OPERATION AND
SERVICE GUIDE
O-184B
MARCH 1999

SERIES 'F'
MAGNETIC COUPLED SEAL-LESS
PUMP & MOTOR UNIT
1½ x 1¼

⚠ *WARNING*
DO NOT USE FOR SOLUTIONS CONTAINING FERROUS (MAGNETIC) FINES

MATERIAL	MODEL
Polypropylene	1½ x 1¼ MPGC
PVDF	1½ x 1¼ MKGC

Refer to Bulletin P-621- and Parts List P-4025-1.

⚠ SAFETY PRECAUTIONS BEFORE STARTING PUMP

1. Read operating instructions and instructions supplied with chemicals to be used.
2. **Refer to a chemical resistance data chart for compatibility of materials with solution to be used.**
3. Note temperature and pressure limitations.
4. **Personnel operating pump should always wear suitable protective clothing: face mask or goggles, apron and gloves.**
5. All piping must be supported and aligned independently of the pump.
6. Always close valves slowly to avoid hydraulic shock.
7. Ensure that all fittings and connections are properly tightened.

BEFORE CHANGING APPLICATION OR PERFORMING MAINTENANCE:

1. Wear protective clothing as described in Item 4 above.
2. Flush pump thoroughly with a neutralizing solution to prevent possible harm to personnel.
3. Shut off power to motor at isolating switch.

SUPPLY OF MACHINERY (SAFETY) REGULATIONS 1992 EEC DIRECTIVES - CE MARKING

SAFETY GUARDS

The products covered by these instructions are, where appropriate, supplied with guards to prevent accidental contact with moving parts.

It is essential that these guards are fitted correctly and securely after assembly, servicing or repair such that the machine conforms with the essential health and safety requirements - machines must not be put into service until they have been declared in conformity with the Machinery Directive.

AIRBORNE NOISE EMISSIONS

The products covered by these instructions, when operating under normal design conditions, generate a continuous noise intensity which does not exceed 70db (A) when measured at a distance of 1m from the machine.
Note: No account has been taken of noise resulting from vibration or reverberation of connecting pipework/tanks or the building enclosing the installation.

WARNING

Operators should be sure that no physical contact is made with rotating pump parts which may be accessible through pump suction/discharge ports.

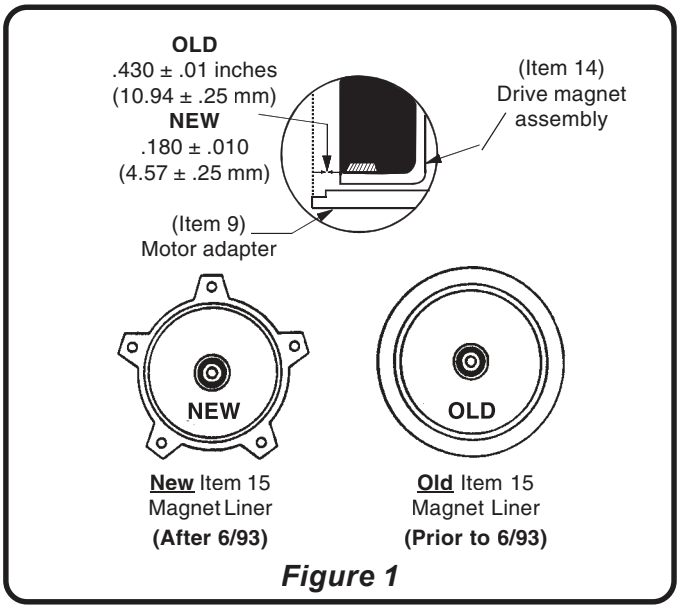

Figure 1

SECTION 1 ASSEMBLY

Unpack pump from carton and check for shipping damage.

PUMPS WITH MOTORS

Remove shipping caps and inserts from suction and discharge, and proceed to installation instructions.

PUMPS WITHOUT MOTORS

1. Remove drive magnet assembly from box.

⚠ ***CAUTION:*** **Strong magnets present.** Keep metal objects and metallic chips/particles away from pump components.

