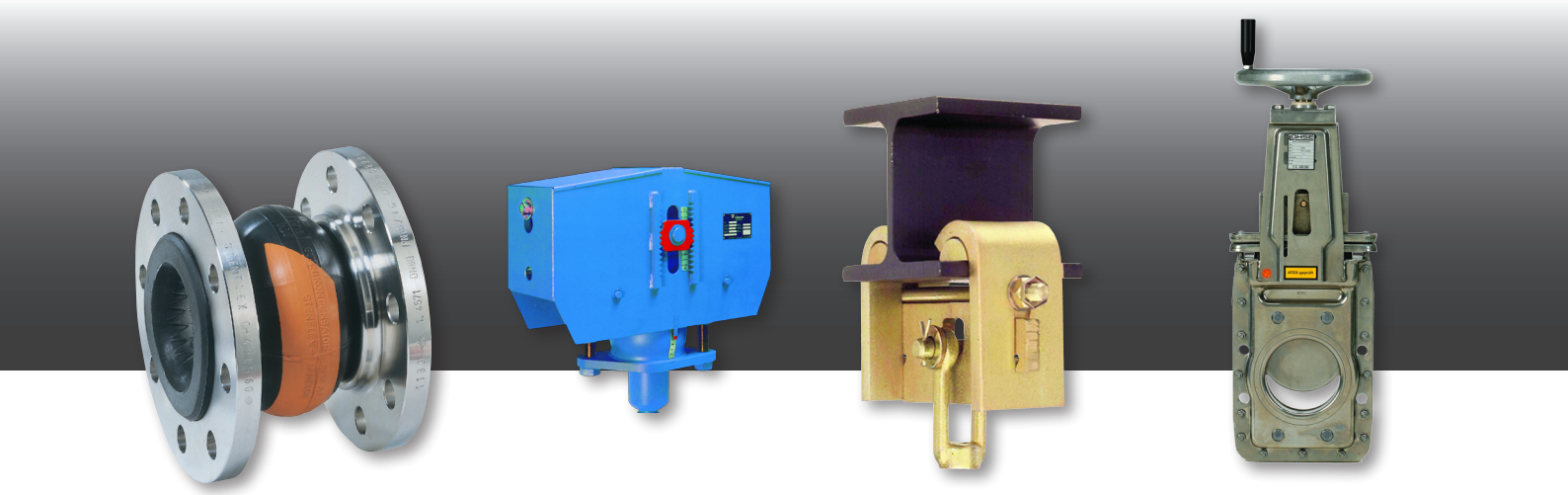
HANWEL NEDERLAND



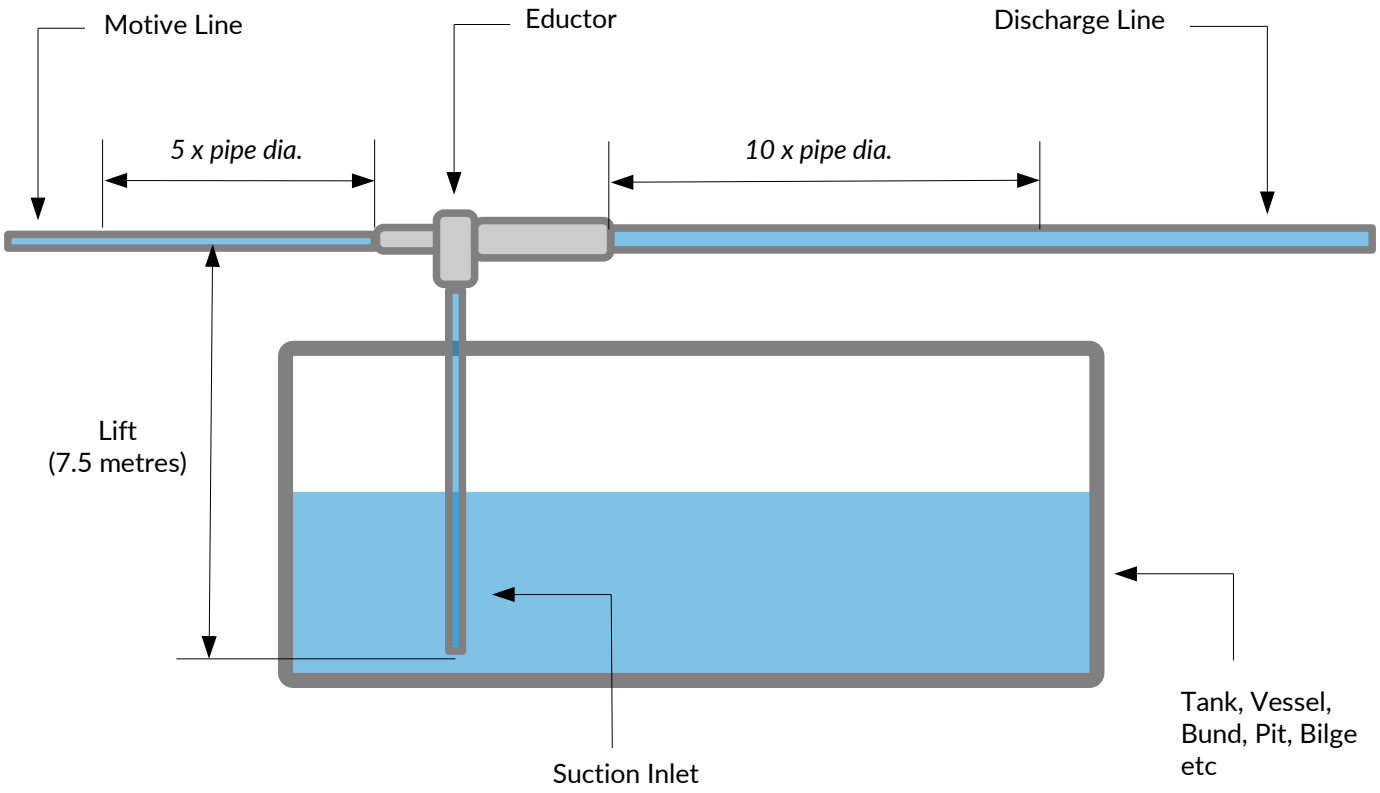
Venturi Fluid Jets

Installation

Venturi Product Experts

Lifting Applications

Eductors can be used to lift fluids and fluidised slurries from bunds, pits, tanks, bilges and vessels. A lifting application is one where the suction fluid is predominantly lifted by the vacuum created at the suction inlet of the eductor.

