NASH Vacuum Pumps for Oil Deodorization

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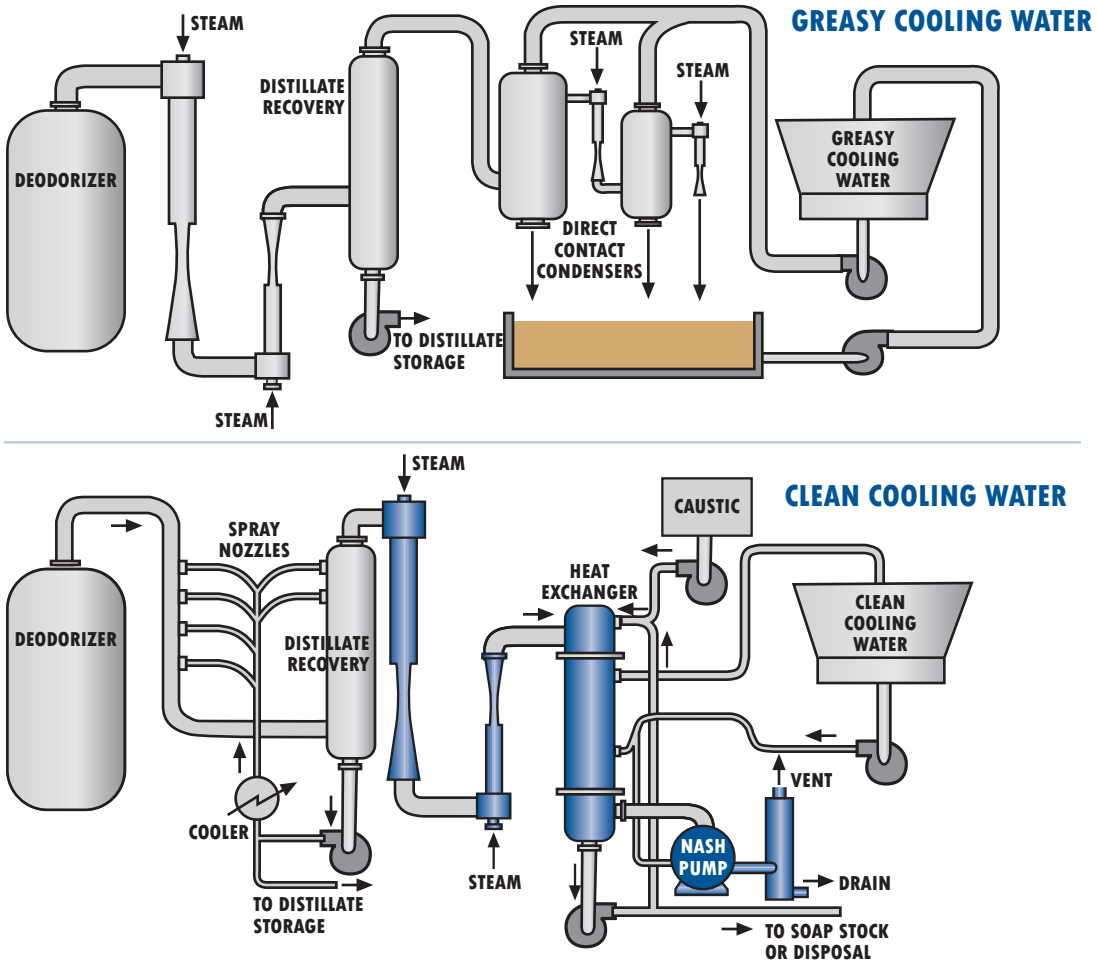
Replacing the final stages of your ejector system with a Nash pump can provide improved oil quality, lower operating costs and the elimination of pollutants

Clean Cooling Towers Lead to Optimum Performance in Production of Edible Oils

Consumer demand for improved quality, better tasting, lighter color, cholesterol free Edible Oils has changed deodorization technology. The changes require better vacuum system performance to improve oil quality, reduce operating costs and, with environmental concerns, the virtual elimination of pollutants.

To achieve better quality oil, lower absolute pressures of 1.5 to 3.0 mm Hg abs are required. Operating costs are reduced by process control, more stringent system design with improved distillate recovery, clean water condensation of steam, and use of liquid ring vacuum pumps to reduce overall steam consumption.

The trend is to place the distillate recovery unit ahead of the vacuum system to remove as much of the distillate or fatty material as possible, thus reducing the load to the vacuum system. This lowers the utility consumption of the combination ejector/liquid ring pump hybrid vacuum system.