2. Remove two Phillips pan head screws (Item 2 from Parts List P-4025) and hex nuts (Item 10) from impeller housing, and remove wet end assembly from motor adapter.
3. Remove hardware package from box.
4. Install motor adapter (Item 9) onto motor and secure with socket head cap screws (Item 11) and lockwashers (Item 12).
5. Slide drive magnet assembly (Item 14) onto motor shaft keeping shaft key (Item 13) in place. Installation dimension from front of drive magnet assembly to face of motor adapter is .180±.010 inches (4.57±.25mm). For older models the dimensions are .430±.010 inches (10.94±.25 mm).

⚠ **IMPORTANT:** Verify the tightness of the set screws in the drive magnet assembly prior to operation.

6. Remove shipping caps and inserts from suction and discharge of the wet end assembly, and install onto the motor adapter.

⚠ **WARNING:**

Components can slam together from strong magnets. Keep fingers away from area between housing and motor adapter.

Tightly grasp the wet end assembly through the suction and carefully slide it into place on the motor adapter, allowing the

magnets to pull the assembly into place.

7. Align mounting holes and install 5 Phillips pan head screws and hex nuts. Hand tighten screws to 30 in/lbs of torque using pattern shown in Figure 2. **Note:** Plastic pumps will expand and contract with temperature so periodically check and hand tighten Phillips pan head screws.

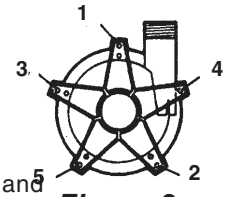

Figure 2

8. Install pump into system according to installation instructions below.

SECTION 2 INSTALLATION

MOUNTING

Motor or base plate should be securely fastened.

PIPING

1. Support piping near pump to minimize strain on pump casing.
2. To minimize head loss from friction:
   a. Increase discharge pipe size one pipe size
   b. Use minimal number of pipe bends
3. Keep bends a minimum of 10 pipe diameters from suction and discharge connections.
4. Position pump as close to liquid source as possible.
5. Maintain flooded suction.
6. Ensure that piping does not leak.
7. Install valves on suction and discharge lines (a minimum of 10 pipe diameters from pump).

IMPORTANT: Considerable damage will result from the rapid temperature rise which will occur if the pump is run against a closed discharge valve.

8. For units in a suction lift system, install appropriate piping in the discharge to allow priming of pumps.
9. The suction valve should be fully open to avoid restricting suction flow. Close only when servicing.

⚠ **IMPORTANT:** To protect the pump if prime is lost, use one of the following: (1) Dri-Stop 3 pressure switch on the discharge; (2) vacuum switch on the suction; (3) a motor minder to monitor motor current.

10. When pumping liquids which may solidify or crystallize, a flush system should be added to the piping. See Figure 3. Install water inlet and outlet valves as shown.

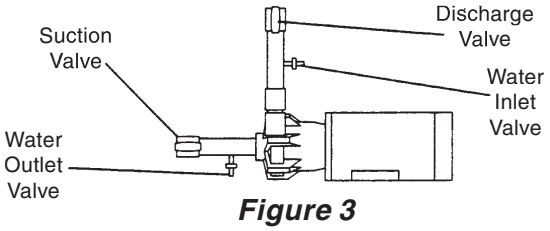

Figure 3

SECTION 3 ELECTRICAL

Install motor according to NEC requirements and local electrical codes.

⚠ **IMPORTANT:** Before operating the pump, jog the motor to verify correct rotation (clockwise as viewed from themotor fan - refer to directional arrow on pump).

SECTION 4 OPERATION

FLOODED SUCTION SYSTEM

1. Fully open suction and discharge valves.
2. Start the pump and check liquid flow. If no flow, see TROUBLESHOOTING Section 7.
3. Adjust flow rate and pressure by regulating discharge valve. Do not attempt to adjust flow with the suction valve.

