CORROSION RESISTANCE CHART

Self-Priming Centrifugal · End-Suction Centrifugal · Hand Pump · Quick Connect Couplings · Elbows · Strainers

Key to product symbols used in chart heading:

A	Bung adapter
B	Bearing housing (on pedestal model centrifugal pumps), adapter plate (between pump & electric motor on centrifugal pumps close coupled to electric motors)
D	Piston
E	Elbow and Nozzle for Hose Assembly on Hand Pump
F	Fasteners, wetted ('pins' in the quick connect couplings)
G	Gasket
H	Housing
I	Impeller
O	O-rings, check valve, shaft seal bellows
R	Piston rod (in the hand pump), pump shaft sleeve (in the centrifugal pumps)
S	Shaft seal
T	Suction tube
U	Discharge Hose
V	Volute
X	Indicates that entire part is constructed of that material

NOTE: Materials of construction listed for various parts or pumps are those which are available. Materials listed are not necessarily standard. Consult your catalog, in conjunction with our model numbering chart, to determine materials of construction.

Consult the factory for chemical applications involving temperatures greater than 80° F.

NOTE: The following Corrosion Resistance Chart is only to be used as a guide to selecting the proper pump for your specific application. To the best of our knowledge, the information contained herein is correct. However, we do not assume any liability whatsoever for the accuracy or inaccuracy, or the completeness, or incompleteness, of the information contained herein. Final determination of the suitability of any information or material for the use intended, or the manner of use, is the sole responsibility of the user.

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A - Recommended
C - Not Recommended
X - Insufficient data
F - Consult Factory

MATERIALS

SEE KEY ON PAGE 1 FOR PRODUCT SYMBOL IDENTIFICATION

PRODUCT	PLASTICS							ELASTOMERS					METALS		MECHANICAL SEALS				
	RYTON (FRP)**	Polyester (FRP)**	Polypropylene (FRP)**	HDPE (High density PE)	Noryl (FRP)**	PVC	HALAR	Cross Linked PE	UHMW Polyethylene	Buna-N	EPDM	Viton	Cork-Nitrile	Hastelloy C	Titanium	316 Stainless Steel	Carbon	Ceramic	Siliconized Graphite
SELF-PRIMING CENTRIFUGAL	H,I,V	H,I,V	H,I				B					O	O	O		S,F	F,R	S,F,R	S	S	S
END-SUCTION CENTRIFUGAL		H,I,V					H,I,V					O	O	O		S,F	F,R	S,F,R	S	S	S
HAND PUMP	H	HTD AE						T,U	A,D,E H	U	T		OG	OG	G			R,F			
QUICK CONNECT COUPLINGS			H									G	G	G				F			
ELBOWS			X																		
STRAINERS						X			X												
PLASTIC PIPE NIPPLES								X													
CHEMICAL																					
ACETALDEHYDE	A	A	C	C	X	C	A	A	A	C	A	C	X	A	A	A	A	A	A
ACETIC ACID, 20%	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A	A
ACETIC ACID, 50%	A	C	X	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A	A
ACETIC ACID, Glacial	A	C	X	C	A	C	A	A	A	C	A	C	C	A	A	A	A	A	A
ACETIC ANHYDRIDE	A	C	A	C	C	C	A*	X	A	C	A	C	X	A	A	A	A	A	A
ACETONE	A	C	A	A	X	C	A	A	A	C	A	C	C	A	A	A	A	A	A
ALCOHOL, AMYL	A	A*	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
ALCOHOL, ETHYL	A	A	A	A	A	X	A	A	A	A	A	A	A	A	X	A	A	A	A
ALCOHOL, ISOPROPYL	A	C	A	X	A	A	A	A	A	C	A	A	C	A	A	A	A	A	A
ALCOHOL, METHYL	A	A	A	A	X	A*	A*	A	A	A	A	C	A	A	A	A	A	A	A
ALCOHOL, PROPYL	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
ALUMINUM CHLORIDE	A	C	A	A	A	A	A	A	A	A	A	A	A	A	C	C	A	A	A
ALUMINUM FLUORIDE	A	C	X	A	A	A	A	A	A	A	A	A	A	A	C	C	A	X	A
ALUMINUM SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
AMMONIA, 30% (cold)	A	C	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A	A	A
AMMONIUM CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
AMMONIUM HYDROXIDE "NOTE 1"	A	C	A	A	A	A	A	A	A	C	A	C	C	A*	A	A*	A	A	A
AMMONIUM NITRATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
AMMONIUM PERSULFATE	A	A	X	A	A	A	A	A	A	C	A	A	X	A	X	A*	A	A	A
AMMONIUM PHOSPHATE	A	A	X	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
AMMONIUM SULFATE	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A	A*	A	A	A
AMYL ACETATE	A	A	C	C	C	C	A	A	A	C	A	C	X	A	A	A	A	A	A
AMYL CHLORIDE	A	A	X	C	C	C	A	C	C	X	X	A	X	A	X	A*	A	A	A
ANILINE	A	C	C	C	C	C	A*	A	A	C	A	C	X	A	A	A	A	A	A
AQUA REGIA	X	C	X	C	C	C	A	X	C	C	X	A*	X	A	A	C	C	A	C
ARSENIC ACID	A	C	A	A	A	A	A	A	A	A	A	A	A	X	X	A	A	A	A
BARIUM CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A*	A	A	A
BARIUM SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
BEER	A	A	X	A	A	A	A	A	A	C	A	A	X	A	A	A	A	A	A
BENZALDEHYDE	C	A	A	C	C	C	A*	X	A	C	A	C	X	A	A	A	A	A	A
BENZENE (BENZOL)	A*	A*	C	C	C	C	A	A	A	C	C	A	A	A	A	A	A	A	A
BENZOIC ACID	A	A	A	A	A	A	A	A	A	C	X	A	X	A	A*	A	A	A	A
BORAX (SODIUM BORATE)	A	A	A	A	A	A	A	A	A	A	A	A	A	A	X	A	A	A	A
BORIC ACID	A	A	X	A	A	A	A	A	A	A	A	A	A	A	A	A	A	X	A
BROMINE WATER	C	C	C	C	A	A*	A	A*	A	C	C	A	X	A	A	C	C	A	A
BUTYL ACETATE	A	A	A	C	C	C	A	A	A	X	A	C	C	A	X	A	A	A	A
BUTYRIC ACID	A*	C	X	C	A	A	A	A	A	C	A	A	X	A	A*	A	A	A	A
CALCIUM BISULFITE	A	C	X	A	A	A	A	A	A	A	C	A	A	A	A*	A	A	A	A
CALCIUM CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A*	A	A	A
CALCIUM HYPOCHLORITE 20%	A	A	X	A	A	A	A	A	A	A	A	A	A	A	A	A*	A	A	A
CALCIUM SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
CARBON TETRACHLORIDE	A*	A*	C	C	C	A*	A	A	A	C	C	A	A	A	A	A	A	A	A
CARBONIC ACID	A	A	A	A	A	A	A	A	A	A	A	A	A	A	X	A	A	A	A
CHLOROACETIC ACID	A	C	X	C	C	A	A	A	A	C	A	C	X	A	A	C	A	A	A
CHLORINE WATER	C	C	X	A	A	A	A	A*	A	C	A	A	A	A	A	C	A	A	A

