	EPDM	Fluorosilicon	Delrin	Ryton
Ethyl Formate	U	U	-	C	C	C	-	C	U	U	G	G	-	-	-	-	-	-	-	-	U	-	-	C	C	U	C	G	-	-
Ethyl Mercaptan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	U	U	C	G	U	G	G	U	C	U	U	-	-	G
Ethyl Oxalate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Ethyl Pentachlorobenzene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Ethyl Silicate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Ethylene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	G	G	G	G	G	G	-	-	G	-	G	-	G
Ethylene Chloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	-	U	U	U	C	G	-
Ethylene Chlorohydrin	C	C	-	C	C	U	U	C	C	G	G	G	-	-	C	-	C	C	U	C	U	G	G	C	C	U	C	C	-	G
Ethylene Diamine	C	C	C	G	G	G	-	C	C	U	G	G	-	-	G	-	C	U	C	C	G	U	G	G	G	G	G	U	G	G
Ethylene Dibromide	U	U	U	U	U	U	-	U	U	C	C	C	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Ethylene Dichloride	U	U	U	U	U	U	-	U	U	C	C	C	U	U	G	-	U	C	U	U	U	G	G	C	U	U	C	C	-	G
Ethylene Glycol	G	G	G	G	G	G	G	G	G	G	G	G	G	-	G	G	C	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethylene Oxide	-	-	U	U	U	-	-	-	-	U	G	G	-	-	G	-	C	C	C	C	U	C	G	C	U	U	C	U	-	G
Ethylene Trichloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Fatty Acids	U	U	U	U	U	U	U	C	U	G	G	G	-	-	G	-	U	U	G	U	C	G	G	U	C	C	U	-	-	G
Ferric Chloride	G	G	G	G	G	-	G	G	G	G	G	G	-	-	U	U	U	U	U	U	G	G	G	G	C	G	G	G	-	G
Ferric Nitrate	G	G	G	G	G	G	G	G	G	G	G	G	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Ferric Sulphate	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	-	U	U	U	U	G	G	G	G	G	G	G	G	-	G
Ferrous Chloride	G	G	G	G	G	G	G	G	G	G	G	G	-	-	U	-	U	U	U	U	G	G	G	G	-	G	G	-	-	G
Ferrous Sulphate	G	G	G	G	G	G	C	G	G	G	G	G	-	-	G	G	U	C	U	U	G	G	G	G	-	G	G	-	-	G
Fish Oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	-	-	-	G	G	G	-	-	G	-	G	-	G
Fluoboric Acid	C	C	G	G	G	C	-	G	G	C	G	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fluorinated Cyclic Ethers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	-	-	-
Fluorine (Liquid)	-	-	-	-	-	-	-	-	-	-	-	-	U	U	-	-	-	-	-	-	-	-	-	C	-	-	C	-	-	-
Fluorobenzene	-	-	-	-	-	-	-	-	-	-	G	G	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Fluorocarbon Oils	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	-	-	-
Fluorolube	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	C	-	-
Fluorosilicic Acid	C	C	G	G	G	-	-	G	G	-	G	G	-	-	-	-	-	-	-	-	G	-	-	-	G	G	-	-	-	-
Formaldehyde	C	C	-	G	G	U	U	G	G	C	G	G	-	-	C	C	C	G	C	C	C	U	G	G	C	C	G	U	G	G
Formic Acid	C	C	G	G	G	-	-	G	C	U	G	G	-	-	G	C	U	C	C	U	C	-	G	G	G	C	G	C	U	G
Freon 112	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	U	C	C	U	-	-	-
Freon 114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	C	-	-
Freon 12	U	U	U	U	U	C	-	G	U	C	G	C	-	-	G	-	C	C	C	C	G	C	G	C	G	G	C	U	-	G
Freon 22	U	U	U	U	U	U	U	G	U	U	G	C	-	-	-	-	-	-	-	-	U	-	-	G	G	U	G	U	-	-
Freon 502	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	G	G	C	G	-	-	-
Fuel Oil	U	U	U	U	U	C	G	C	U	G	G	G	-	-	G	G	C	G	G	G	G	G	G	U	C	G	U	G	-	G
Fumaric Acid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	-	C	G	-	G	-	-
Furan (Furfuran)	U	U	U	U	U	U	U	G	U	-	G	G	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	-	-	-
Furfural	U	U	U	-	C	U	U	G	-	U	G	G	-	-	G	G	C	G	C	C	U	U	G	C	U	U	C	-	-	G
Furfuryl Alcohol	U	U	U	C	C	U	U	G	-	C	G	G	-	-	C	-	C	C	C	C	U	C	G	C	U	U	C	U	-	G
Gallic Acid	-	-	C	C	C	U	U	G	U	U	G	G	-	-	G	G	U	C	C	U	C	G	G	C	C	C	C	G	-	G
Gasoline	U	U	U	U	U	-	G	C	U	G	G	G	-	-	G	G	C	G	G	G	G	G	G	U	C	G	U	G	-	G
Gelatin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Glauber's Salt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	C	C	G	C	U	G	G	C	C	U	C	G	-	G
Gluconic Acid	U	U	-	C	-	-	U	G	C	-	G	G	-	-	C	-	G	C	C	C	G	G	G	-	-	G	-	-	-	-
Glucose	G	G	C	G	G	C	C	C	G	-	G	G	G	G	G	-	C	G	G	C	G	G	G	G	G	G	G	G	-	-
Glue (Depending on type)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Glycerine - Glycerol	G	G	G	G	G	G	G	G	G	G	G	G	G	-	G	G	C	G	G	C	G	G	G	G	G	G	G	G	-	G
Glycols	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	-	C	C	C	U	G	G	G	G	G	G	G	G	-	G
Green Sulphate Liquor	G	G	G	G	G	C	C	C	G	G	G	G	-	-	-	-	-	-	-	-	C	-	-	G	C	C	G	C	-	-
Halowax Oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	G	-	-
Helium	G	G	G	G	G	G	G	G	G	G	G	G	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Heptane	U	U	U	U	U	C	G	G	-	G	G	G	-	-	G	-	G	G	G	G	G	G	G	U	-	G	U	-	G	G
Hexane	U	U	U	U	U	-	G	C	U	G	G	G	-	-	G	-	G	G	G	G	G	G	G	U	C	G	U	G	G	G
Hexyl Alcohol	G	G	G	G	G	C	G	G	G	C	G	G	-	-	G	-	G	G	G	G	G	G	G	C	C	G	C	C	-	G
Hexylene Glycol	G	G	G	G	G	-	G	G	G	G	G	G	-	-	G	-	G	G	G	G	G	G	G	G	-	G	G	-	-	G
Hydraulic Oil	U	U	U	U	U	-	G	G	C	G	G	G	-	-	G	-	G	C	G	C	G	G	G	U	-	G	U	-	-	G
Hydraulic Oil (Petroleum Base)	U	U	U	U	U	-	G	G	C	G	G	G	-	-	-	-	-	-	-	-	G	-	-	U	C	G	U	G	-	-
Hydrazine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	G	C	C	G	-	-	-
Hydrobromic Acid	U	G	G	G	G	U	U	G	G	U	G	G	-	-	U	-	U	U	U	U	U	G	G	G	U	U	G	C	-	G

