WIREMESH SCRUBBER

APF-WSC

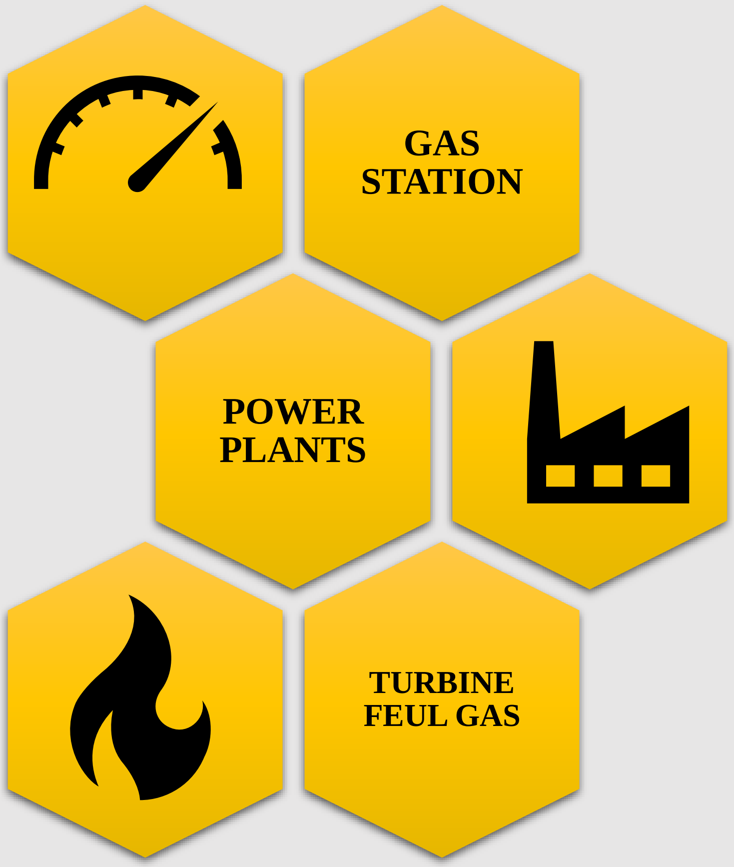
APADANA PETRO FARAYAND

Knowledge is our difference

The APADANA PETRO FARAYAND scrubber provide effective, efficient, and economical removal of dust, dirt, scale, rust, and other solid foreign particles from different types of gas streams.

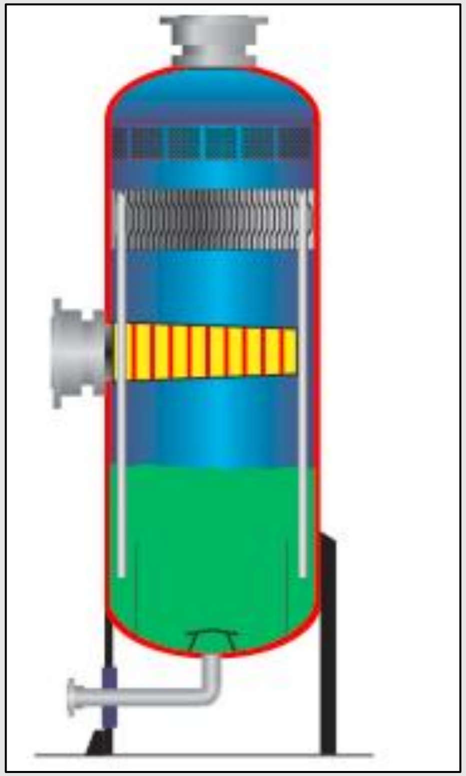
Usage

- ✓ **Gas station**
- ✓ **Gas treatment station for petrochemicals, power plants and industrial factories**
- ✓ **Turbine fuel gas**