Note 1: aqua ammonia
*For use in applications where the temperature does not exceed 80° F.
**FRP = Fiberglass Reinforced Plastic

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	RYTON (FRP)**	Polyester (FRP)**	Polypropylene (FRP)**	HDPE (High density PE)	Noryl (FRP)**	PVC	HALAR	Cross Linked PE	UHMW Polyethylene	Buna-N	EPDM	Viton	Cork-Nitrile	Hastelloy C	Titanium	316 Stainless Steel	Carbon	Ceramic	Siliconized Graphite
SELF-PRIMING CENTRIFUGAL	H,I,V	H,I,V	H,I			B						O	O	O		S,F	F,R	S,F,R	S	S	S
END-SUCTION CENTRIFUGAL		H,I,V				H,I,V						O	O	O		S,F	F,R	S,F,R	S	S	S
HAND PUMP	H	HTD AE					T,U	ADE H	U	T			OG	OG	G			R,F			
QUICK CONNECT COUPLINGS			H									G	G	G				F			
ELBOWS			X																		
STRAINERS						X			X												
PLASTIC PIPE NIPPLES								X													
CHEMICAL																					
CHLOROBENZENE	A	C	C	C		C	C	A	A	A		C	C	A	X	A	X	A	A	A	A
CHLOROFORM (WET)	A	A*	A	C		C	C	A	A*	A		C	C	A	X	A	A	A	A	A	A
CHLOROSULFONIC ACID	C	C	A	C		X	A	A*	A*	A		C	C	C	C	A	A	C	C	A	A
CHROMIC ACID, 10%	A	C	A	A		A	A	A	A	A		C	C	A	C	A	A	A	A*	A	A
CHROMIC ACID, 50%	A*	C	A	A		C	A	A	A	A		C	C	A	C	A	A	C	A*	A	A
CHROMIC ACID, 80%	A*	C	A	A		C	C	A	A	A		C	C	A	C	A	A	C	A*	A	A
CITRIC ACID	A	A	A	A		A	A	A	A	A		C	A	A	A	A	A	A	A	A	A
COPPER CHLORIDE	A	C	A	A		A	A	A	A	A		A	A	A	A	A	A	C	A*	A	A
COPPER CYANIDE	A	C	A	A		A	A	A	X	A		A	A	A	A	A	A	A	A	A	A
COPPER NITRATE	A	A	A	A		A	A	A	A	A		A	X	A	A	A	A	A	A	A	A
COPPER SULFATE	A	A	A	A		A	A	A	A	A		A	A	A	A	A	A	A	A	A	A
CRESYLIC ACID	X	A	C	C		X	A	A	A	A		A	C	A	A	A	A	A	A	A	A
ETHYL ACETATE	A	A	A*	C		C	C	A	A	A		X	A	C	C	A	X	A	A	A	A
ETHYL CHLORIDE	A	C	C	C		C	C	A	A*	A		A	A	A	A	A	A	A	A	A	A
ETHYLENE GLYCOL	A	A	A	A		A	A*	A	A	A		A	A	A	A	A	X	A	A	A	A
FATTY ACIDS	X	A	A	A		A	A	A	A	A		A	C	A	A	A	A	A	A	A	A
FERRIC CHLORIDE	A	C	A	A		A	A	A	A	A		A	A	A	A	A*	A	C	C	A	A
FERRIC NITRATE	A	A*	A	A		A	A	A	A	A		A	A	A	A	A	A	A	A	A	A
FERRIC SULFATE	A	A*	A	A		A	A	A	A	A		A	A	A	A	A	A	A	A	A	A
FERROUS CHLORIDE	A	A	A	A		A	A	A	A	A		X	A	A	A	A	A	C	A	A	A
FERROUS SULFATE	A	A	A	A		A	A	A	A	A		X	A	A	X	A	A	A	A	A	A
FLUOBORIC ACID	A	A*	A	A		A	A	A	X	A		A	A	A	A	A	C	A	A	A	A
FLUOSILICIC ACID	A	X	A	A		A	A	A	X	A		A	A	A	A	A	C	A*	A	C	A
FORMALDEHYDE, 40%	A	A	A	A		A	A	A	A	A		A	A	A	A	A	A	A	A	A	A
FORMIC ACID	A	C	A	A		A	A*	A	A	A		A*	A*	C	A*	A	A	C	A	A	A
FREON 11 (REFR.) (MF)	A*	A*	C	A*		C	C	A	C	A		A*	C	A*	A*	X	X	C	A	A	A
FREON 12 (Wet)	A*	A	A	A		C	A*	A	C	A		A	A*	A*	A	X	X	C	A	A	A
FREON 22 (REFR.) (TMS)	A*	A*	C	A*		C	C	A	C	A		C	C	C	C	X	X	A*	A	A	A
FREON 113 (REFR.)	A*	A*	C	A*		C	C	A	A	A		A*	C	F	A*	A	A	A*	A	A	A
FREON TF (SOLV)	A*	A*	C	A*		C	C	A	A	A		A*	C	F	A*	A	A	A	A	A	A
FREON TMC (SOLV)	A*	C	C	X		C	C	A	C	C		C	C	A*	C	A	X	A	A	A	A
FUEL OILS	A	A	C	C		C	A	A	A*	A		A	C	A	A	A	A	A	A	A	A
FURFURAL	A	A	C	C		C	C	A	A	A		C	A	C	X	A	X	A	A	A	A
GASOLINE	A	A	C	C		C	A*	A	A*	A		A	C	A	A	A	C	A	A	A	A
GLYCERINE (GLYCEROL)	A	A	A	A		X	A	A	A	A		A	A	A	A	A	A	A	A	A	A
HEPTANE	A	A	C	C		C	A	A	A*	A		A	C	A	A	A	X	A	A	A	A
HEXANE	A	A	C	X		C	A*	A	A	C		A	C	A	A	A	X	A	A	A	A
HYDROBROMIC ACID, 50%	A	C	A	A		A	A	A	A	A		A	A	A	A	A*	A	C	A	A*	A
HYDROCHLORIC ACID, 0-20%	A	A	A	A		A	A	A	A	A		A*	A	A	A	A*	C	C	A	A*	A
HYDROCHLORIC ACID, 20+	A	C	A	A		A	A	A	A	A		C	A	A	C	A*	C	C	A	A*	A
HYDROCYANIC ACID	X	A	A	A		A	A	A	A	A		A*	A	A	A	A	X	A	A	A*	A
HYDROFLUORIC ACID, 10%	C	C	C	A		C	A*	A	A	A		X	X	A	X	A	X	C	C	C	A
HYDROFLUORIC ACID, 30%	C	C	C	A		C	A*	A	A	A		C	A	A	X	A	X	C	C	C	A
HYDROFLUORIC ACID 60%	C	C	C	C		C	A	A	A	A		C	A	A	X	A	C	C	C	C	A
HYDROFLUOSILICIC ACID 20%	A	C	A	C		A	A	A	A	A		A	A	A	A	A	C	A	X	C	A