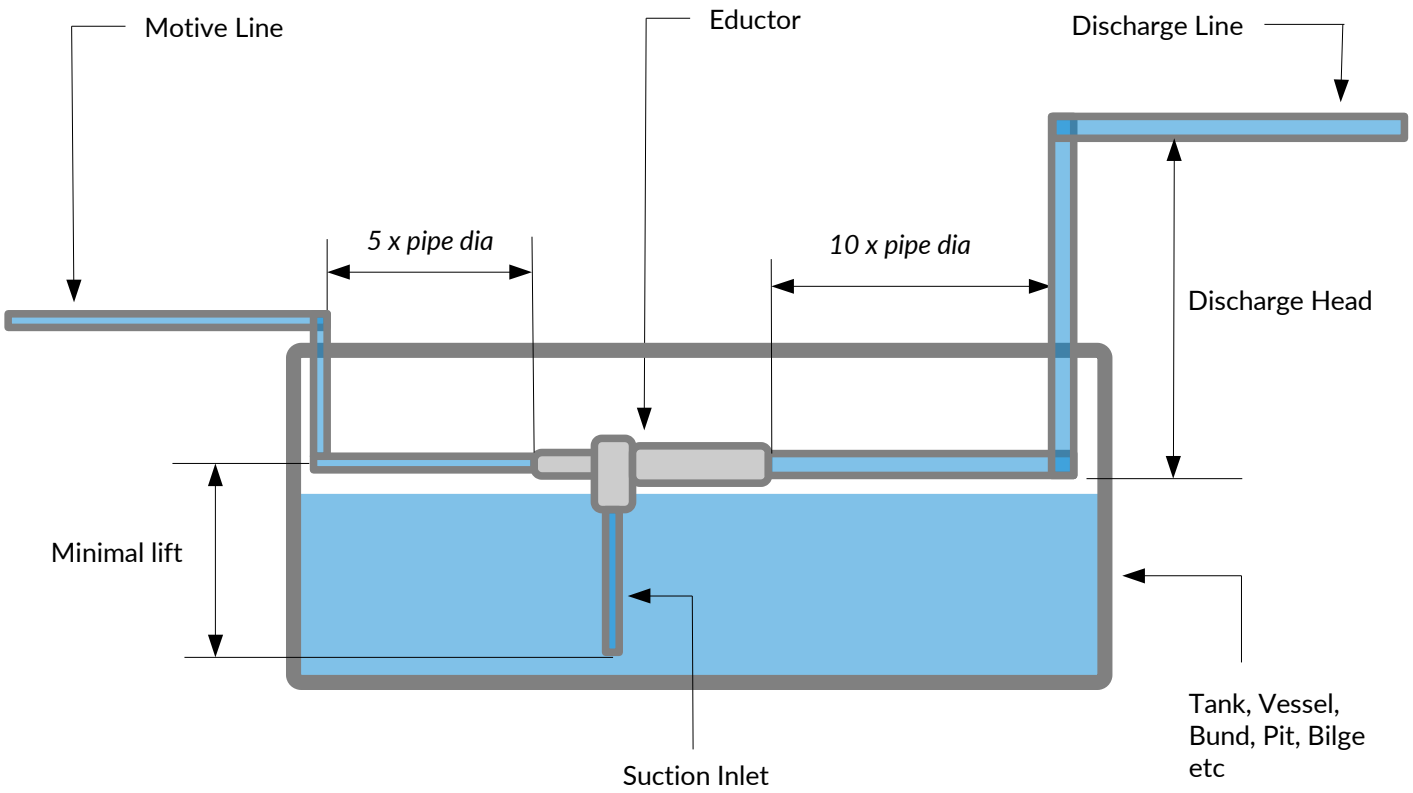


- The eductor is mounted above the suction fluid.
- A maximum of 7.5 metres lift for fluids at SG1.
- A greater SG will decrease the maximum possible lift.
- The fluid must be 20 degree C. less than its boiling point at the minimum suction point.
- For example water lifted 7 metres must be 50 degree C. or less to prevent flashing.
- Aim to install 5 to 10 pipe diameters away from any obstructions / bends / valves etc

Venturi Product Experts

Pumping Applications

Eductors can be used to pump fluids and fluidised slurries from bunds, pits, tanks, bilges and vessels. A pumping application is one where the eductor is installed as near as possible to the suction fluid and the required 'lift' is achieved by the discharge head.



- The eductor is mounted as close to the suction fluid as possible or submerged.
