
DEYLAMAN
Filtration | Separation

Contents

- Company Information
- Company Activities
- Filters and Filtration Skid
- Process Separation Internals
- Mass Transfer internals
- Weld-Overlay Cladding
- Other Equipment
- Design and Engineering Services
- CFD Modeling

Fig. 1 Skid Mounted Separator Package

Company Information

Deylaman Filter Company was established in 1996 and is based in Tehran, Iran. Deylaman Filter as a leading company in design & manufacturing of a complete line of high-quality Filter Elements and Filtration Systems, Separation Internals and Process Equipment for the more than 25 years to handle every need in oil & gas, petrochemical and power plant application. In this regard we have been an established and popular company with an excellent track record for the best customer satisfaction.

The company has 4 main lines of business activity related to oil & gas and petrochemical industries as follows:

- The design and supply of specialist separator internals
- The design and supply of specialist filtration systems
- The design and supply of specialist process packages & process equipment
- Weld-Overlay Cladding of Process equipment

Together we can offer a wide product offering of filtration & separation solutions, whether it be a standalone filter element, separation internals or fully packaged skidded filtration systems for the desired application.

Also, the name of this company has been registered in the nearly all of the main client vendor list of Oil, Gas, Petrochemical and Power Plants industries.

We also have co-operation agreements with international companies for specialist process activities in Iran.

The company's core business is the design and supply of specialist vessel internals and filtration systems for gas/oil/water/ solids separation, related primarily to the oil & gas and petrochemical industries as has been appointed as approved vendor on the long list of the Ministry of Petroleum in Iran.

These Products can be installed in new or retrofit applications as follows:

Gas Scrubber Internals

Inlet Distributors
Cyclones for Dust Removal
Mesh, Vane & Cyclone Mist Eliminators
Filtration & Separation Systems
Dust Collector & Self-Cleaning Systems

Waste Water Treatment packages

Oil / Water Coalescer Packs
Nutshell Filter Packages
Deoiling Hydrocyclone System

Oil Filter/Separator Internals

Inlet Diffusers & Distributors
Oil / Water Coalescer Packs
Foam Breakers and Sand Jets
Mesh, Vane & Cyclone Mist Eliminators
Filtration & Separation Systems

Mass Transfer Internals

Liquid and Gas Distributors
High-Capacity Trays
Random & Structured Packing

In addition to filter/separator internals supply, we offer specialist engineering support services to allow customers to optimize designs and verify filter/separator performance predictions.
A typical production -3phase separator for oilfield service is illustrated below, but the selection and optimization of the appropriate technology is determined on a case-by-case basis.

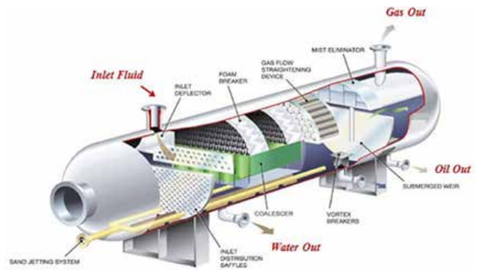

Fig. 2
Typical production 3phase separator for oilfield service

Filters and Filtration Skid

Filtration Skids are highly useful for separation of solid particulate contaminants from a fluid. These can be single stage or multi-stage.
Filter Separator Skid or Filter Separator Module is a special natural gas pipeline unit designed to clean natural gas from solids and impurities as well as liquids that present in natural gas stream. Filter Separator Skid is used both in onshore and offshore natural gas compressor stations, gas processing plants, fuel gas conditioning systems, natural gas distribution and pressure reduction stations. Filter Separator Skids consist of various components, such as filter separator body with quick-opening closure, filter cartridges and vane mist extractors, level gauges, level transmitters, control valves, differential pressure gauge and/or transmitter, pressure and temperature gauges, manual ball valves, pressure relief valves, inlet and outlet pipe branches (extension pipes), junction boxes (in digital control system), skid and steel structures.
There are multiple types of filtration housings which are offered under this category.

