Specifications for:

Energy Efficient Steam Heat Exchanger Component System

Furnish and install according to manufacturer's instructions, one ITT Fluid Handling energy efficient steam-to-liquid heat transfer component system, which shall have the capacity to heat _________ GPM of _________ (fluid) from _________ °F (temperature) to _________ °F (temperature) when supplied with _________ psig saturated (or degrees superheated) steam to the steam regulator. The heat exchanger shall be sized for maximum _________psig inlet pressure. The system is to have a maximum of _________ % flash steam. Energy loss calculations shall be furnished to the engineer for approval and shall include annual dollar operating costs at design conditions.

The energy efficient steam heat exchanger component system shall be piped in the field with all necessary valves, pipe and fittings, according to plans and specifications and shall consist of the following major components:

1. Hoffman Series 2000/1140 (pneumatic or self-contained) modulating steam control valve.

2. Hoffman F&T trap and "Y" strainer for the drip leg.

3. Bell & Gossett "SU" type heat exchanger with _________ fouling factor, ASME constructed with signed U-1 form per heat exchanger specification.

4. Hoffman vacuum breaker for the heat exchanger .

5. Hoffman "Y" Strainer and F&T Trap for the heat exchanger. (F&T Trap size based on 0.5 psig differential pressure with 1.5 min. safety factor.) Trap installed a minimum of 15" below the heat exchanger.

6. Optional components
   - _________ steam safety relief valve
   - _________ gauges, high pressure cocks and pigtails
   - _________ thermometers
   - _________ Bell & Gossett circulating pumps for liquid (primary/secondary) system with flow measuring and balancing valves
   - _________ ASME relief valve for system liquid.
   - _________ factory piped and frame mounted construction or individual components shall be specified.

7. __________ Duplex Domestic/ Hoffman condensate return unit with accessories.

Single source system responsibility requires all major components to be supplied by a single source manufacturer.

ITT Fluid Handling
ITT Fluid Technology Corporation

11/92
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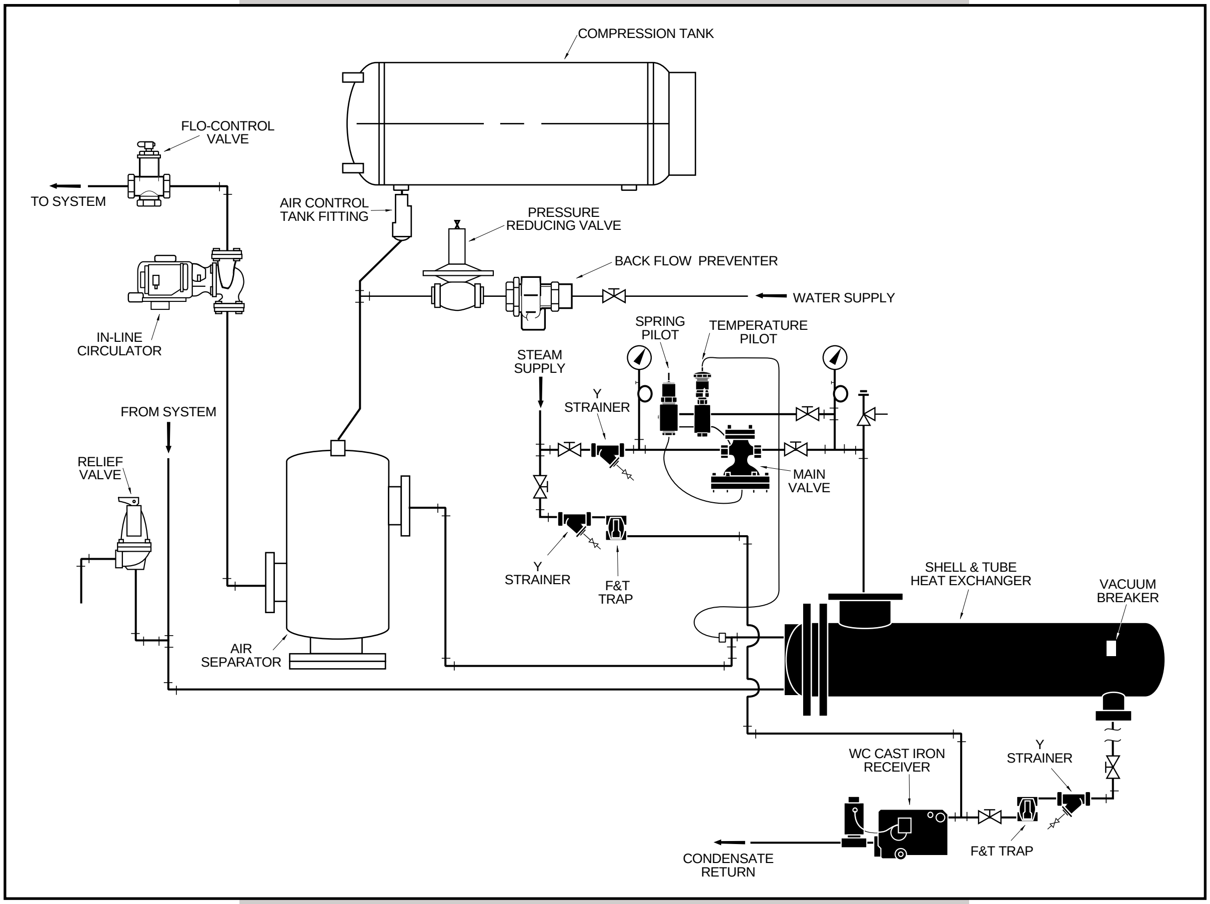
Energy Efficient Selection of Steam-to-Liquid Heat Transfer Systems



