

# INFLATABLE PACKERS



**MFC**International  
*by RESPIREX*

ENGINEERED INFLATABLE PRODUCT SOLUTIONS

# About MFC International



MFC International are a specialist manufacturer of inflatable rescue, recovery, survival and sewer maintenance equipment based in Tonypanyd, South Wales. Our equipment is used by fire brigades, mountain and lowland rescue, utilities, the military and humanitarian support organisations internationally and we have earned an unrivalled reputation for our product quality, durability and performance.

Founded in 1959 at the old Naval Colliery site in Tonypanyd, the company (then called MFC Survival) started by manufacturing life jackets and life rafts for the Royal Navy and South Wales commercial shipping ports. Over time the focus shifted towards the design and manufacture of specialist inflatable products for the defence and rescue industries.

MFC boasts an impressive history of innovation; we were the original inventor of airlift bags, the first to manufacture aircraft recovery bags and one of the first to introduce inflatable shelters.

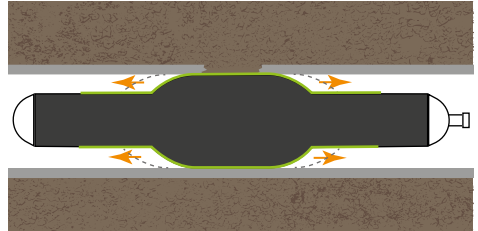
Acquired by Respirex in 2013, MFC has continued to innovate and significant investment has been made into the manufacturing facility. MFC now produce a broad range of product in-house incorporating a diverse range of technologies - these include:

- HF and hot-air welding for shelters and inflatable water rescue equipment
- Vulcanising presses for high pressure lifting bags
- Autoclave vulcanisation for no-dig sewer repair products
- Vulcanisation of neoprene material for pillow packers and low pressure lifting bags

These are combined with 60 years of experience in the manufacture of traditional glued neoprene products to offer an unrivalled range of high performance inflatable rescue equipment.

## UNIQUE INFLATION PROFILE

During inflation, the packer first starts to expand from the centre point; this expansion moves out towards each end as the inflation pressure increases, squeezing the resin from middle out to the ends of the patch, removing air pockets. This inflation profile is especially effective with our T90 packers, as inflation starts in the elbow of the pipe, pushing the resin towards the outer ends of the packer, where the pipe diameter decreases.



## NATURAL & POLYBUTADINE RUBBER BLEND

MFC International packers are manufactured from our own unique natural and polybutadiene rubber formulation, which provides greater flexibility and elasticity than competing products. Puncture resistance on sharp clay pipe ends and chemical resistance are also improved.



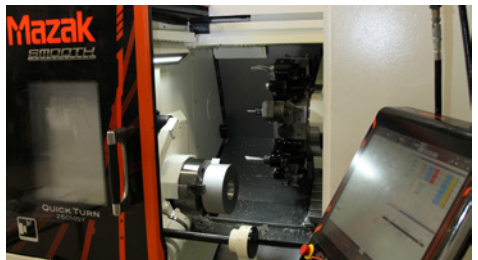
## REDUCED INFLATION PRESSURE

The greater elasticity of our rubber formulation means that inflation pressures during operation of the packer can be lower. The lower operating pressure reduces the stress on the rubber and improves the service life of the product.



## PRECISION MANUFACTURING

Packers and aluminium components are manufactured in house in our UK factories allowing us to keep tight control on quality while ensuring rapid turnaround for customer orders. All packer designs are tested to 100 simulated uses followed by an overpressure test at 16 bar, with on-going randomised sampling testing to the same criteria.

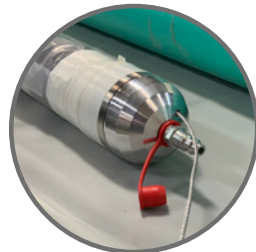


# Why use our packers?

MFC International packers are available in multiple standard sizes, but we can also custom manufacture to a customers specific size requirements if required. All designs are quick and easy to install and can be pushed or dragged through the pipe (both options are available in each packer size and type). Packers require minimal maintenance, but servicing is available on request.

## ALL LATERAL, FLEXIBLE & T90 PACKERS

- Unique inflation profile squeezes resin from the middle outwards, removing air pockets
- Dimensionally stable and highly flexible
- Lightweight design with aluminium ends and lighter weight rubber formulation
- Customer specific sizes available
- Efficient and economical to work with
- Easily manoeuvrable due to low friction metal front end

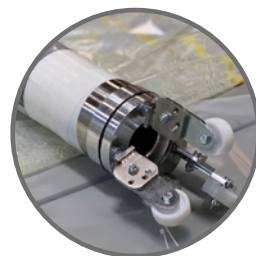


## T90 PACKERS

- Unique inflation from the middle outwards
- Light weight
- Controlled inflation

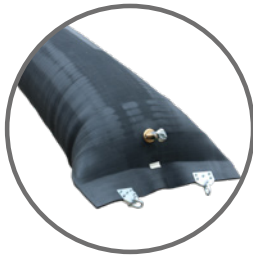
## FLEXIBLE PACKERS

- Suitable for repairs of the pipe and joint region from 0.5 metres to 5 metres in length, even in badly damaged pipes
- Enables installers to close lateral junctions
- Can repair circular and egg-shaped pipes made of concrete, asbestos cement, plastics
- (PVC, PP, HDPE), cast iron, ductile cast iron, reinforced concrete and vitrified clay
- Manoeuvrable front head
- Easy disconnected wheels