*For use in applications where the temperature does not exceed 80° F.
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SELF-PRIMING CENTRIFUGAL	H,I,V	H,I,V	H,I		B							O	O	O		S,F	F,R	S,F,R	S	S	S
END-SUCTION CENTRIFUGAL		H,I,V			H,I,V							O	O	O		S,F	F,R	S,F,R	S	S	S
HAND PUMP	H	HTD AE					T,U	ADE H	U	T			OG	OG	G			R,F			
QUICK CONNECT COUPLINGS			H									G	G	G				F			
ELBOWS			X																		
STRAINERS				X			X														
PLASTIC PIPE NIPPLES								X													
CHEMICAL																					
HYDROGEN PEROXIDE, 30%	A*	C	A	A	X	A	A	A	A	C	A*	A	A	A	A	A*	A	X	A
HYDROGEN PEROXIDE, 50%	C	C	X	A	X	A*	A	A	A	C	A*	A	A	A	X	A*	A	X	A
HYDROGEN PEROXIDE, 90%	X	C	X	A	X	C	A	A	A	C	A*	A*	A	A	X	A*	A	X	A
HYDROGEN SULFIDE, AQ. SOL.	A	A	A	A	A	A	A	A	A	C	A	C	A	A	A	A	A	X	A
IODINE (In Alcohol)	C	C	A*	C	A	C	A	A*	A	C	X	A	X	A	C	C	A	A	A
KEROSENE	A	A	C	C	C	A	A	A	A	A	C	A	A	A	A	A	A	A	A
KETONES	A	A	A*	X	C	C	A	X	C	C	A	C	X	A	A	A	A	A	A
LACQUER THINNERS	X	C	C	X	C	C	A	A*	C	C	C	C	C	A	A	A	A	A	A
LACTIC ACID	A	A*	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
LEAD ACETATE	A	A	A	A	A	A	A	A	A	A*	A	A	A	A	A	A	A	A	A
LUBRICATING OIL	A	A	A*	C	X	A*	A	A	A	A	C	A	A	A	A	A	A	A	A
MAGNESIUM CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A*	A	A	A
MAGNESIUM NITRATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
MAGNESIUM SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
MALEIC ACID	X	A	A	A	X	A	A	X	A	X	C	A	X	A	A	A	A	A	A
METHYL CHLORIDE	A*	C	C	C	C	C	A	A*	A	C	A	C	X	A	A	A	A	A	A
METHYL ETHYL KETONE	A	A	A*	C	C	C	A	C	C	C	A	C	X	A	A	A	A	A	A
METHYL ISOBUTYL KETONE	A	A	A*	X	C	C	A	X	C	C	C	C	X	A	A	A	A	A	A
METHYLENE CHLORIDE	A*	C	C	C	C	C	C	X	C	C	C	C	A	A	A	A	A	A	A
NAPHTHA	A	A	A	C	X	A	A	C	A	A	C	A	A	A	A	A	A	A	A
NAPHTHALENE	A	A	C	A	X	C	A	C	A	C	C	A	X	A	A	A	A	A	A
NICKEL CHLORIDE	A	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
NICKEL SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
NITRIC ACID, 10%	A	A*	A	A	A	A	A	A	A	C	A	A	C	A	A	A	A*	A	A
NITRIC ACID, 20%	A	C	A	A	A	A	A	A	A	C	A	A	C	A	A	A	A*	A	A
NITRIC ACID, 40%	A*	C	A*	A	C	A	A	A	A	C	C	A	C	A	A	A	C	A	A
NITRIC ACID, ANHYDR.	C	C	C	C	C	C	A	A	A	C	C	C	C	A	A	A*	C	A	C
NITRO BENZENE	A	A	A	C	C	C	A	A	A	C	C	C	C	A	A	A	A	A	A
OIL AND FATS	A	A	A	A	C	A	A	X	A	A	C	A	A	A	A	A	A	A	A
OLEIC ACID	A	A	A*	A	A	A	A	X	C	A	C	A*	A	A	X	A	A	A	A
OLEUM	A*	C	C	C	C	C	A	A	A	C	C	A	X	A	X	A	A	A	A
OXALIC ACID	A	C	A	A	A	A	A	A	A	A*	A	A	A*	A	A*	A*	A	A	A
PERCHLOROETHYLENE	A*	A*	C	X	C	C	A	X	C	C	C	A	C	A	A	A	A	A	A
PHENOL	A	C	A	X	C	A*	A	A	A	C	C	A	X	A	A	A	A	A	A
PHOSPHORIC ACID, 0-80%	A	A*	A	A	A	A	A	A	A	A*	A	A	A*	A	A*	A	A	A	A
PHOSPHORIC ACID, 80-100%	A	A*	A	A	A	A	A	A	A	C	A	A	X	A	A*	A	A	A	A
POTASSIUM BICARBONATE	X	A	A	A	A	A	A	X	A	A	X	A	A	A	A	A	A	A	A
POTASSIUM BROMIDE	A	A	A	A	A	A	A	X	A	A	X	A	A	A	A	A	A	A	A
POTASSIUM CARBONATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
POTASSIUM CHLORATE	A	A	A	A	A	A	A	A	A	A	A	A	A	X	A	A	A	A	A
POTASSIUM CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
POTASSIUM CYANIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
POTASSIUM DICHROMATE	A	C	A	A	A	A	A	X	A	A	A	A	A	A	A	A	C	A	A*
POTASSIUM HYDROXIDE	A	C	A	A	A	A	A	A	A	A	A	C	A	A	A*	A	X	A	A
POTASSIUM NITRATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

