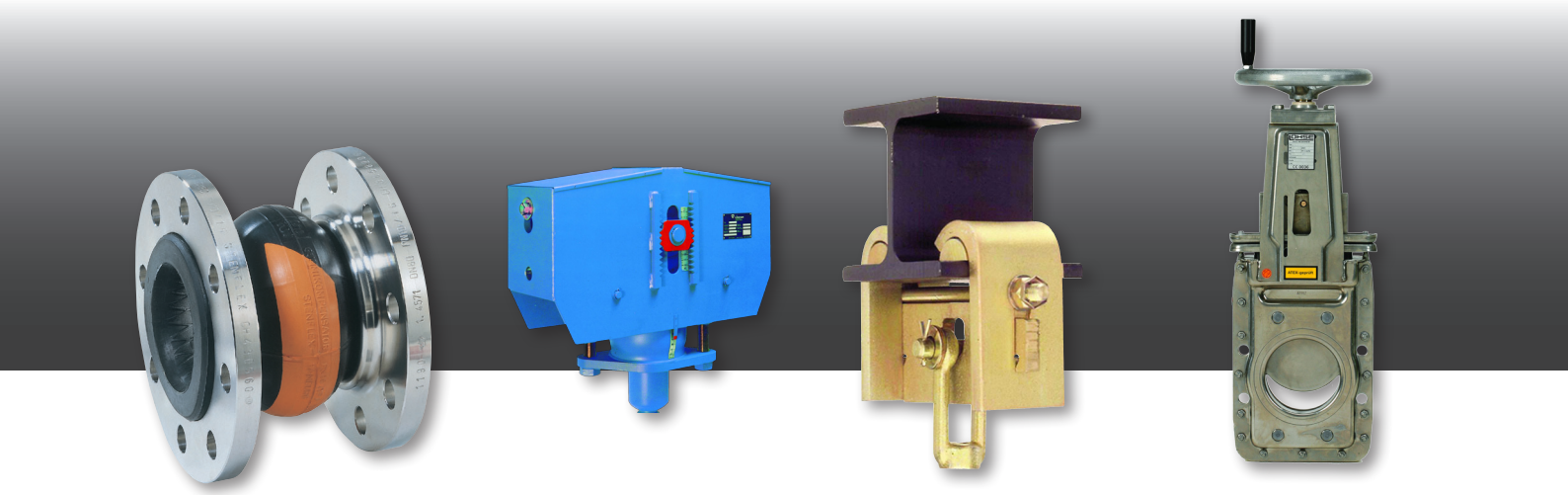
HANWEL NEDERLAND



Venturi Fluid Jets

Operation

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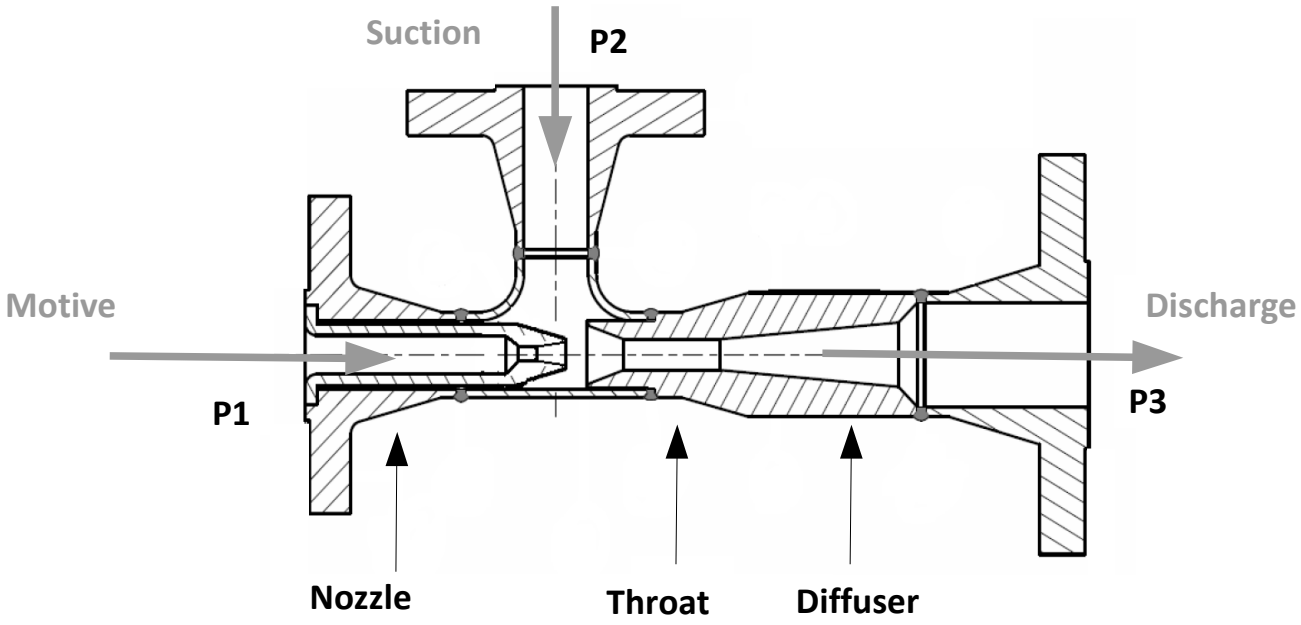
Eductor Operation

Inlet

- A high pressure liquid enters the specially designed nozzle which due to the venturi effect causes the motive pressure (P_1) to be dropped to equal the suction pressure (P_2).
- This allows the suction fluid to enter the eductor body and mixes with the motive fluid in the throat section.