SUCTION LIFT SYSTEM

1. Fully open suction and discharge valves.
2. Prime system by filling a priming chamber and suction line with liquid to be pumped. Allow time for trapped air to work its way out.
3. Start the pump and check liquid flow. If no flow, see TROUBLESHOOTING Section 7.
4. Adjust flow rate and pressure by regulating discharge valve. Do not attempt to adjust flow with the suction valve.

FLUSH SYSTEMS

1. Refer to Figure 3.
2. Fully close pump suction and discharge valves.
3. Connect water supply to water inlet valve.
4. Connect drain hose to water outlet valve.
5. Open water inlet and outlet valves and flush system until pump is clean (approximately 5 minutes).

SECTION 5 MAINTENANCE

DISASSEMBLY

1. Disconnect power. Remove electrical wiring and mount-ing bolts to floor or base plate.
2. Close suction and discharge valves, and disconnect piping.
3. Remove the 5 Phillips pan head screws and hex nuts (Items 2 & 10).
4. Securely clamp or hold motor in place. Remove wet end assembly by inserting both thumbs into pump suction and pulling assembly straight out with a quick motion.

⚠ **WARNING:**
Components can slam together from strong manets. Keep fingers away from area between housing and motor adapter.

5. To disassemble wet end, remove the 5 Phillips head screws (Item 2).
6. Remove suction casing assembly (Item 3) from liner assembly (Item 15) and pull out the impeller assembly (Item 5). Remove gasket (Item 7).
7. Remove drive magnet assembly (Item 14). Insert a 3/16" hex wrench in the access hole on motor adapter top and loosen the 2 set screws (Item 8). Remove the drive assembly from the motor shaft.

⚠ **CAUTION:**
Strong magnets present. Keep metal objects and metallic chips/particles away from pump components.

EXAMINATION

1. Check impeller drive bushing (Item 6), thrust ring (Item 4), ceramic thrust rings and shaft for cracks, chips, scoring or excess wear. Refer to Figure 4 . Replace as required.
2. Check for loose magnets on drive assembly or rubbed areas on impeller or barrier assemblies. Consult the Application Engineering Department if a problem is found.

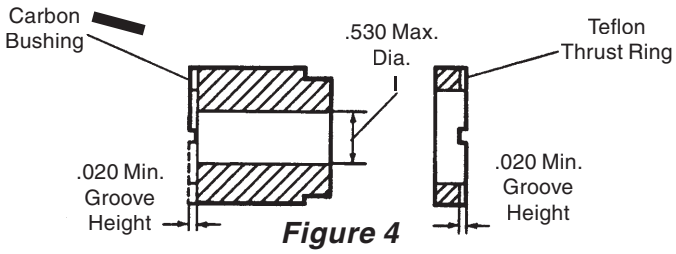

Figure 4

BUSHING AND THRUST RING REPLACEMENT

1. To remove the bushing, place the impeller assembly (Item 5) in an arbor press. Insert a ¾" diameter plastic or wood shaft through the eye of the impeller and press bushing out. Refer to Figure 4.

2. To replace the bushing, place the impeller assembly (Item 5) and thrust ring (Item 4) face up into an arbor press. With grooved side up align the bushing with the impeller bore. Press gently until bushing bottoms out. Bushing is correctly installed when the front face of the bushing is even with bottom of impeller eye.

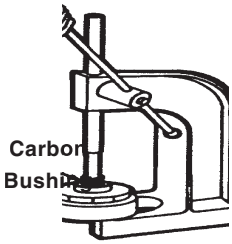

Figure 5

3. The impeller thrust ring (Item 4) can be removed from the impeller assembly (Item 5) by gently pulling the ring from the impeller cover.
4. To replace the thrust ring, align the ring (grooved side up) with the inside of the impeller assembly (Item 5), and press into place.
   NOTE: protect thrust ring face with wood or plastic and avoid tilting of the ring.

SECTION 6 REASSEMBLY

WET END SUBASSEMBLY

1. Install new gasket (Item 7) onto lip of liner assembly (Item 15)
2. Make sure impeller assembly is free of metal chips. Position impeller assembly (Item 5) onto shaft and lower into liner assembly.
3. Install suction casing (Item 3) onto liner assembly, making sure to align matching bosses on liner with recesses in suction casing assembly. Install 4 Phillips head screws and tighten carefully. Do not overtighten.
4. For reassembly of wet end to motor, refer to ASSEMBLY Section 1, Page 1, Steps 6-8.