Introduction

Scrubber or knockout drum is a vessel designed to handle streams with high gas-to-liquid ratios. The liquid is generally entrained as mist in the gas or is free-flowing along the pipe wall. These vessels usually have a small liquid collection section. Vertical separators, are usually selected when the gas-liquid ratio is high or total gas volumes are low. In a vertical separator, the fluids enter the vessel through an inlet device whose primary objectives are to achieve efficient bulk separation of liquid from the gas and to improve flow distribution of both phases through the separator. Liquid removed by the inlet device is directed to the bottom of the vessel. The gas moves upward, usually passing through a mist extractor to remove any small entrained liquid droplets, and then the vapor phase flows out of the vessel. Liquid removed by the mist extractor is coalesced into larger droplets that then fall through the gas to the liquid reservoir in the bottom. The ability to handle liquid slugs is typically obtained by increasing vessel height to accommodate additional surge volume. Level control is normally not highly critical and liquid level can fluctuate several inches without affecting the separation performance or capacity of the vessel. Typical vertical separator L/D ratios are normally in the 2–4 range.



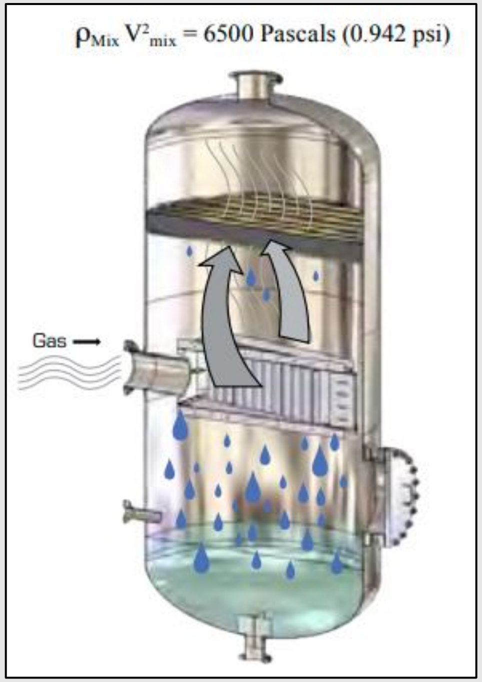
Inlet Devices

The importance of the inlet device with respect to separation performance has been identified only relatively recently, mainly through the use of Computational Fluid Dynamics (CFD) modeling. The main functions of the inlet device are: 1) Reduce the momentum of the inlet stream and enhance flow distribution of the gas and liquid phases 2) Efficient separation of the bulk liquid phase. 3)Prevent droplet shattering and re-entrainment of bulk liquid phase.

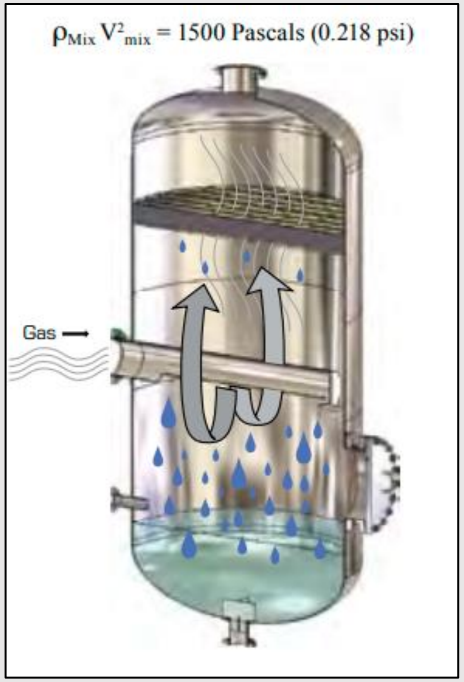
There are several different types of separator inlet devices that are commonly used:

- **diverter plate**
- **half-pipe**
- **Schoepentoeter**

In addition to the inlet device itself, it has been determined that the inlet piping configuration is also important. The Schoepentoeter type inlet devices generally provide improved separation performance compared to the others.



