

METAL CHARACTERISTICS

Aluminum

This silver white metal is very malleable and quite corrosion resistant, since the surface reacts with oxygen to form a protective aluminum oxide coating. This coating is quite resistant to many chemicals—even acids, but can be penetrated by alkaline substances. It is lightweight and easy to machine, forge and cast. Alloys of aluminum are formed by adding a variety of other elements such as copper, manganese, zinc to produce products that can vary in strength, corrosion resistance, weight, and ease of forging.

Brass

Brass is an alloy primarily of copper and zinc with trace elements typically including silicon and iron. Brass is a golden yellow and weathers to a green color but is relatively corrosion resistant.

Bronze

An alloy of primarily copper and tin with traces typically including silicon and iron. Bronze was the first widely used metal strong enough for weapons and tools (hence the Bronze Age). Bronze is a reddish color and weathers to green but is relatively corrosion resistant. Adding beryllium produces an alloy hard enough for production of springs and hand tools.

Cast Iron

Also called pig iron, cast iron describes a wide range of irons with 2% or more carbon. The high carbon content makes cast iron somewhat brittle. Cast iron cannot be forged, but must be formed by casting or machining.

Copper

Copper is element #29, a reddish metal that is the primary metal in alloys of brass, bronze, and monel. Small amounts of copper added to aluminum, silver, and gold make those metals harder, and added to steel copper gives corrosion resistance. Copper pennies were actually bronze, not copper, since copper is too soft. Many modern copper coins are now zinc with a copper coating.

Ductile Iron

Also known as malleable iron, this product is made from cast iron by adding magnesium during the casting process. The magnesium causes the carbon to collect as graphite specks, so that the surrounding iron is low enough to be ductile to some extent. (Ductile means capable of being hammered out thin without cracking). Many items identified as cast iron are actually ductile iron. Ductile iron can be arc welded.

Iron

Pure iron is a soft ductile metal that rusts rapidly. Adding up to 1.5% carbon creates steel which can be hardened. Adding more carbon gives cast iron which is hard but brittle.

Stainless Steel

Stainless steel is a generic name for a class of steels that are used primarily because of their corrosion resistance. All stainless steel alloys contain a minimum of 10.5% chromium. Other elements, particularly nickel and manganese, are added to produce different physical and mechanical properties such as hardness, ease of machining, and ease of welding. Molybdenum may be added to further increase corrosion resistance. While there are many grades of stainless, 70% of production is Type 304 (also known as 18/8, since it is 18% chromium and 8% nickel). The amounts of various elements affect other characteristics. Basically, alloys of principally chromium and iron are known as 400 series and are all magnetic. Alloys with both chromium and nickel are 300 series, and chromium, nickel, manganese alloys are known as 200 series. These two series are generally non-magnetic. For hose fittings and clamps, the major types are:

Type 201 and 202

Uses manganese in place of some of the nickel. Similar to 301 and 302 in corrosion resistance. Commonly found as band material for clamps.

Type 301, 302, and 304

General use stainless steel.

Type 316

For most chemicals — has a very high corrosion resistance. Used where harsh cleaning chemicals are used, or where chemical concentrations are high.

Type 410 and 420

Easily hardened by heat treatment. Used in machine parts and cutters as well as clamps.

Steel

Iron with a small percentage of carbon is steel. The more carbon, the harder the steel can be made by heat treatment. Mild steel is 0.18 to 0.20% carbon. High carbon steels start at roughly 0.75% carbon and go up to around 1.5%. Alloy steels contain other ingredients for special purposes such as corrosion resistance.

Wrought Iron

True wrought iron is pure iron with thin layers of silica slag that gives a grainy appearance. Wrought iron was the primary ductile form of iron for thousands of years, but it is no longer in common use. Today the term wrought iron is used to describe low carbon steel pipe and also decorative ironwork made of any metal.

Zinc

Element #30 is a bluish white ductile metal that is the secondary alloy in brass. Zinc is used to harden aluminum alloys, and aluminum is used to make light strong zinc alloys.

TECHNICAL INFORMATION

THREAD DIMENSIONS

The following tables give the actual outside dimension of male threads in inches as well as the pitch given in threads per inch. For fire hose thread dimensions, see detail listings next to G81 in our Fire Section.

PIPE, STRAIGHT PIPE, & GARDEN HOSE THREADS

Pipe Size	Tapered Pipe		Straight Iron Pipe		Garden Hose	
	(NPT) O.D.	(NPSH) Pitch	O.D.	(GHT) Pitch	O.D.	Pitch
1/16"	0.312"	27				
1/8"	0.405	27				
1/4"	0.540	18				
3/8"	0.675	18				
1/2"	0.840	14				
3/4"	1.050	14	1.035"	14	1.062"	11 1/2
1"	1.315	11 1/2	1.295	11 1/2		
1 1/4"	1.660	11 1/2	1.639	11 1/2		
1 1/2"	1.900	11 1/2	1.878	11 1/2		
2"	2.375	11 1/2	2.352	11 1/2		
2 1/2"	2.875	8	2.841	8		
3"	3.500	8	3.470	8		
3 1/2"	4.000	8	3.970	8		
4"	4.500	8	4.470	8		
5"	5.563	8				
6"	6.625	8				
8"	8.625	8				
10"	10.750	8				
12"	12.750	8				

TUBE FITTING THREADS

Tube O.D.	Brass Compression		SAE 45° Flare		Inverted Flare	
	O.D.	Pitch	O.D.	Pitch	O.D.	Pitch
1/8"	5/16"	24	5/16"	24	5/16"	28
3/16"	3/8"	24	3/8"	24	3/8"	24
1/4"	7/16"	24	7/16"	20	7/16"	24
5/16"	1/2"	24	1/2"	20	1/2"	20
3/8"	9/16"	24	5/8"	18	5/8"	18
7/16"	5/8"	24	11/16"	16	11/16"	18
1/2"	11/16"	20	3/4"	16	3/4"	18
5/8"	13/16"	18	7/8"	14	7/8"	18
3/4"	1"	18	1 1/16"	14	1 1/16"	16
7/8"	1 1/8"	18	1 1/4"	12	1 3/16"	16
1"	1 1/4"	16	1 3/8"	12		

DIMENSIONS OF 150lb ANSI FLANGES

Nominal Size	Flange O.D.	Flange Thickness	No. of Bolts	Bolt Size	Dia. of Bolt Holes	Dia. of Bolt Circle
1"	4.25"	9/16"	4	1/2"	5/8"	3 1/8"
1"	5	11/16"	4	1/2"	5/8"	3 7/8"
2"	6	3/4"	4	5/8"	3/4"	4 3/4"
2"	7	7/8"	4	5/8"	3/4"	5 3/4"
3"	7.5	15/16"	4	5/8"	3/4"	6
4"	9	15/16"	8	5/8"	3/4"	7 1/2"
5"	10	15/16"	8	3/4"	7/8"	8 1/2"
6"	11	1"	8	3/4"	7/8"	9 1/2"
8"	13.5	1 1/8"	8	3/4"	7/8"	11 3/4"
10"	16	1 3/16"	12	7/8"	1"	14 1/4"
12"	19	1 1/4"	12	7/8"	1"	17