TECHNICAL DATA
CHEMICAL RESISTANCE TABLE

AGENT	RUBBER COMPOSITION												PVC		METALS						GASKET MATERIALS									
Legend: G = Good C = Conditional U = Unsatisfactory - No Data	SBR	NR	EPDM	EPR	IIR	CR	NBR	CPE	HYP	VITON	XLPE	UHMW PE	20° C	60° C	316L St. Steel	304 / 321 St. Steel	Carbon Steel	Bronze	Aluminium	Ductile Iron	Buna	Viton	Teflon	EPT	Neoprene	Nitrile	EPDM	Fluorosilicon	Delrin	Ryton
Hydrochloric Acid 37% (cold)	U	C	G	G	C	-	-	G	C	G	G	G	-	-	U	U	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Hydrochloric Acid 37% (hot)	U	U	U	C	U	-	-	G	U	C	G	G	-	-	U	U	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Hydrocyanic Acid	U	U	-	-	C	C	-	U	U	-	G	G	-	-	G	G	U	U	G	C	C	G	G	G	C	C	G	C	-	G
Hydrofluoric Acid, Concentrated	-	-	-	-	-	-	-	-	-	-	-	-	U	U	U	U	U	U	-	-	-	-	-	-	-	-	-	-	-	-
Hydrofluosilicic Acid	U	U	C	G	C	U	-	G	G	-	G	G	-	-	U	U	U	C	-	-	C	-	-	G	C	C	G	U	-	-
Hydrogen Gas, Cold	C	C	-	G	G	G	G	G	C	C	G	G	G	G	-	-	-	-	-	-	G	-	-	G	G	G	G	C	-	-
Hydrogen Peroxide 90%	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Hydrogen Sulphide Wet, Cold	-	-	-	-	-	-	U	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	G	G	G	U	G	C	-	-
Hydrogen Sulphide Wet, Hot	-	-	-	-	-	-	U	-	-	-	-	-	-	-	C	C	U	U	-	-	U	-	G	G	C	U	G	C	-	-
Hydroquinone	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	U	U	C	U	C	-	-
Iodoform	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	-	-	-
Isobutyl Alcohol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	G	G	C	G	C	-	-
Iso-Octane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	G	G	C	G	G	G	U	C	G	U	G	-	G
Isophorone (Ketone)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	G	G	G	U	U	G	G	U	U	G	U	-	G
Isopropyl Acetate	U	U	-	C	C	U	U	-	U	U	G	G	-	-	C	-	C	C	G	C	U	U	G	C	U	U	C	U	-	G
Isopropyl Alcohol	G	G	G	G	G	G	G	G	G	C	G	G	G	-	C	-	C	C	C	C	C	G	G	G	C	C	G	C	G	G
Isopropyl Amine	C	C	G	G	G	-	C	G	U	-	G	G	-	-	C	-	C	U	G	C	U	-	G	G	-	U	G	-	-	G
Isopropyl Chloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Isopropyl Ether	U	U	U	U	U	U	U	-	U	U	G	G	-	-	G	-	G	G	G	C	C	U	G	U	C	C	U	C	-	G
Kerosene	U	U	U	U	U	C	G	G	U	G	G	G	-	-	G	G	C	G	G	C	G	G	G	U	C	G	U	G	-	G
Ketone	U	U	G	G	G	U	U	-	U	U	G	G	-	-	G	-	G	G	G	G	U	U	G	G	-	U	G	-	-	G
Lacquer Solvents	U	U	U	U	U	U	U	U	U	U	G	G	C	U	-	-	-	-	-	-	U	-	-	U	U	U	U	U	-	-
Lacquers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	U	G	G	U	U	G	G	U	U	U	U	U	-	G
Lactic Acid 10%	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	C	U	C	G	U	G	G	G	G	G	G	G	G	-	G
Lactic Acid 100%	-	-	-	-	-	-	-	-	-	-	-	-	U	U	G	C	U	C	G	U	G	G	G	G	G	G	G	G	-	G
Lactic Acid, Cold	C	C	-	G	G	G	U	-	C	G	G	G	-	-	G	G	U	C	-	-	G	-	-	G	G	G	G	G	-	-
Lactic Acid, Hot	U	U	-	-	-	-	-	-	-	U	C	C	-	-	G	C	U	U	-	-	U	-	-	U	U	U	U	C	-	-