- The height to be pumped is only limited by the available motive pressure and flowrate.
- A greater SG will decrease the maximum possible discharge height.
- The fluid must be 80 degree C. or less to avoid flashing & cavitation.
- All pipework must be air tight to avoid entrainment and loss of performance.
- Aim to install 5 to 10 pipe diameters away from any obstructions / bends / valves etc

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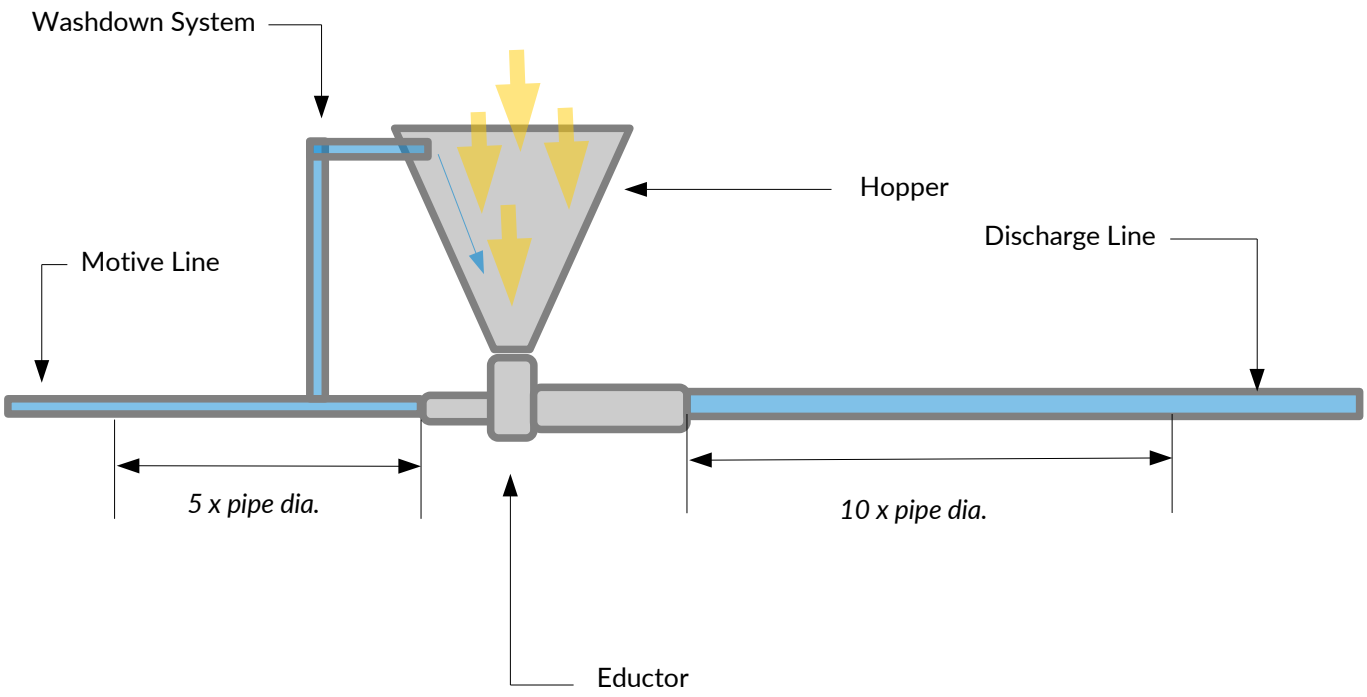
Solids Handling

As well as liquids and fluidised slurries eductors can be used for transporting solids in the form of powders, pellets, granules or anything else which can safely pass through the eductor geometry. Examples of solids include GAC (Granular Activated Carbon) and PAC, ion exchange resin, sand, lime and even food waste.