SECTION 7 TROUBLESHOOTING

NO DISCHARGE

1. Pump not primed
2. Discharge head too high.
3. Suction lift too high. Insufficient NPSH.
4. Closed valve.
5. Viscosity or specific gravity too high (magnets uncoupled).

INSUFFICIENT DISCHARGE

1. Air leaks in suction piping.
2. Discharge head higher than anticipated.
3. Suction lift too high or insufficient NPSH. Check also for clogged suction line or foot valve.
4. Foot valve too small.
5. Foot valve or suction opening not submerged enough.

INSUFFICIENT PRESSURE

1. Air or gases in liquid.
2. Impeller diameter too small.
3. Discharge head higher than anticipated.

LEAK AT IMPELLER HOUSING

1. Gasket pinched or chemically attacked. Replace with new gasket.
2. Phillips pan head screws improperly or overtightened. Install according to assembly instructions.
3. Check motor adapter for cracks.
4. Total overall pressure too high. Do not exceed 35 PSI inlet and outlet pressure.

LOSS OF PRIME

1. Leaking suction line.
2. Suction lift too high or insufficient NPSH.
3. Air or gases in liquid.
4. Foreign matter in impeller.
5. Leaking foot valve.

EXCESSIVE POWER CONSUMPTION

1. Head lower than rating. Pumps too much liquid.
2. Specific gravity or viscosity of liquid pumped is too high or higher than that defined in application.

VIBRATION

1. Excess bearing wear.
2. Magnet drive uncoupled.
3. Loose drive magnet.
4. Pump cavitating.

SELF-PRIMER CHAMBER
FOR USE WITH SERIES 'F' MAGNETIC-COUPLED PUMP

Refer to Bulletin P-621 and Parts list P-4025.

MATERIAL	HIGH DENSITY POLYETHYLENE WITH CPVC FILL & DRAIN PLUGS

INTRODUCTION

Chamber provides a self-priming feature to the seal-less centrifugal pump. A state-of-the-art, one piece modular design allows the pump to lift liquids up to 15 feet (4.75 meters) in two minutes. For use with 'F' magnetic pumps having a 4.5" diameter impeller.

HOW IT WORKS

Chamber is initially filled with liquid. When the pump is started, recirculating liquid creates a vacuum in the suction line. This vacuum draws air from the suction line and releases it through the discharge outlet. When the liquid in the suction line reaches the pump inlet, the pump is primed and normal operation begins (see Figure 1).

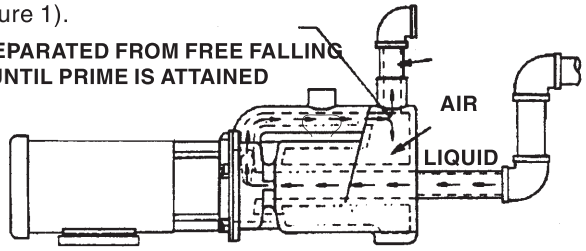

FIGURE 1

SAFETY PRECAUTIONS

⚠ WARNING: READ THIS INSTRUCTION MANUAL COMPLETELY BEFORE INSTALLING AND OPERATING THIS UNIT. FAILURE TO FOLLOW THESE PRECAUTIONS CAN RESULT IN SERIOUS BODILY INJURY.

- Wear proper eye and skin protection when installing, operating and maintaining this equipment.
- All electrical wiring (e.g., motor) should be performed by a qualified electrician.
- Never use this pump for flammables or combustibles.
- Verify chemical compatibility of the pump's materials of construction with the liquid being pumped.
- Maximum liquid temperature is 120°F (49°C).

SECTION 1 - INSTALLATION

Chamber comes complete with housing gasket and hardware. The user must supply 1½" rigid suction piping and 1¼" discharge piping. The suction inlet is located at the front of the priming chamber.