Lard. Animal Fats	U	U	-	C	C	G	G	G	U	U	G	G	-	-	G	-	C	G	G	C	G	G	G	U	C	G	U	G	-	G
Lavender Oil	U	U	U	U	U	U	C	-	U	G	G	G	-	-	-	-	-	-	-	-	C	-	-	U	U	C	U	C	-	-
Lead Acetate	U	C	C	G	C	G	C	G	U	U	G	G	-	-	G	G	U	-	-	-	C	-	-	G	C	C	G	U	-	-
Lead Nitrate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Lead Sulphamate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	G	G	C	G	G	-	-
Lime Bleach	C	C	G	G	G	C	G	-	C	G	G	G	-	-	-	-	-	-	-	-	G	-	-	G	C	G	G	G	-	-
Lime Sulphur	U	U	G	G	G	G	U	-	G	G	G	G	-	-	-	-	-	-	-	-	U	-	-	G	G	U	G	G	-	-
Lindol Hydraulic Fluid (Phosphate Ester Type)	-	-	-	-	-	-	U	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	G	U	U	G	C	-	-
Linoleic Acid	U	U	U	-	-	-	C	-	-	C	G	G	-	-	G	-	C	C	G	C	C	C	G	U	U	C	U	-	-	G
Linseed Oil	U	U	-	C	C	-	G	G	-	G	G	G	-	-	G	G	C	C	G	C	G	G	G	C	C	G	C	G	G	G
Liquid Petroleum Gas (LPG)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	G	G	-	G	G	G	U	C	G	U	C	-	G
Lubricating Oils, Petroleum Base	U	U	U	U	U	C	G	C	-	G	G	G	-	-	G	-	G	-	G	G	G	G	G	U	C	G	U	G	G	G
Lye Solutions	C	C	G	G	G	-	-	G	G	C	G	G	-	-	-	-	-	-	-	-	C	-	-	G	C	C	G	C	-	-
Magnesium Chloride cold	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	C	U	C	U	C	G	G	G	G	G	G	G	G	G	G
Magnesium Hydroxide	C	C	G	G	G	C	C	G	C	C	G	G	-	-	G	-	C	C	U	C	C	G	G	G	C	C	G	-	G	G
Magnesium Sulphate	G	G	G	G	G	G	G	G	G	-	G	G	-	-	G	G	U	G	C	C	G	G	G	G	G	G	G	G	G	G
Maleic Acid	U	U	U	C	-	U	U	U	U	-	G	G	-	-	G	-	C	C	C	C	U	G	G	U	U	U	U	-	-	G
Maleic Anhydride	U	U	U	C	U	U	U	U	U	U	G	G	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	-	-	-
Malic Acid	U	C	-	C	-	-	-	C	C	G	G	G	-	-	-	-	-	-	-	-	G	-	-	U	C	G	U	G	-	-
Mercuric Chloride	-	-	-	-	-	-	-	-	-	-	-	-	U	U	U	U	U	U	U	U	G	G	G	G	G	G	G	-	C	-
Mercury	G	G	G	G	G	G	-	G	G	G	G	G	-	-	G	G	G	U	-	-	G	-	-	G	G	G	G	-	G	-
Mesityl Oxide	U	U	C	C	-	-	-	C	-	-	G	G	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Methane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	G	G	G	G	G	G	U	C	G	U	C	-	G
Methanol (Methyl Alcohol)	G	G	G	G	G	G	G	G	G	C	G	G	-	-	G	G	C	G	G	G	G	-	-	G	G	G	G	G	G	-
Methyl Acetate	U	U	C	G	C	-	-	G	U	U	G	G	-	-	C	-	C	C	G	C	U	U	G	C	C	U	C	U	C	G
Methyl Acrylate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	C	G	C	U	U	G	C	C	U	C	U	-	G
Methyl Alcohol, Methanol 100%	G	G	G	G	G	G	G	G	G	C	G	G	C	-	G	G	C	G	U	C	G	U	G	G	G	G	G	G	-	G
Methyl Amyl Acetate	U	U	-	C	-	-	-	U	-	U	G	C	-	-	C	-	C	C	G	C	-	U	G	G	-	-	G	-	-	G
Methyl Bromide	U	U	U	U	U	U	U	U	U	G	C	C	-	-	-	-	-	-	-	-	C	-	-	U	U	C	U	G	-	-
Methyl Butyl Ketone (Propyl Acetone)	U	U	C	G	C	-	-	-	-	U	G	G	-	-	-	-	-	-	-	-	U	-	-	G	U	U	G	U	-	-
Methyl Cellosolve	U	U	C	G	C	-	U	G	U	U	G	G	-	-	G	-	C	G	G	C	C	U	-	C	C	C	C	U	-	G
Methyl Chloride	U	U	U	U	U	U	U	U	U	C	C	C	U	U	-	-	-	-	-	-	U	-	-	C	U	U	C	C	C	-
Methyl Cyclohexane	U	U	U	U	U	U	U	U	U	C	C	C	-	-	G	-	G	G	G	G	U	G	G	G	-	U	G	-	-	G