HOW TO MEASURE A MALE FIRE HOSE THREAD

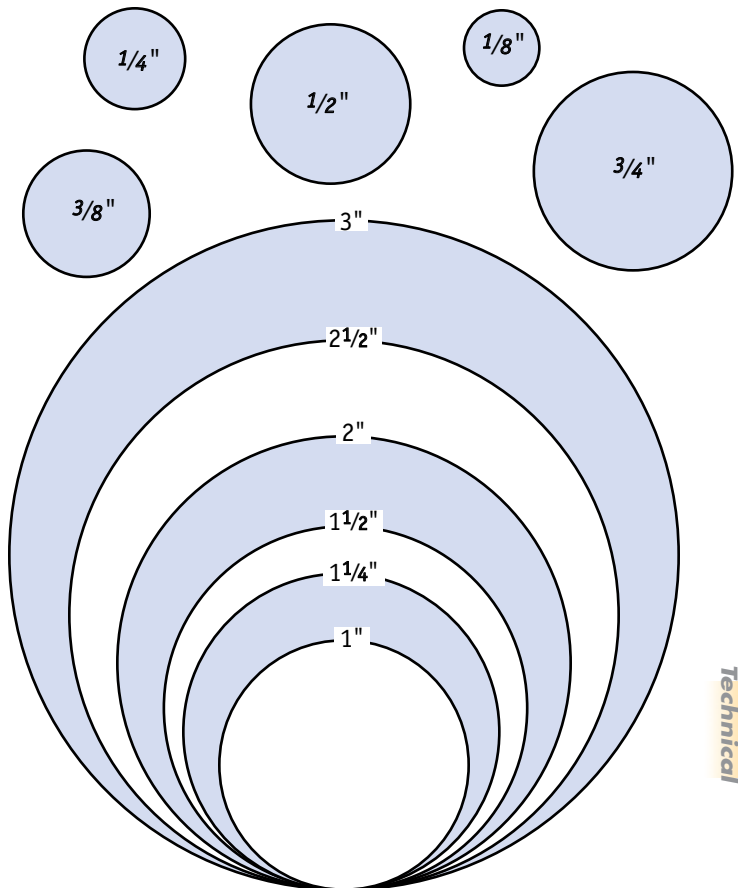
Take a strip of paper about 1" wide and wrap it around the male thread snugly so that it overlaps. Where the two ends overlap, use a pin to pierce the paper so that there is a hole in both ends. Press your thumb against the paper so that the threads leave an impression. Remove the paper and measure the distance between the pinholes. This distance, divided by 3.1416, equals the thread o.d. Count the number of thread impressions showing on the paper and divide by the total width of the impressions (in inches). This figure is the pitch in threads per inch.

PRESSURE/TEMPERATURE RATINGS FOR MALLEABLE IRON FITTINGS

The standard malleable fittings shown in this catalog are Class 150 and meet the working pressures shown here for that class. Heavier Class 300 parts are available on special order.

°C	°F	Class 150	Class 300		
		Working Pressure	Working Pressure		
		All sizes	1/4"-1"	1 1/4"-2"	2 1/2"-3"
		300 psi	2000	1500	1000
93	200	265	1785	1350	910
121	250	225	1575	1200	825
149	300	185	1360	1050	735
185	366	150	1150	900	650
204	400	N/A	935	750	560
232	450	N/A	725	600	475
260	500	N/A	510	450	385
288	550	N/A	300	300	300

ACTUAL MALE PIPE THREAD OUTSIDE DIAMETERS:



CHEMICAL RESISTANCE CHART

Recommendations in this chart are based upon careful examination of published data. However please remember that chemical resistance is affected by temperature, concentration, environment, exposure to multiple chemicals, and other conditions. Other requirements, such as agency standards (CSA, FDA, etc may also dictate selection. Therefore this table must only be used as a general guide.

Chart key:

E... excellent, no effect

G... good, minor effect only

C... conditional, moderate effect, may be suitable in limited applications

X... severe effect, not recommended

I... no data available

	302SS	304SS	316SS	440SS	Aluminum	Cast Bronze	Brass	Cast iron	Carbon Steel	Teflon	Nylon	Polyethylene	Polypropylene	Buna N Seal *	Viton Seal *
acetaldehyde	E	E	E	I	G	X	I	I	C	E	E	C	G	G	X
acetamide	I	G	E	I	I	I	I	I	C	I	I	I	I	E	E
acetate solvent	E	G	E	G	G	E	C	G	E	E	E	G	X	X	X
acetic acid	I	G	E	G	G	C	C	X	C	E	X	G	E	C	C
acetic acid 20%	I	G	E	I	I	I	C	I	I	E	X	I	E	C	E
acetic acid 80%	I	G	E	I	I	I	C	I	I	E	X	I	G	C	E
acetic acid, glacial	I	G	E	E	G	C	C	X	E	E	X	G	G	X	X
acetic anhydride	G	E	E	G	G	C	X	G	X	E	X	E	E	E	X
acetone	E	E	E	G	E	E	E	E	E	E	E	C	G	X	X
acetyl chloride	I	C	E	I	I	X	I	I	I	E	I	I	I	I	E
acetylene	E	E	E	E	E	G	I	E	E	E	E	I	X	E	E
acrylonitrile	E	E	C	I	G	E	I	C	I	I	I	I	G	X	C
alum potassium sulfate (alum), 10%	I	E	I	I	E	I	I	X	E	E	E	E	I	I	E
alum potassium sulfate (alum), 100%	I	X	E	G	G	C	I	I	E	E	X	G	E	E	E
aluminum chloride	C	X	C	I	X	C	I	X	G	E	X	I	E	E	E
aluminum chloride 20%	I	X	C	X	G	X	I	X	E	I	E	G	E	E	E
aluminum fluoride	I	X	C	X	I	I	I	I	E	E	X	G	E	E	E
aluminum hydroxide	I	E	E	E	E	E	I	X	E	E	E	I	E	E	E
aluminum sulfate	I	C	C	E	E	C	C	X	E	E	E	G	E	E	E
amines	E	E	E	I	E	G	I	E	G	E	E	I	I	X	X
ammonia 10%	I	I	E	I	I	I	I	I	I	E	E	I	E	X	E
ammonia, anhydrous	E	G	E	E	G	X	I	X	G	E	E	G	E	G	X
ammonia, liquids	I	E	E	E	X	X	I	E	E	E	I	X	E	G	X
ammonia, nitrate	I	E	E	E	C	X	I	I	E	I	I	I	E	E	I
ammonium bifluoride	I	C	E	I	X	I	I	I	I	I	I	I	E	E	E
ammonium carbonate	G	E	E	E	C	G	I	C	G	E	E	I	E	X	G
ammonium casenite	I	I	E	I	I	I	I	I	I	I	I	I	I	I	I
ammonium chloride	C	E	C	E	C	X	C	X	X	E	E	G	E	E	E
ammonium hydroxide	E	E	E	E	C	X	X	E	C	E	E	G	E	G	G
ammonium nitrate	E	E	E	E	G	X	X	E	X	E	X	G	E	E	X
ammonium oxalate	I	E	E	E	I	I	I	I	E	I	I	I	I	E	I
ammonium persulfate	I	E	E	E	C	E	I	X	E	E	X	I	E	E	C
ammonium phosphate, dibasic	G	E	E	E	G	C	I	I	X	E	E	G	E	E	E
ammonium phosphate, monobasic	I	E	E	E	G	X	I	I	E	E	E	G	E	E	E
ammonium phosphate, tribasic	G	E	E	E	G	C	I	C	X	E	E	G	E	E	E
ammonium sulfate	C	X	G	E	G	G	C	C	C	E	X	G	E	E	X
ammonium thio-sulfate	I	I	E	I	I	I	I	X	E	I	I	I	I	E	I
amyl alcohol	E	E	E	I	C	E	G	C	C	E	E	G	G	E	E
amyl alcohol	I	E	E	I	G	E	I	I	E	E	E	G	E	G	G
amyl chloride	I	C	G	I	X	E	I	I	E	E	C	X	X	X	E
amyl-acetate	G	E	E	C	G	C	I	I	C	E	G	X	X	X	X
aniline	G	E	E	E	C	C	I	I	C	E	C	C	G	X	C
aniline oil	I	E	E	I	C	E	I	E	I	E	C	I	E	X	E
anise oil	I	E	E	I	I	I	I	I	I	I	I	I	I	I	I
anti-freeze	I	E	E	I	E	G	G	G	C	E	E	G	E	E	E
antimony trichloride	I	X	X	I	X	I	I	I	I	E	X	E	I	I	E
aqua regia (80%, hcl, 20%, hno)	I	X	X	I	X	X	I	I	I	E	X	X	C	X	C
aromatic hydrocarbons	I	I	E	I	E	E	I	E	E	I	I	C	I	X	E
arsenic acid	G	E	E	I	X	X	G	X	X	E	E	G	E	E	E
asphalt	I	G	E	I	C	E	I	C	I	I	E	I	E	G	E
barium carbonate	G	E	E	E	G	G	I	G	G	E	E	G	E	E	E
barium chloride	C	X	E	E	X	G	I	I	C	E	G	G	E	E	E
barium cyanide	I	I	E	I	I	C	I	I	E	I	I	G	I	C	E
barium hydroxide	G	C	E	E	X	G	I	C	C	E	E	G	E	E	E
barium nitrate	I	E	E	I	I	X	I	E	E	I	I	I	I	E	E
barium sulfate	G	E	E	E	X	C	I	C	C	E	E	G	E	E	E
beet sugar liquids	E	E	E	I	E	E	G	E	I	E	E	I	E	E	E