INSTALLATION OF CHAMBER FOR AN EXISTING PUMP.

1. Remove any piping from the pump housing.
2. Remove the five ¼"-20 x 1" bolts and 4 Phillips pan head screws from the suction casing.
3. Gently tap the suction casing's discharge outlet (using a rubber mallet) to remove.
4. Save the suction casing -DO NOT DISCARD- it is necessary for pump assembly/disassembly.
5. Remove and discard the gasket (Item 7) from the magnetic liner (Item 15).
6. Install the new housing gasket (supplied with chamber) onto the magnetic liner.
7. Verify that the white ceramic thrust washer is firmly seated into the chamber.
8. Install the chamber by aligning the groove in the chamber with the ridges on the liner. Press in place until firmly seated.
9. Install the five ¼"-20 x 1¾" hex bolts, washers and nuts (Items 2, 6, 10 supplied with chamber). The nuts will insert into the back tabs on the motor adapter (Item 9). Tighten each bolt to between 30 and 35 in/lb (3.4 and 4.0 Nm) using star pattern sequence (shown in Figure 2 Page 1 of Installation and Maintenance Instructions). Do not overtighten.
   NOTE: Periodic retightening of the bolts is required. The bolts will loosen from vibration and the expansion/contraction of the plastic parts.
10. Firmly support the motor, primer chamber and piping. Shim as necessary. Important: Failure to support these items will result in damage to the pump.
11. Plumb the pump/priming chamber assembly into your system. Use only 1½" rigid piping on the suction side. Important: Suction piping must be raised approximately 7" (18 cm) above the center line of the suction inlet on the chamber. This ensures proper priming and pump operation.

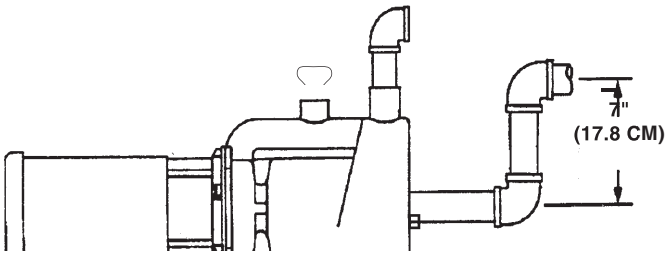

FIGURE 2

12. Install 1¼" rigid piping on the discharge of the chamber. IMPORTANT: if the chamber mounting and piping are not extremely rigid, leakage and possible pump damage can occur.

SECTION 2 - INSTALLATION WHEN CUSTOMER SUPPLIES MOTOR

1. Install the pump (not priming chamber) in accordance with assembly and Installation and Maintenance Instructions - Pages 1& 2.
2. Follow installation steps 2 through 12 from Section 1, Pages 3 & 4.

INSTALLATION WHEN FACTORY SUPPLIES MOTOR

Follow installation steps 2 through 12 from Section 1, Pages 3 & 4.

SECTION 3 - OPERATION

Remove the fill plug (Item 18) located on the top of the chamber. Use approximately 3 quarts of the liquid being pumped to fill the chamber to capacity. Replace the plug.

⚠ ***CAUTION:*** Do not allow chamber to overflow. Start the pump. Check all pump components and piping for leaks.

NOTE: It is critical that the suction piping is air tight. Any leaks, no matter how small, will prevent the pump from priming properly.

SECTION 4 - TROUBLESHOOTING

If pump does not prime and begin to pump within three minutes (specific gravity of 1.0 - higher specific gravities require longer prime times), verify the following:

- No air leaks in suction piping.
- Self-Primer chamber filled to proper level.
- The liquid's specific gravity is not greater than 1.4.
- The impeller is 4½" diameter.
- The motor is at least 2900 rpm and rotating in the proper direction.

For further troubleshooting, consult the Application Engineering Department.

MAINTENANCE DISASSEMBLY

1. Drain chamber into an appropriate container. Remove the ½" drain plug (Item 17) from front of chamber. Reinstall plug after draining.
2. Remove the piping from the suction and discharge on the chamber.
3. Remove the five ¼"-20 x 1¾" bolts from the chamber.
4. Remove the chamber.