PIRTEK fluid transfer solutions

TECHNICAL DATA
CHEMICAL RESISTANCE TABLE

Legend:
G = Good
C = Conditional
U = Unsatisfactory
- = No Data

AGENT	RUBBER COMPOSITION													PVC		METALS						GASKET MATERIALS									
	SBR	NR	EPDM	EPR	IIR	CR	NBR	CPE	HYP	VITON	XLPE	UHMW PE		20° C	60° C	316L St. Steel	304 / 321 St. Steel	Carbon Steel	Bronze	Aluminium	Ductile Iron	Buna	Viton	Teflon	EPT	Neoprene	Nitrile	EPDM	Fluorosilicon	Delrin	Ryton
Methyl Ethyl Ketone (MEK)	U	U	C	G	C	-	-	U	U	U	G	G		U	U	G	-	G	G	G	G	U	U	G	G	U	U	G	U	C	G
Methyl Formate	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	C	C	U	C	-	-	-
Methyl Isobutyl Ketone (MISK)	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	U	-	-
Methyl Methacrylate	U	U	U	U	U	-	-	-	U	U	G	G		-	-	G	-	G	G	G	G	U	U	G	U	U	U	U	U	-	G
Methyl Oleate	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Methyl Salicylate	U	U	-	C	C	-	-	-	-	U	G	G		-	-	G	-	-	-	-	-	U	C	G	C	U	U	C	-	-	G
Methylene Chloride	U	U	U	U	U	U	U	U	U	C	C	C		U	U	C	-	C	C	U	C	U	C	G	U	U	U	U	C	-	-
Milk	-	-	-	-	-	-	-	-	-	-	-	-		G	-	G	C	U	G	-	-	G	G	G	G	G	G	G	G	G	-
Mineral Oils	-	-	-	-	-	-	-	-	-	-	-	-		G	G	G	-	C	C	G	C	G	G	G	U	C	G	U	G	G	G
Mineral Spirits	U	U	U	-	-	C	G	-	-	-	G	G		-	-	C	-	C	C	G	C	G	G	G	U	-	G	U	-	-	G
Molasses (Crude)	-	-	-	-	-	-	-	-	-	-	-	-		G	G	G	G	C	G	G	G	G	G	G	G	-	G	G	-	-	G
Molasses (Edible)	-	-	-	-	-	-	-	-	-	-	-	-		G	G	G	G	C	G	G	G	G	G	G	G	-	G	G	-	-	G
Mono Chlorobenzene	U	U	U	U	U	U	U	U	U	G	C	C		-	-	C	-	C	C	C	C	U	G	G	U	U	U	U	C	-	G
Monoethanolamine	C	G	G	G	G	-	C	-	C	U	G	G		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monomethyl Aniline	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	-	U	U	-	-	-	-
Monomethylether	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	-	-	-
Monovinyl Acetylene	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	G	-	-	G	C	G	G	-	-	-
Muriatic Acid	-	G	C	C	C	-	-	G	-	G	G	G		-	-	U	U	U	U	U	U	U	G	G	C	-	U	C	-	-	G
Mustard Gas	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	G	G	-	G	-	-	-
Myristic Acid	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	-	G	G	G	G	-	-	G	-	-	-	-	-	-	-
Naphta	U	U	U	U	U	U	G	C	-	G	G	G		U	U	G	G	C	C	-	-	C	-	-	U	U	C	U	C	-	-
Naphthenic Acid	U	U	U	U	U	U	C	C	U	G	G	G		-	-	-	-	-	-	-	-	C	-	-	U	U	C	U	G	-	-
Napthalene	U	U	U	U	U	U	U	C	U	C	G	G		U	U	G	G	U	-	-	-	U	-	-	U	U	U	U	G	-	-
Natural Gas	U	U	U	U	U	U	C	-	C	G	G	G		-	-	-	-	-	-	-	-	G	-	-	U	G	G	U	C	-	-
Neatsfoot Oil	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	-	-	-	-	-	G	G	G	C	U	G	C	G	-	G
Neville Acid	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
n-Hexaldehyde	U	U	G	G	C	C	-	-	U	U	G	G		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N-Hexane-1	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	C	-	-	U	C	C	U	G	-	-
Nickel Acetate	C	C	-	G	C	-	C	-	-	U	G	G		-	-	-	-	-	-	-	-	C	-	-	G	C	C	G	U	-	-
Nickel Ammonium Sulphate	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	U	U	U	U	G	G	G	G	-	G	G	-	-	-
Nickel Chloride	G	G	G	G	G	C	G	G	G	G	G	G		-	-	C	C	U	C	U	U	G	G	G	G	C	G	G	G	-	-
Nickel Salts	-	-	-	-	-	-	-	-	-	-	-	-		G	G	-	-	-	-	-	-	G	-	-	G	C	G	G	G	-	-
Nickel Sulphate	G	G	G	G	G	G	G	G	G	G	G	G		-	-	G	G	U	G	U	U	G	G	G	G	G	G	G	G	-	-
Niter Cake	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	C	U	-	-	-	G	-	-	G	G	G	G	G	-	-
Nitric Acid (1) Red Fuming (RFNA)	U	U	U	U	U	U	-	-	U	U	U	U		-	-	G	G	U	U	-	-	U	-	G	U	U	U	U	U	-	-
Nitric Acid 100%	-	-	-	-	-	-	-	-	-	-	-	-		U	U	G	G	U	U	G	U	U	C	G	U	-	U	U	-	-	U
Nitric Acid 50%	U	U	U	U	U	U	-	-	U	C	C	C		G	C	G	G	U	U	U	U	U	C	G	U	-	U	U	-	-	U
Nitric Acid Aq. 10%	U	U	C	G	G	-	-	-	G	G	G	G		G	-	G	G	U	U	C	U	U	G	G	U	-	U	U	-	U	G
Nitric Acid Concentrated	-	-	-	-	-	-	U	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	G	U	U	U	U	U	-	-
Nitric Acid Dilute	-	-	-	-	-	-	U	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	G	C	G	U	C	C	-	-
Nitro Fluorobenzene	-	-	-	-	-	-	-	-	-	-	-	-		-	-	C	-	C	U	C	C	C	U	G	C	-	C	C	-	-	G
Nitrobenzene	U	U	U	U	U	U	-	-	U	C	G	G		U	U	C	-	G	C	C	C	U	C	G	U	U	U	U	U	C	G
Nitroethane	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	-	G	G	G	G	U	-	G	C	C	U	C	U	-	G
Nitrogen	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Nitrogen Tetroxide	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nitromethane	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	C	C	U	C	U	-	-
Nitropropane	-	-	-	-	-	-	-	-	-	-	G	G		-	-	G	-	G	G	G	G	U	U	G	C	U	U	C	U	-	G
N-Octane	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	-	G	G	G	G	C	G	G	U	U	C	U	C	-	G
Nonenes	U	U	U	U	U	-	C	-	-	G	G	G		-	-	G	-	G	G	G	G	G	G	G	U	-	G	U	-	-	G
O-Chloronapthalene	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Octachloro Toluene	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Octadecane	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	G	-	-	U	C	G	U	G	-	-
Octyl Alcohol	C	C	C	G	C	-	-	G	-	C	G	G		-	-	-	-	-	-	-	-	C	-	-	G	C	C	G	C	-	-
O-Dichlorobenzene	-	-	-	-	-	-	U	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	G	U	U	U	U	C	-	-
Oleic Acid	U	U	-	C	-	-	C	G	U	C	G	G		G	-	G	C	C	C	U	U	C	C	G	C	C	C	C	-	C	-
Oleum Spirits	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	C	-	-	U	C	C	U	C	-	-
Olive Oil	U	U	-	C	G	G	G	C	U	G	G	G		-	-	G	-	C	C	G	C	G	G	G	C	C	G	C	G	-	G
Ortho-Dichlorobenzene	U	U	U	U	U	U	U	U	U	G	C	C		-	-	C	-	C	C	C	C	U	G	G	U	U	U	U	C	-	G
Oxalic Acid	U	U	G	G	G	U	U	G	U	U	G	G		-	-	G	-	C	U	U	C	C	G	G	G	C	C	G	G	C	-
Oxygen, Cold	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	C	-	-	G	G	C	G	G	-	-

TECHNICAL DATA
CHEMICAL RESISTANCE TABLE

Legend:
G = Good
C = Conditional
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- No Data