* NOTE: The ratings given for BUNA N and VITON rubber are based on their use as seals in couplings. For Chemical Resistance of Hose components refer to the tables in our Hose Catalog.

CHEMICAL RESISTANCE CHART

	302SS	304SS	316SS	440SS	Aluminum	Cast Bronze	Brass	Cast iron	Carbon Steel	Teflon	Nylon	Polyethylene	Polypropylene	Buna N Seal *	Viton Seal *
benzaldehyde	E	E	E	I	G	E	I	G	E	E	C	X	X	X	X
benzene	G	E	E	E	G	G	E	G	C	E	E	X	X	X	E
benzoic acid	G	E	E	E	G	G	I	X	I	E	X	G	X	X	E
benzol	I	E	E	I	G	G	E	I	I	E	E	I	E	X	E
benzyl alcohol	I	E	E	I	G	E	C	I	I	I	E	X	E	X	E
bone oil	I	E	E	I	I	E	I	I	I	I	I	I	I	E	E
borax (sodium borate)	I	E	E	E	C	E	G	E	C	E	E	G	E	G	E
boric acid	G	E	E	E	G	G	C	X	I	E	E	G	E	E	E
brewery slop	I	I	E	I	I	E	I	E	I	I	I	I	I	E	E
bromine (wet)	X	X	X	X	X	C	I	X	X	E	X	X	X	X	E
butadiene	E	E	E	I	E	C	E	C	C	E	E	I	I	E	E
butane	E	E	E	I	E	E	E	C	C	E	E	C	X	E	E
butanol	I	E	E	I	E	E	I	I	I	E	I	I	I	I	I
butter	I	G	E	I	E	X	I	X	I	I	I	I	I	E	E
buttermilk	E	E	E	E	E	X	I	X	I	E	E	I	I	E	E
butyl acetate	I	I	C	I	E	E	I	I	E	E	I	C	X	G	X
butyl alcohol	E	E	E	I	G	G	C	C	C	E	E	G	G	E	E
butylene	E	G	E	I	E	E	E	E	E	E	I	I	I	G	E
butyric acid	G	G	E	E	G	C	I	X	I	E	X	I	E	X	X
calcium bisulfate	C	X	E	I	X	X	X	X	I	E	E	I	I	E	E
calcium bisulfide	I	I	G	I	C	C	I	I	I	E	E	G	E	E	E
calcium bisulfite	I	G	E	I	C	C	I	I	I	E	E	I	E	E	E
calcium carbonate	G	E	E	E	C	C	I	X	I	E	E	G	E	E	E
calcium chlorate	I	G	E	I	I	C	I	I	I	E	E	E	I	I	E
calcium chloride	C	E	X	C	C	G	I	C	I	E	E	G	E	E	E
calcium hydroxide	G	E	E	I	C	G	I	I	I	E	E	G	E	E	E
calcium hypochlorite	X	X	C	C	C	X	I	X	I	E	X	G	E	G	E
calcium sulfate	G	E	E	E	G	G	I	I	I	E	E	G	E	E	E
calgon	I	E	E	I	I	C	I	X	I	I	I	I	E	E	E
cane juice	I	E	E	I	G	G	C	E	I	I	E	I	X	E	I
carbolic acid (see phenol)	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I
carbon bisulfide	G	E	E	E	E	C	I	G	I	I	E	I	X	X	E
carbon dioxide (wet)	I	E	E	I	C	C	C	C	I	E	I	I	I	I	I
carbon monoxide	I	E	E	I	E	I	I	I	I	I	E	G	E	E	E
carbon tetrachloride	G	G	G	E	C	C	E	C	X	E	E	X	X	C	E
carbonated water	G	E	E	E	E	G	I	X	I	I	E	I	E	E	E
carbon disulfide	I	G	E	I	C	C	C	G	C	E	E	X	X	X	E
carbonic acid	G	E	G	E	E	G	I	X	I	E	E	G	E	G	E
castor oil	I	E	E	I	E	E	I	E	I	I	I	I	I	E	E
chloroacetic acid	X	X	X	X	C	X	I	X	I	E	X	X	X	X	X
chloric acid	I	X	X	I	I	I	I	I	I	E	I	I	I	X	I
chlorinated glue	I	E	E	I	X	C	I	X	I	I	C	I	I	C	E
chlorine (dry)	G	E	E	I	X	E	G	E	I	E	I	I	I	I	X
chlorine water	X	I	X	I	X	X	X	X	I	E	X	I	X	X	E
chlorine, anhydrous liquid	I	X	X	X	X	X	I	C	I	E	X	X	X	X	E
chlorobenzene (mono)	E	E	E	I	G	G	I	G	C	E	E	X	X	X	E
chloroform	E	E	E	E	X	G	I	X	C	E	C	X	X	X	E
chlorosulfonic acid	X	X	I	X	X	X	I	I	X	E	X	X	X	X	X
chlorox (bleach)	I	E	E	I	C	E	I	X	C	E	X	I	X	C	E
chocolate syrup	I	E	E	I	E	I	I	X	I	I	E	I	E	E	E
chromic acid 10%	I	G	I	I	I	I	X	I	I	E	X	I	E	X	E
chromic acid 30%	I	G	I	I	I	I	X	I	I	E	X	I	E	X	E
chromic acid 5%	I	E	E	G	C	X	X	X	I	I	X	G	E	X	E
chromic acid 50%	C	G	G	I	C	X	X	X	I	E	X	C	G	X	E
cider	I	E	E	E	G	E	I	X	I	I	I	G	I	E	E
citric acid	I	E	E	E	C	X	C	X	I	E	C	G	G	X	E
citric oils	I	E	E	I	C	G	I	I	I	I	I	I	E	E	E
cod liver oil	I	E	E	I	G	I	I	I	I	I	E	I	E	E	E
coffee	E	E	E	E	E	G	I	C	I	E	E	I	E	E	E
copper chloride	C	X	X	G	X	X	I	X	I	E	X	G	E	E	E
copper cyanide	I	E	E	E	X	C	I	X	I	E	E	G	E	G	G
copper florobate	I	X	X	I	X	X	I	X	I	E	I	E	I	G	E
copper nitrate	G	E	E	G	X	X	I	I	I	E	X	G	E	E	E
copper sulfate	G	G	I	I	I	C	X	I	I	E	C	I	E	G	E
copper sulfate (5% sol)	I	E	E	E	X	X	X	X	I	E	X	G	E	E	E
corn oil	I	E	E	E	G	G	I	E	I	I	E	I	E	E	E
cotton seed oil	G	E	E	E	G	G	I	E	C	E	E	I	E	E	E