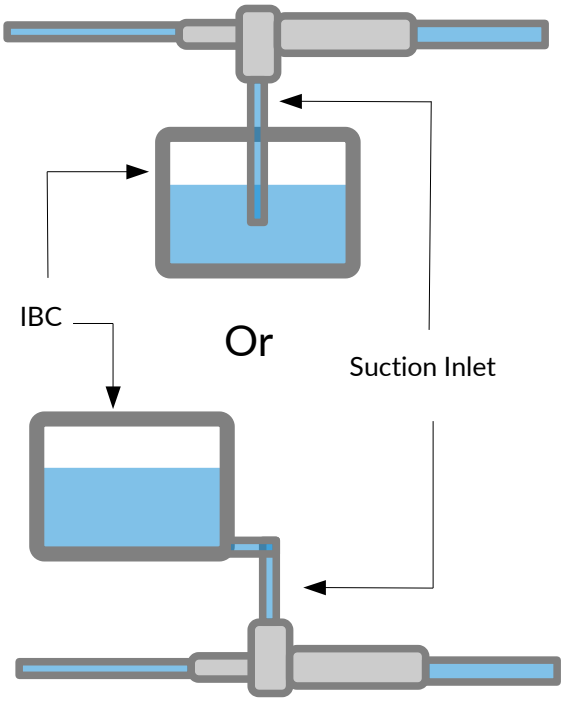


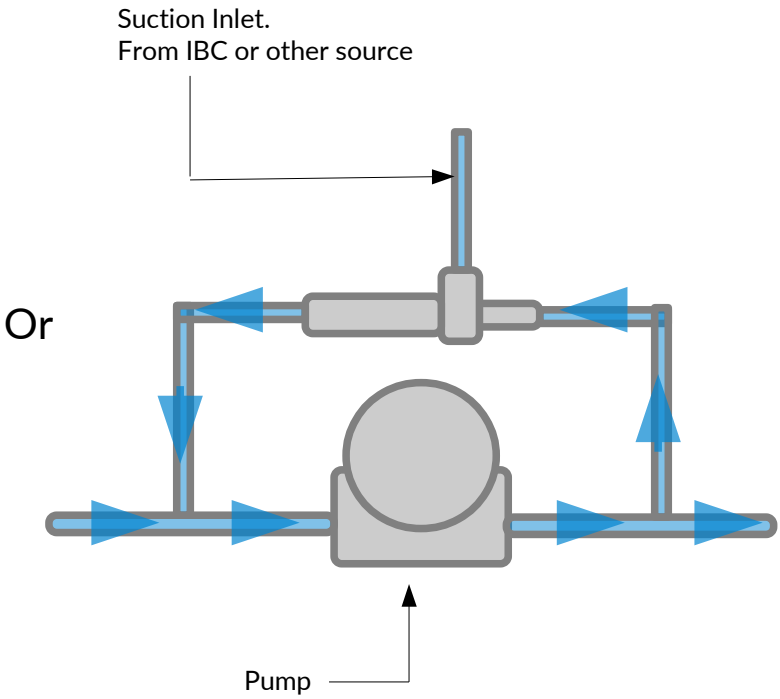
- The eductor is mounted below the hopper.
- Solids are gravity fed into the eductor.
- Hoppers can be design to suit the solids in question. eg incorporation of a lid for use with powders.
- Mass of solids to be transported limited by a maximum 2 SG discharge slurry.
- A wash down system can be incorporated to prevent bridging of solids in the hopper.
- Can be incorporated into a skid arrangement for easy installation.

Venturi Product Experts

Dosing & Mixing Applications

Eductors can be used for accurately dosing and mixing of chemicals or other fluids. By using an eductor you can pump and mix in the same process. This is inherently more efficient and less expensive than using separate dosing pumps and static mixers.



