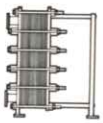
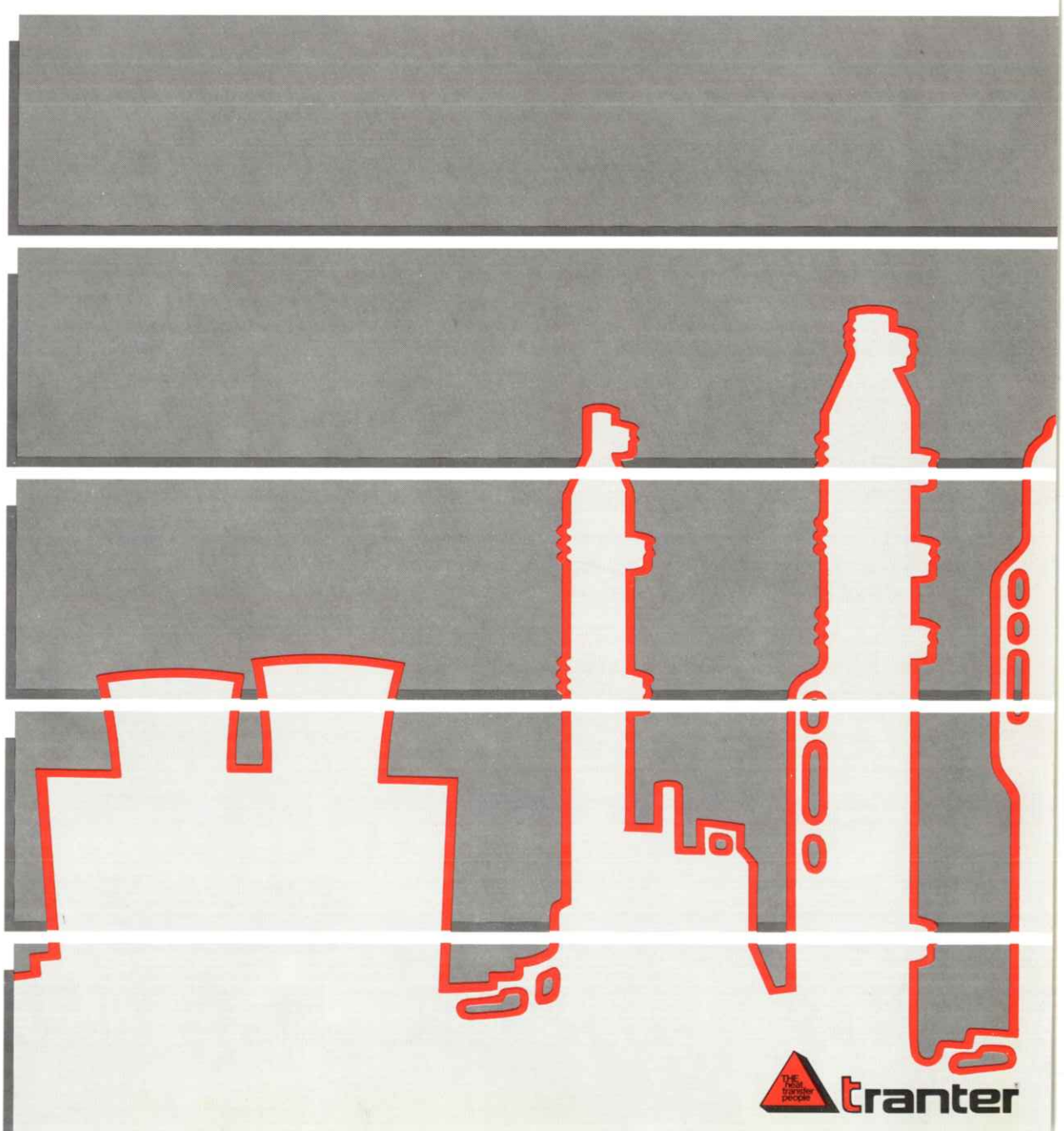
BULLETIN NO. TIS 104-85

