

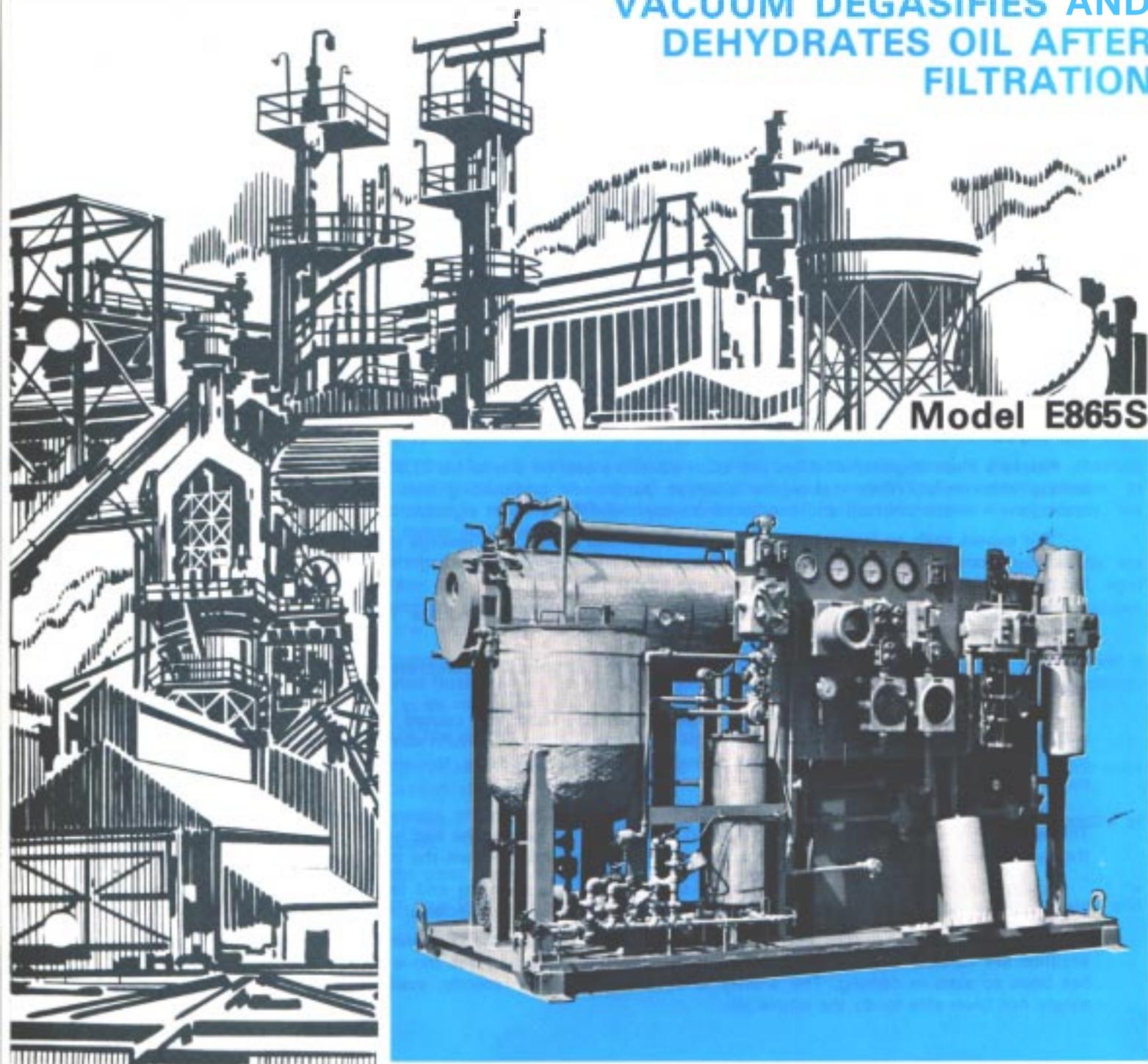
ENERVAC

CORPORATION

Engineers and Manufacturers of

SEAL OIL *PURIFIERS*

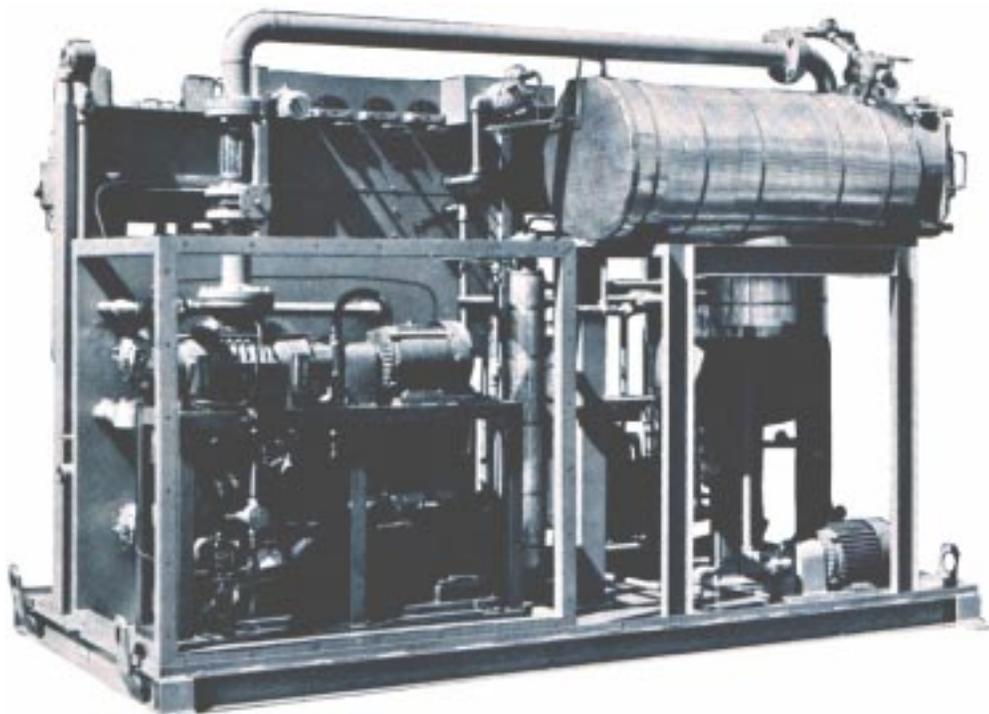
VACUUM DEGASIFIES AND
DEHYDRATES OIL AFTER
FILTRATION



Model E865S

ENERVAC SEAL OIL

Vacuum Purification System



- Dehydrates
- Filters
- Purifies
- De Aerates
- Degasifies

Millions of gallons of good grade turbo-compressor lubricating oil are lost each year through rotary compressor seals. The Lubrication and Plant Engineers face today problems related to supply of new oil, increasing oil prices, and disposal of contaminated seal oil which represents an environmental hazard.

Picture a Plant Engineer who has just been advised a seal on one of his 27,000 HP Centrifugal Compressors is leaking abnormally. What makes the situation particularly aggravating was that the Compressor had just undergone a major overhaul and another one wasn't due for at least eighteen months.

"We expect seals to leak, of course" and have learned to live with leakage rates of 5 to 10 gallons per hour. I guess no one really thought too much about the cost involved, regarding them simply as the cost of doing business.

They just bought new oil on a steady basis, both to accommodate normal leakage and to replace contaminated oil at frequent intervals.

They certainly were going to protect their expensive Turbines and Compressors. The cost of a re-build is so high that no one begrudged the cost of new oil.