Hoffman

Valves, Regulators, Steam Traps, Condensate Pumps, Vacuum Breakers, Strainers

Bell & Gossett

Heat Exchangers, Heat Transfer Packages, Pumps, Air Control Systems

Domestic

Condensate Pumping Systems, Boiler Feed Pumping Systems

McDonnell & Miller

Steam Boiler Controls

ESP CAD

Part of the ESP PLUS Equipment Selection Program

ITT Fluid Handling
ITT Fluid Technology Corporation

Engineered Steam-to-Liquid Heat Transfer Systems

Traditionally, the engineering of steam-to-liquid heat transfer systems has been done by using the maximum available steam pressure to select the smallest and least expensive heat exchanger. The control valve, steam trap and other ancillary equipment would then be selected using the operating conditions of this heat exchanger. While this method works, there is a better way.

It is now possible to reduce *both* initial equipment costs *and* operating costs. This is done by selecting the components of the *entire system* at the same time. Your ITT Fluid Handling Representative can now optimize your steam-to-liquid heat transfer systems with each component working together in a manner that optimizes the system as a whole.

Optimizing The System As A Whole

Let's take an example. Say we have 90 psig steam pressure available for a heat transfer application and use a low pressure drop control valve—10 psig ΔP—to select a heat exchanger with minimal size and surface area.

At a high steam operating pressure, there is less latent heat available for the heat exchanger, while downstream of the heat exchanger, a higher percentage of flash steam is produced. This flash steam results from re-evaporation of the condensate when it is exposed to lower pressure or vented return lines.

In this type of system, a flash tank may be required to handle this re-evaporation, and high temperature condensate return systems may be required to pump the condensate discharging from the flash tank.

The net result of using high steam pressure at the heat exchanger is *flash steam losses* causing wasted energy ($), lower system efficiency ($$), and extra equipment to handle higher temperature returns ($$$). But we did save initial costs by selecting the smallest heat exchanger....? Not necessarily!

It is now possible to reduce both initial equipment costs and operating costs

When we re-select the same application but use a steam pressure regulator to reduce the steam pressure at the heat exchanger to 5 psig, the size of the heat exchanger will increase. However, the heat exchanger cost is only part of the system cost.

By reducing steam pressure at the heat exchanger, the steam control valve may decrease in size, lowering its initial cost. Also, the steam trap may become lower in cost because of the reduced operating pressure. By lowering your steam pressure, the result may be a *net savings on your initial equipment cost.*

But there's more. By using the reduced steam pressure of 5 psig, we have more latent heat available in the heat exchanger, and thus a lower percentage of flash steam. This may allow for elimination of the flash tank and conversion of the high temperature condensate return unit to a lower cost, conventional condensate return unit.