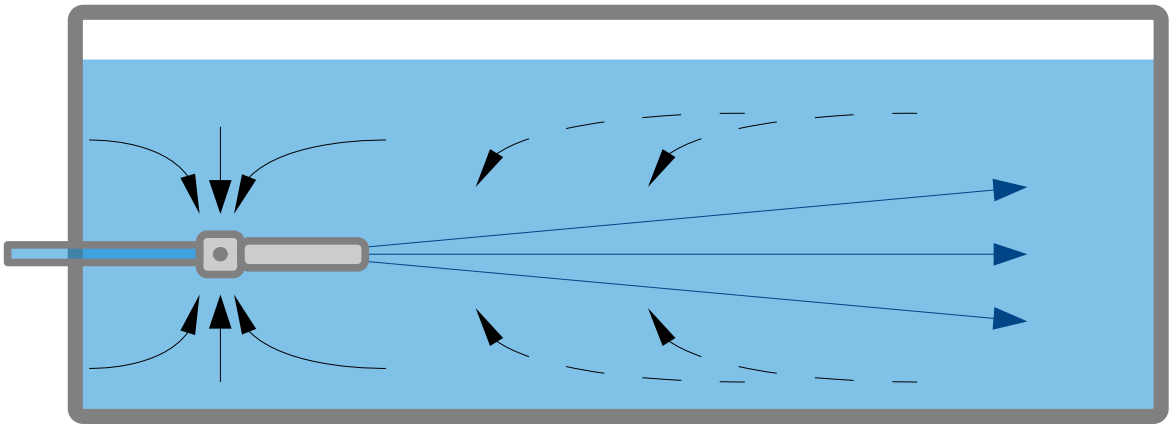


- The eductor can be mounted above, below or alongside the IBC.
- In most cases the eductor design will be sufficient to ensure the correct suction.
- Dependent on the application if a very small suction flowrate is required then a valve can be installed to control the suction flow.
- The pump powers the eductor which draws in the chemical.
- The eductor discharges to the pump inlet where a secondary mixing occurs.
- The pressure differential across the eductor is the same as that across the pump.

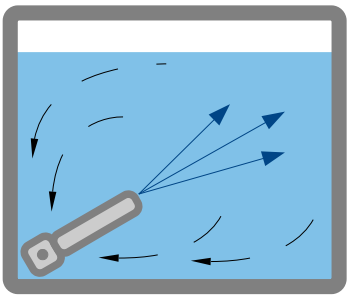
Venturi Product Experts

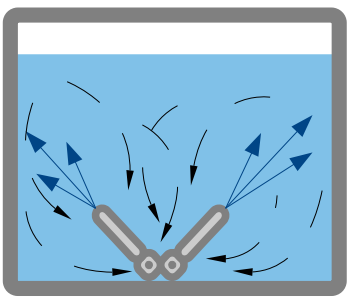
Tank Mixing & Agitation

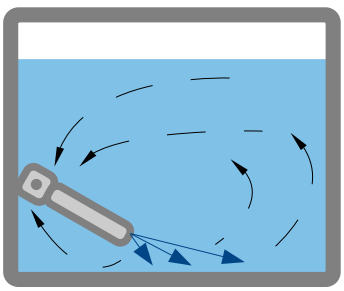
Specially designed eductors with open suction ports and an open discharge can be installed in tanks to provide mixing and agitation of fluids. The eductors should be installed so that the discharge plume covers as much as the tank as possible without breaking the surface. For agitation purposes the eductor can be pointed downwards so as to 'scour' the bottom of the tank and so prevent any solids from settling.



Depending on the application requirements, the shape of the tank, the type of fluid to be mixed, the height of the fluid and the amount of mixing required, all of this will determine the orientation and the number of the mixing eductors required. If positioned correctly non rotational fully homogeneous mixing is achievable.