AGENT	RUBBER COMPOSITION													PVC		METALS						GASKET MATERIALS									
	SBR	NR	EPDM	EPR	IIR	CR	NBR	CPE	HYP	VITON	XLPE	UHMW PE		20° C	60° C	316L St. Steel	304 / 321 St. Steel	Carbon Steel	Bronze	Aluminium	Ductile Iron	Buna	Viton	Teflon	EPT	Neoprene	Nitrile	EPDM	Fluorosilicon	Delrin	Ryton
Oxygen, Cold 200-400°F	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	U	-	-
Ozone	U	U	G	G	C	C	U	G	C	U	G	G		G	-	-	-	-	-	-	-	U	-	-	G	C	U	G	C	C	-
Paint Thinner, Duco	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Palm Oil	-	-	-	-	-	-	-	-	-	-	-	-		-	-	C	-	C	C	G	C	G	G	G	C	-	G	C	-	-	G
Palmitic Acid	U	U	-	C	C	-	G	G	U	U	G	G		G	-	C	-	C	C	C	C	G	G	G	C	C	G	C	G	-	-
Paradyne	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	-	G	G	G	G	G	G	G	U	-	G	U	-	-	G
Paraffin	U	U	U	U	U	C	G	G	U	G	G	G		C	-	C	G	G	G	G	C	G	G	G	C	-	G	C	-	G	G
P-Cymene	-	-	-	-	-	-	U	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	G	U	U	U	U	C	-	-
Peanut oil	-	-	-	-	-	-	-	-	-	-	-	-		-	-	C	-	C	C	G	C	G	G	G	C	C	G	C	G	-	G
Pear Oil	-	-	-	-	-	-	-	-	-	-	-	-		-	-	C	-	C	C	G	C	U	U	G	G	-	U	G	-	-	G
Pentane	U	U	U	U	U	C	G	G	U	G	G	G		-	-	C	-	C	C	G	C	G	G	G	U	-	G	U	-	-	G
Perchloric Acid	U	U	-	C	-	U	U	-	C	G	G	G		-	-	-	-	-	-	-	-	U	-	-	C	C	U	C	G	C	-
Perchloroethylene	U	U	U	U	U	U	U	U	U	G	G	G		-	-	G	-	G	C	U	C	C	G	G	U	U	C	U	C	G	G
Perilla Oil	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	-	C	C	G	C	G	G	G	G	-	G	G	-	-	-
Petroleum Ether	U	U	U	U	U	U	C	C	U	G	G	G		-	-	G	G	C	G	G	G	G	G	G	U	-	G	U	-	G	G
Petroleum Oil, < 250°F	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	G	-	-	U	C	G	U	C	-	-
Petroleum Oil, > 250°F	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	U	-	-
Petroleum Oils	U	U	U	U	U	-	G	-	U	G	G	G		-	-	G	-	G	C	G	C	G	G	G	U	C	G	U	G	-	G
Phenols (Carbolic Acid)	U	U	U	-	C	-	U	G	-	G	G	G		-	U	G	G	U	C	-	-	-	-	-	-	-	-	-	-	-	-
Phenyl Ethyl Ether	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	U	-	-
Phenylbenzene	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Phenylhydrazine	C	C	C	C	C	U	U	-	U	G	C	C		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phorone	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	U	-	-
Phosphoric Acid 20%	-	-	-	-	-	-	-	-	-	-	-	-		G	G	C	U	U	U	-	-	U	-	-	G	C	U	G	C	-	-
Phosphoric Acid 25%	-	-	-	-	-	-	-	-	-	-	-	-		G	G	C	U	U	U	U	U	U	G	G	U	-	U	U	-	-	G
Phosphoric Acid 45%	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	C	C	U	C	C	-	-
Phosphorous Trichloride	-	-	-	-	-	-	U	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	G	G	U	U	G	G	-	-
Phthalic Acid	-	-	-	-	-	-	-	-	-	-	-	-		-	-	C	-	U	C	C	C	C	G	G	C	-	C	C	-	-	-
Phthalic Anhydride	-	-	-	-	-	-	-	-	-	-	-	-		-	-	C	-	U	C	C	C	C	G	G	C	-	C	C	-	-	G
Pickling Solution	-	-	-	-	-	-	U	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	G	C	U	U	C	U	-	-
Picric Acid	C	C	C	-	C	-	-	C	G	U	G	G		-	-	G	-	-	U	C	-	G	G	G	G	-	G	G	-	-	G
Pine Oil	U	U	U	U	U	U	U	C	U	G	G	G		-	-	-	-	-	-	-	-	C	-	-	U	U	C	U	G	-	-
Pinene	U	U	U	U	U	U	C	G	U	G	G	G		-	-	-	-	-	-	-	-	C	-	-	U	C	C	U	C	-	-
Piperidine	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	U	-	-
Plating Solutions, Chrome	-	-	-	-	-	-	U	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	G	G	U	-	G	-	-	-
Plating Solutions, Others	-	-	-	-	-	-	U	-	-	-	-	-		-	-	-	-	-	-	-	-	G	-	G	G	-	G	G	-	-	-
Polyester Resin	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	-	G	U	U	G	G	G	G	U	-	G	U	-	-	G
Polyethylene Glycol	G	G	G	G	G	-	G	G	G	G	G	G		-	-	C	-	C	C	G	C	G	G	G	G	-	G	G	-	-	G
Polymerised Gasoline	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	-	G	G	G	G	G	G	G	U	-	G	U	-	-	G
Polypropylene Glycol	G	G	G	G	G	-	G	G	G	G	G	G		-	-	C	-	C	C	G	C	G	G	G	G	-	G	G	-	-	G
Polyvinyl Acetate Emulsion	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	-	C	G	G	G	-	-	G	G	C	-	G	-	-	G
Polyvinyl Alcohol	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	-	G	C	G	G	G	G	G	-	-	G	-	-	-	G
Potash	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	-	G	-	C	G	G	G	G	G	-	G	G	-	-	G
Potassium Acetate	U	U	G	G	C	C	C	G	U	U	G	G		-	-	-	-	-	-	-	-	C	-	-	G	C	C	G	U	G	-
Potassium Aluminium Sulphate	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	-	C	C	C	C	G	G	G	G	-	G	G	-	-	G
Potassium Chloride	G	G	G	G	G	G	G	G	G	-	G	G		-	-	G	-	C	C	U	C	G	G	G	G	G	G	G	G	-	G
Potassium Cupro Cyanide	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Potassium Cyanide	G	G	G	G	G	-	-	G	G	-	G	G		-	-	G	G	C	U	U	U	G	G	G	G	G	G	G	G	-	-
Potassium Dichromate	-	-	-	G	G	-	-	G	C	G	G	G		-	-	G	G	-	U	-	-	G	-	-	G	G	G	G	G	-	-
Potassium Hydroxide	C	C	G	G	G	U	U	G	C	U	G	G		G	U	G	G	C	C	U	U	C	U	G	G	C	C	G	C	-	G
Potassium Nitrate	G	G	G	G	G	G	G	G	G	G	G	G		-	-	G	G	U	C	-	-	G	-	-	G	G	G	G	G	C	-
Potassium Salts	-	-	-	-	-	-	-	-	-	-	-	-		G	G	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Potassium Sulphate	-	-	-	-	-	-	-	-	-	-	-	-		-	-	G	G	C	G	C	C	G	G	G	G	G	G	G	G	-	G
Potassium Sulphide	-	-	-	-	-	-	-	-	-	-	-	-		-	-	C	-	U	U	C	U	G	G	G	G	-	G	G	-	-	G
Producer Gas	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	G	-	-	U	C	G	U	C	-	-
Propane	U	U	U	U	U	U	G	G	C	G	G	G		G	G	-	-	G	G	G	G	G	G	G	U	C	G	U	C	-	G
Propyl Acetate	U	U	C	C	C	-	-	C	-	U	G	G		-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	U	-	-
Propyl Alcohol	G	G	G	G	G	-	C	G	G	-	G	G		-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Propyl Nitrate	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	U	-	-
Propylene	U	U	U	U	U	U	U	G	-	G	G	-		-	-	G	-	G	G	G	G	U	G	G	U	U	U	U	C	-	G

