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The Mechanical Spray Desuperheater (MSD) or Simple Spray Desuperheater

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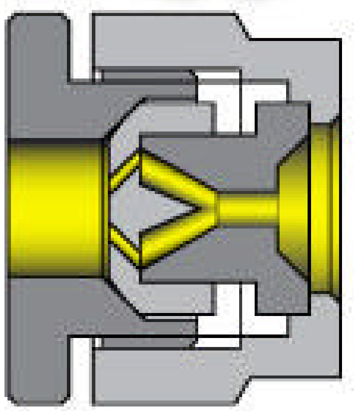
This is the most basic type of Desuperheater, consisting of a fixed area nozzle arranged to face downstream at or near the Desuperheating pipe. The MSD relies on the pressure differential available across the nozzle to achieve the conditions for rapid absorption of the water into the steam.

Cooling water control valve install in the line ahead of the MSD will very in water supplied to the nozzle to maintain the down stream steam temperature at the measuring point. Whilst the MSD is working between about 5 and 100% of maximum rated capacity, there will be adequate pressure differential across the nozzle to ensure a spray pattern in the form of a hollow cone of finely divided water particles. When Desuperheating loads goes about the maximum, the steam velocity at the exist of the nozzle will ensure turbulent flow, helping mix water particles in to the steam thoroughly. With reduction in steam flows the steam velocity through the pipe reduces proportional to flow and the turbulence will also reduce. With the reduced steam flow the water requirement will also be proportionately reduced in order to maintain the constant temperature. Plug of the control valve will automatically move towards the closed position to achieve this. Since, the nozzle has a fixed orifice; the pressure differential across it will reduce proportional to square of the reduction flow in accordance with Bernoulli's law. This causes a reduction in differential velocity between the steam and the water particles, a reduction in the cone angle so that the water is projected more directly downstream, and an increase in water droplet size and all of these phenomena adversely affect the ability of the Desuperheater to work efficiency. MSD or Simple spray Desuperheaters relies upon the pressure drop across the spray nozzle to achieve the necessary atomization.



The unit consists of an orifice plate or nozzle through which the water is discharge and the pressure drop across this creates a spray pattern to achieve the necessary atomization. The orifice plate can only be design for maximum flow condition and since the pressure drop across the orifice plate follows, the square laws, as the flow is reduced the pressure drop across the orifice plate is substantially reduced and the atomizing characteristic is rapidly lost. For, example, if the flow is reduced by 50% of pressure drop across the orifice is reduced by 4. As the load further reduces a stage would be reached where the nozzle ceases spraying and the water is projected straight downstream unit and collects at the bottom of the steam pipe. Since the steam is not being Desuprerheated the temperature senses a rise in steam temperature, the control valve plug moves towards the open position and the nozzle commences to spray again, but at too high a rate of steam flow at that time. The steam is thus overcooled causing the control valve to close again the whole cycle the repeats with consequent swings in temperature and intermittent flooding of the steam line with cooling water.

Many attempts have been made to produce a nozzle having a better rangeability such as swirl nozzles but they still suffer the fact that as steam and water flow reduces, this mechanical phenomena result in

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Desuperheating efficiency fall away proportional to the square of the flow.

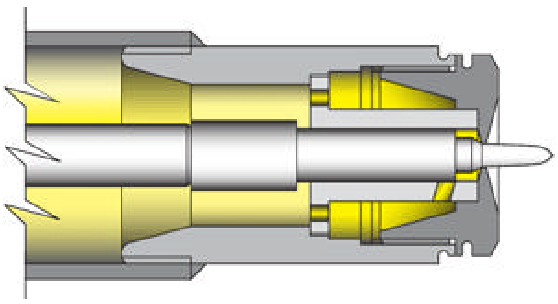
More recently different designs of variable nozzle spray type Desuperheaters have been attempted. In these designs it is intended to maintain constant water pressure differential to ensure good atomizing, a wide angle cone and high water velocity at all loads, changing the orifice area proportionally to load varies throughout.

However, the MSD is widely used with good results in those installation whore the load is relatively steady. The inevitable variation in the steam temperature downstream of the Desuperheater and the water, which collect and trapped out, are of law order to be acceptable.

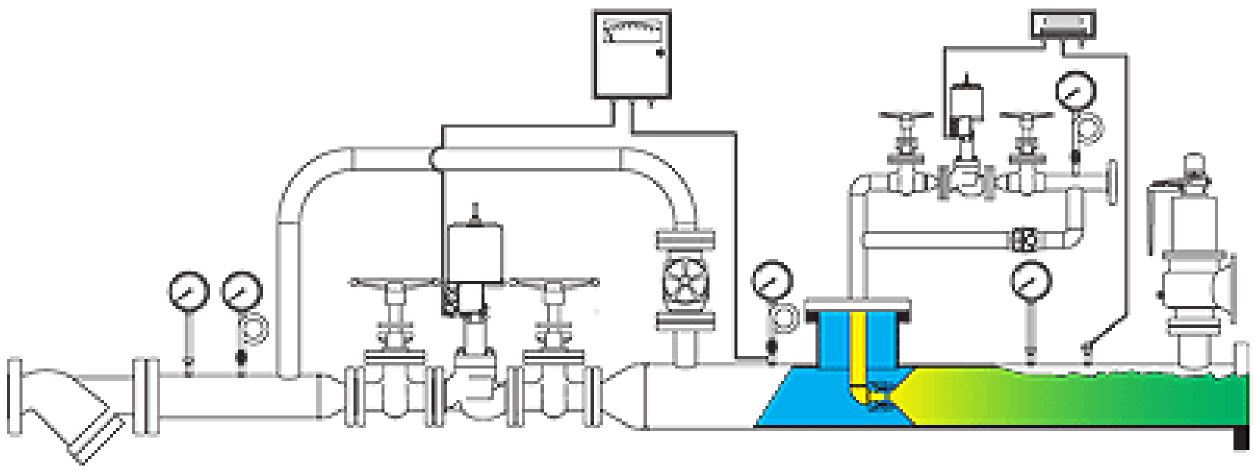
For us to design most efficient Desuperheater for you, we need following parameters:

- Operating pressure of Steam
- Maximum Inlet temperature of Steam**
- Required Outlet temperature of Steam
- Steam Flow Rate**
- Available Cooling water Pressure
- Available Cooling water Temperature

** You can give all possible values for these parameters



Typical Pressure Reducing and Desuperheating unit (PRDS)



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