DESUPER HEATER

EJECTOR

POWER PLANT

STATIC MIXER

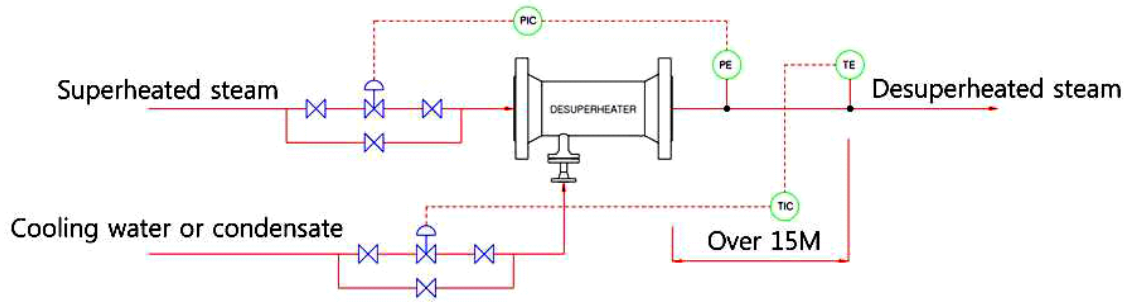
SAMWON ENGINEERING CO., LTD.

DESUPERHEATER

What is DESUPERHEATER?

In typical process plants, process steam is usually superheated, or heated to a temperature above saturation. The difference between the saturation temperature and the actual temperature of the steam is called 'superheat'. To resolve problems, such as occurrence of condensate water caused by reduction in transportation efficiency from the boiler to the point of use and external heat loss in vapor pipelines, vapors need to be at an overheated level.
Desuperheated steam is more efficient in the transfer of thermal energy, consequently desuperheaters are used to bring the outlet degree of superheat closer to that of saturation.

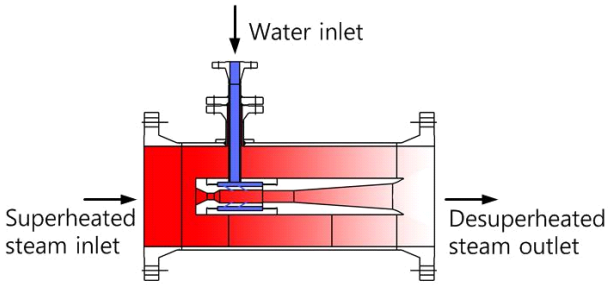
DESUPERHEATER installation diagram



- Straight length
  - Upstream : 5D or 1.5m
  - Downstream : 10D or 3m
  - D = Desuperheater in diameter

Operation principle

All desuperheaters operate on the same principle. Water (usually condensate), is introduced into the process line and thus comes into direct contact with the superheated steam. Evaporation of the water reduces the steam temperature. The outlet steam temperature is controlled by the quantity of water that is evaporated. It is preferred to use hot injection water near the saturation temperature of the steam to be cooled so that it is mainly the latent heat which is extracted to evaporate the injection water. This minimizes the time of the suspension of the water particles in the steam so that all the water is evaporated and none falls to the inside walls of the pipe work.



Types of DESUPERHEATER

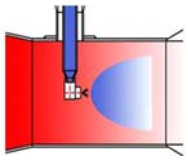
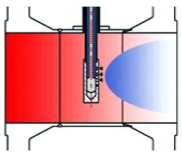
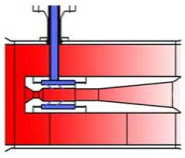
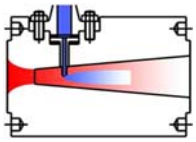
It is easy to understand why there has to be a period of good contact between the droplets of cooling water the superheated steam. If good contact is lost, the water can no longer absorb heat effectively from the steam, evaporation stops and the desuperheating process comes to a halt.
When the steam velocity is too low, 'water droplet fall-out' occurs and a pool of water is formed which runs along the bottom of pipe.
There are basic types of SAMWONENG desuperheater (shown below) which all use a method to atomise the cooling water droplets.

Spray nozzle type

- This is one of the most simplest forms of desuperheaters and is also termed as amechanical desuperheater.
- The basic principle of operation is to desuperheat the steam by introducing water droplets through a spraying nozzle and breaking the water droplets into a fine mist at the point of exit.
- The performance of this desuperheater corresponds directly to the design of the spray nozzle.
- This unit offers negligible pressure drop across the system.
- This unit requires typical superior water pressure than the steam operating pressure
- Due to this simple construction it is one of the most economic desuperheaters available in the market

Venturi nozzle type

- This unit is ideally suited when high pressure water is unavailable.
- Required water pressure can be about 1kg/cm^2 over the steam pressure.
- This unit would perform even if the water pressure is same as the steam operating pressure.
- In this configuration, the water is piped right into the Venturi Nozzle which does all the work of atomizing the water.
- This unit has absolutely no moving parts and negligible pressure drop.
- The venturi nozzle has a converging, stabilizing and a diverging configuration.
- This unit creates very high velocity and turbulence which assists in instantaneous evaporation of the injected water droplets.

Structure				
Type	Single nozzle	Multi nozzle spray type	Venturi nozzsle type	Venturi II Type
Turn-Down Ratio	Max. 3:1	Max. 10:1	Max. 30:1	Max. 5:1
Installation	Horizontal / Vertical	Horizontal / Vertical	Horizontal / Vertical	Horizontal / Vertical
Temperature Accuracy	Sat. 20℃/+10℃	Sat. 20℃/+10℃	Sat. +6℃/+5℃	Sat. +7℃ or more
Temp. Detection Distance	15m / 12m or more	15m / 12m or more	10m or more	12m or more
Cooling Water Pressure	Steam+7bar / +5bar or more	Steam+7bar / +5bar or more	Steam+0bar or more	Steam+1bar or more
Steam Piping Size	3” or more	6”/8” or more	3” or more	2” or less
Application	Load Temp (Small variation) • Condenserdump • Turbine dump •- Process steam	Load Temp (Small variation) • Condenserdump • Turbine dump • Process steam	Load Temp (Large variation) Press drop (Very small) • Turbine dump • Process steam	Load Temp (Large variation) Press drop (Middle) • Turbine dump • Process steam

DESUPERHEATER

Application

Power Plant
- Reduce the temperature of the steam from the turbine bypass system to be used elsewhere in the plant. (Turbine washing)

Process Industries
- Desuperheaters are available to lower the boiler's steam temperature and pressure for economical operation in the process industry.

Petrochemical Industry
- Vacuum Distillation Startup Heater
- Steam supply to process heaters
- Decompression station and turbine bypass
- TVR backstage
- MVR

Tobacco Industry
- Tobacco leaf drying process

Textile Industry
- Steam sterilization processor

Food Industry
- Steam washing of cookware
- evaporative heat exchanger
- Product conditioning

Chemical and Pharmaceutical Industry
- Reactor heater jackets and coils
- Steam supply to process heaters

Casting and Ddistillation Industry
- Steam heating system

Paper industry
- Paper drying machine

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