SUPERCHANGER®

PLATE AND FRAME HEAT EXCHANGERS FOR THE CHEMICAL INDUSTRY





THE heat transfer people

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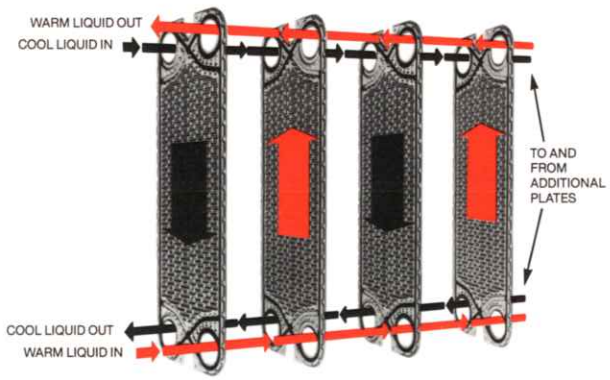
SUPERCHANGER® APPLICATIONS IN THE CHEMICAL INDUSTRY

WHAT IT IS

A SUPERCHANGER unit is a highly efficient plate and frame type heat exchanger that provides steam-to-liquid or liquid-to-liquid heat transfer. It consists of a series of embossed metal plates



stacked together to form channels through which the hot and cold media flow. The plates are bolted between rugged end frames. Hot medium flows on the one side of the plate, while cold medium flows counter-currently on the other. The plate between the two media provides the means to transfer heat from one to the other.

HIGH HEAT TRANSFER EFFICIENCY

The unmatched heat transfer efficiency of the SUPER-CHANGER plate and frame heat exchanger is due to the turbulent flow created by the corrugated plates. As turbulence increases, so does the amount of heat transferred from one medium to the other. Resulting are heat transfer coefficients from two to five times greater than those achieved by other means of heat transfer, such as the shell-and-tube heat exchanger.

SUPERCHANGER heat exchangers can easily be designed for temperature approaches as close as 2°F, compared to 10°F for shell-and-tube units in similar applications. This close approach capability makes it particularly ideal for cooling tower applications and energy recovery.

LOW FOULING

Fouling is minimized in the SUPERCHANGER unit for the same reason its heat transfer efficiency is so high. Turbulent flow, coupled with the velocity profile, causes deposits from the dirty media to be continually washed away from the unit's heat transfer surfaces. Because of the high "U" values obtained from the turbulent conditions within a SUPERCHANGER unit, fine slurries, etc. (within particle size and concentration limits) can be processed very efficiently.

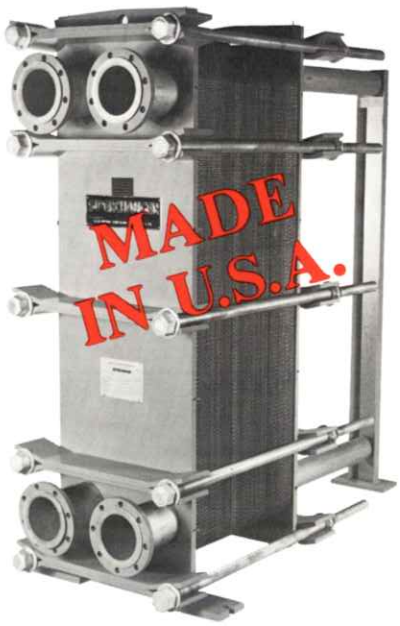
EASY TO MAINTAIN

SUPERCHANGER plate and frame heat exchangers are easy to maintain. Low fouling rates result in reduced cleaning requirements. Units can be either chemically cleaned in place, cleaned by back-flushing, or quickly disassembled by hand, cleaned and put back in operation. Regardless of the method used, cleaning time is minimal when compared to that required for shell-and-tube units.

MADE IN U.S.A.

The SUPERCHANGER heat exchanger is the only major industrial plate and frame heat exchanger completely made in the U.S.A. The benefits are many—from a substantially lower initial cost, to easier availability, faster delivery and better service. Because SUPERCHANGER units are manufactured in the United States, the user is assured of greater savings of money and time. And fewer headaches.

Furthermore, the cost of the SUPERCHANGER plate and frame heat exchanger is generally much lower than for high alloy shell-and-tube or graphite exchangers in corrosive solution applications because, due to its high "U" values, much less surface area is needed.