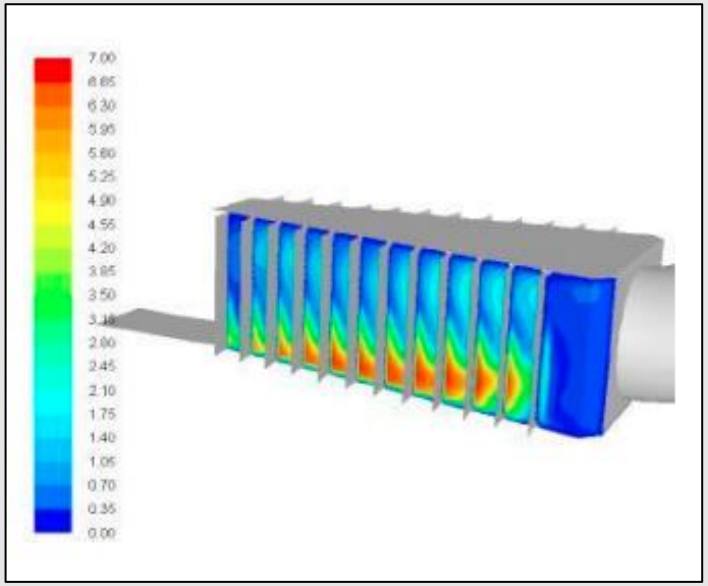
Schoepentoeter

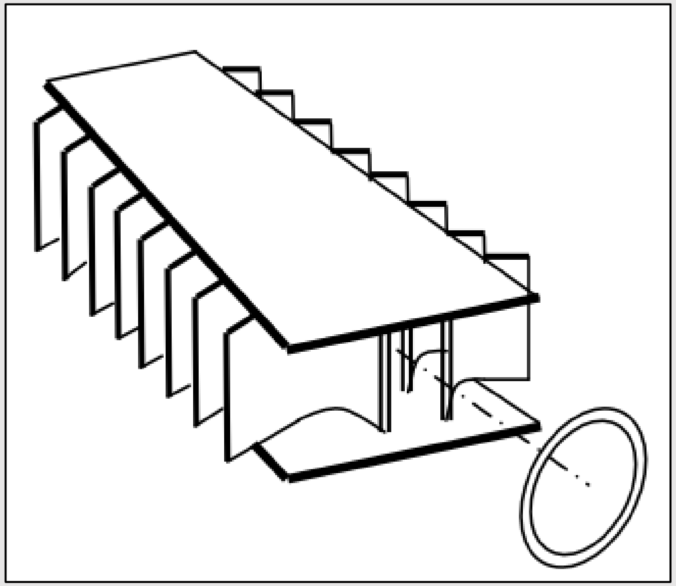


Half-pipe

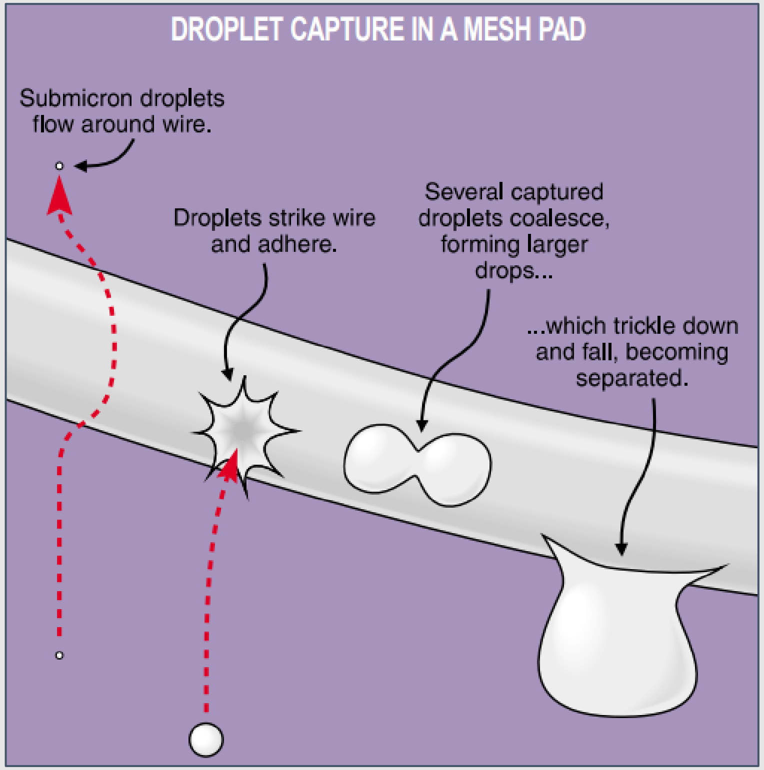
Schoepentoeter

Schoepentoeter was first designed and introduced by Shell company and is a multi-vane inlet device used in horizontal and vertical separators where there is a requirement for good flow distribution with minimum shear and pressure drop. Benefits of this device compared with simpler deflectors include reduced agitation and hence improved 2 and 3 phase operational performance, more stable level control, and reduced foaming. For vertical vessel installations, usually where there is a high gas flow relative to the liquid flow, the Schoepentoeter provides excellent vapor distribution allowing a reduced height to the mass transfer or mist eliminator internals. This device works by smoothly dividing the incoming flow into various segments using an array of curved vanes to suit the overall geometry of the inlet nozzle and distributor length. To achieve this effect the vanes start with a wide spacing and gradually reduce the gap, giving the unit its characteristic tapering shape. The Schoepentoeter is usually constructed from stainless steel and is designed to be installed in sections through a vessel manway and assembled in the vessel.





In APF-WSC designed by APADANA PETRO FARAYAND, wire mesh is used as the separation device. Wire mesh mist eliminators provide a high separation efficiency at the lowest installation costs. They are usually comprised of multiple, compressed layers of thermoplastic or metal wire, and deliver excellent results over a broad range of gas/liquid separation tasks. When the gas with liquid drops rises at a certain speed and passes through the knitted wire mesh mist eliminator, the small openings of knitted wire mesh will prevent the drops passing through and inertia of the rising drops make them collide with wire mesh and then adhere to the surface of the wire mesh. The drops on the wire mesh surface will diffuse and subside.