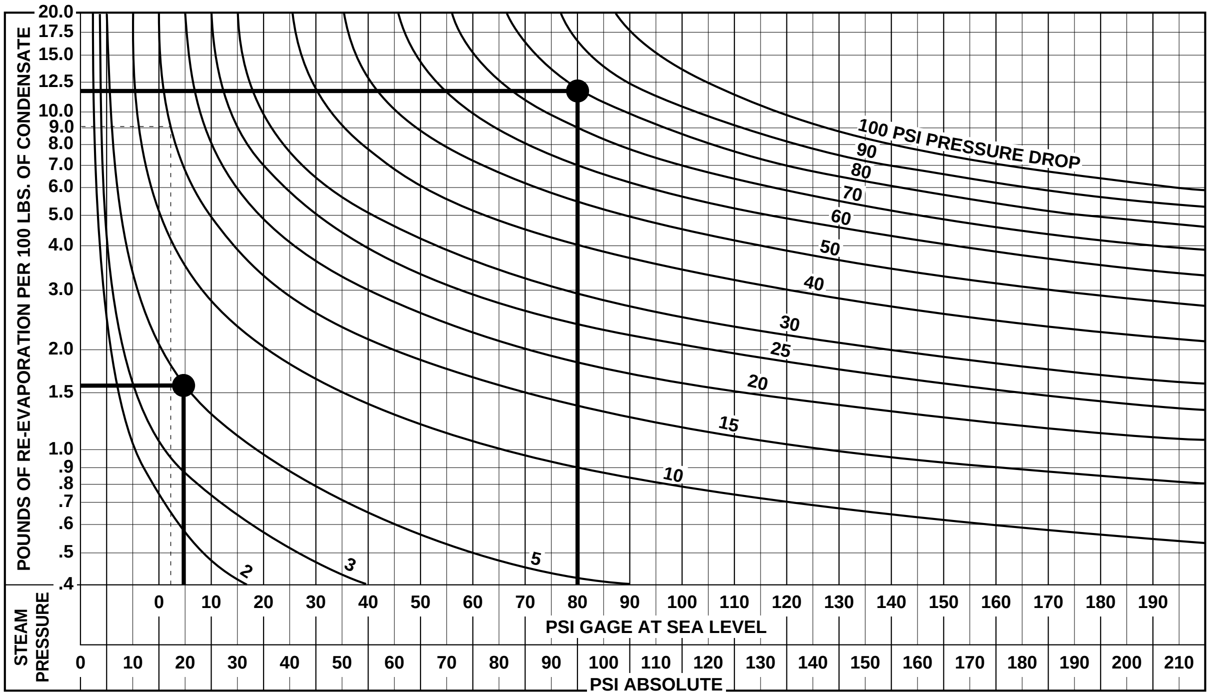
The net result: lower initial costs—and most importantly, lower operating costs yielding annual cost savings that greatly increase payback. See the example on the next page for a typical comparison.

Your ITT Fluid Handling Representative can select *an engineered steam-to-liquid heat transfer system that operates efficiently, effectively, and possibly at a lower initial cost* because they fully understand all of the critical components involved.

Your ITT Fluid Handling Representative handles Bell & Gossett heat exchangers, pumps and air control equipment; Hoffman steam control valves, regulators, safety valves, steam traps, vacuum breakers and strainers; and Domestic condensate return and boiler feed pumps. Count on your representative for the right combination of training, expertise and tools to pull it all together in a system that suits your application *exactly,* using ITT Fluid Handling's award-winning ESP-PLUS system evaluation and equipment selection program.

Reduced Steam Pressure Yields Lower Operating Costs

Steam Re-Evaporation Rates



Using our example steam pressures, let's assume our heat exchanger requires 3,000 lbs/hr of steam, operates 14 hours a day for 250 days per year and the condensate goes to a vented condensate receiver at 0 psig atmospheric pressure. We will assume our steam costs $6.50 per 1000 lbs.

For 80 psig Steam-Flashing to 0 psig

Per above chart 11.8% flash loss

11.8% x 3,000 lbs/hr = 354 lbs/hr flash loss

354 lbs/hr x 3,500 hrs x $\frac{\$6.50}{1000 \text{ lbs}}$ =

$8,053.00
in Flash Losses Per Year
At Current Energy Costs

For 5 psig Steam-Flashing to 0 psig

Per above chart 1.6% flash loss

1.6% x 3,000 lbs/hr = 48 lbs/hr flash loss

48 lbs/hr x 3,500 hrs x $\frac{\$6.50}{1000 \text{ lbs}}$ =

$1,092.00
in Flash Losses Per Year
At Current Energy Costs

NET ANNUAL SAVINGS FROM REDUCING PRESSURE
1,071,000 lbs of steam or $6,961.00