*For use in applications where the temperature does not exceed 80° F.
**FRP = Fiberglass Reinforced Plastic

A - Recommended
C - Not Recommended
X - Insufficient data
F - Consult Factory

MATERIALS

SEE KEY ON PAGE 1 FOR PRODUCT SYMBOL IDENTIFICATION

PRODUCT	PLASTICS							ELASTOMERS					METALS		MECHANICAL SEALS				
	RYTON (FRP)**	Polyester (FRP)**	Polypropylene (FRP)**	HDPE (High density PE)	Noryl (FRP)**	PVC	HALAR	Cross Linked PE	UHMW Polyethylene	Buna-N	EPDM	Viton	Cork-Nitrile	Hastelloy C	Titanium	316 Stainless Steel	Carbon	Ceramic	Siliconized Graphite
SELF-PRIMING CENTRIFUGAL	H,I,V	H,I,V	H,I		B						O	O	O		S,F	F,R	S,F,R	S	S	S
END-SUCTION CENTRIFUGAL		H,I,V			H,I,V						O	O	O		S,F	F,R	S,F,R	S	S	S
HAND PUMP	H	HTD AE				T,U	ADE H	U	T			OG	OG	G			R,F			
QUICK CONNECT COUPLINGS			H								G	G	G				F			
ELBOWS			X																	
STRAINERS				X			X													
PLASTIC PIPE NIPPLES						X														
CHEMICAL																			
POTASSIUM PERMANGANATE	A	C	A	A	A	A	A	X	A	A	X	A	A	A	A	A	A	A	A
POTASSIUM SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
SOAPS (NEUTRAL)	A	A	A	A	A	A*	A	A	A	A	A	A	A	A	A	A	A	A	A
SODIUM ACETATE	A	A	A	A	A	A	A	A	A	C	A	C	X	A	A	A	A	A	A
SODIUM BICARBONATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
SODIUM BISULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
SODIUM BISULFITE	X	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
SODIUM CARBONATE, 10%	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A*	A	A	A
SODIUM CHLORATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
SODIUM CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
SODIUM CYANIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
SODIUM HYDROXIDE, 20%	A	C	A	A	A	A	A	A	A	A*	A	C	A*	A	A	A	A	C	A
SODIUM HYDROXIDE, 50%	A	C	A	A	A	A	A	A	A	A*	A	C	A*	A	A	A	A	C	A
SODIUM HYPOCHLORITE	A	C	A*	A	A	A	A	X	A	C	A	A*	X	A	A	C	C	C	A
SODIUM NITRATE	A	A	A	A	A	A	A	A	A	A*	A	A	A	A	A	A	A	A	A
SODIUM SILICATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	X	A	A	A	A
SODIUM SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	X	A	A	A	A
SODIUM SULFIDE	A	A	A	A	A	A	A	A	A	C	A	A	X	A	A	A	A	A	A
STANNIC CHLORIDE	A	C	A	A	A	A	A	A	A	A	A*	A	A	A	A	C	A	A	A
STEARIC ACID	X	A*	A*	A	X	A	A	A	A	A	A	A	A	A	A	A	A	A	A
STODDARDS SOLVENT	A	A	X	A	C	C	A	X	A	A	C	A	A	A	A	A	A	X	A
SULFURIC ACID 0-29%	A	A*	A	A	A	A*	A	A	A	C	A*	A	A	A	A*	A*	A	A	A
SULFURIC ACID 30-90%	A*	C	A	A	A	A*	A	A	A*	C	C	A	C	A	C	C	A	A	A
SULFURIC ACID 91-100%	A*	C	A	X	A	A	A	A	A*	C	C	A*	C	A	C	F	X	A	A*
TANNIC ACID	A	C	A	A	X	A	A	A	A	C	A	A	A	A	A	A	A	A	A
TANNING LIQUORS	X	X	A	A	X	A	A	A	A	A	A	A	A	A	A	A	A	A	A
TARTARIC ACID	A	A	A	A	A	A	A	X	A	C	A	A	X	A	A	A	A	A	A
TETRACHLOROETHANE	X	C	C	X	C	C	X	X	X	C	C	A	C	A	A*	A	A	A	A
TETRAHYDROFURANE	A	A*	A	C	C	C	C	X	C	C	C	C	X	A	X	A	A	A	A
TOLUENE (TOLUOL)	A	C	A	C	C	C	A	A	A	C	C	A	A	A	A	A	A	A	A
(I,I,I) TRICHLOROETHANE	A	C	A	C	C	C	X	A*	X	C	C	A	C	A	A	A	A	A	A
TRICHLOROETHYLENE	A	C	A	C	C	C	A	A*	A	C	C	A	C	A	A	A	A	A	A
TRICRESYLPHOSPHATE	X	X	X	A	X	C	C	X	A	C	A	A	X	A	X	A	A	A	A
TURPENTINE	A	A	C	C	X	A	A	A	A	A	C	A	A	A	X	A	A	A	A
UREA	A	C	A	A	A	A	A	X	A	C	A	A	X	A	A	A	A	A	A
VINEGAR	A	A	A	A	A	A	A	A	A	C	A	C	A	A	A	A	A	A	A
WHITE LIQUOR (ACID)	X	X	X	X	A	A	A	X	C	A	X	A	A	A	X	A	X	A	A
XYLENE (SYLOL)	A	C	C	C	C	C	A	A	A	C	C	A	A	A	X	A	A	A	A
ZINC CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A
ZINC SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

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**FRP = Fiberglass Reinforced Plastic