Proper separation in wire mesh depends on their proper design. The main parameter in the design of this equipment is the speed of the gas passing through it. If the speed of the gas passing through the wires is too high, the entrainment phenomenon occurs. In this phenomenon, liquid droplets accumulated on the wires are being removed from the wires surface due to the high speed of the gas and get out of the tank with the gas flow. One of the most widely used equation to calculate the maximum allowable gas velocity passing through a wire mesh is the one by Souders-Brown. The constant value of K in this regard is mentioned in various sources. This amount also depends on the operating pressure of the system.

Souders-Brown Equation $$V_G = K\left(\frac{\rho_L - \rho_G}{\rho_G}\right)^{0.5}$$

The most widely applicable type of mist eliminator is made of metal or plastic wire with typical diameter of 0.006 to 0.011 inch. In the most familiar application of knitted mesh, the crimped strips are stacked to form a pad with typical thickness of four or six inches. Rigidity is provided by a frame usually metal consisting of a grid on each side and rods passing through the mesh. Mesh pads can be made in almost any shape, but most are round or rectangular.

Optional features

- ✓ **Design for specific capacity, pressure and temperature**
- ✓ **Design class rating ASME 900,1500,2500**
- ✓ **Design for sour gas and corrosive fluid**
- ✓ **Use of level switch, level alarm, differential pressure alarm, automatic drain system**
- ✓ **Spare part for commissioning & operation**