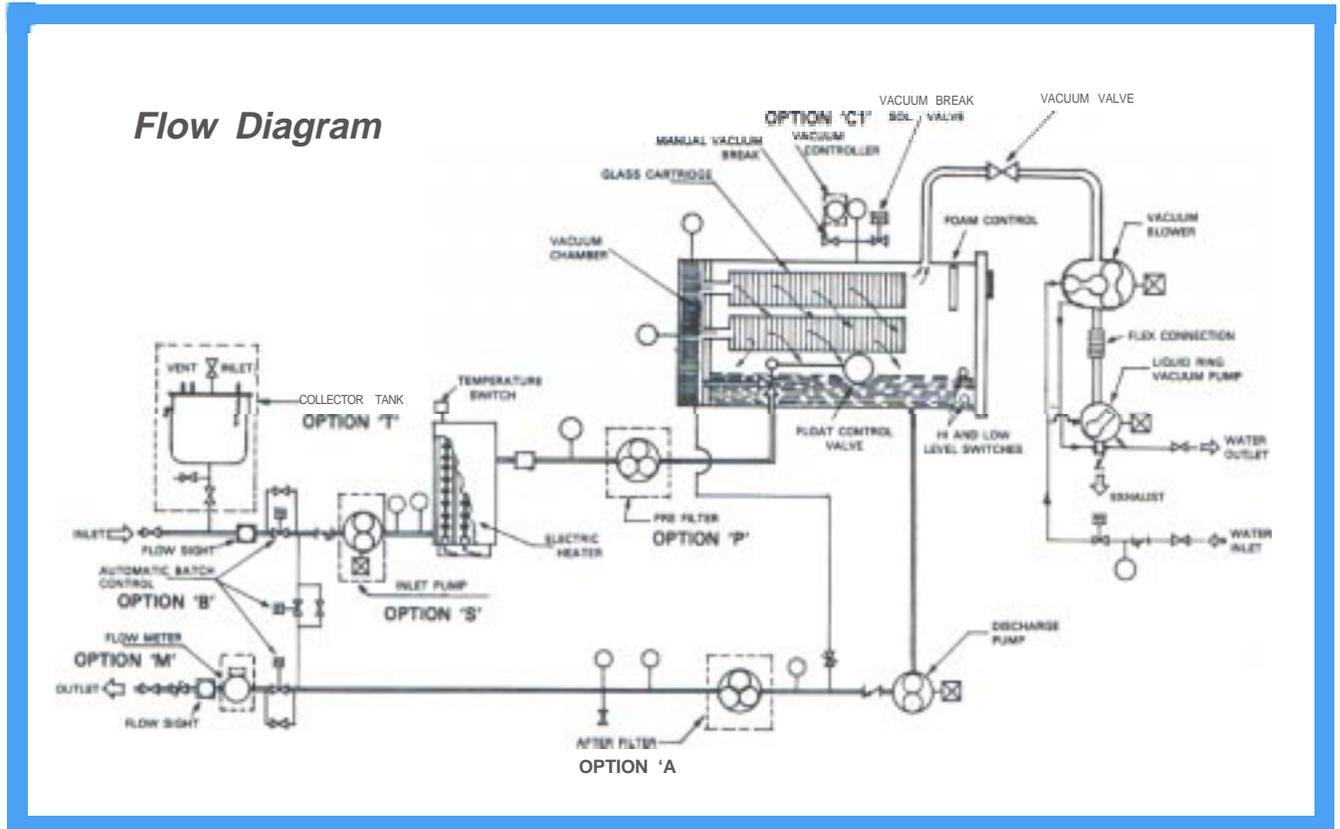
However, this new seal was leaking 30 gallons an hour and this caused the Plant Engineer to do some arithmetic. Figuring the cost for just this single new leak, he came up with some astounding cost figures. With today's oil prices and the cost of paying a dealer to haul sour oil away, this single leak was going to cost him more than \$1,000.00 a day.

When this is multiplied by the number of days in a year, it became apparent he had a six figure problem. This set him thinking about the normal 5 to 10 gallon an hour leakage he had become accustomed to. That was the eye-opener. They were pouring an enormous number of dollars down the drain every year.

To one degree or another, every Plant Manager faces this dilemma and like the foregoing Engineer, most plant men probably don't calculate the exact dollars involved until a special problem brings it to their attention;

The obvious answer to this profit drain, of course, is to reclaim the contaminated oils. The economics of the situation are so clear cut that the question naturally arises as to why the move by industry to recycle Seal Oils has been so slow in coming. The answer is equally clear. Until recently, available Reclamation Systems have simply not been able to do the whole job.

Flow Diagram



Description Of Process & Flow (See Flow Diagram)

Oil is drawn to the inlet line due to pressure difference between atmospheric pressure and low absolute pressure in the vacuum chamber. In the inlet line, oil passes through a strainer and an electric heater. In installations where the foregoing is not practical because of location of Purifier in relation to oil supply, we provide Option 'S' an inlet pump and relief valve.

Oil enters the vacuum chamber through special chemically-inert accelerator cartridges where solids are removed and retained. Water and volatile contaminants are boiled off in vapour form. Dissolved air, light hydrocarbons and other gases are also removed and are drawn off with water vapours at the top of the vacuum chamber into the vacuum line, and are discharged by the vacuum package.

Purified oil falls to the bottom of the vacuum chamber to be removed by the discharge pump. The oil level is controlled by a direct operated float valve in the vacuum chamber. In the event of failure of the discharge pump, the control valve shuts off at its maximum level.

The key to the process is the special chemically-inert accelerator cartridges in the vacuum chamber:

First, their in-depth design structure allows free water to be rapidly separated from oil by coalescence even before it reaches the evaporation stage.