## LONG PACKERS

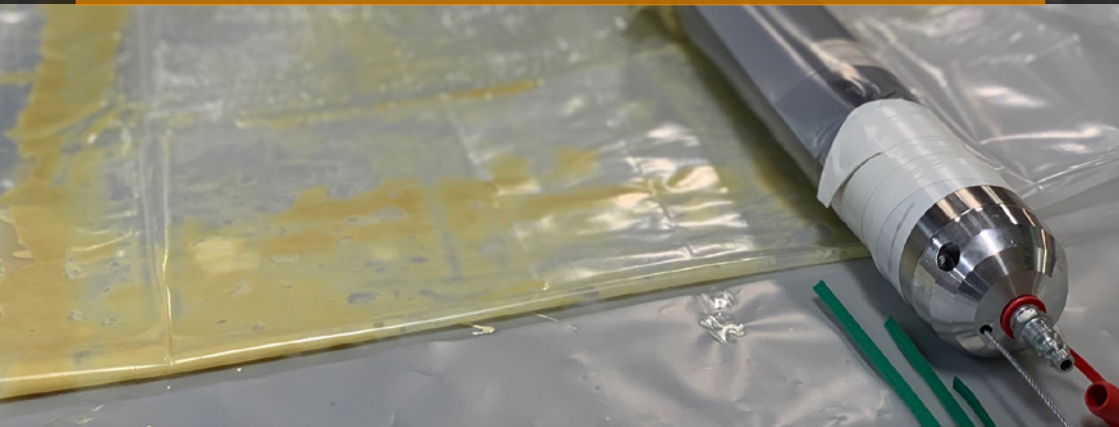
- Suitable for repairs of the pipe and joint region from 0.5 metres to 5 metres in length, even in badly damaged pipes
- Enables installers to close lateral junctions
- Can repair circular and egg-shaped pipes made of concrete, asbestos cement, plastics (PVC, PP, HDPE), cast iron, ductile cast iron, reinforced concrete and vitrified clay
- Manoeuvrable front head for easy installation and pushing through bends



## PILLOW PACKERS

- Light weight
- Easy to manoeuvre
- One type for multiple shape pipes: oval, egg shape, round
- One size fits to multiple sizes of pipes
- Available in sizes to suit up to a 3000mm pipe
- Easy insertion also through small holes (can be folded)
- Inflates to fit the shape of damaged infrastructure
- Can make a repair up to 5m in length

# Lateral Packers



MFC Lateral Packers are suitable for repairs of small diameter pipes, especially in house connection installations. Lateral packers are rounded on both ends in order to simplify the handling/insertion and come equipped with quick action couplings.

## FEATURES

- Available in multiple sizes
- Flexible to manoeuvre
- Nylon reinforced
- Easy to push around corners
- Can be used in all types of pipes
- Manufactured with anti-slip pattern

## TECHNICAL DATA

| Product Code  | Size (mm)    | Min. Usable Size (mm) | Max. Usable Size (mm) | Working Pressure (bar) | Diameter of Deflated Packer (mm) | Length of Deflated Packer (mm) | Weight (kg) | Rubber Length (mm) |
|---------------|--------------|-----------------------|-----------------------|------------------------|----------------------------------|--------------------------------|-------------|--------------------|
| PLA071007/001 | 70-100 x 0.7 | 70                    | 100                   | 2.5                    | 45                               | 720                            | 0.6         | 600                |
| PLA071010/001 | 70-100 x 1.0 | 70                    | 100                   | 2.5                    | 45                               | 1120                           | 0.8         | 1000               |
| PLA071015/001 | 70-100 x 1.5 | 70                    | 100                   | 2.5                    | 45                               | 1620                           | 1.1         | 1500               |
| PLA071020/001 | 70-100 x 2.0 | 70                    | 100                   | 2.5                    | 45                               | 2120                           | 1.4         | 2000               |
| PLA071025/001 | 70-100 x 2.5 | 70                    | 100                   | 2.5                    | 45                               | 2620                           | 1.6         | 2500               |
| PLA071030/001 | 70-100 x 3.0 | 70                    | 100                   | 2.5                    | 45                               | 3120                           | 1.9         | 3000               |

| Product Code  | Size (mm)     | Min. Usable Size (mm) | Max. Usable Size (mm) | Working Pressure (bar) | Deflated Packer Diameter (mm) | Deflated Packer Length (mm) | Weight (kg) | Rubber Length (mm) |
|---------------|---------------|-----------------------|-----------------------|------------------------|-------------------------------|-----------------------------|-------------|--------------------|
| PLA071040/001 | 70-100 x 4.0  | 70                    | 100                   | 2.5                    | 45                            | 4120                        | 2.4         | 4120               |
| PLA071050/001 | 70-100 x 5.0  | 70                    | 100                   | 2.5                    | 45                            | 5020                        | 2.8         | 5000               |
| PLA101507/001 | 100-150 x 0.7 | 100                   | 150                   | 2.5                    | 65                            | 720                         | 1.1         | 600                |
| PLA101510/001 | 100-150 x 1.0 | 100                   | 150                   | 2.5                    | 65                            | 1120                        | 1.5         | 1000               |
| PLA101515/001 | 100-150 x 1.5 | 100                   | 150                   | 2.5                    | 65                            | 1620                        | 1.9         | 1500               |
| PLA101520/001 | 100-150 x 2.0 | 100                   | 150                   | 2.5                    | 65                            | 2120                        | 2.4         | 2000               |
| PLA101525/001 | 100-150 x 2.5 | 100                   | 150                   | 2.5                    | 65                            | 2620                        | 2.8         | 2500               |
| PLA101530/001 | 100-150 x 3.0 | 100                   | 150                   | 2.5                    | 65                            | 3120                        | 3.2         | 3000               |
| PLA101540/001 | 100-150 x 4.0 | 100                   | 150                   | 2.5                    | 65                            | 4120                        | 4.0         | 4120               |
| PLA101550/001 | 100-150 x 5.0 | 100                   | 150                   | 2.5                    | 65                            | 5020                        | 5.4         | 5000               |
| PLA152507/001 | 150-250 x 0.7 | 150                   | 250                   | 2.5                    | 85                            | 720                         | 1.9         | 600                |
| PLA152510/001 | 150-250 x 1.0 | 150                   | 250                   | 2.5                    | 85                            | 1120                        | 2.5         | 1000               |
| PLA152515/001 | 150-250 x 1.5 | 150                   | 250                   | 2.5                    | 85                            | 1620                        | 3.1         | 1500               |
| PLA152520/001 | 150-250 x 2.0 | 150                   | 250                   | 2.5                    | 85                            | 2120                        | 3.8         | 2000               |
| PLA152525/001 | 150-250 x 2.5 | 150                   | 250                   | 2.5                    | 85                            | 2620                        | 5.0         | 2500               |
| PLA152530/001 | 150-250 x 3.0 | 150                   | 250                   | 2.5                    | 85                            | 3120                        | 6.3         | 3000               |
| PLA152540/001 | 150-250 x 4.0 | 150                   | 250                   | 2.5                    | 85                            | 4120                        | 8.6         | 4120               |
| PLA152550/001 | 150-250 x 5.0 | 150                   | 250                   | 2.5                    | 85                            | 5020                        | 9.2         | 5000               |