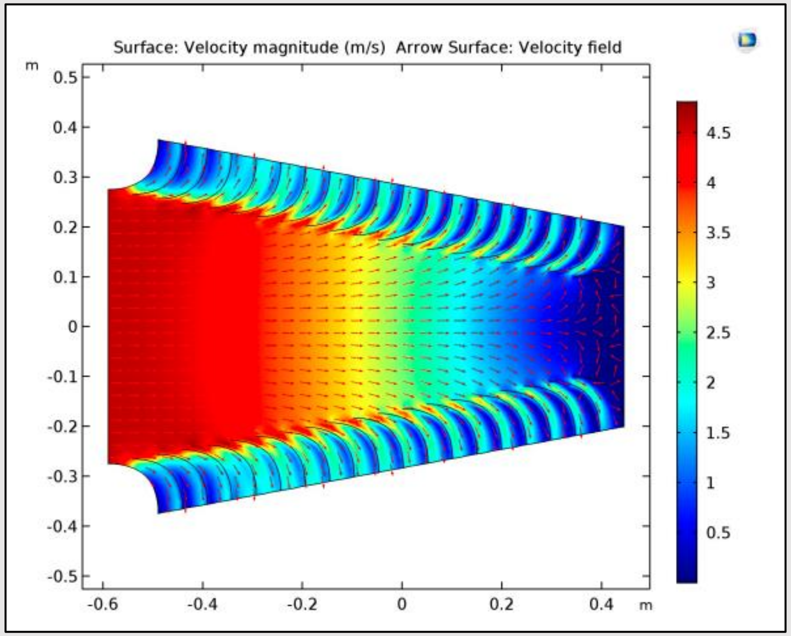
Mechanical features

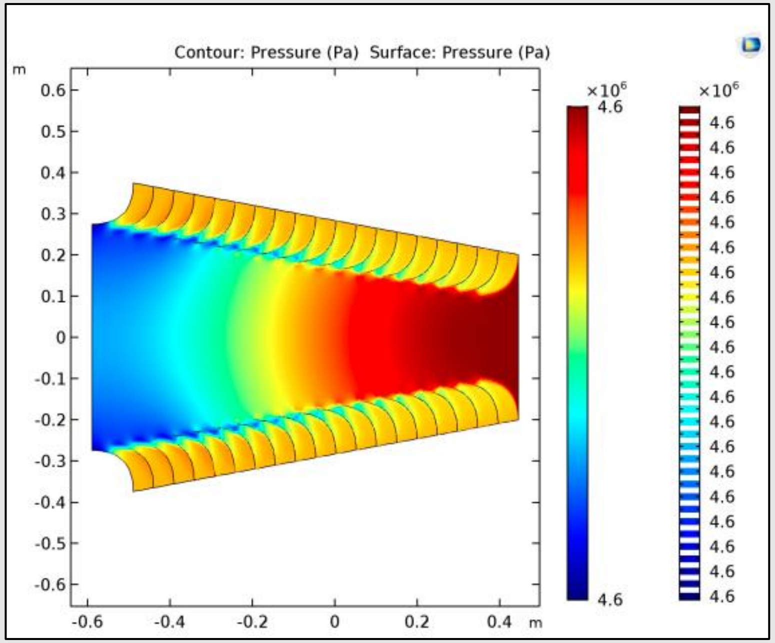
- ✓ **Safety opening system**
- ✓ **Level, pressure and differential pressure gage included**
- ✓ **Inspection openings**
- ✓ **Vent and drain valve included**
- ✓ **Low pressure drops**
- ✓ **Self-supported and lifting lug included**
- ✓ **Long life 'O' ring sealing design**
- ✓ **Standard class rating ASME 150,300,600**


BENEFITS
INCREASE EQUIPMENT UPTIME
REDUCE MAINTANANCE COST
EXTENDS EQUIPMENT CHANGEOUTS

Knowledge is our difference…

We believe that investment in research and development is an essential component for long term success. Computational Fluid Dynamics is a reliable tool for design optimization, troubleshooting, and product development. Flow distribution is critical in all gas-liquid and liquid-liquid separation vessels. As vessel sizes are reduced or more capacity is expected from existing equipment, traditional design rules for vessel geometry and flow distribution must be reviewed for all elements that can affect separation performance such as flow velocity through inlet and outlet nozzles, spacing between nozzles, internals and liquid levels. CFD modeling is used by engineers at APADANA PETRO FARAYAND to simulate flow conditions and vessel geometry. The modeling provides a close approximation of the fluid flow profile inside the vessel.





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