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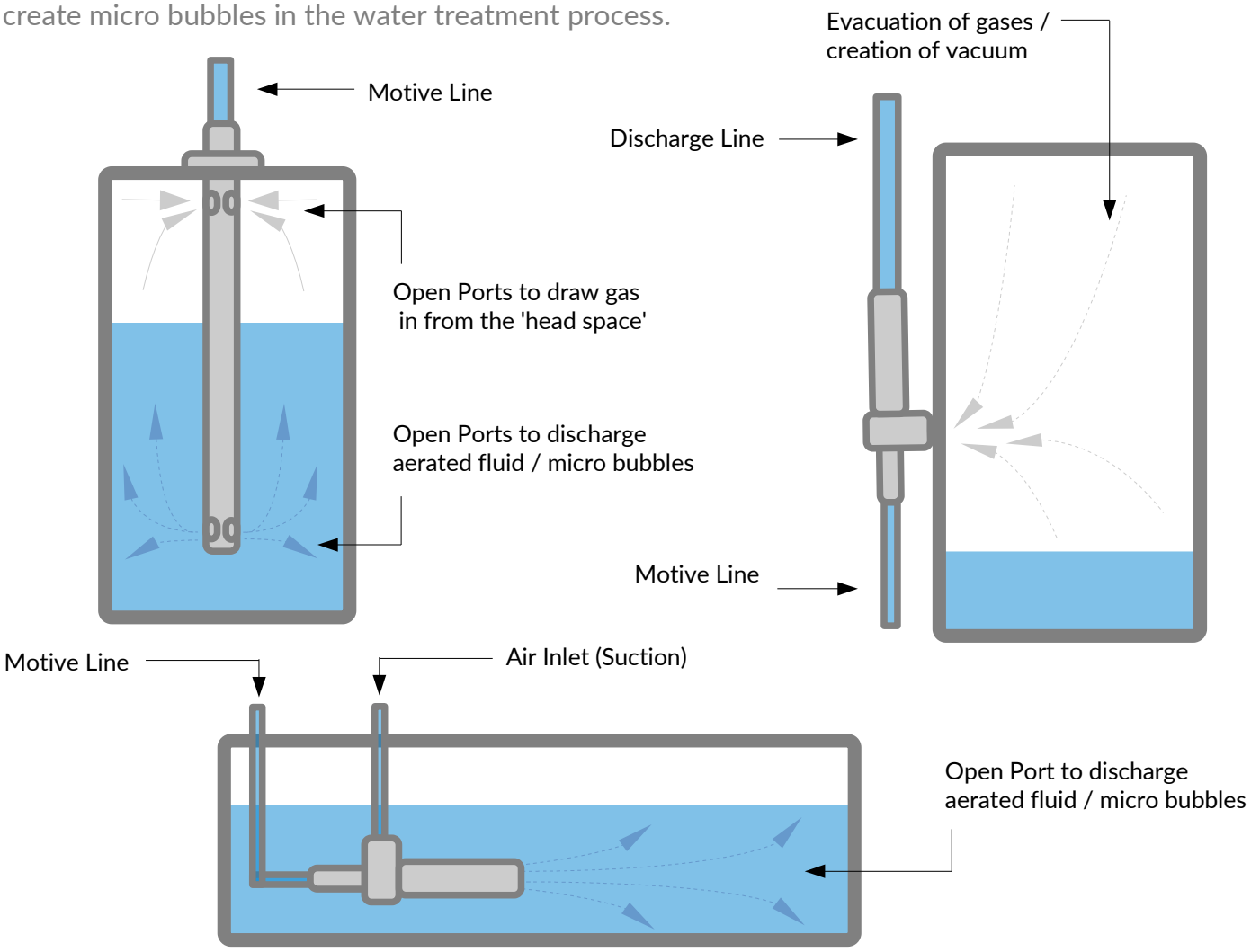
Aeration & Evacuation

Liquids eductors can also be used to entrain gases. This allows for the creation of vacuums, evacuation of vessels and aeration of the motive fluid. For example IGF vessels use eductors to create micro bubbles in the water treatment process.



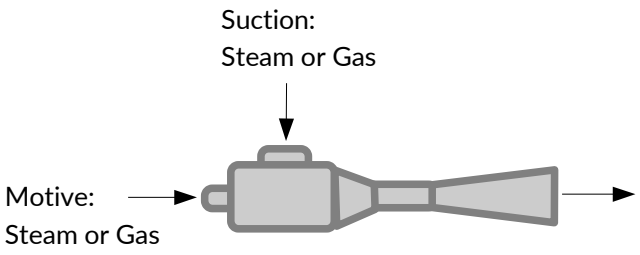
- The eductor can be mounted inside or outside the vessel.
- The open discharge port can be shaped to suit to increase exit velocity
- Installation can be vertical (up) or horizontal.
- Vacuums as great as – 0.75 barg can be created. Dependent on motive / discharge conditions.

Venturi Product Experts

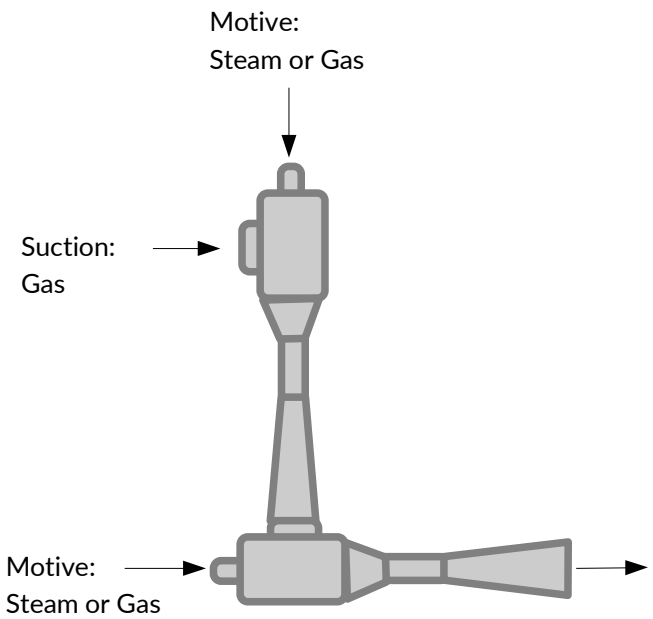
Vacuum & Compression Applications

Ejectors and Thermocompressors, like the Liquid Jet Gas Eductors can be used to create vacuums, however Ejectors and Thermocompressors having a gaseous motive can be installed in series to create even greater vacuums as well as being able to recover these waste gases and compress them to higher pressures.