PACER

Safety First / An Ounce of Prevention

Static Electricity is Blamed for Explosion

"User of hand pump is burned while transferring gasoline from a 55-gallon drum, which had been slushing around in the back of a pickup truck. Explosion took place when the liquid entered the receiving tank. . . It is presumed that the potential static electricity in the receiving tank was different from that of the holding tank, which was aggravated due to an extremely dry climate. . ."

Flammable solvents are often purchased in bulk and transferred manually or with motor driven pumps. Care must be taken to neutralize static electricity which may rest as a potential in the storage tank, as well as that which may rest in the receiving tank. The potential of such would, of course, be greatly increased if the liquid were allowed to splash around during movement of the container. Therefore both containers must be satisfactorily grounded, and then each of the containers must be bonded, that is connecting the ground wire from tank to tank so that the potential static electricity is now equalized.

Sparks from Open Motor Cause Explosion

"User of pump is burned while transferring explosive liquids. Accident was caused by the use of an open motor. . . Explosion resulted and the employee was burned over many parts of his body."

In addition to the proper use of bonding and grounding cables, when motorized pumps are used to transfer flammables and combustibles those of the explosion-proof or air driven type should be used. Electric or air motors are often wired and/or enclosed in such a way that no sparks can be emitted from the motor casing - otherwise sparks from the motor could cause the flammable liquid to flash or explode.

Splashing of Acid Causes Burns

"Operator working with aggressive acids receives skin burns when pump, which was energized, created pressure in a pressure vessel not closed properly, therefore allowing liquid to escape and splashing the operator."

Operator should have checked the instruction manual and followed procedures as set forth by the manufacturer to ensure that the cover of the pressure vessel was securely tightened. Operator could also have prevented bodily injury if he was protected with adequate clothing, which is fabricated to resist such liquids.

Injuries due to splashing of aggressive liquids or explosion of flammables can be avoided by wearing proper clothing, which may include coveralls, apron, shoes, goggles, gloves, face mask and hat.

Each of the above operators could have avoided some bodily harm by wearing outer garments for protection from skin burns.

Consult a Dealer in Your Area for these Garments

PSB33C
189

DRUM PUMP CHEMICAL RESISTANCE GUIDE

TECHNICAL BULLETIN PTP-107C

PACER®

The information contained in this Drum Pump Chemical Resistance Guide is to be used only as a general guide for proper drum pump tube selection. No warranty is implied nor is any guarantee provided. When compatibility data are inconclusive, field testing is recommended. An asterisk indicates the material is flammable and may only be handled with a stainless steel pump tube and appropriate drive motor which are properly grounded and bonded according to Operating Instructions. Always consult with a safety engineer for proper drive motor selection when pumping flammables. All test data listed is at room temperature (72°F, 22°C) unless otherwise stated.