TECHNICAL DATA
CHEMICAL RESISTANCE TABLE

Legend:
G = Good
C = Conditional
U = Unsatisfactory
- No Data

AGENT	RUBBER COMPOSITION												PVC		METALS					GASKET MATERIALS									
	SBR	NR	EPDM	EPR	IIR	CR	NBR	CPE	HYP	VITON	XLPE	UHMW PE	20° C	60° C	316L St. Steel	304 / 321 St. Steel	Carbon Steel	Bronze	Aluminium	Ductile Iron	Buna	Viton	Teflon	EPT	Neoprene	Nitrile	EPDM	Fluorosilicon	Delrin	Ryton
Propylene Diamine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	C	C	C	C	U	U	G	U	-	U	U	-	-	G
Propylene Glycol	G	G	G	G	G	-	-	G	G	G	G	G	-	-	C	-	C	C	G	C	G	G	G	G	-	G	G	-	-	G
Propylene Oxide	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	C	C	C	C	U	U	G	C	U	U	C	U	-	G
Prussic Acid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	G	U	G	C	C	G	G	G	-	C	G	-	-	-
Pyranol, Transformer Oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	U	C	G	U	G	-	-
Pyridine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	C	C	G	C	U	U	G	C	U	U	C	U	G	C
Pyrogallic Acid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	U	C	C	U	C	G	G	C	-	C	C	-	-	-
Pyroligneous Acid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	U	-	-
Pyrrole	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	U	-	-
Pyrrolidine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	C	C	C	C	U	U	G	G	-	U	G	-	-	-
Radiation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	C	C	C	C	U	-	-
Rafilnate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	G	G	G	G	G	G	-	-	G	-	-	-	-
Rapeseed Oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	G	C	C	G	G	-	-
Red Oil (MIL-H-5606)	U	U	U	U	U	C	G	G	C	G	G	G	-	-	-	-	-	-	-	-	G	-	-	U	C	G	U	G	-	-
Sal Ammoniac	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-
Salicyclic Acid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	U	C	C	U	C	G	G	G	-	C	G	G	-	G
Sea / Salt Water	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	-	U	C	C	U	G	U	G	G	G	G	G	G	-	G
Sewage	C	C	U	U	C	G	G	G	G	-	G	G	-	-	C	C	U	C	-	-	G	-	-	C	C	G	C	G	-	-
Shellacol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	G	G	C	-	G	G	-	-	-	-	-	-	G
Silicate Esters	-	-	-	-	-	G	C	G	-	-	G	G	-	-	-	-	-	-	-	-	C	-	-	U	G	C	U	G	-	-
Silicone Greases	G	G	G	G	G	G	G	G	G	-	G	G	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Silicone Oils	G	G	G	G	G	G	G	G	G	-	G	G	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Silver Nitrate	G	G	G	G	G	G	C	G	G	G	G	G	-	-	G	G	U	U	-	-	C	-	-	G	G	C	G	G	G	-
Skydrol 500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	G	U	U	G	C	-	-
Skydrol 7000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	G	U	U	G	C	-	-
Soap Solutions	C	C	G	G	G	C	G	G	G	G	G	G	G	-	G	G	C	G	C	G	G	G	G	G	G	G	G	G	G	G
Soda Ash	G	G	G	G	G	G	G	G	G	G	G	G	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Sodium Acetate	U	U	C	G	C	-	-	G	U	U	G	G	-	-	G	C	U	-	-	-	C	-	-	G	C	C	G	U	-	-
Sodium Aluminate	G	G	G	G	G	G	-	G	G	-	G	G	-	-	G	-	C	C	C	C	G	G	G	G	-	G	G	-	-	G
Sodium Bicarbonate (Baking Soda)	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	G	U	C	U	C	G	G	G	G	G	G	G	G	G	G
Sodium Bisulphite	C	C	G	G	G	-	G	G	G	-	G	G	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Sodium Borate	G	G	G	G	G	G	G	G	G	G	G	G	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Sodium Carbonate (Soda Ash)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	G	C	C	U	C	G	G	G	G	G	G	G	G	G	G
Sodium Chloride	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	C	U	C	U	C	G	G	G	G	G	G	G	G	G	G
Sodium Cyanide	U	U	-	G	G	U	U	G	G	-	G	G	-	-	G	G	C	U	U	C	G	-	G	G	G	G	G	G	G	G
Sodium Hydroxide (Caustic Soda)	-	-	-	-	-	-	-	-	-	-	-	-	G	U	G	G	C	C	U	G	C	C	G	G	C	C	G	C	C	G
Sodium Hypochlorite (Clorox)	U	U	-	C	C	-	-	G	C	C	G	G	-	-	C	C	U	C	U	U	C	G	G	C	C	C	C	C	C	G
Sodium Metaphosphate	C	C	G	G	G	C	C	G	C	-	G	G	-	-	C	-	U	C	U	C	G	G	G	G	C	G	G	G	-	-
Sodium Nitrate	G	G	G	G	G	-	-	G	G	G	G	G	-	-	G	G	C	G	G	C	C	-	G	G	C	C	G	-	G	G
Sodium Perborate	C	C	G	G	G	C	C	G	G	-	G	G	-	-	C	-	C	C	U	C	C	G	G	G	C	C	G	G	-	G
Sodium Peroxide	C	C	G	G	G	-	-	-	C	-	G	G	-	-	G	-	C	U	C	C	C	G	G	G	C	C	G	G	-	G
Sodium Phosphate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	C	C	U	C	G	G	G	G	-	G	G	-	-	G
Sodium Silicate	G	G	-	G	G	G	-	G	G	-	G	G	-	-	C	-	C	U	U	C	G	G	G	G	G	G	G	-	-	G
Sodium Sulphate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	G	U	G	G	C	G	G	G	G	G	G	G	G	-	G
Sodium Thiosulphate ('Hypo')	G	G	G	G	G	G	-	G	G	G	G	G	-	-	C	G	U	U	G	U	C	G	G	G	G	C	G	G	G	G
Soybean Oil	U	U	-	C	G	C	G	-	C	G	G	G	-	-	G	-	U	C	C	U	G	G	G	C	C	G	C	G	-	G
Stannic Chloride	G	G	G	G	G	-	-	G	G	-	G	G	-	-	U	U	U	U	U	U	G	G	G	C	U	G	C	G	-	G
Stannous Chloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	U	U	U	U	U	G	G	G	G	G	G	G	G	-	G
Steam, < 176°C	U	U	G	G	C	U	U	-	-	U	U	U	-	-	G	C	U	G	-	-	U	-	G	G	U	U	G	U	-	-
Steam, > 176°C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	U	-	-
Stearic Acid, Botanical	U	U	C	G	C	C	C	G	U	U	G	G	-	-	G	G	U	C	C	C	C	-	G	C	C	C	C	-	-	G
Stoddard Solvent	U	U	U	U	U	-	G	G	U	G	G	G	-	-	G	-	G	G	G	G	G	G	G	U	C	G	U	G	-	G
Styrene	U	U	U	U	U	U	U	U	U	C	C	C	-	-	G	-	G	C	G	G	U	C	G	U	U	U	U	C	-	G
Sucrose Solutions	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	C	G	G	U	G	G	G	G	C	G	G	G	-	G
Sulfonic Acid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	U	C	U	U	-	-	G	-	-	-	-	-	-	-
Sulphate Liquors	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	C	U	U	C	C	G	G	G	-	C	G	-	-	G
Sulphite Liquors	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	C	C	C	C	C	-	-
Sulphur (not molten)	U	U	U	U	U	-	-	U	U	C	G	G	-	-	G	C	U	U	G	G	U	C	G	G	G	U	G	G	G	-
Sulphur Chloride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	U	U	G	-	-	U	-	-	U	U	U	U	G	-	-
Sulphur Dioxide	U	U	C	C	-	-	-	-	C	-	G	G	-	-	G	C	U	C	C	C	U	G	G	C	-	U	C	-	-	G