Outlet

- The diffusers section reduces the fluid back to pipeline velocities which allows recovery of some of the fluid pressure (P_3)
- The performance of the eductor is determined by the motive & suction flow rates, pressure differential between the motive, suction and discharge ports, fluid temperature and the precise internal eductor geometry.

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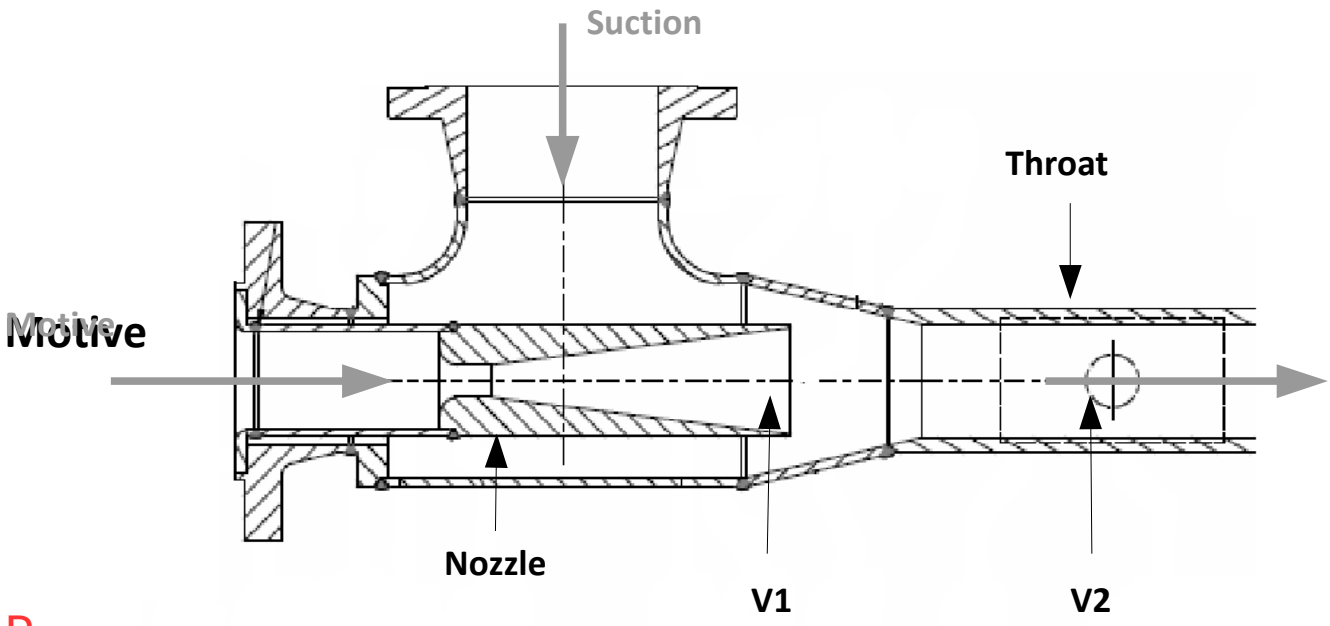
Ejector Operation