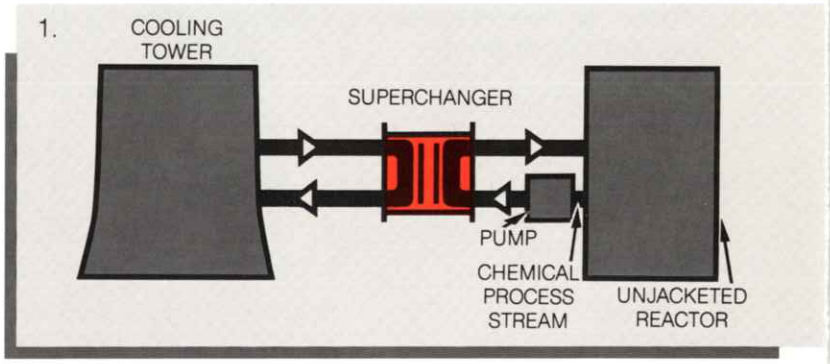
SMALLER, LIGHTER, EXPANDABLE

Compared to other heat exchangers, such as the shell-and-tube type, SUPERCHANGER units require much less floor space, are lighter in weight, cost less and can be expanded to handle increased heat loads simply by adding more plates.

SUPERCHANGER® APPLICATIONS

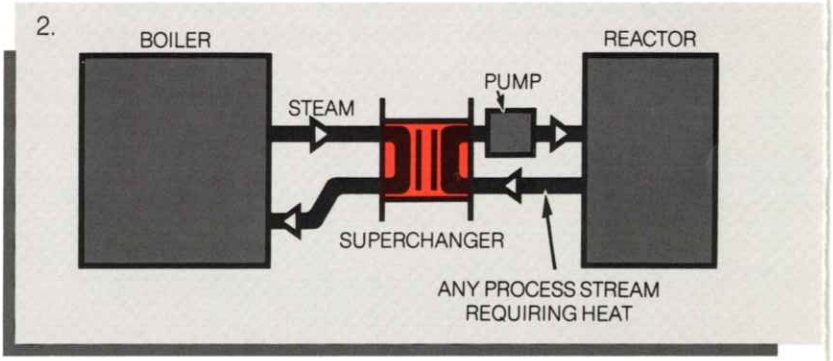
COOL CHEMICAL SOLUTIONS TO REMOVE REACTION HEAT, ETC.

SUPERCHANGER plate and frame heat exchangers find many cooling applications for chemical solutions. The unit's high "U" values make it a logical choice for these duties. In addition to the cooling tower shown here, the coolant may also come from various sources, including lakes, rivers, chillers, etc.



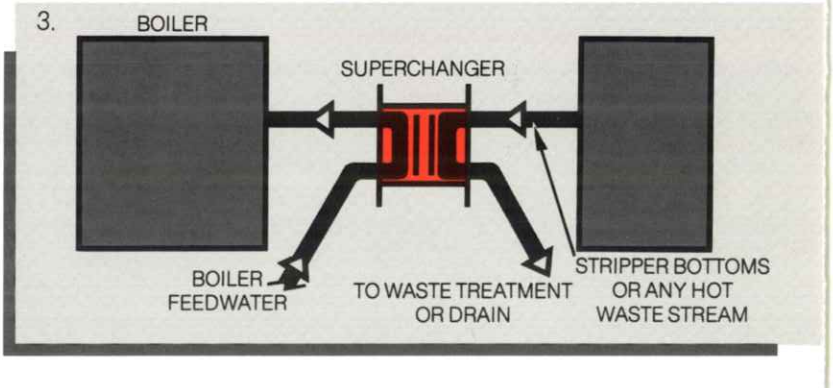
HEATING WITH STEAM

Within certain temperature limitations, low pressure steam is frequently used with a SUPERCHANGER unit for heating chemical streams. For conditions that may require occasional or frequent manual cleaning, the ease of opening this type of heat exchanger is a special added advantage. Other heating media can also be used, including hot water and hot oils.



HEAT RECOVERY

With growing concern about energy conservation over recent years, hundreds of SUPERCHANGER plate and frame heat exchangers have been installed for a variety of heat recovery applications. As the chemical industry has many hot process streams and hot waste fluids, efficient and compact SUPERCHANGER units can be readily used to preheat water and other liquids.



NOTE: THE DIAGRAMS SHOWN HERE ARE PURPOSELY BRIEF: NO ATTEMPT HAS BEEN MADE TO SHOW ALL THE VALVES, CONTROLS AND PIPING THAT MAY BE REQUIRED. IN MOST SYSTEMS, ALL PIPING ACTUALLY IS FROM THE SUPERCHANGER FIXED FRAME. THIS FACILITATES OPENING THE UNITS, WHEN REQUIRED, WITHOUT DISASSEMBLING PIPING.