TECHNICAL DATA
CHEMICAL RESISTANCE TABLE

AGENT	RUBBER COMPOSITION												PVC		METALS						GASKET MATERIALS									
Legend: G = Good C = Conditional U = Unsatisfactory - No Data	SBR	NR	EPDM	EPR	IIR	CR	NBR	CPE	HYP	VITON	XLPE	UHMW PE	20° C	60° C	316L St. Steel	304 / 321 St. Steel	Carbon Steel	Bronze	Aluminium	Ductile Iron	Buna	Viton	Teflon	EPT	Neoprene	Nitrile	EPDM	Fluorosilicon	Delrin	Ryton
Sulphur Dioxide, Dry	-	-	-	-	-	-	-	-	-	-	-	-	G	G	G	G	U	G	-	-	U	-	-	G	U	U	G	C	C	-
Sulphur Dioxide, Wet	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	-	-	-	-	U	-	-	G	C	U	G	C	-	-
Sulphur Hexafluoride	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	G	G	C	G	C	-	-
Sulphur Trioxide	U	U	U	U	-	-	-	-	-	-	U	U	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	C	-	-
Sulphuric Acid - Fuming	U	U	U	U	U	U	U	U	U	U	U	U	U	U	C	U	U	C	-	-	-	-	-	-	-	-	-	-	-	-
Sulphuric Acid, 20% Oleum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	U	-	-
Sulphuric Acid, Concentrated	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	U	U	C	U	-	-
Sulphuric Acid, Dilute	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	C	C	U	C	C	-	-
Sulphurised Oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	C	U	C	C	U	U	G	U	-	U	U	-	-	G
Sulphurous Acid	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	C	C	C	C	-	C	-
Tall Oil	U	U	U	U	U	C	G	-	U	G	G	G	-	-	C	-	C	C	U	C	C	G	G	U	-	C	U	-	-	G
Tannic Acid	C	C	G	G	G	-	-	G	G	-	G	G	G	-	G	G	U	G	C	C	G	G	G	G	C	G	G	-	-	G
Tar Oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	C	C	G	G	G	U	-	G	U	-	-	G
Tar, Bituminous	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	U	C	C	U	G	-	-
Tartaric Acid	U	U	C	G	G	C	C	G	G	-	G	G	G	-	G	C	U	G	-	-	G	-	-	C	C	G	C	G	-	-
Terpineol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	C	U	C	C	G	-	-
Tertiary Butyl Alcohol	C	C	G	G	G	-	G	G	G	G	G	G	-	-	-	-	-	-	-	-	C	-	-	C	C	C	C	C	-	-
Tertiary Butyl Mercaptan	U	U	U	U	U	-	-	-	-	G	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	-	-	-
Tetrachloroethylene	U	U	U	U	U	U	U	U	U	G	C	G	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Tetrahydrofuran	U	U	U	U	U	U	U	U	U	-	C	G	U	U	G	-	G	G	G	G	U	U	G	C	U	U	C	-	G	G
Tetrapropylene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	G	G	G	G	G	G	U	-	G	U	-	-	G
Toluene	U	U	U	U	U	-	U	-	-	G	C	C	U	U	G	-	G	G	G	G	U	G	G	U	U	U	U	C	G	G
Toluene Diisocyanide	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	U	U	G	U	C	G	C	U	U	C	U	-	G
Transformer Oil	U	U	U	U	U	C	G	G	-	G	G	G	G	U	-	-	-	-	-	-	G	-	-	U	C	G	U	G	-	-
Transmission Fluid Type A	U	U	U	-	U	C	G	-	U	G	G	G	-	-	G	G	G	G	G	G	G	G	G	U	C	G	U	G	-	-
Triacetin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	G	C	C	G	U	-	-
Tributoxy Ethyl Phosphate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	G	U	U	G	C	-	-
Tributyl Mercaptan	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	U	U	U	U	C	-	-
Tributyl Phosphate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	U	-	-	G	U	U	G	U	-	-
Trichloroacetic Acid	U	U	C	G	C	-	-	-	U	U	G	G	-	-	U	U	U	C	U	U	C	C	G	C	U	C	C	U	-	G
Trichloroethane	U	U	U	U	U	U	U	U	U	C	C	C	U	U	G	-	G	G	U	G	U	G	G	U	U	U	U	C	-	C
Trichloroethylene (dry only)	U	U	U	U	U	U	U	U	U	C	C	C	U	U	G	C	U	G	U	C	C	G	G	U	U	C	U	C	C	C
Tricresyl Phosphate	U	U	-	C	C	-	-	C	U	U	G	G	-	-	-	-	-	-	-	-	U	-	-	G	U	U	G	C	-	-
Tri-Decyl Alcohol	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	G	G	G	U	G	G	U	-	U	U	-	-	G
Triethanol Amine	U	C	C	C	C	C	U	G	C	U	G	G	G	G	G	-	G	U	G	G	C	U	G	C	G	C	C	U	-	G
Triethyl Aluminium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Triethyl Borane	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trimethylamine	U	U	-	-	-	-	-	G	-	U	G	G	-	-	G	-	G	U	G	G	C	U	G	G	-	C	G	-	-	G
Tuna Fish Oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	C	U	C	C	G	G	G	-	-	G	-	-	-	G
Tung Oil (China Wood Oil)	U	U	U	U	U	C	G	C	C	G	G	G	-	-	G	-	C	C	C	C	G	G	G	U	C	G	U	C	-	G
Turpentine	U	U	U	U	U	U	U	C	-	G	G	G	-	-	G	-	C	C	G	C	G	G	G	U	U	G	U	C	G	G
Urea	C	C	C	G	C	C	C	G	G	-	G	G	G	-	C	-	C	U	C	C	G	-	G	C	-	G	C	-	G	G
Varnish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	G	C	G	G	C	C	G	G	U	U	C	U	C	-	G
Vegetable Oils / Greases	U	U	U	U	G	-	G	G	C	G	G	G	G	-	G	-	C	C	G	C	G	G	G	C	C	G	C	G	G	G
Versilube	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	-	G	G	G	G	G	-	-
Vinegar (dil. impure Acetic Acid)	C	C	G	G	G	-	U	C	C	U	G	G	G	-	G	-	U	C	C	U	C	G	G	G	C	C	G	C	C	G
Vinyl Acetate	U	U	-	C	C	-	-	G	U	U	G	G	U	U	G	-	G	U	U	G	-	U	G	G	-	-	G	-	-	G
Vinyl Chloride	U	U	U	U	U	U	U	U	U	G	G	G	-	-	G	-	G	U	U	G	-	G	G	C	U	-	C	-	-	u
Water	G	G	G	G	G	C	G	G	G	G	G	G	G	G	G	C	C	G	G	C	G	U	G	G	G	G	G	G	G	G
Water (Distilled)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	U	G	G	U	G	U	G	G	-	G	G	-	-	G
Whiskey and Wines	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	-	U	G	U	U	G	G	G	G	G	G	G	G	-	G
White Oil	U	U	U	U	U	C	G	-	-	-	G	G	-	-	-	-	-	-	-	-	G	-	-	U	C	G	U	G	-	-
White Pine Oil	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	U	U	C	U	G	-	-
Wool Oil (Lanoline)	U	U	U	U	U	C	G	C	-	G	G	G	-	-	-	-	-	-	-	-	G	-	-	U	C	G	U	C	-	-
Xylene	U	U	U	U	U	U	U	-	-	G	C	C	U	U	G	-	G	G	G	G	U	G	G	U	U	U	U	G	-	G
Xylidenes- Mixed- Aromatic Amines	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	C	-	-	U	U	C	U	U	-	-
Zeolites	-	-	-	-	-	-	-	-	-	-	-	-	-	-	G	-	G	U	U	G	G	G	G	G	G	G	G	G	-	G
Zinc Acetate	G	G	G	G	G	G	G	G	G	-	G	G	-	-	-	-	-	-	-	-	C	-	-	G	C	C	G	U	-	-
Zinc Chloride	G	G	G	G	G	G	G	G	G	-	G	G	-	-	U	C	U	U	U	C	G	G	G	G	G	G	G	G	-	G
Zinc Sulphate	G	G	G	G	G	G	G	G	G	G	G	G	-	-	G	G	C	C	U	C	G	G	G	G	G	G	G	G	-	G