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	302SS	304SS	316SS	440SS	Aluminum	Cast Bronze	Brass	Cast Iron	Carbon Steel	Teflon	Nylon	Polyethylene	Polypropylene	Buna N Seal *	Viton Seal *
cream	I	E	E	I	E	C	I	X	I	I	E	I	E	E	E
creosote	I	E	E	I	E	I	I	I	I	I	I	I	X	E	E
cresols	I	E	E	I	G	X	C	I	I	I	I	X	C	X	X
creylic acid	G	E	E	I	C	C	I	I	I	E	X	C	I	X	E
cyanic acid	I	E	I	I	I	I	I	I	I	I	I	I	I	C	I
cyclohexane	I	E	I	I	E	E	I	I	E	I	I	I	X	E	E
detergents	I	E	E	I	E	E	I	I	E	I	E	G	E	E	E
diacetone alcohol	I	E	E	I	E	E	C	I	E	I	E	I	X	X	X
dichlorethane	I	E	E	I	I	I	I	I	E	E	E	X	I	I	G
diesel fuel	E	E	E	I	E	E	I	E	E	I	I	I	X	E	E
diesel fuel (2d, 3d, 4d, 5d)	I	E	E	I	E	E	I	I	I	I	E	I	E	E	E
diethylamine	E	E	I	I	E	E	I	I	I	E	I	I	C	G	X
diethylene glycol	I	E	I	I	I	E	I	I	I	I	E	G	I	E	E
diphenyl oxide	I	E	I	I	I	E	I	I	I	I	I	I	I	X	E
dyes	I	E	E	I	G	C	I	I	I	I	I	I	I	I	E
epsom salts (magnesium sulfate)	G	E	E	E	E	G	I	I	I	I	I	I	E	E	E
ethane	E	E	I	I	E	E	I	I	I	I	I	I	I	E	E
ethanol	I	E	E	E	G	E	C	E	E	I	E	G	E	E	E
ethanolamine	I	E	E	I	I	I	I	I	C	I	I	I	I	G	X
ether	E	E	E	E	E	G	E	I	G	I	C	I	I	X	C
ethyl acetate	I	E	E	I	G	G	I	I	C	E	E	C	C	X	X
ethyl chloride	I	E	E	E	G	G	I	C	X	E	E	X	X	X	E
ethyl sulfate	I	X	I	I	I	I	I	I	I	I	I	I	I	E	E
ethylene chloride	I	E	E	I	C	E	I	C	C	E	I	I	X	X	E
ethylene dichloride	I	E	E	I	X	C	I	I	C	E	E	X	E	X	E
ethylene glycol	I	E	E	I	E	G	G	G	C	E	E	G	E	E	E
ethylene oxide	I	I	E	I	E	E	I	I	I	E	E	I	I	X	X
fatty acids	I	E	E	I	G	C	I	X	I	E	E	G	E	C	E
ferric acid	I	X	X	X	X	X	X	X	I	E	X	G	E	X	E
ferric nitrate	I	E	E	E	X	X	I	I	I	E	X	G	E	E	E
ferric sulfate	I	E	C	E	X	X	X	X	I	E	E	I	E	G	E
ferrous chloride	I	X	X	I	X	C	I	X	I	E	X	G	E	G	E
ferrous sulfate	G	E	C	I	X	C	I	X	X	E	X	G	E	G	E
fluoboric acid	I	X	G	I	I	I	I	X	I	E	C	G	E	G	E
fluorine	X	X	X	I	X	X	I	X	X	C	X	C	I	I	I
fluosilicic acid	I	I	G	I	X	I	I	X	I	E	X	G	E	E	G
formaldehyde	E	E	E	I	E	E	G	X	E	E	E	G	E	C	X
formaldehyde 40%	I	I	E	I	I	I	I	I	I	E	X	I	E	G	X
formic acid	C	E	G	G	X	C	C	X	X	E	X	G	E	X	G
freon 11	E	I	E	I	G	G	I	C	G	E	E	C	I	C	G
freon 113	I	I	E	I	G	G	I	I	I	I	E	I	I	E	C
freon 12 (wet)	I	I	X	I	G	G	I	I	I	E	E	C	E	E	E
freon 22	I	I	E	I	G	G	I	I	I	I	E	I	I	X	X
freon t.f.	I	I	E	I	G	G	I	I	I	I	E	I	X	E	G
fruit juice	E	E	E	E	G	G	I	X	X	E	E	G	E	E	E
fuel (1,2,3,5a, 5b, 6)	I	E	E	I	E	E	I	I	I	E	I	I	G	G	E
fuel oils	E	E	E	I	E	G	I	C	G	E	E	X	G	E	E
furan resin	I	E	E	I	E	E	I	E	E	E	I	I	I	X	E
furfural	E	E	E	I	E	E	I	I	E	E	E	X	X	X	X
gallic acid	G	E	E	I	E	E	I	X	X	E	E	I	I	E	G
gasoline	E	E	E	E	E	E	I	E	E	E	E	X	C	E	E
gelatin	E	E	E	E	E	E	C	X	X	E	E	I	E	E	E
glucose	E	I	E	I	E	E	E	G	G	E	E	G	E	E	E
glue p.v.a.	G	G	E	I	G	E	I	I	E	E	E	I	I	E	E
glycerine	E	E	E	E	E	E	G	G	G	E	E	I	E	E	E
glycolic acid	I	I	I	I	I	I	I	I	I	I	I	G	E	E	E
gold monocyanide	I	I	E	I	I	E	I	X	I	I	I	I	I	E	E
grape juice	I	E	E	I	G	G	I	X	I	I	I	G	I	E	E
grease	E	E	E	I	E	G	I	E	E	E	E	I	I	E	E
heptane	E	I	E	I	E	E	I	I	G	E	E	X	X	E	E
hexane	E	E	E	I	E	G	I	I	G	E	E	I	C	E	E
hexyl alcohol	I	E	E	I	E	E	C	I	E	I	E	I	E	E	E
honey	I	E	E	I	E	E	I	E	I	I	E	I	E	E	E
hydraulic oils (petroleum)	E	E	E	I	E	G	I	E	E	E	E	I	X	E	E
hydraulic oils (synthetic)	I	E	E	I	E	E	I	E	I	I	E	I	X	C	E
hydrazine	I	E	E	I	I	I	I	C	I	I	I	I	I	G	E
hydrobromic acid	X	X	X	X	X	X	I	X	X	E	X	G	G	X	E

