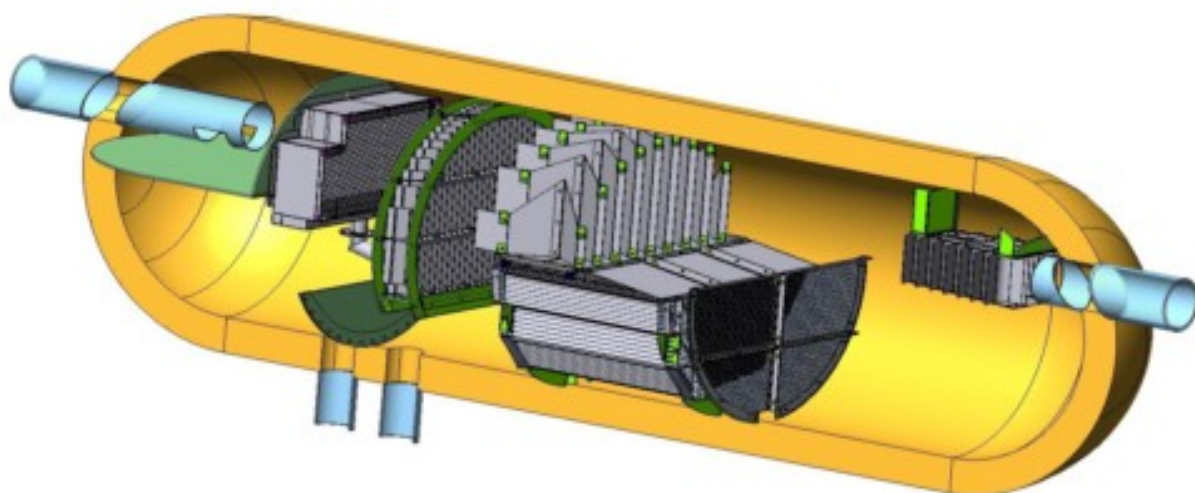




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**WIRE MESH SEPARATORS  
AND EQUIPMENTS FOR  
COLUMNS, VESSELS AND PROCESS PLANTS**

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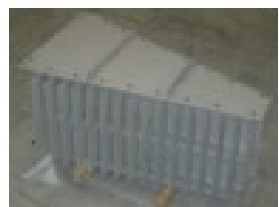


## - AFP TECH MAIN PRODUCTS -



- **WIRE MESH SEPARATORS:** used when high performances of separation and low pressure drop are required as in chemical and petro-chemical industry, desalinization plants, wine and food industry, biogas treatment, oil separation in screw compressors, drying plants, refrigeration plants or air treatment and air depuration plants;

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- **ST INLET DEVICES:** this kind of inlet device is often used in horizontal and vertical vessels. AFP Tech ST inlet device allows the reduction of the stress due to the flow, in order to obtain a primary separation of the phases. Moreover it allows the treatment of an higher flow rate and the reduction of dimensions and costs of the vessels.

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- **CALMING BAFFLES:** this kind of perforated plates are commonly used to prevent the flow turbulences inside the treatment plants and to introduce the liquid into the settling compartment with laminar flow regime. According to different working conditions they are available with different sizes, diameter of holes and shapes.

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- **PARALLEL PLATE PACKS:** this kind of internal is commonly used to separate a liquid-liquid mix exploiting the different densities of the two liquids. They are often used in many three-phase separators where the flow is composed by gaseous phase, heavy liquid phase (ex. water) and light liquid phase (ex.: oil).

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- **VANE PACKS:** this kind of packs are used to separate liquid droplets carried by gaseous streams with an high crossing speed. It is composed by sets of vane profiles where the gas passes through and, changing direction, it clashes on the vanes. The liquid droplets are drained down by a tube into the liquid section of the vessel

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- **SPECIAL INTERNALS:** candelas, baskets, metallic wire meshes, air filters, special grates, liquid distributors etc. Thanks to a close collaboration with some of the most important producers located in our region we are able to supply also some products widely used in chemical and petrochemical applications.

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## - WIRE MESH SEPARATORS -



Wire mesh separators are widely used when a effective separation between liquid and aeriform phase is very important in order to obtain cheap and efficient industrial processes.

This kind of separators are made by a alveolar structure of wire mesh obtained by the superposition of several layers of a tubular sock.

This sock is weaved by very thin wires with a diameter inferior to 0,3 mm and that allows to obtain a structure with high free volume (usually > 95%), a big active surface with a low density of the mesh allowing a saving about used material and costs.