SUPERCHANGER PLATE AND FRAME HEAT EXCHANGER VS. SHELL-AND-TUBE HEAT EXCHANGER

For many years, the most commonly used type of heat exchanger in chemical industry applications has been the shell-and-tube heat exchanger. With the advent of plate and frame heat exchangers for general industrial use in recent years, however, the swing has been away from shell-and-tube — simply because of the many superior advantages offered by plate and frame heat exchangers as follows:

1. Requires as little as one-tenth to one-half the space required by shell-and-tube exchangers.
2. Heat transfer rates several times higher than shell-and-tube.
3. Easier to clean.
4. Lower fouling rates.
5. No interleakage.
6. Greater flexibility; capacity can be increased merely by adding plates.
7. Less weight.
8. Lower cost.

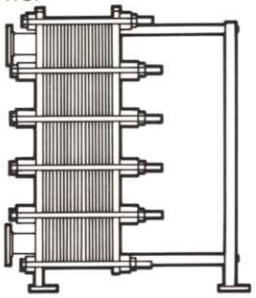
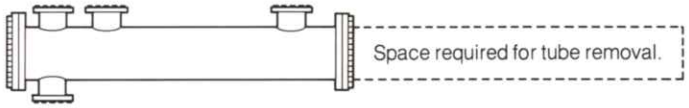


Plate and frame heat exchangers take as little as one-tenth the space required for shell-and-tube exchangers, particularly when considering the space required for tube removal.



For a side-by-side comparison between plate and frame and shell-and-tube exchangers, the charts below show the difference in dimensions and comparative data for two units in a similar application.

Typical units designed for the same heat transfer conditions.

Item	SUPERCHANGER	Shell-and-Tube
Surface Area	1000 sq. ft.	3000 sq. ft.
Total Length Required	86"	157"
Width	32" diameter	30" diameter
Height	84"	42"
Gross Volume	18 ft.^{3}	116 ft.^{3}
Net Weight	1600 lbs.	6000 lbs.

OTHER TRANTER HEAT EXCHANGE PRODUCTS FOR CHEMICAL INDUSTRY APPLICATIONS

PLATECOIL® is the most efficient and versatile prime surface heat exchanger available today. Its unique design is the key to both its high heat transfer efficiency and unlimited versatility for heating and cooling requirements.

PLATECOIL is fabricated from embossed metal sheets which, when welded together, form a series of well-defined channels or passages through which the heat transfer media flows. Depending on the application, these passages are designed in either of two basic patterns: the Serpentine or Multi-Zone.

Because of its remarkable efficiency, PLATECOIL finds wide application in the chemical industry. It is ordinarily used as an immersion or clamp-on type heat exchanger for process tanks, although it also serves a variety of other heat transfer needs.

Besides being efficient, PLATECOIL is one of the most flexible heat exchangers made. Available from stock in over 300 different sizes, ranging up to 43" wide and 143" long, it can be bent, rolled, or otherwise formed into virtually any configuration. It can be made into shelves, shaped into troughs, rolled into clamp-on jackets for vessels, and utilized in any number of dual-purpose applications.

PLATECOIL can be fabricated from most weldable metals, including carbon steel, stainless steel, titanium, Monel, nickel and various special corrosion-resistant alloys. A variety of surface finishes is available to minimize fouling and reduce maintenance.

With its practically unlimited selection of materials, surface finishes, sizes, shapes, pass patterns, pressure containments, capacities and other features, PLATECOIL can meet an endless variety of heat transfer requirements.

Represented by:

Additional SUPERCHANGER information available from your Tranter Sales Representative: • Typical plate and frame heat exchanger specifications • SUPERCHANGER installation and operation manual • SUPERCHANGER product bulletin • Specific industry brochures

For further information, contact: TEXAS Division, Tranter, inc., P.O. Box 2289, Wichita Falls, Texas 76307 • 817/723-7125