⚠ ***CAUTION:*** Some fluid may leak out when the chamber is removed.

5. Reinstall the suction casing (saved from Step 4 in Section 1, Page 4). Using 4 Phillips pan head screws, secure the housing to the barrier. NOTE: Reinstalling the casing allows the impeller and barrier to be easily and safely removed from the motor adapter.
6. Remove the impeller and liner in accordance with Maintenance Disassembly Instructions, Page 2.
7. Inspect and replace worn parts. Reassemble per Reassembly Instructions , Page 2.
8. Reinstall the chamber following installation Steps 2 through 12, Pages 3 & 4.

NOTE: Only the 4 Phillips pan head screws will be removed in Step 2.

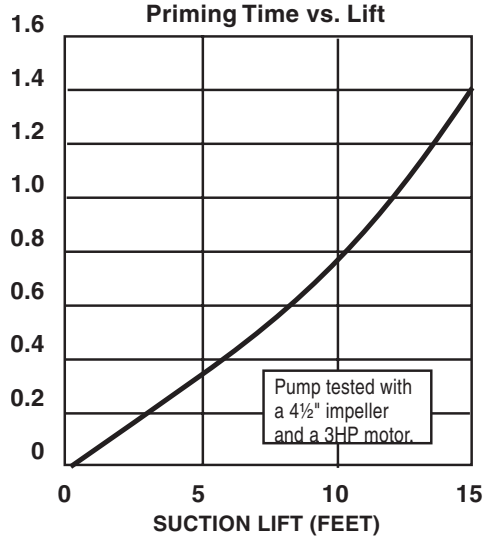

FIGURE 3

CHEMICAL RESISTANCE DATA FOR HIGH DENSITY POLYETHYLENE

HDPE is the material of construction for the "Self-Primer" Magnetic Drive Pump.
Note: pipe plugs installed in the priming chamber are CPVC.

E- 30 days of constant exposure cause no damage. Plastic may even tolerate for years.

G - Little or no damage after 30 days of constant exposure to the reagent.

F - Some effect after 7 days of constant exposure to the reagent.

N- Not recommended for continuous use. Immediate damage may occur.

1st letter @20°C 2nd letter@50°C

CHEMICAL	CLASS
Acetaldehyde	GF
Acetamide, Sat.	EE
Acetic Acid 5%	EE
Acetic Acid 50%	EE
Acetone	EE
Acetonitrile	EE
Acrylonitrile	EE
Adipic Acid	EE
Alanine	EE
Allyl Alcohol	EE
Aluminum Hydroxide	EE
Aluminum Salts	EE
Amino Acids	EE
Ammonia	EE
Ammonium Acetate	EE
Ammonium Glycolate	EE
Ammonium Hydroxide 5%	EE
Ammonium Hydroxide 30%	EE
Ammonium Oxalate	EE
Ammonium Salts	EE
n-Amyl Acetate	EG
Amyl Chloride	FN
Anilene	EG
Benzaldehyde	EE
Benzene	GG
Benzoic Acid, Sat.	EE
Benzyl Acetate	EE
Benzyl Alcohol	FN
Bromine	FN
Bromobenzene	FN
Bromoform	NN
Butadiene	FN
n-Butyl Acetate	EG
n-Butyl Alcohol	EE
Butyric Acid	FN
Calcium Hydroxide, Conc.	EE
Calcium Hypochlorite, Sat.	EE
Carbazole	EE
Carbon Disulphide	NN
Carbon Tetrachloride	GF
Cedarwood Oil	FN
Cellosolve Acetate	EE
Chlorine 10% in air	EF
Chlorine 10% moist	GF
Chloracetic Acid	EE
p-Chloroacetophenone	EE
Chloroform	GF
Chromic Acid, 10%	EE
Chromic Acid, 50%	EE
Cinnamon Oil	FN
Citric Acid, 10%	EE