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CHEMICAL RESISTANCE CHART

	302SS	304SS	316SS	440SS	Aluminum	Cast Bronze	Brass	Cast iron	Carbon Steel	Teflon	Nylon	Polyethylene	Polypropylene	Buna N Seal *	Viton Seal
hydrobromic acid 20%	I	I	X	I	I	I	I	I	I	E	X	I	E	X	E
hydrochloric acid (dry gas)	X	C	E	I	X	I	I	I	X	E	I	I	I	I	I
hydrochloric acid 100%	I	X	X	I	X	X	I	X	I	E	X	E	I	X	C
hydrochloric acid 20%	I	X	X	X	X	X	I	X	I	E	X	E	E	C	E
hydrochloric acid 37%	I	X	X	X	X	X	I	X	I	E	X	E	E	C	E
hydrocyanic acid	E	E	E	C	E	X	X	I	C	E	E	G	E	C	E
hydrocyanic acid (gas 10%)	I	X	X	I	I	I	I	I	I	E	I	I	I	I	I
hydrofluoric acid 100%	X	X	X	I	X	X	I	X	X	E	I	X	I	X	I
hydrofluoric acid 20%	I	X	X	X	X	X	I	X	I	E	X	C	E	X	E
hydrofluoric acid 75%	I	C	X	I	X	X	I	X	I	E	X	C	G	X	E
hydrofluosilicic acid	I	X	X	I	C	X	I	I	I	E	I	I	I	I	I
hydrofluosilicic acid 20%	I	X	X	I	X	E	I	X	I	E	X	I	E	G	E
hydrogen gas	E	E	E	I	E	E	I	G	G	E	I	I	I	I	E
hydrogen peroxide	I	E	G	E	E	X	X	X	X	E	X	G	E	X	E
hydrogen peroxide 10%	I	C	C	I	E	X	X	X	I	E	X	E	I	E	I
hydrogen peroxide 30%	E	I	G	I	I	I	X	I	I	E	X	I	E	X	E
hydrogen sulfide (dry)	I	C	E	I	X	X	C	G	G	E	X	I	I	I	X
hydrogen sulfide, aqueous solution	I	X	E	C	C	X	C	X	I	E	X	G	E	C	X
hydroxyacetic acid (70%)	I	I	I	I	X	I	I	I	I	I	I	I	I	E	E
indium sulfamate plating r.t.	I	I	C	I	I	I	I	I	I	E	X	I	E	E	E
ink	E	E	E	I	C	C	I	X	X	I	E	G	I	E	E
iodine	I	X	X	X	X	X	I	X	I	E	X	X	X	G	E
iodine (in alcohol)	I	I	G	I	I	I	I	I	I	E	X	I	G	X	E
iodoform	G	C	E	I	E	C	I	C	G	E	E	I	I	I	E
isobutyl alcohol	I	E	E	I	G	E	C	I	E	I	E	I	E	C	E
isopropyl acetate	I	I	G	I	C	I	I	I	I	I	I	I	I	X	X
isopropyl alcohol	I	E	E	I	G	E	C	C	E	I	E	I	E	C	E
isopropyl ether	E	I	E	I	E	E	I	I	E	E	I	I	X	G	X
isotane	I	I	I	I	E	I	I	I	I	I	I	I	X	E	E
jet fuel (jp#, jp4, jp5)	E	E	E	I	E	E	I	E	E	E	E	I	X	E	E
kerosene	E	E	E	E	E	E	E	E	G	E	E	X	X	E	E
ketones	E	E	E	I	G	E	I	E	E	E	E	X	X	X	X
lacquer thinners	I	I	E	I	I	I	C	I	I	E	E	I	G	X	I
lacquers	E	E	E	I	E	E	C	C	C	I	E	I	E	X	X
lactic acid	E	E	G	C	C	X	I	X	X	E	C	G	E	G	G
lard	G	E	E	E	E	E	I	E	C	I	E	I	E	E	E
latex	I	E	E	I	E	E	I	I	I	I	E	G	I	E	E
lead acetate	G	E	E	I	X	C	I	I	X	E	E	G	E	G	X
lead sulfamate	I	I	I	I	I	I	I	I	I	I	I	I	E	G	E
lime	I	E	E	I	C	E	I	E	I	I	I	I	I	E	E
linseed oil	I	E	E	E	E	E	I	E	I	I	E	I	E	E	E
lubricants	I	E	E	I	E	G	I	I	I	E	E	I	E	E	E
magnesium carbonate	I	E	E	E	I	I	I	I	I	I	I	G	E	E	I
magnesium chloride	G	G	G	E	X	G	C	X	C	E	E	G	E	E	E
magnesium hydroxide	E	E	E	I	X	C	G	G	G	E	E	G	E	G	E
magnesium nitrate	I	E	E	E	I	I	I	I	I	E	E	G	E	E	E
magnesium oxide	I	E	E	I	I	I	I	I	I	I	I	I	I	E	I
magnesium sulfate	G	G	E	I	G	G	G	C	G	E	E	G	E	E	E
maleic acid	C	E	E	E	G	C	I	I	G	E	E	I	C	X	E
maleic anhydride	I	I	I	I	I	I	I	I	I	I	I	I	I	X	E
malic acid	G	E	E	I	C	X	I	I	X	E	E	I	I	I	G
melamine	I	X	X	I	I	X	I	I	I	I	I	I	I	C	I
mercuric cyanide	E	E	E	I	X	X	I	I	X	E	I	G	E	E	I
mercuric chloride (dilute solution)	X	X	X	X	X	X	X	X	X	E	E	G	E	E	E
mercury	E	E	E	E	C	X	X	E	E	E	E	G	E	E	E
methanol	I	E	E	E	G	E	C	E	E	E	E	G	E	G	C
methyl acetate	E	I	E	I	E	E	I	I	G	E	I	I	I	X	X
methyl acetone	E	I	E	I	E	E	I	E	E	E	I	I	I	X	X
methyl acrylate	I	I	I	I	I	I	I	I	I	I	I	I	I	X	X
methyl alcohol 10%	E	I	E	I	C	C	I	I	G	E	E	I	I	G	I
methyl bromide	I	I	I	I	I	I	I	I	I	I	I	X	I	G	E
methyl butyl ketone	I	I	E	I	E	I	I	I	I	I	I	I	I	X	X
methyl cellosolve	I	I	I	I	E	E	I	I	I	I	I	I	E	X	X
methyl chloride	I	E	E	I	X	E	I	I	I	E	E	X	X	X	E
methyl dichloride	I	I	I	I	I	I	I	I	I	I	I	I	I	X	E
methyl ethyl ketone	I	E	E	I	E	E	I	I	I	E	E	X	E	X	X
methyl isobutyl ketone	I	I	E	I	I	I	I	I	I	E	E	I	C	X	X