THE heat transfer people

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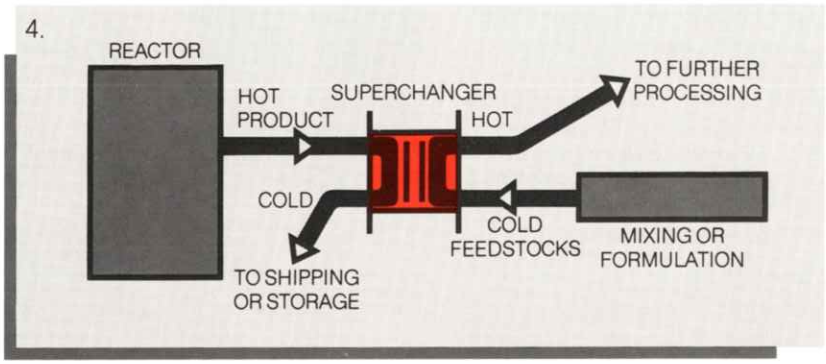
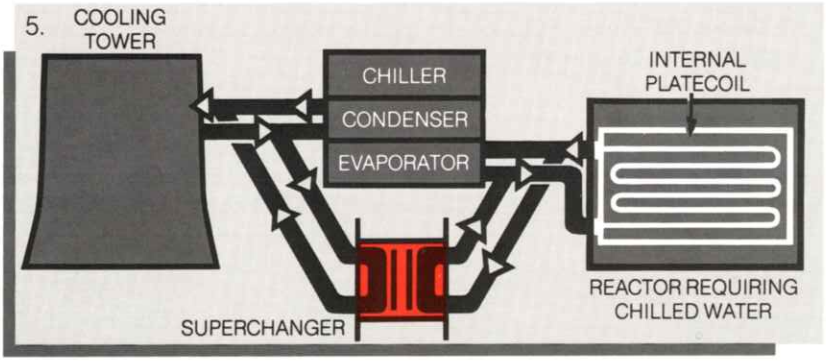
REGENERATIVE HEAT EXCHANGE

Heating cold feedstocks with hot products which require cooling is a form of heat recovery ideally suited to the SUPERCHANGER unit. With "U" values several times greater than those offered by shell-and-tube heat exchangers, a large number of SUPERCHANGER installations are currently handling liquid-to-liquid transfer very efficiently.



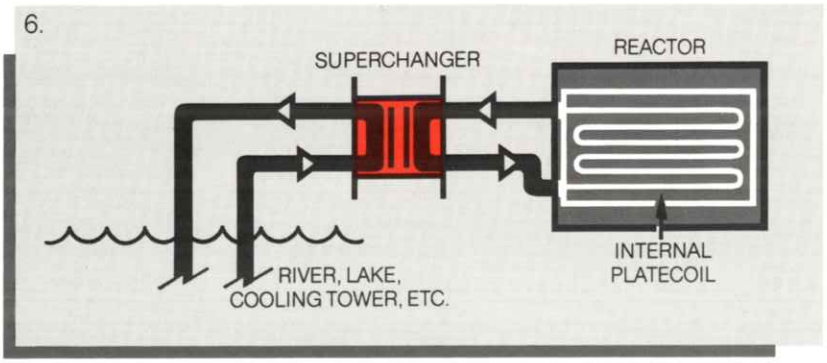
"FREE COOLING" DURING MODERATE TEMPERATURES (CHILLER BYPASS)

When ambient temperatures provide suitably cool water directly from the cooling tower, operating costs can be reduced significantly by bypassing the chiller. The SUPERCHANGER unit shown in this schematic drawing also provides cooling tower isolation so plant piping and heat exchange equipment is not fouled by cooling tower water.



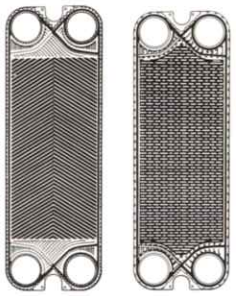
COOLING WATER CIRCUIT ISOLATION

This diagram is an example of how heat exchangers and other equipment can be protected from plugging conditions that may result from river water or other potentially fouling fluids circulated through them directly. The easy-cleaning features of the SUPERCHANGER plate and frame unit make this a very common application. In some cases, two units have been installed so that one can be used as a standby.



CONDENSED SPECIFICATIONS

The data on this page provides basic condensed engineering information. All selections are by computer to provide the best plate size and design fit for each specific application. More complete literature and specifications are available on request.