R = Recommended
M = Minor to moderate, should be field tested
X = Not recommended
— = No data
***** = Flammable or explosive

Use only explosion-proof motors on flammable liquids. Only metallic pumps should be used for transferring flammable or explosive liquids.
All pumps and containers must be properly grounded and bonded to prevent static discharge and sparking, which could cause electric shock, fire or explosion. A ground wire should be used on any explosion-proof motor as well as the container when transferring explosive material. Always consult with a Safety Engineer for proper pump / motor selection.

	POLYPROPYLENE - MAX. 130°F (54°C)	PVDF (KYNAR®) - MAX. 175°F (80°C)	STAINLESS STEEL 316 - MAX 175°F (80°C)	CPVC / PVDF - MAX 175°F (80°C)
* Acetaldehyde	X	X	R	X
Acetamide (PVDF, R to 75°F/24°C)	—	R	R	—
* Acetate solvents	X	X	R	X
Acetic acid (10% -80%)	R	R	M	R
Acetic acid (80%)	—	R	M	X
Acetic acid, glacial (PVDF, R to 120°F/49°C) (PP, R to 100°F/38°C)	R	R	M	X
Acetic anhydride	X	X	R	X
* Acetone	X	X	R	X
* Acetyl chloride	X	X	M	X
* Acetylene	X	X	R	X
* Alcohols	X	X	R	X
Aluminum chloride	R	R	X	R
Aluminum fluoride	R	R	X	R
Aluminum hydroxide	R	R	R	R
Aluminum nitrate	R	R	R	R
Aluminum potassium sulfate	R	R	R	R
Aluminum sulfate	R	R	R	R
Amines	—	—	R	X
* Ammonia, aqua (10%)	X	X	R	X
* Ammonia, aqueous	X	X	R	X
* Ammonia, (concentrated)	X	X	R	X
Ammonium bifluoride (PP, R to 70°F/21°C)	R	R	R	R
Ammonium carbonate	R	R	R	R
Ammonium chloride	R	R	M	R
Ammonium fluoride (10%)	—	R	—	R
Ammonium fluoride (25%)	R	R	—	R
Ammonium hydroxide	R	R	R	X
Ammonium nitrate	R	R	R	R
Ammonium nitrite (PP, R to 70°F/21°C)	R	—	—	—
Ammonium oxalate	R	—	R	—

	POLYPROPYLENE - MAX. 130°F (54°C)	PVDF (KYNAR®) - MAX. 175°F (80°C)	STAINLESS STEEL 316 - MAX 175°F (80°C)	CPVC / PVDF - MAX 175°F (80°C)
Ammonium persulfate	R	R	R	R
Ammonium phosphate, dibasic	R	R	R	R
Ammonium phosphate, monobasic	R	R	R	R
Ammonium phosphate, tribasic	R	R	R	R
Ammonium sulfate	R	R	R	R
Ammonium sulfide (PVDF & CPVC / PVDF, R to 125°F/52°C)	—	R	—	R
Ammonium thiocyanate	—	R	—	R
Ammonium thiosulfate	—	R	R	R
* Amyl acetate	X	X	R	X
* Amyl chloride	X	X	R	X
Aniline (PVDF, R to 75°F/24°C)	M	R	R	X
Aniline dyes	—	—	M	—
Aniline hydrochloride (PVDF, R to 75°F/24°C)	—	R	X	X
Anisole	—	—	R	—
Aqua regia (80%) (PVDF, R to 75°F/24°C)	X	R	X	X
Arsenic acid	R	R	R	R
Barium carbonate	R	R	R	R
Barium chloride	R	R	M	R
Barium hydroxide	R	R	R	R
* Barium nitrate	X	X	R	X
Barium sulfate	R	R	R	R
Barium sulfide	R	R	R	R
Benzaldehyde (PVDF, R to 75°F/24°C)	X	R	R	X
Benzene, benzol	X	X	R	X
Benzene sulfonic acid (PVDF, R to 75°F/24°C)	—	R	M	X
Benzoic acid	M	R	R	R
Bismuth carbonate	R	R	—	R
Black liquors	R	R	—	—
Boric acid	R	R	R	R
Brine acid	—	R	—	—

DRUM PUMP Chemical Resistance Guide (cont'd.)

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Use only explosion-proof motors on flammable liquids. Only metallic pumps should be used for transferring flammable or explosive liquids.
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Bromic acid	R	R	—	R
Bromine liquid (PVDF, R to 150°F/66°C)	—	R	X	X
Bromine water	—	R	M	X
* Butane	X	X	R	X
* Butyl acetate	X	X	M	X
Butyl phenol	—	—	—	—
* Butylene	X	X	R	X
Butyric acid	R	R	R	X
Calcium bisulfide	R	R	M	R
Calcium bisulfite	R	R	M	R
Calcium chlorate	R	R	R	R
Calcium chloride	R	R	M	R
Calcium hydroxide	R	R	R	R
Calcium hypochlorite (PVDF & CPVC / PVDF, R to 70°F/21°C)	R	R	R	R
Calcium nitrate	R	R	M	R
Calcium sulfate	R	R	R	R
Calcium sulfite	R	—	M	—
* Carbon disulfide	X	X	R	X
Carbonic acid	R	R	R	R
Carbon tetrachloride	X	R	R	X
Cellosolve®	R	R	M	X
* Cetyl alcohol	X	X	R	X
Chlorine liquid	X	R	X	X
Chloroacetic acid	X	X	X	X
* Chlorobenzene	X	X	R	X
Chlorobenzyl chloride (PVDF, R to 125°F/52°C)	—	R	—	X
Chloroform (PVDF, R to 125°F/52°C)	X	R	R	X
Chlorosulfonic acid (100%)	X	X	X	X
Chromic/sulfuric acid	X	X	X	X
Chromic acid (10%) (PVDF& CPVC / PVDF, R to 120°F/49°C)	R	R	R	R
Chromic acid (50%) (PVDF, R to 120°F/49°C) (CPVC / PVDF, R to 70°F/21°C)	R	R	M	R
Citric acid	R	R	R	R
Citric oils	R	—	R	—
Copper chloride	R	R	X	R
Copper cyanide	R	R	R	R
Copper nitrate	R	R	R	R
* Copper sulfate	R	R	R	R