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CHEMICAL RESISTANCE CHART

	302SS	304SS	316SS	440SS	Aluminum	Cast Bronze	Brass	Cast iron	Carbon Steel	Teflon	Nylon	Polyethylene	Polypropylene	Buna N Seal *	Viton Seal *
methyl isopropyl ketone	I	I	E	I	I	I	I	I	I	I	E	I	I	X	X
methyl methacrylate	I	I	I	I	I	I	I	I	I	I	I	I	I	X	X
methylamine	E	E	E	E	E	X	I	G	G	I	I	I	I	G	I
methylene chloride	E	E	E	I	E	E	C	I	G	E	X	X	X	X	X
milk	E	E	E	E	E	C	C	X	X	I	E	G	E	E	E
mineral oil	E	E	E	E	E	E	I	E	G	I	E	I	G	E	E
molasses	E	E	E	E	E	E	G	E	E	I	E	G	E	E	E
naptha	E	E	E	E	E	G	I	G	G	E	E	X	E	G	E
napthalene	G	E	G	I	G	C	I	G	E	E	I	X	G	X	G
nickel chloride	I	E	G	I	X	X	I	X	I	E	E	G	E	E	E
nickel sulfate	G	E	G	I	X	C	C	X	X	E	E	G	E	E	E
nitric acid (10% solution)	E	E	E	E	X	X	I	X	X	E	X	G	E	X	E
nitric acid (20% solution)	I	E	E	E	X	X	I	X	I	E	X	G	E	X	E
nitric acid (50% solution)	I	E	E	E	X	X	I	X	I	E	X	C	X	X	E
nitric acid (concentrated solution)	I	X	G	E	G	X	X	X	I	E	X	X	X	X	G
nitrobenzene	G	E	G	I	C	X	I	G	G	E	C	X	C	X	X
octyl alcohol	I	E	E	I	E	E	C	I	E	I	E	I	I	G	E
oleic acid	G	E	E	G	G	G	C	C	C	E	E	X	C	G	X
oleum	G	I	E	I	G	C	C	I	G	E	I	I	X	C	E
oleum 25%	I	I	I	I	I	I	I	I	I	E	I	I	I	X	E
olive oil	E	E	E	I	E	G	I	E	G	E	E	I	E	E	E
oxalic acid (cold)	C	E	G	E	C	G	C	X	X	E	X	E	E	G	E
paraffin	E	E	E	E	E	E	I	G	G	E	E	I	E	E	E
peanut oil	I	E	E	I	E	E	I	E	I	I	I	I	X	E	E
pentane	E	C	C	I	E	E	I	G	G	E	E	I	I	E	E
perchloroethylene	G	E	E	I	E	C	I	G	G	E	I	I	X	C	E
petrolatum	E	I	E	I	G	G	I	C	C	E	E	I	I	E	E
phenol (carbolic acid)	G	E	E	E	G	G	X	X	X	E	X	X	G	X	E
phenol 10%	G	E	E	I	E	C	I	G	X	E	X	I	I	X	G
phosphoric acid (crude)	I	X	C	C	X	X	X	X	X	E	X	C	I	X	E
phosphoric acid (to 40% solution)	I	G	E	E	X	X	X	X	I	E	X	G	E	X	E
phosphoric anhydride (dry or moist)	I	E	E	I	I	I	X	I	I	E	I	I	I	X	X
photographic (developer)	I	C	E	C	C	I	I	X	I	I	I	G	E	E	E
phosphoric acid (40-100% solution)	I	C	G	G	X	X	X	X	I	E	X	C	E	X	E
phosphoric anhydride (molten)	I	E	E	I	X	X	X	I	I	E	E	X	I	C	X
phthalic anhydride	G	E	G	I	G	G	I	C	C	E	E	I	I	C	E
picric acid	G	E	E	I	C	X	X	X	X	E	E	E	I	E	E
pine oil	E	E	E	I	E	X	I	C	G	E	I	I	I	E	E
plating solutions:															
- antimony plating 130°f	I	I	E	I	I	I	I	I	I	E	X	I	E	E	E
- arsenic plating 110°f	I	I	E	I	I	I	I	I	I	E	E	I	E	E	E
- brass bath 100°f	I	I	E	I	I	I	I	I	I	E	E	I	E	E	E
- bronze	I	I	E	I	I	I	I	I	I	E	E	I	E	E	E
- cadmium cyanide bath 90°f	I	I	E	I	I	I	I	I	I	E	E	I	E	E	E
- cadmium fluoborate bath 100°f	I	I	E	I	I	I	I	I	I	E	X	I	E	G	E
- chromium barrel chrome bath 95°f	I	I	X	I	I	I	I	I	I	E	X	I	E	X	C
- chromium black chrome bath 115°f	I	I	C	I	I	I	I	I	I	E	X	I	E	X	C
- chromium chromic-sulfuric bath 130°f	I	I	C	I	I	I	I	I	I	E	X	I	E	X	C
- chromium fluoride bath 130°f	I	I	X	I	I	I	I	I	I	E	X	I	E	X	C
- chromium fluosilicate bath 95°f	I	I	C	I	I	I	I	I	I	E	X	I	E	X	C
- copper (electroless) 140°f	I	I	I	I	I	X	I	I	I	E	E	I	E	X	E
- copper acid fluoborate bath 120°f	I	I	X	I	I	I	I	I	I	E	X	I	E	G	E
- copper acid sulfate bath r.t.	I	I	X	I	I	I	I	I	I	E	X	I	E	E	E
- copper cyanide rochelle salt bath 150°f	I	I	E	I	I	I	I	I	I	E	E	I	E	E	E
- copper cyanide high speed bath 180°f	I	I	E	I	I	I	I	I	I	E	E	I	E	E	E
- copper pyrophosphate 140°f	I	I	E	I	I	I	I	I	I	E	E	I	E	E	E
- gold acid 75°f	I	I	C	I	I	I	I	I	I	E	E	I	E	E	E
- gold cyanide 150°f	I	I	E	I	I	C	I	I	I	E	E	I	E	E	E
- gold neutral 75°f	I	I	C	I	I	I	I	I	I	E	E	I	E	E	E
- iron ferrous am. sulfate bath 150°f	I	I	C	I	I	I	I	I	I	E	X	I	E	E	E
- iron ferrous chloride bath 190°f	I	I	X	I	I	I	I	I	I	E	X	I	C	G	E
- iron ferrous sulfate bath 150°f	I	I	C	I	I	I	I	I	I	E	X	I	E	E	E
- iron fluoborate bath 145°f	I	I	X	I	I	I	I	I	I	E	X	I	E	G	E
- iron sulfamate 140°f	I	I	X	I	I	I	I	I	I	E	X	I	E	E	E
- iron sulfate-chloride bath 160°f	I	I	X	I	I	I	I	I	I	E	X	I	E	G	E
- lead fluoborate	I	I	C	I	I	I	I	I	I	E	X	I	E	G	E
- nickel electroless 200°f	I	I	I	I	I	I	I	I	I	E	X	I	X	X	E