Fig. 3 Skid Mounted Filtration Package

Deylaman can offers a broad range of filtration technologies such as gas/liquid coalescing filters as filtration-separation solutions.
Some of our major filtration products are as follows:
1. Gas Turbine Air Intake Filters
2. Gas Cartridges & Gas Coalescer Filter Elements
3. Liquid Cartridges & Liquid Coalescer Filter Elements
4. Air Dryer & Oil Mist Eliminator (Oil Mist) Filters
5. Fuel & Hydraulic Filters
6. Process Liquid Filters & Activated Carbon Canisters
7. Different types of Air Filters (Bag, Panel & Frame type)
8. Different types of Strainers (Basket, Tee & Y type)

Inlet Devices

Different types of inlet devices are used both in horizontal and vertical vessels. In general the use of the inlet device allows the reduction of the agitation of the flow, to obtain a first separation of the phases and to reduce the problems due to the forming of foam. Moreover, the use of the inlet devices, providing an optimal gas distribution, allows the treatment of a higher flow rate and the reduction of the dimensions and the costs of the vessel.

Multi Vane Inlet Distributor

This 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.
This device usually constructed from stainless steel and is designed to be installed in sections through a vessel manway and assembled in the vessel. When sizing this device to match the inlet nozzle, we recommend the fluid momentum ρv^2 is in the range of 6,000 - 10,000 Pa.

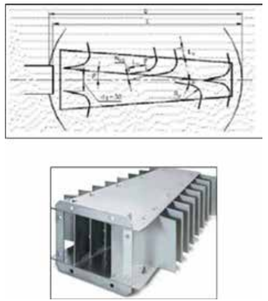

Fig. 4 Vane Inlet Device

Cyclonic Inlet Distributor

Within the upstream oil and gas processing industry, cyclonic type separation devices are being used in various applications, one of which is as an inlet device for separators and scrubbers. Within this role, many cyclonic devices function very well, but in some applications, serious problems have occurred.

Fig. 5 Cyclonic Inlet Device

Demisting Device

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, loosely knitted in a form resembling a cylindrical net. This tube is flattened to form a two-layer strip typically 12 inches wide, which is then crimped in a diagonal pattern with ridges as shown in below figure.
When these strips are laid together, the ridges slant in alternate directions, forming an open structure through which gas flows freely. Such mesh can efficiently capture mist droplets as small as 5 microns (Micrometers).
For eliminating droplets down to 1 micron in diameter, Deylaman developed a new style in which multi-filament yarns of various plastics or glass are knitted into the mesh. The result is called a composite or co-knit mesh.

Fig. 6 Mesh Pad Demister

Vane-Type Mist Eliminator (Vane Pack)

Also known as chevron or plate type, vane mist eliminators consist of closely spaced corrugated plates that force mist-laden gas to follow serpentine paths. These devices are generally not efficient for mist droplets smaller than about 8 microns, but they are sturdier than mesh pads and impose less pressure drop. Vane arrays can be mounted horizontally or vertically.

Fig. 7 Vane Type Mist Eliminator

Multi-Cyclone Scrubbers

The multicyclone scrubber is designed to remove liquids and dry impurities at the wellhead, inlet to transmission stations & gas compressor station, in distribution systems and in many industrial processes.

The dry scrubber has the following efficiency on pipeline dust:
- 10 micron size particles and above: 100 percent
- 6 to 8 micron size particles: 99 percent
- 4 to 6 micron size particles: 90 percent
- 2 to 4 micron size particles: 85 percent

Any desired capacity is afforded by providing a sufficient number of tubes in parallel in a suitably sized vessel.
A maximum capacity of 40 ACFM per tube and a minimum of 10 ACFM are recommended. The maximum is recommended to prevent excessive wear of the tubes and the minimum is maintained to provide sufficient centrifugal force to accomplish satisfactory particle removal efficiency. The maximum can be exceeded and greater efficiency is obtained. This practice is recommended in specific applications only.

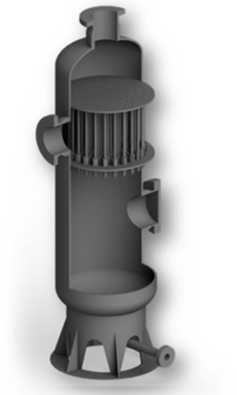

Fig. 8 Multi Cyclone Scrubbers

Swirl Type Mist Eliminator

The Swirl Type Mist Eliminator is an axial cyclone device designed specifically for high efficiency liquid-gas separation for very high gas and liquid capacities.
The design combines high gas velocity, high liquid capture capacity and low to medium pressure drop.
The advantages of this design are:
- Highly efficient separation of droplets above 10 microns, even at high pressures
- Very high gas and liquid capacities at high gas velocities
- The mist may contain solid particles
- The Swirl Type Mist Eliminator is foam-breaking due to its special construction
- Low or medium pressure drop (10-30 mbar)
- Reduce the vessel size and weight especially in high pressure applications
- High flexibility (turndown) in combination with mesh demister coalescer
- Easy to install
- Retrofits easily into existing vessels / scrubbers to give extra capacity
- The unit has no moving parts and is maintenance free