# Flexible Packers



MFC Flexible packers are suitable for patch repairs ranging from 1 up to 5 meters. Flexible packers are equipped with a bypass and wheel system that allows positioning along the pipeline. Flexible Packers bend allowing them to fit through manholes easily.

## FEATURES

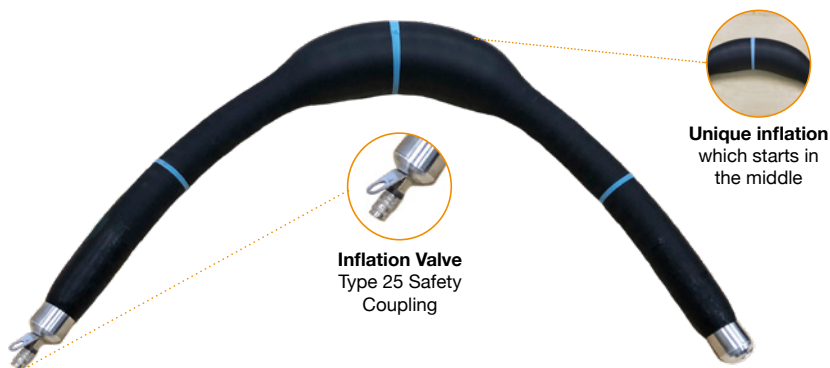
- Available in multiple sizes
- Flexible and easy to manoeuvre
- Wheels can be removed easily
- Easy to push around corners
- Manufactured with anti-slip pattern

## TECHNICAL DATA

| Product Code  | Size (mm)     | Min. Usable Size (mm) | Max. Usable Size (mm) | Working Pressure (bar) | Deflated Packer Diameter (mm) | Deflated Packer Length (mm) | Weight (kg) | Rubber Length (mm) | Bypass Dia. (female) |
|---------------|---------------|-----------------------|-----------------------|------------------------|-------------------------------|-----------------------------|-------------|--------------------|----------------------|
| PFL101510/001 | 100-150 x 1.0 | 100                   | 150                   | 2.5                    | 65                            | 1080                        | 2.1         | 1000               | N/A                  |
| PFL101515/001 | 100-150 x 1.5 | 100                   | 150                   | 2.5                    | 65                            | 1580                        | 2.5         | 1500               | N/A                  |
| PFL101520/001 | 100-150 x 2.0 | 100                   | 150                   | 2.5                    | 65                            | 1980                        | 2.8         | 1900               | N/A                  |
| PFL101525/001 | 100-150 x 2.5 | 100                   | 150                   | 2.5                    | 65                            | 2580                        | 3.3         | 2500               | N/A                  |
| PFL101530/001 | 100-150 x 3.0 | 100                   | 150                   | 2.5                    | 65                            | 3080                        | 4.2         | 3000               | N/A                  |
| PFL101540/001 | 100-150 x 4.0 | 100                   | 150                   | 2.5                    | 65                            | 4080                        | 5.0         | 4000               | N/A                  |
| PFL101550/001 | 100-150 x 5.0 | 100                   | 150                   | 2.5                    | 65                            | 4980                        | 6.0         | 4900               | N/A                  |