Principle

- Ejectors differ from eductors in that they operate with gaseous fluids, steam or air for example, instead of liquids. They are primarily designed to operate at sonic conditions and operate on the two sonic choke principle.

- Ejectors can be designed to operate at Sub Critical velocities in certain circumstances.



Process

- Motive gas is passed through the nozzle and accelerated to critical velocities (V_1) to create a sonic choke. The kinetic energy from the motive velocity and pressure drop generates the suction and draws in the secondary, suction, gas.
- The throat diameter creates a second sonic choke (V_2) which limits the suction flow rate and is used to determines the achievable counter pressure.

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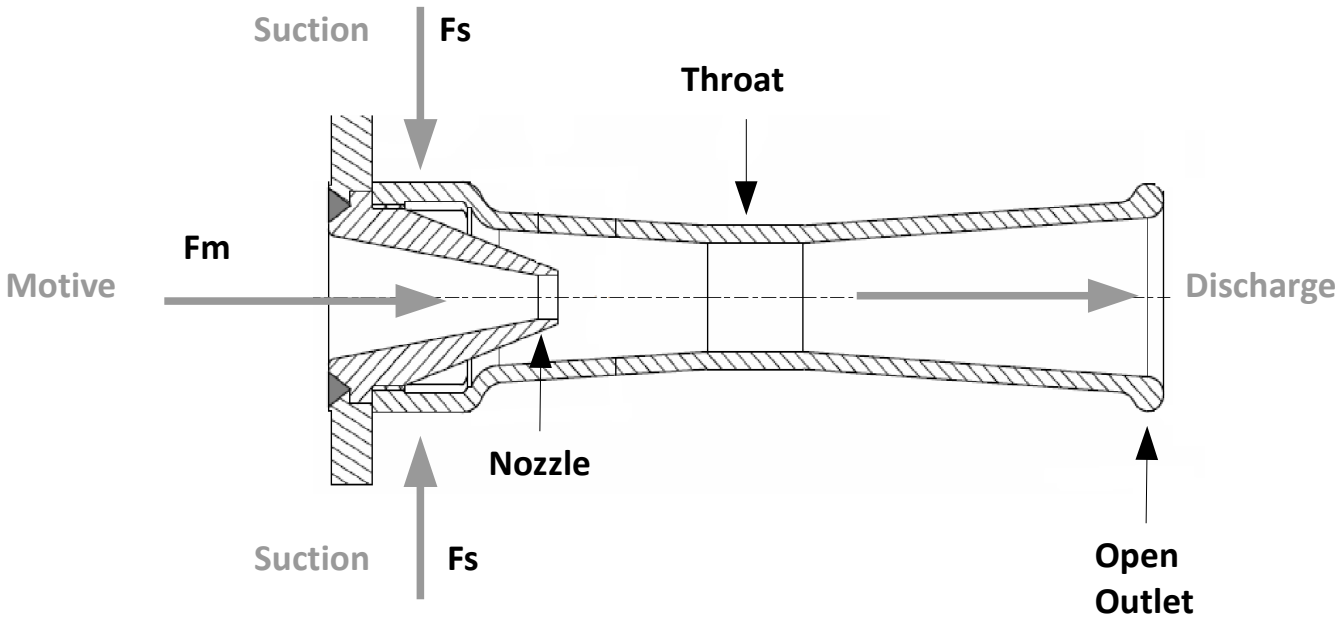
Mixing Eductor