Second, millions of glass fibers 3-10 micrometer diameter provide a large total surface area for exposure of the thin oil film to the vacuum.

Third, sharp points of the glass fibers promote fast release of gases and vapors from oil.

Fourth, the elements act as a fine filter solid contaminants. The cartridges are easily replaced and disposable.

Filtration equipment, for example, is effective at removing solid particles, but can't remove water and gases. Coalescing Systems can remove water and solids particles, but are disarmed by the surface active additives found in most oils on the market today. Centrifuge Systems remove free water and heavy solids, but require frequent and expensive maintenance.

Early reclamation systems then, simply weren't cost-effective. The Purification industry kept working on the problem, spurred by the stakes involved and the tremendous increase in payoff, caused by soaring oil prices. The breakthrough came as a result of logical reasoning, that since a single technology can't do the whole job, what about combining technologies? Hence, the Enervac Seal Oil Purifier, combining the genesis of vacuum flash distillation with filtration and coalescent technologies, to remove both heavy and light solids, free and soluble water and free and soluble gases.

Reclaim Costly and Scarce Seal Oils with the **ENERVAC** **VACUUM PROCESS** without removing incorporated additives

The most common contaminants of the seal oils, depending on the type of gas being compressed are:

1. Particulate matter which may originate from many sources. Residual system dirt, wear of the seals and other moving parts of machinery, corrosion, atmospheric dust and carbon generated on hot spots.

2. Water is a major contaminant, present in the majority of gases compressed and in steam turbine driven systems.

3. Products of oxidation result from high temperature operation in presence of water, oxygen and metal particles acting as catalysts. Gums, varnishes and sludge are symptomatic of this contamination, high acid number (Neut No.) confirms it. Oxidized oil also changes color becoming darker.

4. Dilution by lighter hydrocarbons, the range C1 through C6, is quite common in seal oils for natural and synthetic gas compressors. Samples from some oil traps indicate dilution content as high as 15-22% of lighter fractions by weight. This results in a marked reduction of oil viscosity and flash point.

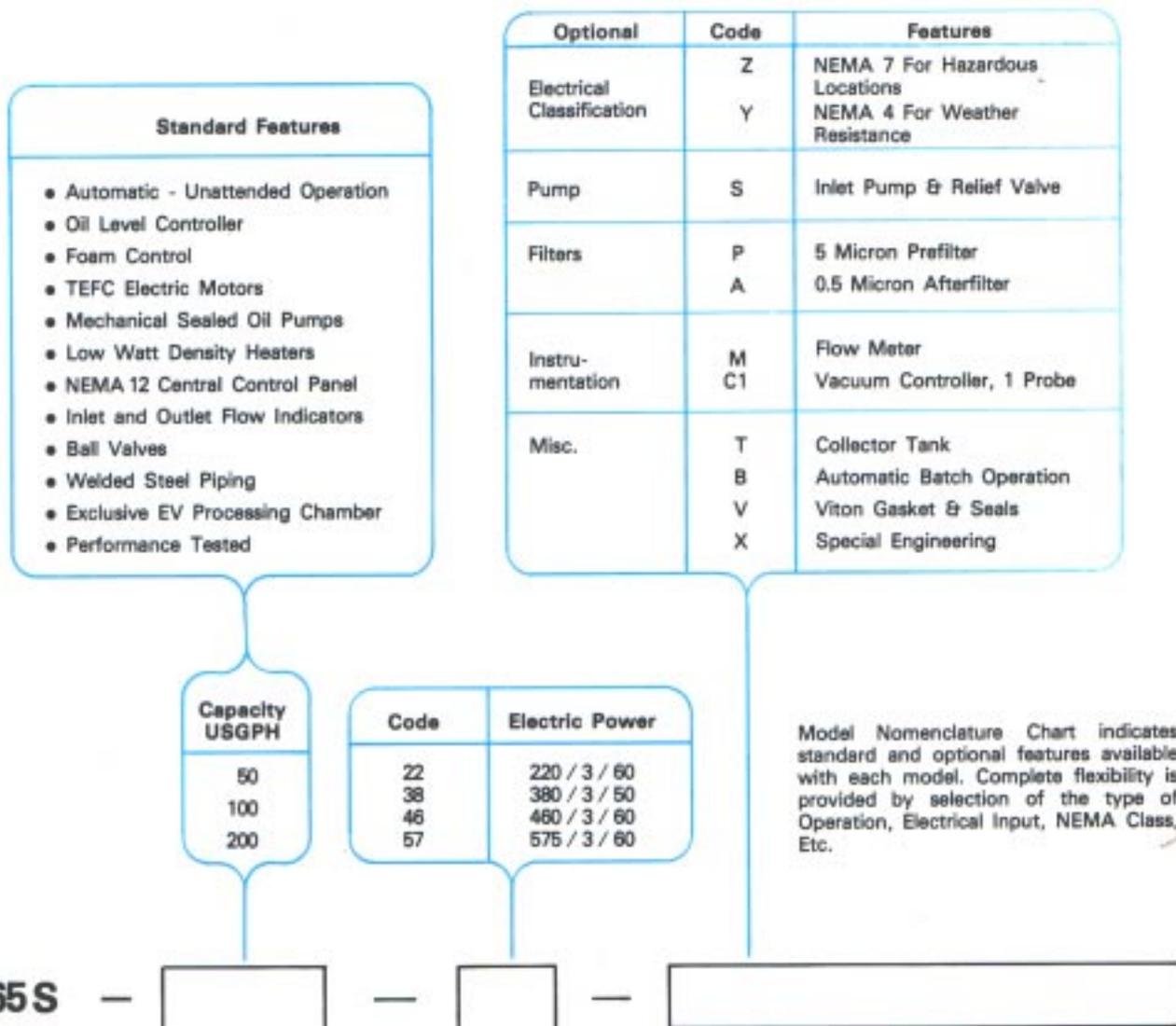
5. Chemically active gases. In compressor seals where oil is in direct contact with Ammonia, Chlorine, and Hydrogen Sulfide there is adsorption of gas in oil depending on: time of contact, gas pressure and percentage of active gas in the compressed mixture of gases.