| Product Code  | Size<br>(mm)  | Min.<br>Usable<br>Size<br>(mm) | Max.<br>Usable<br>Size<br>(mm) | Working<br>Pressure<br>(bar) | Deflated<br>Packer<br>Diameter<br>(mm) | Deflated<br>Packer<br>Length<br>(mm) | Weight<br>(kg) | Rubber<br>Length<br>(mm) | Bypass<br>Dia.<br>(female) |
|---------------|---------------|--------------------------------|--------------------------------|------------------------------|----------------------------------------|--------------------------------------|----------------|--------------------------|----------------------------|
| PFL152510/001 | 150-250 x 1.0 | 150                            | 250                            | 2.0                          | 112                                    | 1080                                 | 8.0            | 1000                     | 2"                         |
| PFL152515/001 | 150-250 x 1.5 | 150                            | 250                            | 2.0                          | 112                                    | 1580                                 | 9.5            | 1500                     | 2"                         |
| PFL152520/001 | 150-250 x 2.0 | 150                            | 250                            | 2.0                          | 112                                    | 1980                                 | 11.0           | 1900                     | 2"                         |
| PFL152525/001 | 150-250 x 2.5 | 150                            | 250                            | 2.0                          | 112                                    | 2580                                 | 14.3           | 2500                     | 2"                         |
| PFL152530/001 | 150-250 x 3.0 | 150                            | 250                            | 2.0                          | 112                                    | 3080                                 | 15.2           | 3000                     | 2"                         |
| PFL152540/001 | 150-250 x 4.0 | 150                            | 250                            | 2.0                          | 112                                    | 4080                                 | 17.2           | 4000                     | 2"                         |
| PFL152550/001 | 150-250 x 5.0 | 150                            | 250                            | 2.0                          | 112                                    | 4980                                 | 21.4           | 4900                     | 2"                         |
| PFL203010/001 | 200-300 x 1.0 | 200                            | 300                            | 1.5                          | 210                                    | 1080                                 | 11.3           | 1000                     | 2"                         |
| PFL203015/001 | 200-300 x 1.5 | 200                            | 300                            | 1.5                          | 210                                    | 1980                                 | 13.3           | 1900                     | 2"                         |
| PFL203020/001 | 200-300 x 2.0 | 200                            | 300                            | 1.5                          | 210                                    | 2580                                 | 14.3           | 2500                     | 2"                         |
| PFL203025/001 | 200-300 x 2.5 | 200                            | 300                            | 1.5                          | 210                                    | 3080                                 | 15.2           | 3000                     | 2"                         |
| PFL203030/001 | 200-300 x 3.0 | 200                            | 300                            | 1.5                          | 210                                    | 4080                                 | 17.2           | 4000                     | 2"                         |
| PFL203040/001 | 200-300 x 4.0 | 200                            | 300                            | 1.5                          | 210                                    | 4980                                 | 19.1           | 4900                     | 2"                         |
| PFL304010/001 | 300-400 x 1.0 | 300                            | 400                            | 1.5                          | 210                                    | 1080                                 | 19.2           | 1000                     | 3"                         |
| PFL304015/001 | 300-400 x 1.5 | 300                            | 400                            | 1.5                          | 210                                    | 1580                                 | 21.6           | 1500                     | 3"                         |
| PFL304020/001 | 300-400 x 2.0 | 300                            | 400                            | 1.5                          | 210                                    | 1980                                 | 25.0           | 1900                     | 3"                         |
| PFL304025/001 | 300-400 x 2.5 | 300                            | 400                            | 1.5                          | 210                                    | 2580                                 | 30.0           | 2500                     | 3"                         |
| PFL304030/001 | 300-400 x 3.0 | 300                            | 400                            | 1.5                          | 210                                    | 3080                                 | 33.0           | 3000                     | 3"                         |
| PFL304040/001 | 300-400 x 4.0 | 300                            | 400                            | 1.5                          | 210                                    | 4080                                 | 41.5           | 4000                     | 3"                         |
| PFL304050/001 | 300-400 x 5.0 | 300                            | 400                            | 1.5                          | 210                                    | 4980                                 | 47.0           | 4900                     | 3"                         |
| PFL456010/001 | 450-600 x 1.0 | 450                            | 600                            | 1.2                          | 340                                    | 1080                                 | 34.5           | 1000                     | 3"                         |
| PFL456015/001 | 450-600 x 1.5 | 450                            | 600                            | 1.2                          | 340                                    | 1580                                 | 36.6           | 1500                     | 3"                         |
| PFL456020/001 | 450-600 x 2.0 | 450                            | 600                            | 1.2                          | 340                                    | 1980                                 | 41.6           | 1900                     | 3"                         |
| PFL456025/001 | 450-600 x 2.5 | 450                            | 600                            | 1.2                          | 340                                    | 2580                                 | 50.0           | 2500                     | 3"                         |
| PFL456030/001 | 450-600 x 3.0 | 450                            | 600                            | 1.2                          | 340                                    | 3080                                 | 53.0           | 3000                     | 3"                         |

# T-90 Packers

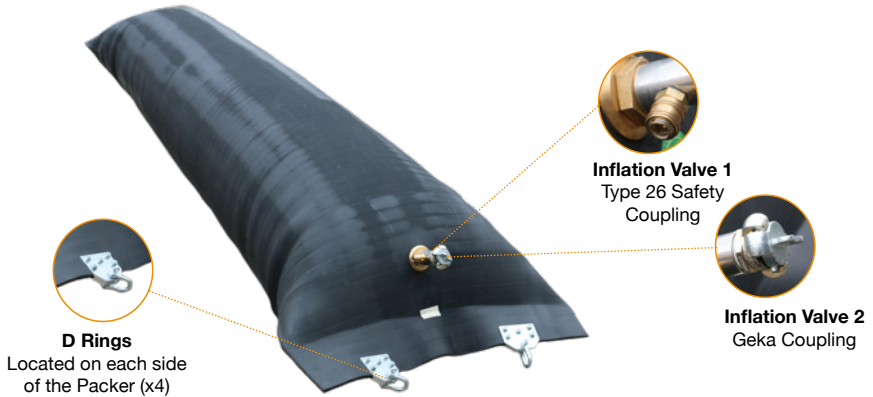


MFC T90 Packers are constructed using unique flexible rubber materials making them lightweight, flexible to manoeuvre and can inflate to repair pipes with 45°, 60° and 90° corners. T90 Packers are easy to operate and are specifically designed to simplify the process of inserting/removing a packer through a tricky pipe system.

## FEATURES

- Available in multiple sizes
- Flexible to manoeuvre
- Folds flat for easy transportation
- Unique inflation process which starts in middle
- Suitable to repair pipes with 45°, 60° and 90° corners
- Inflates to fit the shape of damaged infrastructure
- No-dig method of repair which reduces cost, time on site and disruption

| TECHNICAL DATA                | 100-125 x 1m     | 100-125 x 1.5m   | 150-165 x 1m     | 150-165 x 1.5m   |
|-------------------------------|------------------|------------------|------------------|------------------|
| Product Code                  | PT9010012510/001 | PT9010012515/001 | PT9015016510/001 | PT9015016515/001 |
| Min. Diameter (mm)            | 100              | 100              | 150              | 150              |
| Max. Diameter (mm)            | 125              | 125              | 165              | 165              |
| Max. Inflation Pressure (bar) | 2.0              | 2.0              | 2.0              | 2.0              |
| Rubber Body Length (mm)       | 1000             | 1500             | 1000             | 1500             |
| Deflated Diameter (mm)        | 65               | 65               | 85               | 85               |
| Deflated Height (mm)          | 1100             | 1600             | 1100             | 1600             |
| Weight (kg)                   | 2                | 2.8              | 3.2              | 4.1              |



MFC Pillow Packers are constructed using unique flexible rubber materials making them lightweight, flexible to manoeuvre and can inflate to fit the shape of any damaged area. Pillow packers are easy to operate and can be folded flat when deflated, making them easy to transport.