CHEMICAL	CLASS
Cresol	FN
Cyclohexane	FN
DeCalin	EG
o-Dichlorobenzene	FF
p-Dichlorobenzene	GF
Diethyl Benzene	FN
Diethyl Ether	FN
Diethyl Ketone	GG
Diethyl Malonate	EE
Diethylene Glycol	EE
Diethylene Glycol Ethyl Ether	EE
Dimethyl Formamide	EE
Dimethylsulfoxide	EE
1,4 - Dioxane	GG
Dipropylene Glycol	EE
Ether	FN
Ethyl Acetate	EE
Ethyl Alcohol (Absolute)	EE
Ethyl Alcohol, 40%	EE
Ethyl Benzene	GF
Ethyl Benzoate	GG
Ethyl Butyrate	GF
Ethyl Chloride, Liquid	FF
Ethyl Cyanoacetate	EE
Ethyl Lactate	EE
Ethylene Chloride	GF
Ethylene Glycol	EE
Ethylene Glycol Methyl Ether	EE
Ethylene Oxide	GF
Fluorides	EE
Fluorine	GN
Formaldehyde, 10%	EE
Formaldehyde, 40%	EE
Freon TF	EG
Formic Acid, 35%	EE
Formic Acid, 50%	EE
Formic Acid, 98-100%	EE
Fuel Oil	GF
Gasoline	GG
Glacial Acetic Acid	EE
Glycerine	EE
n-Heptane	GF
Hexane	GF
Hydrochloric Acid, 1-5%	EE
Hydrochloric Acid, 20%	EE
Hydrochloric Acid, 35%	EE
Hydrofluoric Acid, 45%	EE
Hydrofluoric Acid, 48%	EE
Hydrogen Peroxide, 3%	EE
Hydrogen Peroxide, 30%	EE
Hydrogen Peroxide, 90%	EE

CHEMICAL	CLASS
Isobutyl Alcohol	EE
Isopropyl Acetate	EG
Isopropyl Alcohol	EE
Isopropyl Benzene	GF
Kerosene	GG
Lactic Acid, 35%	EE
Lactic Acid, 85%	EE
Methoxyethyl Oleate	EE
Methyl Alcohol	EE
Methyl Ethyl Ketone	EE
Methyl Isobutyl Ketone	EG
Methyl Propyl Ketone	EG
Methylene Chloride	GF
Mineral Oil	EE
Nitric Acid, 1-10%	EE
Nitric Acid, 50%	GN
Nitric Acid, 70%	GN
Nitrobenzene	FN
n-Octane	EE
Orange Oil	GF
Ozone	EE
Perchloric Acid	GN
Perchloroethylene	NN
Phenol, crystals	GF
Phosphoric Acid, 1-5%	EE
Phosphoric Acid, 85%	EE
Pine Oil	EG
Potassium Hydroxide, 1%	EE
Potassium Hydroxide, Conc.	EE
Propane Gas	FN
Propylene Glycol	EE
Propylene Oxide	EE
Resorcinol, 5%	EE

CHEMICAL	CLASS
Salicylaldehyde	EE
Salicylic Acid, Powder	EE
Salicylic Acid, Sat.	EE
Salt Solutions, Metallic	EE
Silver Acetate	EE
Silver Nitrate	EE
Sodium Acetate, Sat.	EE
Sodium Hydroxide, 1%	EE
Sodium Hydroxide, 50% to Sat.	EE
Sodium Hypochlorite, 15%	EE
Stearic Acid, crystals	EE
Sulfuric Acid 1-60%	EE
Sulfuric Acid, 98%	GG
Sulfur Dioxide, Liq., 46 psig	FN
Sulfur Dioxide, Wet or Dry	EE
Sulfur Salts	GF
Tartaric Acid	EE
Tetrahydrofuran	GF
Thionyl Chloride	NN
Toluene	GG
Tributyl Citrate	EG
Trichloroethane	FN
Trichloroethylene	FN
Triethylene Glycol	EE
Tripropylene Glycol	EE
Turpentine	GG
Undecyl Alcohol	EG
Urea	EE
Vinylidene Chloride	FN
Xylene	GF
Zinc Stearate	EE

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