1 - Single Stage Ejector System

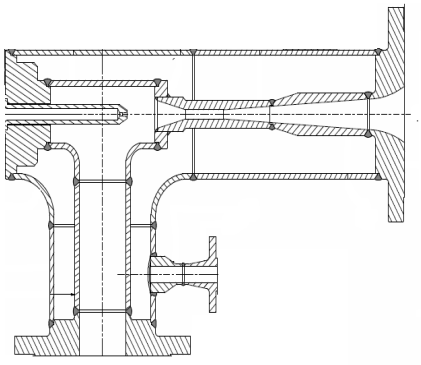


2 - Two Stage Ejector System



- Up to five (5) ejectors can be installed in series to create vacuums up to 0.1 mm Hg
- If steam is used as a motive fluid then an intercondenser will need to be installed in-between each stage.
- Inter-condensers 'knock out' the condensable gases to minimise the load on the ejector system.
- Steam jackets should be incorporated at pressures less than 5 mm Hg to prevent formation of ice within the ejector.

Jacketed Ejector

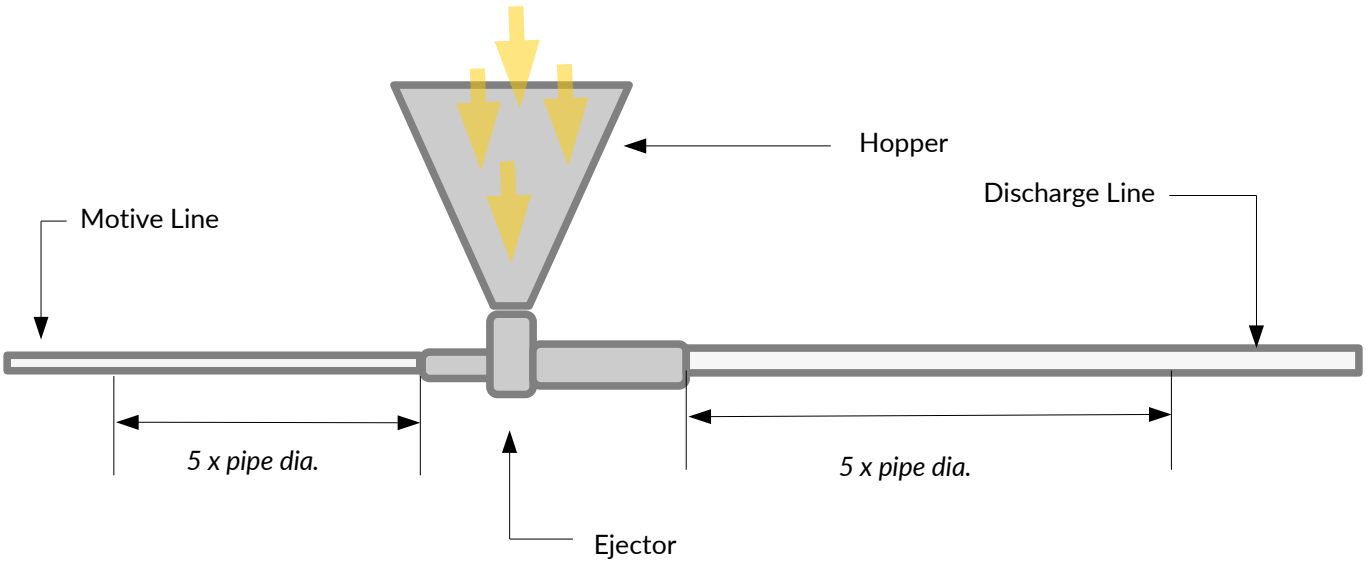


Venturi Product Experts

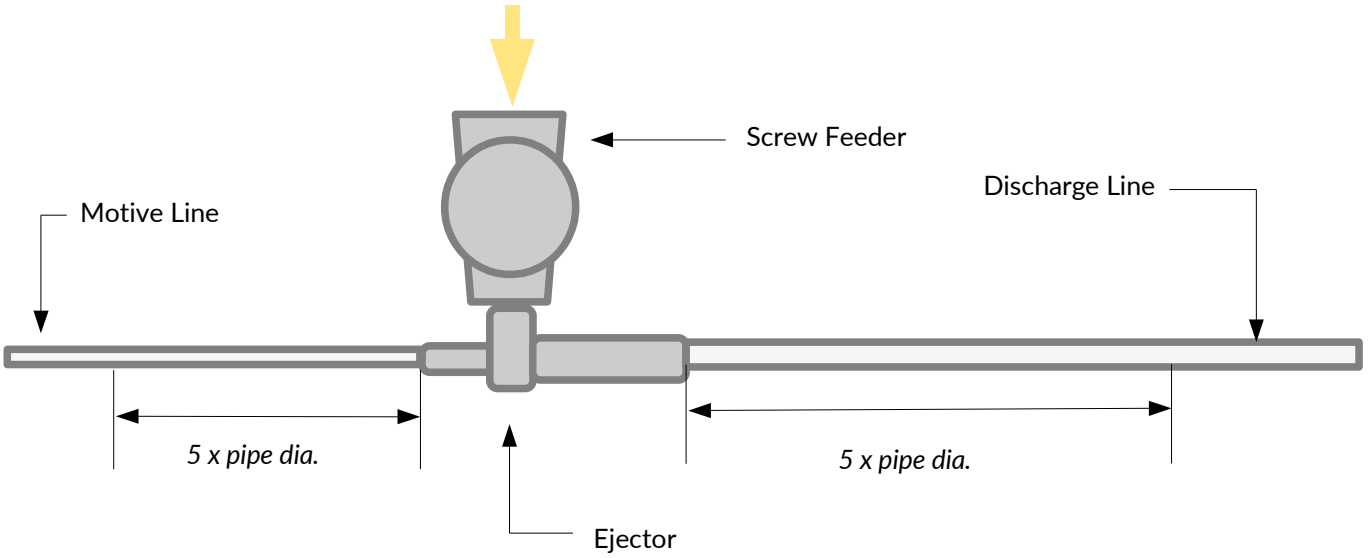
Pneumatic Conveyance

Air ejectors can also be used for transporting solids in a dilute pneumatic conveyance system either under positive or negative pressure.. These are also known as venturi feed devices.

1 – Hopper Feed Ejector System



2 – Screw Feed Ejector System

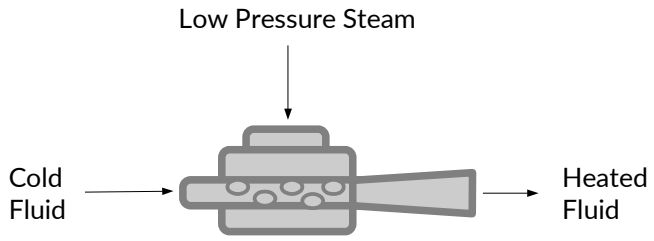


Venturi Product Experts

Inline, Instantaneous, Silent Heating