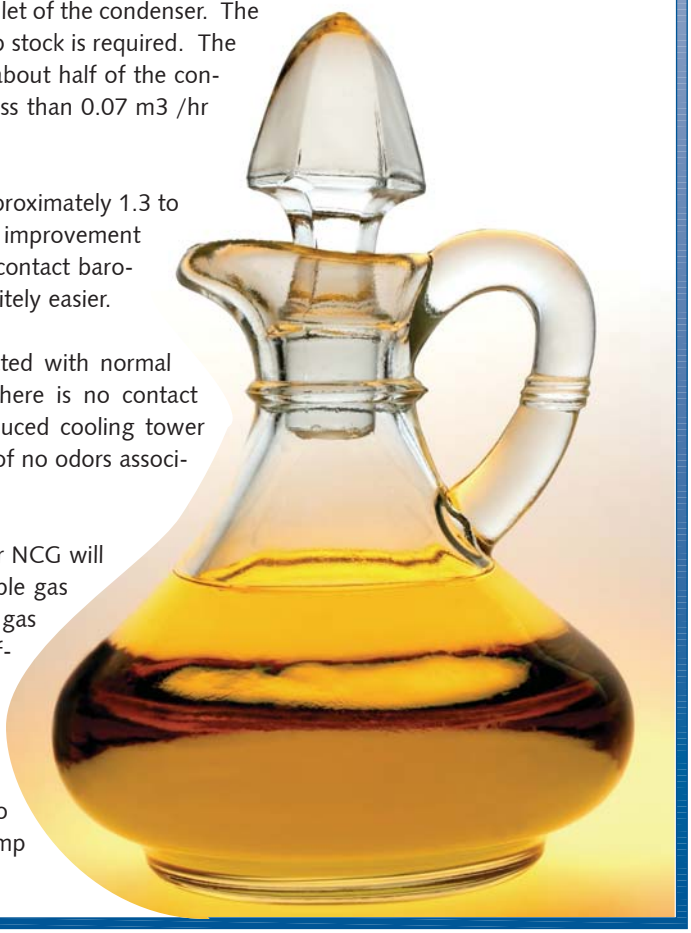
Improvements to distillate recovery performance have been accomplished by:

1. Spraying oil into the vapor lines ahead of the unit effectively reducing the temperature and specific volume of the material to be handled.
2. The addition of wetted packing material improves the heat and mass transfer, and lessens the amount of material being carried over into the vacuum system.
3. Improved demister pads reduce the amount of physical carry-over.
4. Finally the use of an external heat exchanger allows for better control of the temperature of the recirculated material. Lower temperatures improve the amount of material recovered.

The vacuum equipment consists of two boosters (steam operated ejectors), and a tubular heat exchanger/condenser followed by an efficient liquid ring vacuum pump. The condenser is mounted in the vertical position. Steam and small amounts of fatty vapors are condensed on the tube side. The water is passed vertically upward through the shell and the exit temperature is controlled to improve the efficiency of the condenser.

A tepid water control loop may be necessary to prevent fouling of the condenser, due to the change in the state of the fatty material from a liquid to a solid. The tepid water maintains the tube wall surface temperature sufficient to prevent oil from changing from a liquid to a solid.

Depending upon the feed stock to the Deodorizer the clean water system will require recirculating part of the condensate from the bottom of the condenser to the vapor inlet of the condenser. The addition of caustic material to keep condensate in the form of basic soap stock is required. The pH of the condensate should be maintained at approximately 10, and about half of the condensate recirculated. The maximum amount of caustic anticipated is less than 0.07 m3 /hr based on a 14 MT/hr deodorizer.



Depending on the deodorizer size, these systems generally discharge approximately 1.3 to 1.4 m3/hr, of basic soap stock condensate for disposal. This is a marked improvement over handling the 125 to 230 m3/hr of greasy water in the old direct contact barometric systems. The disposal of the small volume of condensate is infinitely easier.

The clean cooling tower that supplies water to the condenser is treated with normal chemicals. No accumulation of fatty material is anticipated, since there is no contact between the water and condensed fatty material. In addition to reduced cooling tower maintenance and fewer chemical requirements, there is the advantage of no odors associated with the cooling tower.

The liquid ring vacuum pump used after the condenser to remove air or NCG will track the condenser vacuum based upon the amount of non-condensable gas flow. The pumps, since they are volumetric devices, track instantaneous gas loads without any interruption in performance. This is particularly significant on those deodorizers that use an atmospheric oil measuring tank system. When the measuring tank is dropped or loaded into the deodorizer there is an instantaneous gas load, which, if of significant magnitude or short enough duration, causes the vacuum system to have a "spiking effect" (rapid loss of vacuum) and may not allow the system to recover. The vacuum pumps virtually eliminate instability of ejector/pump hybrid systems and are forgiving of upsets.

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