The Swirl Type Mist Eliminator provides optimal performance of mist elimination or entrainment separation at high gas capacities and pressures from 10 up to 200 bar.
Common applications include:
- Glycol and amine mist eliminators in HP gas treaters
- Droplet removal from distillation or absorber towers
- Vertical KO drums and horizontal oil/gas separators
- Compressor suction and discharge scrubbers

The installed unit consists of special separating elements fixed on a tray with openings for draining the separated liquid. Where low turndown is required (below approx %30) it can be used with a wire mesh pre-coalescer.
The Swirl Type elements are available in a range of materials including low cost/weight glass reinforced plastics and stainless steels.

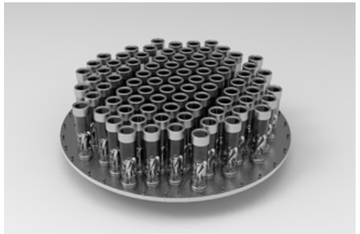

Fig. 9 General view of a Swirl Type Mist Eliminator and relating tray construction

Column Internals

The performance of columns is closely related to the performance of all internals such as the liquid distributors, collectors, trays, packing and mist eliminators. Design and performance of internals are especially important when used with high performance trays or special packing. We can offer a complete line of tower internals to be used with all types of trays or packing (random or structured packing).

Packing (Random or Structured)

Packing can be used instead of trays and they are very useful for small columns where installation of trays are difficult. Packing typically has a lower pressure drop than trays which makes it favorable for vacuum columns.
Vapor liquid contact may not be as good. The liquid moves towards the walls and vapor flows more readily in the areas free of liquid.

Fig. 10 Random Packing

Fig. 11 Structured Packing

High Performance Liquid Distributors / Collector

High performance liquid distributors aim towards ideal liquid distribution, i.e. equal liquid rate per unit area of the packed bed surface. These distributors are available in a complete range to suit various column diameters, liquid rates and service conditions. Models, which can give turndown ratio up to 10:1, are available.

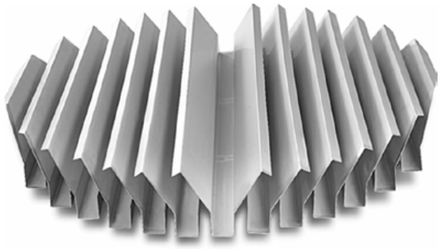

Fig. 12 Vane Liquid Collector

Trays

Conventional absorption, distillation or fractionating trays consist of vapor/liquid contacting decks or trays with segmented liquid down flow areas.
Columns can contain any number of trays installed vertically above each other.

Fig. 13 Different Types of Trays

Weld-Overlay Cladding of Process Equipment

Weld-Overlay Cladding utilizes the consumable CRA (Corrosion Resistant Alloy) materials as a layer to apply onto the surface of a component. This process is mainly used for corrosion protection. The oil and gas industry often uses it to ensure the safe, long-term operation of vessels, pipelines, valves, flanges, and other process equipment.
Weld-overlay cladding protects the surface of component which is exposed to corrosive fluid and allows for the integrity of the substrate without degradation of wall strength.
As well as designing and manufacturing of all process equipment types, we have also the largest CRA cladding shop with various advanced processes for automatic weld-overlay cladding regarding most types of fixed and process equipment in sour service and high-pressure classes, such as two/three phase separators, pressure vessels, free water knock out drums, pig launcher/receiver with quick opening closures, heat exchangers, grit & stone traps.

Fig. 14 General View of process column and relating weld-overlay cladding

Quick Opening Closures (QOC)

Quick Opening Closures (QOC) are engineered doors with quick action mechanism, used for quickly accessing pipelines or pressure vessels without the need of conventional tools. Typical applications are end closures for pig launchers & receivers (scrapper trap doors), pressure vessel end closures (filter vessel quick open closures) and blow down lines end closures. Deylaman designs and manufactures three types of quick opening closures namely Band-Lock (segmented band locking type), Clamp Type (double yoke type) and Swing Bolt Type closures.
Our Band-Lock Type and Clamp Type closures are designed in accordance with ASME Sec VIII Div. 1 UG35 requirements.

This means, inherent to the QOC design is the inclusion of a pressure warning device as well mechanical safety interlock to avoid inadvertent opening of closures under pressure. This ensures safety to the operator and the environment.
The closure seal is a uniquely engineered seal which is designed to provide maximum sealing protection under high pressure as well as high temperature.