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CHEMICAL RESISTANCE CHART

	302SS	304SS	316SS	404SS	Aluminum	Cast Bronze	Brass	Cast Iron	Carbon Steel	Teflon	Nylon	Polyethylene	Polypropylene	Buna N Seal *	Viton Seal *
plating solutions:															
- nickel fluoborate 100-170°F	I	I	C	I	I	X	I	I	I	E	X	I	E	G	E
- nickel high chloride 130-160°F	I	I	C	I	I	I	I	I	I	E	X	I	E	E	E
- nickel sulfamate 100-140°F	I	I	C	I	I	I	I	I	I	E	E	I	E	E	E
- nickel watts type 115-160°F	I	I	C	I	I	I	I	I	I	E	E	I	E	E	E
- rhodium plating 120°F	I	I	X	I	I	I	I	I	I	E	X	I	E	E	E
- silver plating 80-120°F	I	I	E	I	I	I	I	I	I	E	E	I	E	E	E
- tine-lead plating 100°F	I	I	C	I	I	I	I	I	I	E	X	I	E	G	E
- tin-fluoborate plating 100°F	I	I	C	I	I	I	I	I	I	E	X	I	E	G	E
- zinc acid chloride 140°F	I	I	X	I	I	I	I	I	I	E	X	I	E	E	E
- zinc acid fluoborate bath r.t.	I	I	I	C	I	I	I	I	I	E	X	I	E	G	E
- zinc acid sulfate bath 150°F	I	I	C	I	I	I	I	I	I	E	X	I	E	E	E
- zinc alkaline cyanide bath r.t.	I	I	I	E	I	I	I	I	I	E	E	I	E	E	E
potash	I	E	I	E	C	C	I	G	I	I	E	G	E	E	E
potassium bicarbonate	I	E	I	G	C	G	I	X	I	E	E	G	E	E	E
potassium bromide	E	E	I	G	C	C	I	X	X	E	C	G	E	E	E
potassium carbonate	G	E	I	E	C	C	I	G	G	E	E	G	E	G	E
potassium chlorate	G	E	E	E	G	G	I	G	G	E	X	G	E	E	E
potassium chloride	C	E	E	G	G	C	C	G	G	E	G	G	E	E	E
potassium chromate	I	I	G	G	E	E	I	E	I	I	I	G	I	E	E
potassium cyanide solutions	G	E	G	E	X	X	I	G	G	E	E	G	E	E	G
potassium dichromate	G	E	E	E	E	C	I	G	C	E	X	G	E	E	G
potassium ferrocyanide	G	E	I	E	C	E	I	I	C	E	E	E	I	X	I
potassium hydroxide (50%)	E	G	G	G	X	X	X	C	E	E	E	G	E	G	X
potassium nitrate	G	E	G	E	G	G	I	I	G	E	C	G	E	E	G
potassium permanganate	G	E	G	G	G	G	I	G	G	E	X	G	G	E	G
potassium sulfate	G	E	G	G	E	G	G	G	G	E	C	G	E	E	E
potassium sulfide	E	E	I	E	E	G	I	G	G	E	I	I	I	E	I
propane (liquified)	E	E	I	E	E	E	E	I	G	E	E	I	X	E	E
propyl alcohol	I	E	E	I	E	E	I	I	E	E	E	I	E	E	E
propylene glycol	G	G	I	E	E	G	I	G	G	E	G	G	I	E	E
pyridine	I	C	I	G	G	I	I	G	E	E	I	C	G	X	X
pyrogalllic acid	G	E	E	E	G	G	I	G	G	E	E	I	I	E	E
rape seed oil	I	E	E	I	I	E	I	I	I	I	I	I	I	G	E
rosins	E	E	E	E	E	E	C	I	C	E	E	I	E	E	I
sea water	E	E	C	E	C	C	I	I	X	E	E	E	G	E	E
shellac (bleached)	E	E	I	E	E	E	G	G	E	E	E	I	E	E	I
shellac (orange)	E	E	I	E	E	E	C	C	E	E	E	I	E	E	I
silicone	I	G	I	E	G	E	I	I	I	I	E	I	E	E	E
silicone oil	I	E	E	I	E	I	E	I	E	I	E	I	E	E	E
silver bromide	I	C	C	G	X	I	I	I	I	I	I	I	I	I	I
silver nitrate	G	E	G	E	X	X	I	X	X	E	E	G	E	C	E
soap solutions	E	E	C	E	G	E	I	G	G	E	E	E	E	I	G
sodium acetate	G	E	E	G	G	G	I	C	C	E	E	G	E	X	X
sodium aluminatate	G	I	I	E	C	G	I	I	C	E	E	I	I	E	E
sodium bicarbonate	G	E	E	E	E	G	E	C	C	E	E	G	E	E	E
sodium bisulfate	E	E	I	E	X	C	C	X	X	E	C	G	E	E	G
sodium bisulfate	I	E	I	E	E	C	I	X	I	E	X	G	E	E	E
sodium borate	G	E	I	E	C	E	I	C	C	E	E	E	I	I	E
sodium carbonate (soda ash)	G	E	G	G	C	G	G	G	G	E	E	G	E	E	E
sodium chlorate	G	E	I	E	G	G	I	I	C	E	E	G	E	X	E
sodium chloride	G	E	C	G	C	G	C	G	C	E	E	G	E	E	E
sodium chromate	E	E	E	I	X	G	I	G	G	E	E	I	E	E	G
sodium cyanide	G	E	I	E	X	X	X	G	G	E	C	G	E	E	E
sodium fluoride	G	C	I	C	C	C	I	X	X	E	E	C	I	X	G
sodium hydrosulfite	I	I	I	I	E	C	I	I	I	E	E	I	I	I	E
sodium hydroxide (20%)	I	E	E	E	X	C	X	E	I	E	C	G	E	E	E
sodium hydroxide (50% solution)	I	E	G	I	X	C	X	G	I	E	C	C	E	X	X
sodium hydroxide (80% solution)	I	E	X	I	X	C	X	C	I	E	C	C	E	X	G
sodium hypochlorite	X	I	E	I	X	X	I	X	X	E	E	I	E	G	G
sodium hypochlorite (to 20%)	I	C	C	C	C	X	X	X	I	E	E	G	X	C	E
sodium hyposulfate	I	E	E	I	X	X	I	I	I	E	I	I	I	I	I
sodium metaphosphate	E	I	E	I	E	C	C	G	G	E	E	I	X	E	E
sodium metasilicate	E	I	E	I	E	G	I	C	C	E	I	I	I	E	E
sodium nitrate	G	E	E	E	E	G	C	E	G	E	E	G	E	C	X
sodium perborate	G	I	C	I	G	C	C	G	G	E	E	I	E	G	E