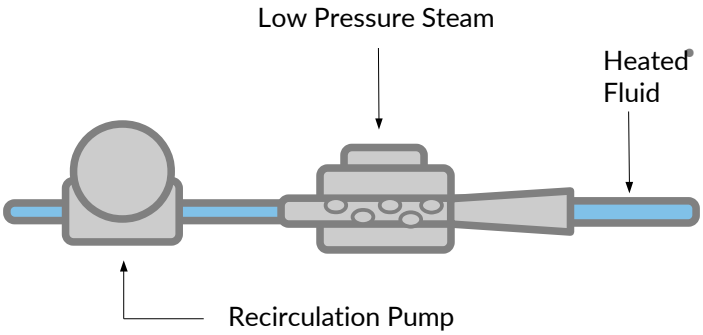
Venturi devices known as instantaneous or silent heaters can be used to directly inject steam into the motive fluid to raise its temperature. This allows for fluids to be heated inline rather than in a tank. This is inherently a more efficient and quieter process

1 - Single Pass Heating

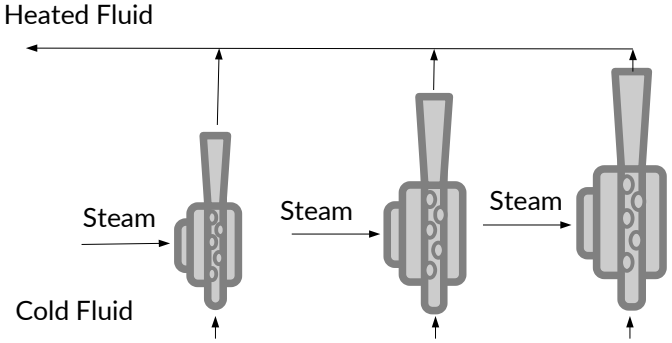


- Single pass operation allows the motive fluid to be heated by up to 30 degC.
- Passing the motive fluid through the heater multiples times allows heating of greater than 30 degC to be achieved.
- The final fluid temperature is dependent on the operating pressure as the maximum fluid temperature has to be 20 degC less than the fluid saturation point to prevent flashing.
- Multiple heaters of different sizes can be installed in parallel to provide control over a range of flowrates.

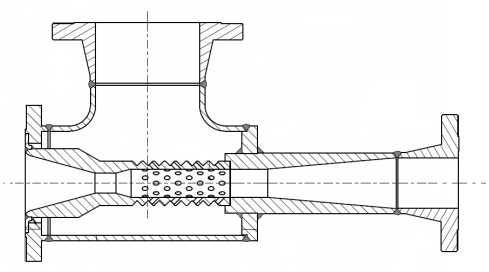
2 – Multiple Pass Heating



3 –Parallel Installation



Instantaneous Heater



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