## FEATURES

- Available in multiple sizes
- Flexible to manoeuvre
- Lighter weight than standard packers of the equivalent size
- Folds flat for easy transportation
- Inflates to fit the shape of damaged infrastructure (repairs ovoid as well as circular pipes)
- No-dig method of repair which reduces cost, time on site and disruption
- Repair is structural, dependant on layers installed

## TECHNICAL DATA

### Pillow Packer 600 - 1000

|                               |      |
|-------------------------------|------|
| Product Code                  | ???? |
| Min. Diameter (mm)            | 600  |
| Max. Diameter (mm)            | 1000 |
| Max. Inflation Pressure (bar) | 1.0  |
| Test Pressure (bar)           | 1.3  |
| Bursting Pressure (bar)       | 3.0  |
| Deflated Diameter (mm)        | 560  |
| Deflated Width (mm)           | 910  |
| Deflated Height (mm)          | 3500 |
| Weight (kg)                   | 38   |
| Number of D Rings             | 4    |

# Chemical Resistance



The table below uses the classifications defined in the ISO/TR 7620 standard for the chemical resistance of rubber materials. The effect of the media on the product is classified as 1 - Negligible, 2 - Low, 3 - Medium and 4 - Significant.

|                                     |   |                                    |   |                                     |   |
|-------------------------------------|---|------------------------------------|---|-------------------------------------|---|
| Chloroacetone                       | 4 | Cumene                             | 4 | Dimethyl Aniline (Xylidine)         | 3 |
| Chlorobenzene                       | 4 | Cyclohexane                        | 4 | Dimethyl Ether (Methyl Ether)       | 4 |
| Chlorobromomethane                  | 4 | Cyclohexanol                       | 4 | Dimethyl Formamide                  | 4 |
| Chlorobutadiene                     | 4 | Cyclohexanone                      | 4 | Dimethyl Phthalate                  | 4 |
| Chlorododecane                      | 4 | P-Cymene                           | 4 | Dinitrotoluene                      | 4 |
| Chloroform                          | 4 | Decalin                            | 4 | Diocetyl Phthalate                  | 4 |
| O-Chloronaphthalene                 | 4 | Decane                             | 4 | Diocetyl Sebecate                   | 4 |
| 1-Chloro-1Nitro Ethane              | 4 | Denatured Alcohol                  | 1 | Dioxane                             | 4 |
| Chlorosulfonic Acid                 | 4 | Detergent Solutions                | 2 | Dioxolane                           | 4 |
| Chlorotoluene                       | 4 | Developing Fluids                  | 1 | Dipentene                           | 4 |
| Chlorox (Sodium Hypochlorite NaOCl) | 4 | Diacetone                          | 4 | Diphenyl (Biphenyl) (Phenylbenzene) | 4 |
| Chrome Plating Solutions            | 4 | Diacetone Alcohol                  | 4 | Diphenyl Oxides                     | 4 |
| Chromic Acid                        | 4 | Dibenzyl Ether                     | 4 | Dowtherm Oil                        | 4 |
| Citric Acid                         | 1 | Dibenzyl Sebecate                  | 4 | Dry Cleaning Fluids                 | 4 |
| Coal Tar (Creosote)                 | 4 | Dibromoethylbenzene (Alkazine)     | 4 | Epichlorohydrin                     | 4 |
| Cobalt Chloride (aq)                | 1 | Dichloro-Isopropyl Ether           | 4 | Ethane                              | 4 |
| Cocoon Oil                          | 4 | Dicyclohexylamine                  | 4 | Ethanolamine                        | 2 |
| Cod Liver Oil                       | 4 | Diesel Oil                         | 4 | Ethyl Acetate                       | 4 |
| Coke Oven Gas                       | 4 | Diethylamine                       | 2 | Ethyl Acetoacetate                  | 3 |
| Copper Acetate (aq)                 | 1 | Diethyl Benzene                    | 4 | Ethyl Acrylate                      | 4 |
| Copper Chloride (aq)                | 1 | Diethyl Ether                      | 4 | Ethyl Alcohol                       | 1 |
| Copper Cyanide (aq)                 | 1 | Diethylene Glycol                  | 1 | Ethyl Benzene                       | 4 |
| Copper Sulfate (aq)                 | 2 | Diethyl Sebecate                   | 4 | Ethyl Benzoate                      | 1 |
| Corn Oil                            | 4 | Diisobutylene                      | 4 | Ethyl Cellosolve                    | 4 |
| Cottonseed Oil                      | 4 | Diisopropyl Benzene                | 4 | Ethyl Cellulose                     | 2 |
| Creosote (Coal Tar)                 | 4 | Diisopropyl Ketone                 | 4 | Ethyl Chloride                      | 4 |
| Cresol                              | 4 | Diisopropylidene Acetone (Phorone) | 4 | Ethyl Chlorocarbonate               | 4 |
| Cresylic Acid                       | 4 |                                    |   | Ethyl Chloroformate                 | 4 |