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CHEMICAL RESISTANCE CHART

	302SS	304SS	316SS	440SS	Aluminum	Cast Bronze	Brass	Cast iron	Carbon Steel	Teflon	Nylon	Polyethylene	Polypropylene	Buna N Seal *	Viton Seal *
sodium peroxide	G	E	E	I	C	C	C	X	C	E	X	I	I	C	E
sodium polyphosphate (mono, di, tribasic)	I	E	E	I	X	C	I	I	I	E	I	I	I	E	E
sodium silicate	G	E	G	E	C	C	C	I	G	E	E	I	E	E	E
sodium sulfate	G	E	E	C	G	G	G	E	G	E	E	G	E	E	E
sodium sulfide	G	E	G	I	X	X	X	E	G	E	E	G	E	C	E
sodium sulfide	I	C	C	I	C	C	I	E	I	E	X	E	I	E	E
sodium tetraborate	I	I	E	I	I	I	I	I	I	I	I	I	I	E	E
sodium thiosulphate ("hypo")	E	E	E	I	G	X	X	C	G	E	E	I	E	G	E
sorghum	I	E	E	I	I	I	I	E	I	I	E	I	I	E	E
soy sauce	I	E	E	I	E	E	I	X	I	I	E	I	I	E	E
soybean oil	I	E	E	I	E	G	I	E	I	I	E	I	E	E	E
stannic chloride	X	X	X	I	X	X	I	X	X	E	E	G	E	E	E
stannic fluoborate	I	I	E	I	I	I	I	X	I	I	I	I	I	E	E
stannous chloride	X	X	C	I	X	X	I	X	X	E	X	E	I	C	G
starch	G	E	E	I	E	G	I	C	C	E	E	G	I	E	E
stearic acid	G	E	E	E	G	C	C	C	C	E	E	G	X	G	E
stoddard solvent	E	E	E	E	E	E	E	G	G	E	E	X	X	G	E
styrene	E	E	E	I	E	E	I	I	E	E	I	I	I	X	G
sugar (liquids)	E	E	E	E	E	E	I	G	G	E	E	I	E	E	E
sulfate liquors	I	C	C	I	G	C	I	I	I	I	I	I	E	I	I
sulfur chloride	I	X	X	X	X	C	X	I	I	E	E	E	X	X	E
sulfur dioxide	I	E	E	C	E	G	I	I	I	E	X	C	X	X	X
sulfur dioxide (dry)	E	E	E	I	E	E	C	E	G	E	E	X	I	I	X
sulfur trioxide (dry)	E	E	C	I	E	G	I	G	G	E	X	I	I	X	E
sulfuric acid (to 10%)	I	X	C	C	C	X	X	X	I	E	X	G	E	C	E
sulfuric acid 10%-75%	I	X	X	X	X	X	X	X	I	E	X	C	E	X	E
sulfuric acid 75%-100%	I	I	X	I	I	I	X	I	I	E	X	I	G	X	E
sulfurous acid	C	C	G	C	C	X	I	X	X	E	X	G	E	C	E
sulfuryl chloride	I	I	I	I	I	I	I	I	I	E	I	I	I	I	I
syrup	I	E	E	E	E	X	I	I	I	I	E	I	E	E	E
tallow	I	E	E	I	E	I	I	I	I	I	E	C	I	E	E
tannic acid	G	E	E	E	C	G	I	C	C	E	X	G	E	X	E
tanning liquors	I	E	E	I	C	E	I	I	I	E	I	I	E	C	E
tartaric acid	G	E	G	G	C	E	C	X	X	E	E	G	E	X	E
tetrachlorethane	I	I	E	I	I	I	I	I	I	E	E	I	E	X	E
tetrahydrofuran	I	E	E	I	X	X	I	X	E	E	E	X	C	X	X
toluene, toluol	E	E	E	I	E	E	E	E	E	E	E	X	X	X	C
tomato juice	E	E	E	I	E	C	I	C	C	E	E	I	E	E	E
trichlorethane	I	C	E	I	C	C	I	C	I	E	I	I	I	X	E
trichlorethylene	G	E	E	I	G	G	E	C	G	E	C	X	X	X	E
trichloropropane	I	I	E	I	E	I	I	I	I	I	I	I	I	E	E
tricresylphosphate	I	I	E	I	E	I	I	I	I	E	I	I	I	X	G
triethylamine	I	I	I	I	I	E	I	I	I	I	I	I	I	E	E
turbine oil	I	E	E	I	E	E	I	E	I	I	I	I	I	E	E
turpentine	G	E	E	I	C	G	C	G	G	E	E	X	G	X	E
varnish	E	E	E	E	E	E	G	I	C	E	E	I	E	G	E
vegetable juice	I	E	E	I	E	C	I	X	I	I	E	I	I	E	E
vinegar	E	E	E	E	X	G	G	C	X	E	E	G	C		E
water, acid, mine	I	E	E	I	C	C	X	C	I	I	E	I	E	E	E
water, distilled, lab grade 7	I	E	E	I	G	E	I	X	I	E	E	I	E	E	E
water, fresh	E	E	E	I	E	E	C	G	I	E	E	X	E	E	E
water, salt	I	E	E	I	G	G	C	X	I	I	E	I	E	E	E
weed killers	I	E	E	I	C	C	I	I	I	I	I	I	I	G	E
wey	I	E	E	I	G	I	I	I	I	I	I	I	I	E	E
whiskey & wines	E	E	E	E	X	G	G	X	X	E	E	G	E	E	E
white liquor (pulp mill)	I	E	E	I	I	X	I	C	I	E	E	I	E	E	E
white water (paper mill)	I	E	E	I	I	E	I	I	I	I	E	I	E	I	E
xylene	E	E	E	I	E	E	E	E	G	E	E	X	X	X	E
zinc chloride	X	X	G	G	X	X	X	X	X	E	E	G	E	E	E
zinc hydrosulphite	I	I	E	I	X	X	I	X	I	I	I	I	I	E	I
zinc sulfate	G	E	E	E	X	G	C	C	X	E	E	G	E	E	E

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G20S	3	G35G	9	G6090N	85	G65SSD	26	G84C	34	TSG	165
G20SM	3,12	G35MH	9	G6090P	118	G65SSDC	27	G84E	34	UCS	165
G21B	87	G35MP	9	G6096	110	G65SSDD	28	G84SZ	34	V10	79
G21B45	87	G35SC	9	G6096N	85	G65SSDP	27	G85	33	V12	79,80
G21B90	87	G36BFH	89	G6096P	119	G65SSE	27	G85B	33	V14	81
G21BL	88	G36BLF	89	G6098	110	G65SSF	27	G86	33	V16	81
G21BLM	88	G36BLM	89	G60T00	110	G65SSY	21	G87	33	V201	74
G21BRI	88	G36BM	89	G60TOOP	119	G65SSZ	21	G87S	33	V201PVC	82
G21BRS	88	G36NF	85	G60T06	111	G65ST	21	G88	33	V202	74
G21C	28	G36NM	85	G60T06P	119	G65VS	21	G88C	33	V202L	75
G21CRLM	28	G36RG	89,93	G60T60	111	G65VX	21	G88R	33	V203	76
G21N	83	G36SG	89,93	G60T60P	119	G65X	21	G89	50	V205	76
G21N90	84	G36VG	89,93	G61	29	G65Y	21	G8L	48	V207	77
G21SAE	88	G37	34	G6100	108	G66LC	20	G8M	47	V302	74
G21SS	29	G37-GHT	35,157	G6100P	119	G66LD	20	G9	166	V302L	75
G21TVB	162	G37JM	41	G6103	108	G66LDC	20	G91JM	39	V302LB	75
G21XS	162	G37MC	41	G62	29	G67	30	G91MC	38	V302W	74
G21Z	29	G37NK	41	G63	29	G68	30	G92	51	V303	76
G22B	88	G37NST	41	G65A	17	G69	31	G92JM	39	V305	76
G22BFS	88	G37P	34	G65AA	19	G6HD	60	G92MC	38	V306	77
G22N	84	G37SZ	41	G65AW	19	G6N	59	G92-RACK	52	V307	77
G22SAE	89	G37T	41	G65B	17	G7	47	G94	52	V308	77
G22TVB	162	G37TJM	40	G65BRA	22	G7000	115	G95NK	38	V401	78
G23S	11	G37TMC	40	G65BRB	22	G7001	115	G95SZ	39	V402	78
G23SSX	158	G37TNK	40	G65BRC	22	G7008	115	G97	34	V432	78
G23T	44	G37TNST	40	G65BRD	22	G7008P	113	G97B	34	V601	78
G24LM	89	G38	45	G65BRDC	23	G7016	115	G97G	34	V605	78
G25	13,14	G38W	45	G65BRDP	23	G7016P	113	G97-GHT	35,157	V610	79
G25B	13	G39	50	G65BRE	23	G7046	116	G97JM	40	V611	79
G26	13	G3A	57	G65BRF	23	G7046P	113	G97MC	40	V611M	79
G26B	13	G3S	58	G65C	17	G7070	116	G97NK	40	V803	82
G27	13,14	G3SS	58	G65CA	19	G7070P	114	G97SZ	40	V825	82
G27B	13	G4-019	90	G65CV	20	G7070PBH	114	G98JM	42	V853	82
G28	13,14	G4-025	90	G65D	17	G7090	117	G98JMA	41	XP100	164
G28C	13	G40L	90	G65DC	18	G7090P	114	G98JMC	42		
G28L	13	G40R	90	G65DDL	20	G7096	116	G98MC	42		
G28P	13	G41L	90	G65DD	19	G7096P	113	G98MCA	41		
G28SC	13	G41R	90	G65DIA	26	G7096PX	114	G98NK	42		
G28SP	13	G42	90	G65DIC	26	G7098	116	G98NKA	41		