Principle

- A mixing eductor works on the same principle as a standard eductor and can be used for any liquid or liquid slurry with a viscosity of less than 100cP and 2 SG

- Operationally however they differ in that the mixing eductor is installed in a tank rather than in a pipeline.



Conditions

- Requires a minimum of 2 bar pressure differential between motive fluid and the tank head pressure (level of fluid in the tank).
- Suction flowrate (F_s) is fixed at 3 times the motive flowrate (F_M)
- Discharge plume of 1 metre length per 0.2 bar motive to suction differential pressure.

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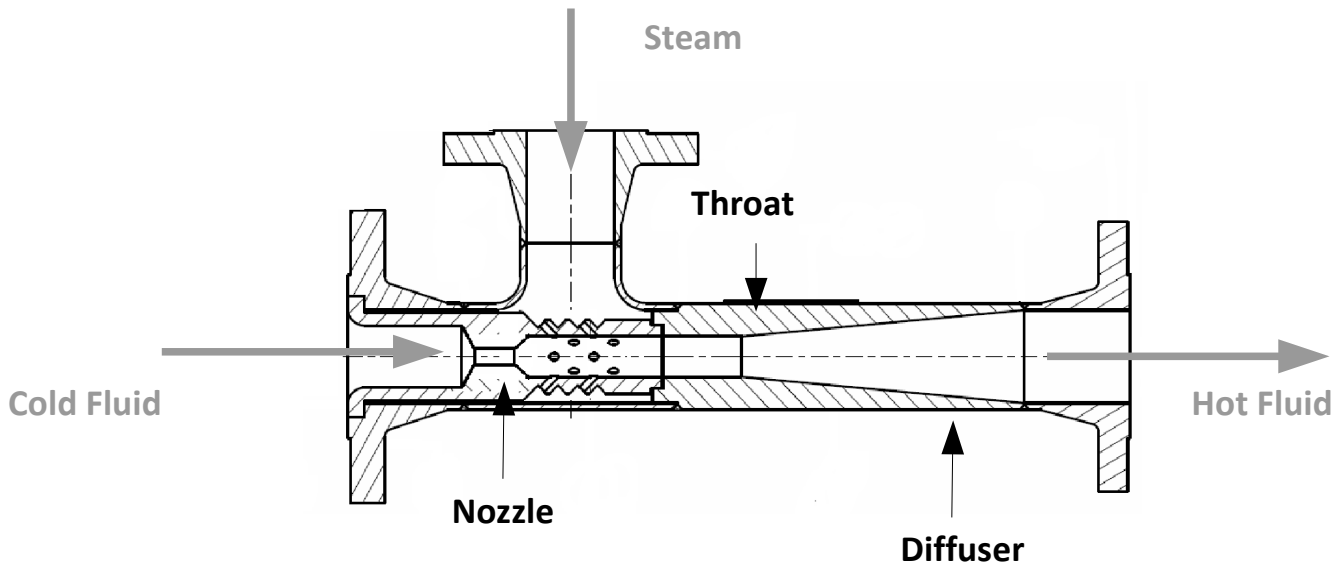
Instantaneous Heater

Types

- The instantaneous heater is a device used for heating newtonian fluids with low pressure steam. There are two types of heater design dependent on the pressures involved.
- A type - Steam pressure < water pressure
- B type - Steam pressure > water pressure



Operation

- Both designs work on the same principle of equalising the steam/water pressures to allow the two to mix.
- The number of holes in the mixing throat controls the heating by dictating the amount of steam which is allowed to enter
- Heaters have a fixed designed therefore are suitable for a relatively stable operating duty only. However multiple heaters can be used together.