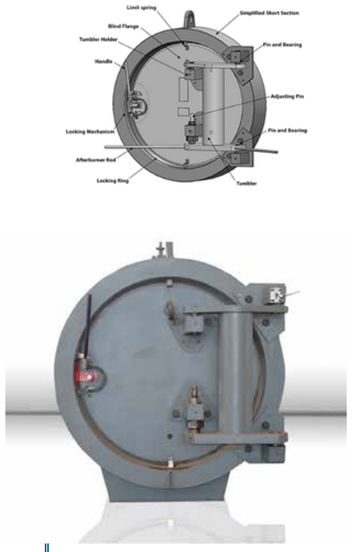

Fig. 15 Band-Lock Type QOC

Sand Jet

Much work has been performed on the development of sand or sludge removal systems from separators over many years. However, no single “sand jet” system has evolved as clearly superior; rather there are a number of design features to choose from depending on the characteristics and nature of the problem.
Twin jet headers are placed either side of the centerline to provide maximum coverage. They can be split into several ‘H’ sections (partitioned) each separately fed with jet water, and separately drained so that sand deposition and flushing can be monitored and controlled at or above the critical fluidization Factor.
The headers are fitted with an array of smaller arms fitted with fan-jet nozzles to fluidize and sweep the solids most effectively.
The central sand pan prevents sand settling on the centerline and clogging the flushing out (sand removal) nozzles.
Segmentation of the sand area of the vessel is important for flushing purposes. It minimizes jet water use and prevents fluidized solids from dissipating downstream. These segment lengths are calculated on an individual application basis.

Fig. 16 Sand Jet Nozzle Header

Static Mixer

Mixing is blending of miscible components regardless of the volume, density, viscosity and properties of the media.
Static mixers are tubular internals of appropriate shape and strength to cause desired mixing and dispersion effects as the fluid flows around suitably arranged motionless mixer parts. The fluid flow is provided by pumping. In practice, small volumes, low maintenance, simple installation and cleaning and excellent reliability characterize the static mixer.
Mixing is dispersing of two or more products for scrubbing processes, reactions, mass transfer and etc.
Contacting of liquids with gases is in order to create high mass transfer surface area and high rates of absorption, reaction, vaporization and condensation.

Fig. 17 Static Mixer

Gas Jet Pump/Ejector

Production and total recovery from many fields is restricted by low reservoir pressure. This can apply to many depleted fields or new fields where production pressure is insufficient for transport of fluids by pipeline or to meet downstream process requirements.
Gas Jet Pump is a cost-effective boosting system designed to meet production pressure requirements whilst allowing wellhead production pressure to be reduced, thus increasing production and recovery. Gas Jet Pumps utilizes energy from a high pressure (HP) source to boost the production pressure of low pressure (LP) wells or recovery of low-pressure gas from process systems to avoid flaring and wastage. The high-pressure source can be a high pressure well or an existing boosting system such as a compressor or booster pumps. Gas Jet Pump applies to both gas and oil production.

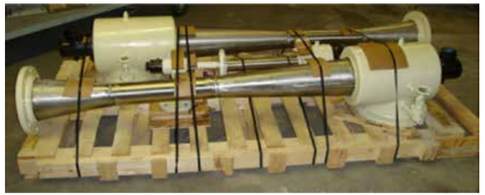

Fig. 18 Gas Jet Pump

Design and Engineering Services

Deylaman maintains state-of-the-art engineering design and drafting capabilities through its commitment to application of cutting-edge technology.
D.S. Catia, Auto-CAD, -3D SolidWorks, Codeware COMPRESS,P.V. Elite, and FEM & CFD Analysis are the high-tech tools used to deliver design and engineering services.
Our expert team of engineers, draftsmen, and project managers work closely with client technical personnel to ensure full compliance with all applicable codes and customer specifications. Deylaman design team is very familiar with process equipment engineering and manufacturing technologies and is capable of considering all aspects of manufacturing when detailing a job. Some of these projects are presented here as CFD modeling.

CFD Modeling

Computational Fluid Dynamics (CFD) is a mathematical tool capable of simulating a wide range of fluid flows. Integrated CFD software has been applied to study the flows in two- and three-phase oilfield separators and filtration systems. The influence of inlet nozzle configuration, flow distributors, perforated plates, and outlet nozzles have been studied.