# Chemical Resistance

|                                            |   |
|--------------------------------------------|---|
| Ethyl Ether                                | 4 |
| Ethyl Formate                              | 4 |
| Ethyl Mercaptan                            | 4 |
| Ethyl Oxalate                              | 1 |
| Ethyl Pentachlorobenzene                   | 4 |
| Ethyl Silicate                             | 2 |
| Ethylene                                   | 3 |
| Ethylene Chloride                          | 4 |
| Ethylene Chlorohydrin                      | 2 |
| Ethylene Diamine                           | 1 |
| Ethylene Dichloride                        | 4 |
| Ethylene Glycol                            | 1 |
| Ethylene Oxide                             | 4 |
| Ethylene Trichloride                       | 4 |
| Fatty Acids                                | 4 |
| Ferric Chloride (aq)                       | 1 |
| Ferric Nitrate (aq)                        | 1 |
| Ferric Sulfate (aq)                        | 1 |
| Fish Oil                                   | 4 |
| Fluorinated Cyclic Ethers                  | 4 |
| Fluorine (Liquid)                          | 4 |
| Fluorobenzene                              | 4 |
| Fluoroboric Acid                           | 1 |
| Fluorocarbon Oils                          | 2 |
| Fluorolube                                 | 2 |
| Fluorosilicic Acid (Hydrofluosilicic Acid) | 2 |
| Formaldehyde (RT)                          | 2 |
| Formic Acid                                | 2 |
| Freon 11                                   | 4 |
| Freon 12                                   | 2 |
| Freon 13                                   | 1 |
| Freon 21                                   | 4 |
| Freon 22                                   | 2 |
| Freon 31                                   | 2 |
| Freon 32                                   | 1 |
| Freon 112                                  | 4 |
| Freon 113                                  | 3 |
| Freon 114                                  | 1 |
| Freon 115                                  | 1 |
| Freon 142b                                 | 2 |
| Freon 152a                                 | 1 |
| Freon 218                                  | 1 |
| Freon C316                                 | 1 |
| Freon C318                                 | 1 |
| Freon 12B1                                 | 1 |
| Freon 114B2                                | 4 |
| Freon 502                                  | 1 |
| Freon TF                                   | 4 |
| Freon T-WD602                              | 4 |

|                                          |   |
|------------------------------------------|---|
| Freon TMC                                | 4 |
| Freon T-P35                              | 1 |
| Freon TA                                 | 3 |
| Freon TC                                 | 4 |
| Freon MF                                 | 4 |
| Freon BF                                 | 4 |
| Fuel Oil                                 | 4 |
| Fumaric Acid                             | 3 |
| Furan, Furfuran                          | 4 |
| Furfural                                 | 4 |
| Fyrquel (cellulube)                      | 4 |
| Gallic Acid                              | 1 |
| Gasoline                                 | 4 |
| Gelatin                                  | 1 |
| Glauber's Salt (aq)                      | 2 |
| Glucose                                  | 1 |
| Glue                                     | 2 |
| Glycerin                                 | 1 |
| Glycols                                  | 1 |
| Green Sulfate Liquor                     | 2 |
| Halowax Oil                              | 4 |
| N-Hexaldehyde                            | 4 |
| Hexane                                   | 4 |
| N-Hexene-1                               | 4 |
| Hexyl Alcohol                            | 2 |
| Hydrazine                                | 1 |
| Hydraulic Oil (Petroleum)                | 4 |
| Hydrobromic Acid                         | 1 |
| Hydrobromic Aid 40%                      | 1 |
| Hydrochloric Acid (Cold) 37%             | 2 |
| Hydrochloric Acid (Hot) 37%              | 4 |
| Hydrocyanic Acid                         | 2 |
| Hydrofluoric Acid (Conc.) Cold           | 4 |
| Hydrofluoric Acid (Conc.) Hot            | 4 |
| Hydrofluoric Acid-Anhydrous              | 4 |
| Hydrofluosilicic Acid (Fluosilicic Acid) | 2 |
| Hydrogen Gas                             | 2 |
| Hydrogen Peroxide (90%)                  | 4 |
| Hydrogen Sulfide (Wet) Cold              | 4 |
| Hydrogen Sulfide (Wet) Hot               | 4 |
| Hydroquinone                             | 2 |
| Hypochlorous Acid                        | 2 |
| Iodine Pentafluoride                     | 4 |
| Iodofom                                  | 4 |
| Isobutyl Alcohol                         | 1 |
| Isooctane                                | 4 |
| Isophorone                               | 4 |
| Isopropyl Acetate                        | 4 |
| Isopropyl Alcohol                        | 1 |

|                                      |   |
|--------------------------------------|---|
| Isopropyl Chloride                   | 4 |
| Isopropyl Ether                      | 4 |
| Kerosene                             | 4 |
| Lacquers                             | 4 |
| Lacquer Solvents                     | 4 |
| Lactic Acid (Cold)                   | 1 |
| Lactic Acid (Hot)                    | 4 |
| Lard                                 | 4 |
| Lavender Oil                         | 4 |
| Lead Acetate (aq)                    | 1 |
| Lead Nitrate (aq)                    | 1 |
| Lead Sulfamate (aq)                  | 2 |
| Ligroin (Benzine) (Nitrobenzine)     | 4 |
| Lime Bleach                          | 1 |
| Lime Sulfur                          | 4 |
| Lindol (Hydraulic Fluid)             | 4 |
| Linoleic Acid                        | 4 |
| Linseed Oil                          | 4 |
| Liquefied Petroleum Gas              | 4 |
| Lubricating Oils (Petroleum)         | 4 |
| Lye                                  | 2 |
| Magnesium Chloride (aq)              | 1 |
| Magnesium Hydroxide (aq)             | 2 |
| Magnesium Sulfate (aq)               | 2 |
| Maleic Acid                          | 3 |
| Maleic Anhydride                     | 3 |
| Malic Acid                           | 3 |
| Mercury Chloride (aq)                | 1 |
| Mercury                              | 1 |
| Mesityl Oxide                        | 4 |
| Methane                              | 4 |
| Methyl Acetate                       | 3 |
| Methyl Acrylate                      | 4 |
| Methylacrylic Acid                   | 4 |
| Methyl Alcohol                       | 1 |
| Methyl Bromide                       | 4 |
| Methyl Butyl Detone (Propyl Acetone) | 4 |
| Methyl Cellosolve                    | 4 |
| Methyl Chloride                      | 4 |
| Methyl Cyclopentane                  | 4 |
| Methylene Chloride                   | 4 |
| Methyl Ether (Dimethyl Ether)        | 4 |
| Methyl Ethyl Ketone                  | 4 |
| Methyl Formate                       | 4 |
| Methyl Isobutyl Ketone               | 4 |
| Methyl Methacrylate                  | 4 |
| Methyl Oleate                        | 4 |
| Methyl Salicylate                    | 3 |