Herringbone Design | Washboard Design

Pressure Rating: Up to 300 psig operating pressure
Maximum Temperature: 350 °F
Heat Transfer Coefficients: Greater than 1000 Btu/hr. ft.² F
Heat Transfer Surface: Up to 9,100 ft² per unit

Plates: SUPERCHANGER plates are fabricated from virtually any metal that can be cold-worked, including stainless steels; (types 304, 316, 317, etc.), titanium, Monel, nickel, alloys 825, 20Cb-3, B-2, G, C-276 and others.
Frames: Carbon steel with baked epoxy enamel paint, side bolts and shroud.
Nozzles: 150 lb. ASA-rated loose flange type as standard. 300 lb. rated available.
Gaskets: Nitrile, Ethylene Propylene, Viton, Neoprene, Hypalon, Butyl, Teflon-encapsulated NBR and others available.

Optional Extras: Connecting frames. Threaded or clamp type nozzles. Stainless steel tightening bolts. ASME Code Stamp.
Rental Units Available: SUPERCHANGER units are available on a rental basis for in-plant testing and evaluation. Contact your Tranter representative for information on the SUPERCHANGER Rental Policy.

WHERE IT'S USED

Below is a partial list of substances in the chemical industry which can be heated or cooled by SUPERCHANGER plate and frame heat exchangers:

Acetic Acid Solutions
Acetic Acid and Acetic Anhydride Mixtures
Acetic Acid and Vinyl Acetate Mixtures
Acrylonitrile
Alcohol Solutions
Amine Solutions
Amino Acids
Ammonia Solutions
Ammonical Brine
Ammonium Bromide Solutions
Ammonium Carbonate Solutions
Ammonium Nitrate
Ammonium Phosphate (Dibasic)
Ammonium Sulfate Solutions
Antibiotic Liquors
Boric Acid Liquor
Butadiene Latex Emulsions
Butyl Alcohol Solutions
Butyraldehyde
Calcium Bisulfite
Calcium Chloride Brine
Calcium Lactate
Caprolactam
Carbon Disulfide
Caustic Soda Solutions
Cellulose Acetate
Chlorinated Brine
Chlorine Solutions
Citric Acid Solutions
Crotonaldehyde
Dimenthylamine
Dimenthyl Formamide
Effluents from:
- Ammonia Stills
- Cellulose Bleacheries
- Glue Making Plants

Enzyme Solutions
Ethyl Alcohol
Ethylene Glycol
Ethyl-Hexyl Alcohol
Fatty Acids
Formaldehyde Solutions
Formalin
Glycerine Solutions
Gum Arabic
Hexamine
Hydrochloric Acid Solutions
Hydrolyzed Protein Liquor
Hydroxylamine Sulfate
Isopropyl Alcohol
Lacquer
Lactic Acid
Latex (Synthetic or Rubber)
Lead Fluoroborate
Lecithin
Lignin
Magnesium Hydroxide
Maleic Anhydride
Methyl Acetate
Methyl Alcohol Solutions
Methyl Methacrylate
MEA Solutions
Milk of Lime
Monochloracetic Acid
Monoethanolamine Solutions
Monosodium Glutamate Solutions
N-Methyl Pyrrolidone
Nickel Sulfate
Nitrate Acids
Oleic Acid
Oxalic Acid
Paraffin Emulsion
Paraffin Wax
Paraquat
Pectin
Pentaerythritol
Pheno Adhesive
Phosphoric Acid Solutions
Plasticizers
Polyester Resin
Polyvinyl Acetate Solutions (PVA)
Potassium Carbonate Lye
Potassium Chloride Solutions
Propionic Acid
Propylene Glycol
PVC Solutions
Resin Liquid
Rubber Latex
Saccharified Solutions
Sodium Alkyl Glycerol Sulfonate
Sodium Aluminate Solutions
Sodium Carbonate
Sodium Chloride Solutions
Sodium Cresylate
Sodium Cyanide Liquor
Sodium Hydroxide Solutions
Sodium Hypochlorite Solutions
Sodium Metaborate Solutions
Sodium Perborate Solutions
Sodium Sulfite Liquor
Sodium Thiocyanate
Sodium Thiosulfate
Sorbitol Solutions
Stearic Acid
Sulfonic Acid
Sulfite Cooking Acid
Sulfite Waste Liquor
Sulfuric Acid
Sulfurous Acid
Trichlorethylene
Triethylene Glycol
Urea Formaldehyde
Urea Formaldehyde Resins
Vinyl Acetate Solutions
Viscose
Water:
- Boiler Feed
- Deionized
- Demineralized
- Distilled
- Lake
- River
- Sea

Xylene
Yeast Cream
Zinc Chloride
Zinc Sulfate