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# STEAMLINE

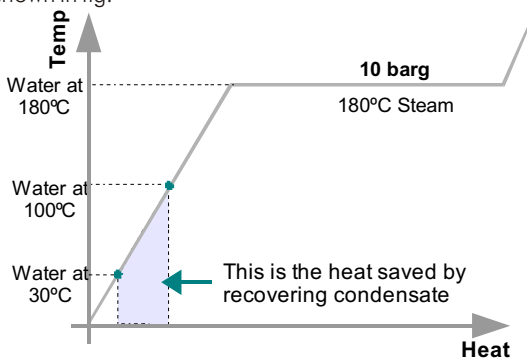
## Condensate Return



## Why recover Condensate ?

Condensate is steam that has condensed as a result of doing work and liberating heat. Being condensed water vapour (steam) and relatively pure compared to most water supplies, condensate is an excellent source of feedwater. Since condensate is typically of better quality than normal make-up sources, boiler water cycles of concentration can be increased and blowdown amounts can be reduced with its use. This results in a reduction of heat lost through blowdown, which reduces the amount of heat (fuel) required to maintain operating pressures.

The most important aspect of condensate is its heat content. Feed water supplied at 95-100°C needs very little energy to go to an operating pressure of 10 barg and temperature of 180°C inside the boiler. Ambient water supplied at 30°C will use more heat, i.e., more fuel as shown in fig.



Finally, condensate is water that a plant has already treated (pre-treatment, scale/corrosion inhibitors, oxygen removed, pumped and evaporated to steam i.e. distilled), it represents a valuable investment that can be utilised over, if recovered. Therefore, recovering and reusing condensate whenever possible, is good management.

## How is it done?

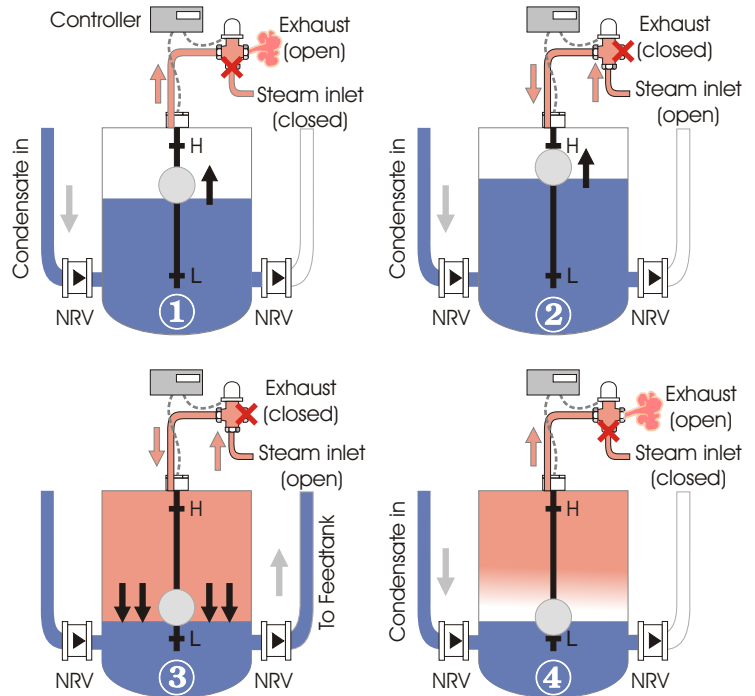
Condensate is discharged from steam using equipment through steam traps. The condensate will be at the saturation temperature corresponding to steam (and condensate) pressure. However, this pressure is not always enough to lift the condensate back to the boiler feed tank. Further, if multiple traps discharge to a common line, a fluctuating back pressure can cause malfunction of some of the traps. So the common practice is to collect condensate in a tank and pump it back to the boiler house.

Conventionally, an electrical pump is used. However, an electrical pump system has many special requirements - the pump needs to be switched On and Off based on the water level in the condensate collection tank, which radiates heat to the atmosphere. The high temperatures of condensate cause cavitation in the pumps. The pump also needs protection from dry running, and has many moving parts such as bearings, impellers, bushings etc. which have their own maintenance needs. Most of all, it uses expensive electricity, taking away from the economic benefit of condensate return. All these issues can be resolved by a Steamline Condensate Recovery Pump System, based on a mechanical pump.

## Operating principle

1 Filling Mode: Condensate fills by gravity flow into the pump. The steam inlet is closed, exhaust is open, so no back pressure is seen by the condensate entering the pump. As condensate fills, the float rises towards the H position.

2 Transition to Pump Mode: As the float reaches position H, the controller opens the steam inlet and closes the exhaust. Steam rushes in, pressurising the pump to the steam pressure. This pushes the water in the pump. The water cannot flow back from the inlet (due to the NRV), it gets pushed out (or pumped) through the condensate outlet.



3 Pump Mode: Condensate is pumped to the feedwater tank. As the condensate level in the pump falls, the float descends towards position L. Note that the steam is not used up to pump the water - only the pressure exerted by the steam is used as a motive force. Hence, the steam used is very little. The volume of water between H and L is a constant and is used to totalise the quantity of condensate returned.

Transition to Filling Mode: As soon as the float reaches position L, the controller closes the steam inlet valve, and opens the exhaust valve. The small quantity of steam in the pump is exhausted, and the pump body returns to atmospheric pressure. As soon as this happens, the positive gravity head enables the condensate to start filling into the pump, and the cycle repeats.

## Features of Steamline Condensate Return Pumps

- Uses inexpensive steam, air or gas to work
- Supplied complete with receiver, valves, accessories
- Negligible steam consumption
- Zero Maintenance, no cavitation, leaking seals, impeller wear or motor problems
- Only one moving part (SS float) increases reliability
- Superior build quality and rugged construction
- Pre-wired, pre-piped package for easy installation
- Electronic Condensate flow totaliser included
- Widest range of steam-op. pumps in the market



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