	POLYPROPYLENE - MAX. 130°F (54°C)	PVDF (KYNAR®) - MAX. 175°F (80°C)	STAINLESS STEEL 316 - MAX 175°F (80°C)	CPVC / PVDF - MAX 175°F (80°C)
Cresylic acid (PVDF, R to 150°F/66°C)	—	R	R	M
* Cyclohexane	X	X	R	X
* Cyclohexanol	X	X	M	X
* Cyclohexanone	X	X	M	X
Diacetone alcohol	X	X	R	X
* Dichloroethylene	X	X	X	X
Diesel fuels	X	R	R	X
* Diethyl ether	X	X	M	X
* Diisobutylene	X	X	M	X
Dimethyl formamide	—	X	R	X
Dioctyl phthalate	—	—	R	—
Dyes	—	—	R	—
* Epichlorohydrine	X	X	R	X
* Ethanolamine	X	X	R	X
* Ether	X	X	R	X
* Ethyl acetate	X	X	R	X
* Ethyl chloride	X	X	R	X
* Ethyl ether	X	X	R	X
* Ethylene chloride	X	X	R	X
* Ethylene dichloride	X	X	R	X
Ethylene glycol	R	R	R	R
* Ethylene oxide	X	X	—	X
Fatty acids	M	M	R	M
Ferric chloride	R	R	M	R
Ferric nitrate	R	R	R	R
Ferric sulfate	R	R	R	R
Ferrous chloride	R	R	X	R
Ferrous sulfate	R	R	M	R
Fluoboric acid (CPVC / PVDF, R to 140°F/60°C)	R	R	M	R
Fluosilicic acid	R	M	—	M
Formaldehyde (PVDF, R to 120°F/49°C)	R	R	R	X
Formic acid	R	R	R	X
Furfural	X	M	R	X
Gallic acid (PVDF & CPVC / PVDF, R to 75°F/24°C)	M	R	M	R
Gelatin	X	R	R	R
Glue P. V. A.	M	R	R	R
Glycerin	R	R	R	R
Glycolic acid (PP, R to 70°F/21°C) (PVDF & CPVC / PVDF, R to 75°F/24°C)	R	R	—	R
Glycols	—	R	M	R

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	POLYPROPYLENE - MAX. 130°F (54°C)	PVDF (KYNAR®) - MAX. 175°F (80°C)	STAINLESS STEEL 316 - MAX 175°F (80°C)	CPVC / PVDF - MAX 175°F (80°C)		POLYPROPYLENE - MAX. 130°F (54°C)	PVDF (KYNAR®) - MAX. 175°F (80°C)	STAINLESS STEEL 316 - MAX 175°F (80°C)	CPVC / PVDF - MAX 175°F (80°C)
* Heptane	X	X	R	X	Muriatic acid (37%) (hot)	—	R	X	R
* Hexane	X	X	R	X	* Naptha	X	X	R	X
Hydrobromic acid	M	R	X	R	* Napthalene	X	X	M	X
Hydrochloric acid (20%)	R	R	X	R	Nickel chloride	R	R	R	R
Hydrochloric acid (37%) (cold)	R	R	X	R	Nickel sulfate	R	R	R	R
Hydrochloric acid (37%) (hot)	—	R	X	R	Nitric acid (5-10%)	R	R	R	R
Hydrofluoric acid (20%)	R	R	X	X	Nitric acid (20%)	R	R	R	R
Hydrofluoric acid (50%)	X	R	X	X	Nitric acid, (conc.) (PVDF, R to 120°F/49°C)	X	R	R	X
Hydrofluoric acid (75%)	X	R	X	X	Nitric acid, red fuming	—	X	R	X
Hydrofluoric acid (conc.) (cold)	—	R	—	X	Nitrobenzene (PVDF, R to 75°F/24°C)	M	R	M	X
Hydrofluosilicic acid (20%)	R	R	X	R	Oleic acid	R	R	R	X
Hydrogen fluoride	R	—	R	—	Oleum	X	X	R	X
* Hydrogen peroxide	X	X	R	X	Oxalic acid (cold) (PVDF, R to 125°F/52°C)	R	R	R	R
* Hydrogen sulfide (cold)	X	X	R	X	Palmitic acid	M	R	R	R
* Hydrogen sulfide (hot)	X	X	R	X	Perchloric acid (PVDF, R to 125°F/52°C)	—	R	X	M
Hypochlorous acid	—	R	X	R	Perchloroethylene	X	R	R	X
Iodine (PVDF, R to 150°F/66°C)	M	R	X	M	Petrolatum	—	R	R	R
* Isopropyl ether	X	X	R	X	Phenol (carbolic acid)	R	R	R	R
* Jet fuel (JP3, JP4, JP5)	X	X	R	X	Phosphoric acid (20%)	R	R	M	R
* Lacquer solvents	X	X	R	X	Phosphoric acid (20%-40%)	R	R	R	R
Lactic acid (PVDF & CPVC / PVDF, R to 120°F/49°C)	R	R	R	R	Phosphoric acid (45%)	R	R	M	R
Lead acetate	R	R	M	R	Phosphorus, red	—	—	R	—
Lead sulfamate	R	—	—	—	Phosphorus, yellow	—	—	R	—
* Ligroin	X	X	R	X	Photographic solutions	R	—	R	—
Magnesium carbonate	R	R	R	R	Plating solutions, chrome 40	R	R	R	R
Magnesium chloride	R	R	R	R	Plating solutions, copper	R	R	R	R
Magnesium hydroxide	R	R	R	R	Plating solutions, gold	R	—	R	—
Magnesium sulfate	R	R	R	R	Plating solutions, iron	R	R	R	R
Maleic acid	M	R	R	R	Plating solutions, lead	R	R	—	R
Mercuric chloride (dilute solution)	R	R	X	R	Plating solutions, nickel	R	R	—	R
Mercuric cyanide	R	R	R	R	Plating solutions, silver	R	R	R	R
* Methyl acetone	X	X	R	X	Plating solutions, tin	R	R	R	R
Methyl chloride	X	R	R	X	Plating solutions, zinc	R	R	R	R
* Methyl ethyl ketone	X	X	R	X	Potassium bicarbonate	R	R	M	R
* Methyl isobutyl ketone	X	X	R	X	Potassium bromide	R	R	R	R
Methylene chloride	X	X	R	X	Potassium carbonate	R	R	R	R
Milk	R	R	R	R	Potassium chlorate	R	R	R	R
* Monoethanolamine	X	X	R	X	Potassium chloride	R	R	R	R
Muriatic acid (20%)	R	R	X	R	Potassium chromate	R	R	M	R
Muriatic acid (37%) (cold)	R	R	X	R	Potassium dichromate	R	R	R	R