# Chemical Resistance

|                                       |   |
|---------------------------------------|---|
| Milk                                  | 1 |
| Mineral Oil                           | 4 |
| Monochlorbenzene                      | 4 |
| Monomethyl Aniline                    | 4 |
| Monoethanol Amine                     | 2 |
| Monomethyl Ether (Methyl Ether)       | 4 |
| Monovinyl Acetylene                   | 2 |
| Mustard Gas                           | 1 |
| Naphtha                               | 4 |
| Naphthalene                           | 4 |
| Naphthalenic Acid                     | 4 |
| Natural Gas                           | 2 |
| Neats Foot Oil                        | 4 |
| Neville Acid                          | 4 |
| Nickel Acetate (aq)                   | 1 |
| Nickel Chloride (aq)                  | 1 |
| Nickel Sulfate (aq)                   | 2 |
| Niter Cake                            | 1 |
| Nitric Acid (Conc.)                   | 4 |
| Nitric Acid (Dilute)                  | 4 |
| Nitric Acid0Red Fuming                | 4 |
| Nitrobenzene                          | 4 |
| Nitrobenzene (Petroleum Ether)        | 4 |
| Nitroethane                           | 2 |
| Nitrogen                              | 1 |
| Nitrogen Tetroxide                    | 4 |
| Nitromethane                          | 2 |
| Octachlorotolene                      | 4 |
| Octadecane                            | 4 |
| N-Octane                              | 4 |
| Octyl Alcohol                         | 2 |
| Oleic Acid                            | 4 |
| Oleum Spirits                         | 4 |
| Olive Oil                             | 4 |
| O-Dichlorobenzene                     | 4 |
| Oxalic Acid                           | 2 |
| Oxygen - Cold                         | 2 |
| Oxygen - (200-400 Degree Fahrenheit)  | 4 |
| Ozone                                 | 4 |
| Paint Thinner, Duco                   | 4 |
| Palmitic Acid                         | 2 |
| Peanut Oil                            | 4 |
| Perchloric Acid                       | 4 |
| Perchloroethylene                     | 4 |
| Petroleum-Below 250 Degree Fahrenheit | 4 |
| Petroleum-Above 250 Degree Fahrenheit | 4 |

|                                      |   |
|--------------------------------------|---|
| Phenol (Carbolic Acid)               | 4 |
| Phenylbenzene (Biphenyl) (Diphenyl)  | 4 |
| Phenyl Ethyl Ether                   | 4 |
| Phenyl Hydrazine                     | 1 |
| Phorone (Diisopropylidene Acetone)   | 4 |
| Phosphoric Acid-20%                  | 2 |
| Phosphoric Acid-45%                  | 3 |
| Phosphorus Trichloride               | 4 |
| Pickling Solution                    | 4 |
| Picric Acid                          | 2 |
| Pinene                               | 4 |
| Pine Oil                             | 4 |
| Piperidine                           | 4 |
| Plating Solution-Chrome              | 4 |
| Plating Solution-Others              | 4 |
| Polyvinyl Acetate Emulsion           | 2 |
| Potassium Acetate (aq)               | 1 |
| Potassium Chloride (aq)              | 1 |
| Potassium Cupro Cyanide (aq)         | 1 |
| Potassium Cyanide (aq)               | 1 |
| Potassium Dichromate (aq)            | 2 |
| Potassium Hydroxide (aq)             | 2 |
| Potassium Nitrate (aq)               | 1 |
| Potassium Sulfate (aq)               | 2 |
| Producer Gas                         | 4 |
| Propane                              | 4 |
| I-Propyl Acetate                     | 4 |
| N-Propyl Acetate                     | 4 |
| Propyl Acetone (Methyl Butyl Ketone) | 4 |
| Propyl Alcohol                       | 1 |
| Propyl Nitrate                       | 4 |
| Propylene                            | 4 |
| Propylene Oxide                      | 4 |
| Pydraul, 10E, 29 ELT                 | 4 |
| Pydraul, 30E, 50E, 53E, 90E          | 4 |
| Pydryl, 115E                         | 4 |
| Pydraul, 230E, 312C, 540C            | 4 |
| Pyranol, Transformer Oil             | 4 |
| Pyridine                             | 4 |
| Pyroligneous Acid                    | 4 |
| Pyrrole                              | 3 |
| Radiation                            | 3 |
| Rapeseed Oil                         | 4 |
| Red Oil (MIL-H-5606)                 | 4 |
| RJ01 (MIL-F-2558 B)                  | 4 |
| RP-1 (MIL-F-22576 C)                 | 4 |
| Sal Ammoniac                         | 1 |