6. Inert gases, Carbon Dioxide, Carbon Oxide, Hydrogen and Hydrocarbon gases are usually harmless to oil, however if not extracted may cause fire hazard or in combination with water some system corrosion.

Oil Sample For Analysis:

We recommend you provide ENERVAC with a sample of your contaminated Seal Oil for analysis and processing. We will return to you a processed sample so you can do your own analysis. "Let us prove to you what the Enervac Vacuum Purifier can do." A minimum of 5 gallons is required for our laboratory work and processing.

MODEL NOMENCLATURE CHART



The Enervac Seal Oil Purifier can effectively remove dissolved and adsorbed gases including Hydrogen Sulfide which is detrimental in even trace quantities. Lighter fraction Hydrocarbons are driven out returning the oil to its original viscosity. Water is always a major contaminant particularly in combination with other components, such as Ammonia, Carbon Dioxide and when present in synthetic lubricants, the Vacuum Process removes water easily and to low levels below saturation point. The Seal Oil Purifier provides mechanical separation of particulate matter down to the sub-micronic range. The removal of the above prevents oxidation from taking place and assures the acid number remains within acceptable levels.



ENERVAC produces a wide range of specialty products and systems, most of which are based on a high order of technology.

Solving Tomorrow's Problems TODAY

HIGH VACUUM DEGASIFICATION

For upgrading of new and used electrical insulating liquids, transformer oil, polybutenes and silicones – the removal of free and soluble water, free and dissolved air and gases and particulate matter. Mobile and stationary units in sizes to fit every need.

SEAL-OIL PURIFIERS

Seal oil purifiers offer proper treatment and upgrading of compressor sealing oils in a completely enclosed system, removal of free and soluble water, free and dissolved air and gases, light hydrocarbons and particulate matter.

LUBE SYSTEMS

Oil circulating lubrication systems including pumps, tanks, filters, coolers, indicators and other accessory equipment in either packaged or component systems are available.

AIR AND GAS DRYERS AND FILTERS

Enervac dryers and filters are designed for removal of moisture from process air and gases, eliminating condensation and freezeup, moisture corrosion, protecting pneumatic instruments and extending the life of pneumatic tools.

VACUUM DEHYDRATORS

Low vacuum units are available from Enervac Corporation for the continuous maintenance of the original chemical and physical qualities of lubricating, insulating, cooling, hydraulic and synthetic oils.

INDUSTRIAL FILTERS

Industrial filtration equipment utilizing pleated paper, and other media to provide the exact degree of filtration and flow rate for virtually any application.



Representative

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