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Use only explosion-proof motors on flammable liquids. Only metallic pumps should be used for transferring flammable or explosive liquids.
All pumps and containers must be properly grounded and bonded to prevent static discharge and sparking, which could cause electric shock, fire or explosion. A ground wire should be used on any explosion-proof motor as well as the container when transferring explosive material. Always consult with a Safety Engineer for proper pump / motor selection.

	POLYPROPYLENE - MAX. 130°F (54°C)	PVDF (KYNAR®) - MAX. 175°F (80°C)	STAINLESS STEEL 316 - MAX 175°F (80°C)	CPVC / PVDF - MAX 175°F (80°C)
Potassium hydroxide (PVDF & CPVC / PVDF, R to 150°F/66°C)	R	R	R	R
Potassium nitrate	R	R	R	R
Potassium permanganate	M	R	M	R
Potassium sulfate	R	R	M	R
Propionic acid (CPVC / PVDF, R to 140°F/60°C)	—	R	M	R
Silicone oil	R	R	R	R
Silver nitrate	R	R	R	R
Soap solutions	R	R	R	R
Sodium acetate	X	X	R	X
Sodium bicarbonate	R	R	R	R
Sodium bisulfate	R	R	R	R
Sodium bisulfite	R	R	R	R
Sodium borate	—	R	M	R
Sodium bromide	R	R	R	R
Sodium carbonate	R	R	R	R
Sodium chlorate (50%)	R	R	R	R
Sodium chloride	R	R	R	R
Sodium cyanide	R	R	R	R
Sodium hydroxide (20%)	R	R	R	R
Sodium hydroxide (50%)	R	X	M	X
Sodium hydroxide (80%)	R	X	X	X
Sodium hypochlorite to 20%	X	R	X	R
Sodium metaphosphate	X	—	R	—
Sodium nitrate	R	R	R	R
Sodium perborate	R	—	X	—
Sodium phosphate	R	R	M	R
Sodium silicate	R	R	R	R
Sodium sulfate	R	R	R	R
Sodium sulfide	R	R	R	R

	POLYPROPYLENE - MAX. 130°F (54°C)	PVDF (KYNAR®) - MAX. 175°F (80°C)	STAINLESS STEEL 316 - MAX 175°F (80°C)	CPVC / PVDF - MAX 175°F (80°C)
Sodium thiosulfate	R	R	R	R
Stannic chloride	R	R	X	R
Stearic acid	X	R	R	R
Sulfate liquors	R	—	X	—
Sulfur	R	R	R	R
Sulfur chloride (PVDF, R to 75°F/24°C)	X	R	X	R
Sulfur dioxide	X	R	R	X
Sulfuric acid (10%)	R	R	M	R
Sulfuric acid (10%-75%)	R	R	M	R
Sulfuric acid (66° Baumè) (PVDF & CPVC/PVDF, R to 120°F/49°C)	X	R	M	R
Sulfurous acid	R	R	M	R
Tannic acid	R	R	R	R
Tartaric acid	R	R	R	R
* Tetrahydrofuran	X	X	R	X
Tetralin	—	—	R	—
Titanium tetrachloride (PVDF, R to 150°F/66°C)	—	R	M	X
* Toluene (toluol)	X	X	R	X
Transformer oil	R	—	R	—
Trichloroacetic acid (PVDF & CPVC/PVDF, R to 75°F/24°C)	—	R	X	R
1, 1, 1, Trichloroethane	—	—	X	—
Trichloroethylene	X	R	R	X
Tricresylphosphate	—	X	R	X
Triethylamine (PVDF, R to 125°F/52°C)	—	R	—	X
* Vinyl chloride	X	X	—	X
* Wood oil	X	X	R	X
* Xylene (xylol)	X	X	R	X
Zinc hydrosulfite	—	R	R	R

Information subject to change without notice.

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