|                                           |   |
|-------------------------------------------|---|
| Salicylic Acid                            | 1 |
| Salt Water                                | 1 |
| Sewage                                    | 2 |
| Silicate Esters                           | 4 |
| Silicone Greases                          | 1 |
| Silicone Oils                             | 1 |
| Silver Nitrate                            | 1 |
| Skydrol 500                               | 4 |
| Skydrol 7000                              | 4 |
| Soap Solutions                            | 2 |
| Soda Ash                                  | 1 |
| Sodium Acetate (aq)                       | 1 |
| Sodium Bicarbonate (aq) (Baking Soda)     | 1 |
| Sodium Bisulfite (aq)                     | 1 |
| Sodium Borate (aq)                        | 1 |
| Sodium Chloride (aq)                      | 1 |
| Sodium Cyanide (aq)                       | 1 |
| Sodium Hydroxide (aq)                     | 1 |
| Sodium Hypochlorite (aq) (Chlorox)        | 4 |
| Sodium Metaphosphate (aq)                 | 1 |
| Sodium Nitrate (aq)                       | 2 |
| Sodium Perborate (aq)                     | 2 |
| Sodium Peroxide (aq)                      | 2 |
| Sodium Phosphate                          | 1 |
| Sodium Silicate (aq)                      | 1 |
| Sodium Sulfate (aq)                       | 2 |
| Sodium Thiosulfate (aq)                   | 2 |
| Soybean Oil                               | 4 |
| Stannic Chloride (aq)                     | 1 |
| Stannous Chloride (aq)                    | 1 |
| Steam Under 300 Degree Fahrenheit         | 4 |
| Steam Over 300 Degree Fahrenheit          | 4 |
| Stearic Acid                              | 2 |
| Stoddard Solvent                          | 4 |
| Styrene                                   | 4 |
| Sucrose Solution                          | 1 |
| Sulfite Liquors                           | 2 |
| Sulfur                                    | 4 |
| Sulfur Chloride (aq)                      | 4 |
| Sulfur Dioxide (Dry)                      | 2 |
| Sulfur Dioxide (Wet)                      | 4 |
| Sulfur Dioxide (Liquified Under Pressure) | 4 |
| Sulfur Hexafluoride                       | 4 |
| Sulfur Trioxide                           | 2 |
| Sulfuric Acid (Dilute)                    | 3 |
| Sulfuric Acid (Conc.)                     | 4 |

|                                         |   |
|-----------------------------------------|---|
| Sulfuric Acid (20% Oleum)               | 4 |
| Sulfurous Acid                          | 2 |
| Tannic Acid                             | 1 |
| Tar, Bituminous                         | 4 |
| Tartaric Acid                           | 3 |
| Terpineol                               | 4 |
| Tertiary Butyl Alcohol                  | 2 |
| Tertiary Butyl Catechol                 | 4 |
| Teritary Butyl Mercaptan                | 4 |
| Tetrabromoethane                        | 4 |
| Tetrabromomethane                       | 4 |
| Tetrabutyl Tianate                      | 2 |
| Tetrachloroethylene                     | 4 |
| Tetraethyl Lead                         | 4 |
| Tetrahydrofuran                         | 4 |
| Tetralin                                | 4 |
| Thionyl Chloride                        | 4 |
| Titanium Tetrachloride                  | 4 |
| Toluene                                 | 4 |
| Toluene Diisocyanate                    | 4 |
| Transformer Oil                         | 4 |
| Transmiision Fluid Type A               | 4 |
| Triacetin                               | 2 |
| Traryl Phosphate                        | 4 |
| Tributoxy Ethyl Phosphate               | 2 |
| Tributyl Mercaptan                      | 4 |
| Tributyl Phosphate                      | 2 |
| Trichlooacetic Acid                     | 3 |
| Trichloroethane                         | 4 |
| Trichloroethylene                       | 4 |
| Tricresyl Phosphate                     | 4 |
| Triethanol Amine                        | 2 |
| Triethyl Aluminum                       | 4 |
| Triethyl Borane                         | 4 |
| Trinitrotoluene                         | 4 |
| Trioctyl Phosphate                      | 4 |
| Tung Oil (China Wood Oil)               | 4 |
| Turbine Oil                             | 4 |
| Turpentine                              | 4 |
| Unsymmetrical Dimethyl Hydrazine (UDMH) | 1 |
| Varnish                                 | 4 |
| Vegetable Oils                          | 4 |
| Versilube F-50                          | 1 |
| Vinegar                                 | 2 |
| Vinyl Chloride                          | 4 |
| Wagner 21B Brake Fluid                  | 2 |
| Water                                   | 1 |
| Whiskey, Wines                          | 1 |
| White Pine Oil                          | 4 |

|                               |   |
|-------------------------------|---|
| White Oil                     | 4 |
| Wood Oil                      | 4 |
| Xylene                        | 4 |
| Xyliidine (Di-methyl Aniline) | 3 |
| Zeolites                      | 1 |
| Zinc Acetate (aq)             | 1 |
| Zinc Chloride (aq)            | 1 |
| Zinc Sulfate (aq)             | 2 |
|                               |   |
| TT-T656b                      | 4 |
| VV-B-680                      | 3 |
| VV-G-632                      | 4 |
| VV-G-671c                     | 4 |
| VV-H-910                      | 2 |
| VV-I-530a                     | 4 |
| VV-K-211d                     | 4 |
| VV-K-220a                     | 4 |
| VV-L-751b                     | 4 |
| VV-L-800                      | 4 |
| VV-L-820b                     | 4 |
| VV-L-825a Type I              | 4 |
| VV-L-825a Type II             | 4 |
| VV-L-825a Type III            | 4 |
| VV-O-526                      | 4 |
| VV-P-216a                     | 4 |
| VV-P-236                      | 4 |
| 51-F-23                       | 4 |
|                               |   |
| MIL-L-644 B                   | 3 |
| MIL-L-2104 B                  | 4 |
| MIL-L-2105 B                  | 4 |
| MIL-G-2108                    | 4 |
| MIL-S-3136 B Type I           | 4 |
| MIL-S-3136 B Type II          | 4 |
|                               |   |
| ASTM Method D-471             |   |
| 1                             | 4 |
| 2                             | 4 |
| 3                             | 4 |



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