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PRODUCT ENQUIRY / DEVELOPMENT FORM

Doc No. FM-0301.09 C

Please send this completed form to: group.tech@pirtek.com.au OR Fax to (02) 8822 9019

Centre	
Contact Person	
Customer / End User	
Date	

Please attach any photos or dimensional sketches of the products (or application) with this form if appropriate to assist in clarifying request

Date response / quote required	

SIZE	**Dash Size**	**Millimetres**

TEMPERATURE °C	
Temperature of Medium °C	
Environmental Temp °C	

Comments on Temperature

Please add comments on temperature here

APPLICATION	Consider (but not limited to) whether the component is indoor or outdoor, bend radius, movement, types of conditions, type of machine or apparatus, what the product is intended for, etc

Be as descriptive as possible to convey what the hose / item will be subjected to in this cell

MEDIUM CONVEYED	

If the medium is more complex and no MSDS is attached, please detail here with as much information as possible

Comments on Medium

If medium is complex then is MSDS attached?	**Y / N**

Please add specific details pertaining to medium here

PRESSURE (Bar)	
Operating Pressure (Bar)	
Peak Pressure (Bar)	
VACUUM / SUCTION (Gauge)	
mm Mercury (mm/hg)	
Bar	

Comments on Pressure or Suction

Please add specific details pertaining to pressure or suction here

PIRTEK fluid transfer solutions

PRODUCT ENQUIRY / DEVELOPMENT FORM

Doc No. FM-0301.09 C

Please send this completed form to: group.tech@pirtek.com.au OR Fax to (02) 8822 9019

ENDS / ADAPTORS - Connections

Prospective Part No.	
Type (Termination)	
Termination Angle (°)	
Material	
Retention type eg Bandit	

Comments on Ends

Please add specific details pertaining to ends here

DELIVERY

Date product is required to the customer	

Comments on Delivery

Please add specific details pertaining to delivery here

COMMERCIAL AND ORDER DETAILS

Opening Order Quantity (qty or metres)	
Annual Quantity (qty or metres)	
On going or once-off project	

Comments on Quantity and Commercial Considerations

Please add specific details pertaining to quantity and any commercial considerations here

Please advise what current Product Brands and Part Numbers are being used in the Application (if applicable)

Please indicate how any existing product is performing in the application and in what aspects are improvements sought

Target Pricing if known or if applicable

General Comments pertaining to this enquiry

Please add general details pertaining to this enquiry here

PIRTEK fluid transfer solutions