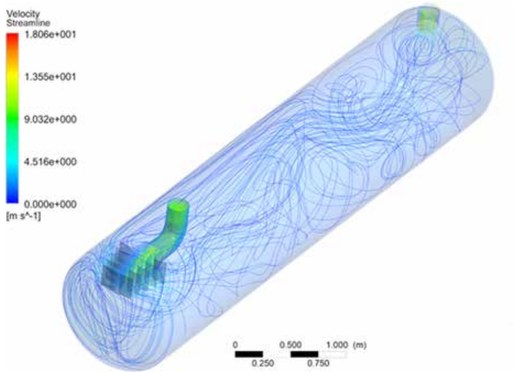

Fig. 19 Flow Path lines colored by Velocity magnitude in a Separator with Vane Inlet Device

Vane Pack CFD Modeling

Vane packs are designed to separate entrained liquids from a gas stream. They have high efficiency, as well as low-pressure drop. Liquid-laden gas is passed into the vanes and the gas is then subjected to several changes in direction, which causes the liquid to impact on the vane walls.

The application of CFD to solving oilfield related problems can be valuable in new product development,vessel design optimization, determining sources of underperformance for existing or proposed vessels, and for evaluating the projects.
Performance improvement when retrofits are installed to upgrade existing process equipment. CFD provides the means to visualize fluid flows within a filter/separator as well as an ability to track the movement of gas/liquid and liquid/liquid interfaces. In newer versions of CFD software, gas bubbles, oil droplets, and solid particles can be tracked through a separator using advanced multiphase models.
This permits one to incorporate performance enhancement into the design of a vessel without the need for extensive testing in physical models.

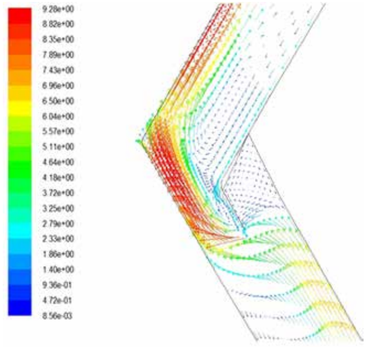

Fig. 20 Velocity's Vectors near a Hook

Cyclone Separators

Cyclone is another separator internals that is used for droplet/particle separation by centrifugal separation.
Rotational effects and gravity are used to separate mixtures of solids and fluids in Cyclones.

Some parameters in better separation of cyclone are valuable, for instance; vortex finder length, inlet position, dust bin and so on.
By CFD modeling, we can design better geometry with higher separating performance.

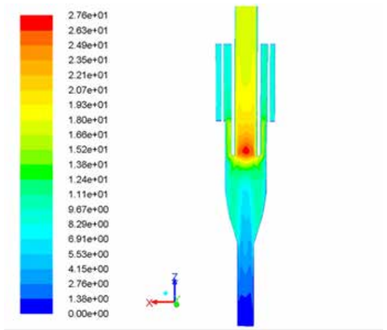

Fig. 21 Contours of Velocity Magnitude(m/s) In Reverse Flow Cyclone

Swirl Cyclone Scrubber

In this part we study on CFD modeling of a Swirl Cyclone Scrubber with whole geometry.
This developed Swirl Cyclone Scrubber is an excellent mist eliminating device, highly suitable for demanding conditions.
An advanced aeronautical technology has been used to optimize the vane design and achieve an even better pressure to velocity conversion.
This leads to reduced pressure drops and lower shear stresses between the gas and liquid within the vessel. As a result this scrubber can handle higher gas flow rates in smaller vessel sizes or higher throughputs in retrofit situations. In addition to this, the scrubber liquid handling capacity has been increased significantly.
Then this special design is more compact, more efficient, has a lower pressure drop and better turn down properties than other comparable technologies.

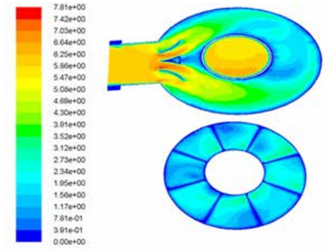

Fig. 22 Contours of Velocity in two Sections of Scrubber

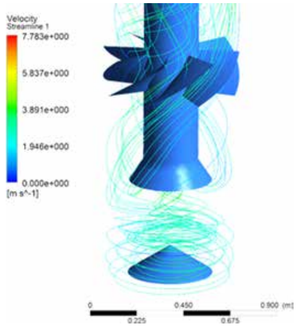

Fig. 23 Stream lines in whole Scrubber

DEYLAMAN

Filtration | Separation

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