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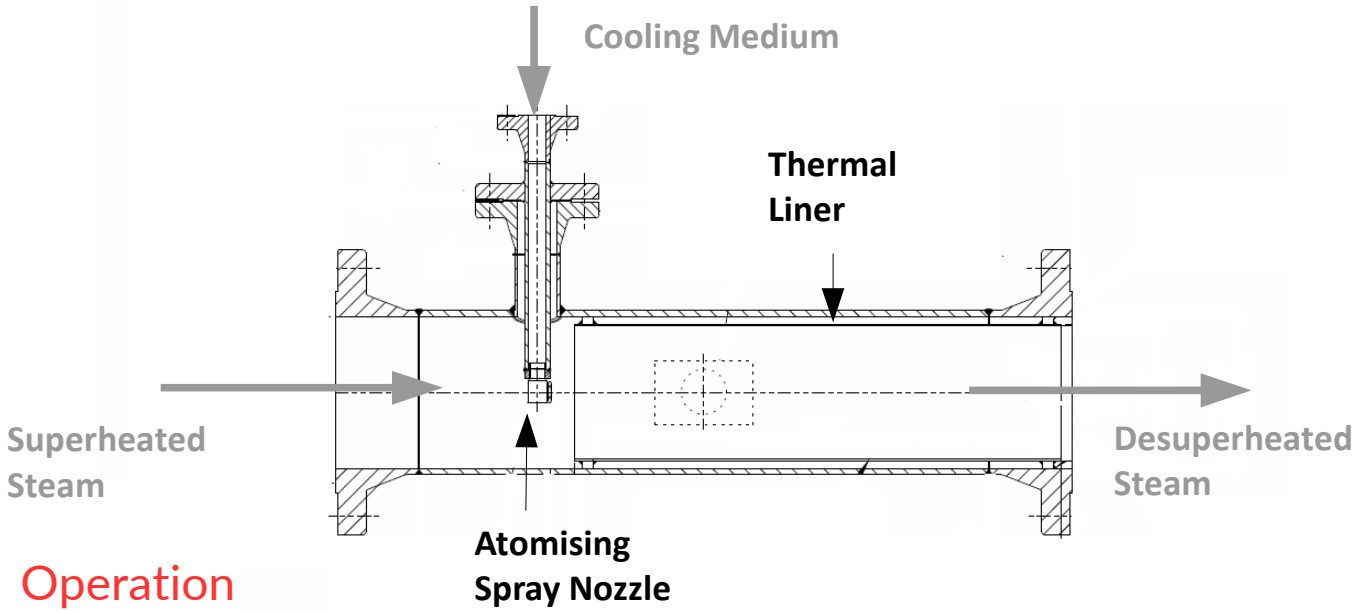
Spray Type Desuperheater

Principle

- The spray type desuperheater is used to reduce the temperature of steam to near saturation temperatures from superheated temperatures.(+3 degC)
- Cooling is achieved by evaporation of a cooling medium upon contact with the steam.
- The cooling medium is sprayed into the steam flow in the form of fine droplets to increase fluid surface area and therefore fluid / steam interaction.



Operation

- The cooling fluid must be at a pressure of at least 1 bar greater than the superheated steam flow.
- Dependent on the required reduction in superheated steam temperature pressure drops across the desuperheater range from 0.1 to 1 bar.
- Having a fixed geometry spray type desuperheaters are designed for a relatively stable range of operation. Having a maximum turn down of 2:1.

Hanwel B.V.
Jan Tinbergenstraat 209
7559 SP Hengelo

Tel: +31 (0) 74 2650000

Email: verkoop@hanwel.com
www.hanwel.com