### ***Wire mesh separators are widely used:***

- *in gasses purification plants;*
- *to eliminate liquids that could damage the production processes;*
- *to prevent problems to the plant structures;*
- *to prevent dangerous emissions for the environment;*
- *to recover expensive liquids.*



## - ACCESSORIES -

Wire mesh separators are often supplied with accessories like boxes, extractors and fixing systems. Among the most common there are:

- **Containment meshes** usually used when the crossing speed is particularly high.
- **Fixing elements** according to the most used international standards like L and J bolts, fixing wire etc.
- **Support grates** used to contain and support the mesh pad.

## - SUPERFICIAL TREATMENT -

Every welded material could be treated with a passivation process in order to eliminate all the residues of welding and to avoid a corrosion effect coming from aggressive environment.

To ensure the best quality of our products we adopted a special **TIG BRUSH CLEANING SYSTEM** allowing us to clean perfectly every single weld.

## - MATERIALS -

AISI 304L, AISI 316L or AISI 314 always on stock. Special materials as Inconel, Monel, copper on request.





# Demisters for screw compressores and refrigeration industry

AFP Tech Srl produces different kinds of wire mesh demister for refrigeration industry and screw compressors. We can realize circular filters with holes in central or eccentric position and with different sizes and shapes. Customized wire mesh density and wire diameters are also available.



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## - ADVANTAGIES OF WIRE MESH SEPARATORS -

- Easy installation and moving through man holes and small spaces.
  - High efficiency of separation processes with low pressure drop.
  - Reduction of the vessel's dimensions with less working costs.
  - Less costs if compared with other separation methods.
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## - AIR TREATMENT -



In many cases the air treatment plants need a wire mesh separator usually installed in series with other filters, as for example filter cells, to get their life longer or to improve the efficiency of the filtration process.

In both cases stainless steel demisters can provide high performances of separation, usually capturing till 3 micron droplets, with a very small pressure drop.

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## - WIRE MESH ROLLS -



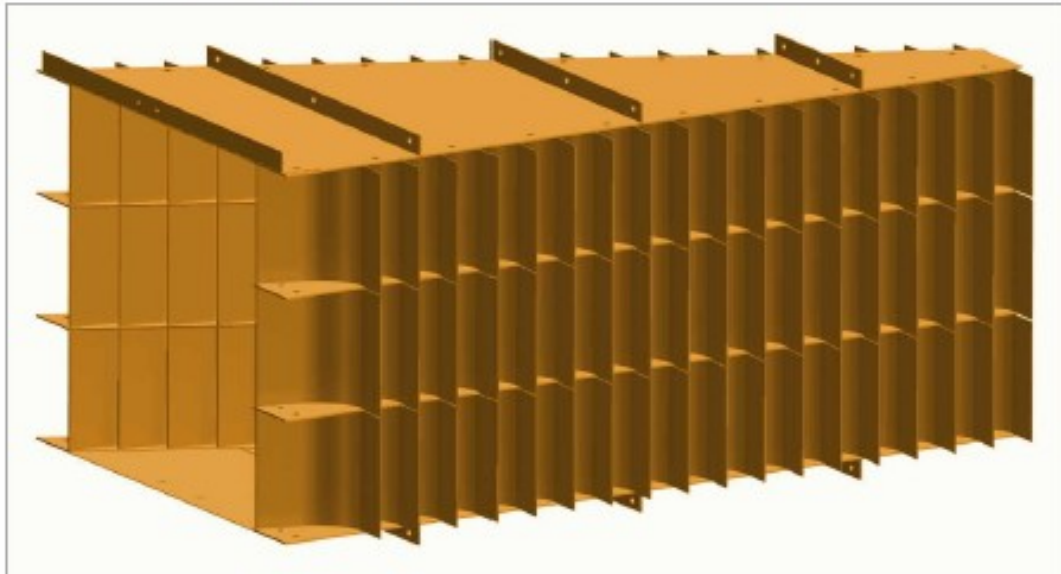
Metallic wire mesh is the raw materials used to make wire mesh demisters but it can find a lot of application in many sectors of industry to produce, for example full metallic antivibrations, air treatment filters, automotive components like filters, antivibrations, separator rings, silencers, thermal insulators, anti intrusion and anti vandalism elements, cleaning of mechanical components etc.



## - AFP ST INLET DEVICE -

The AFP tech ST inlet device is composed by one or more planes of vanes and two covers that allow to canalize the flow through the slots among the vanes.

This kind of inlet device is widely used in horizontal and vertical vessels when the inlet flowrate, composed by a mix of liquid and gas, is large.



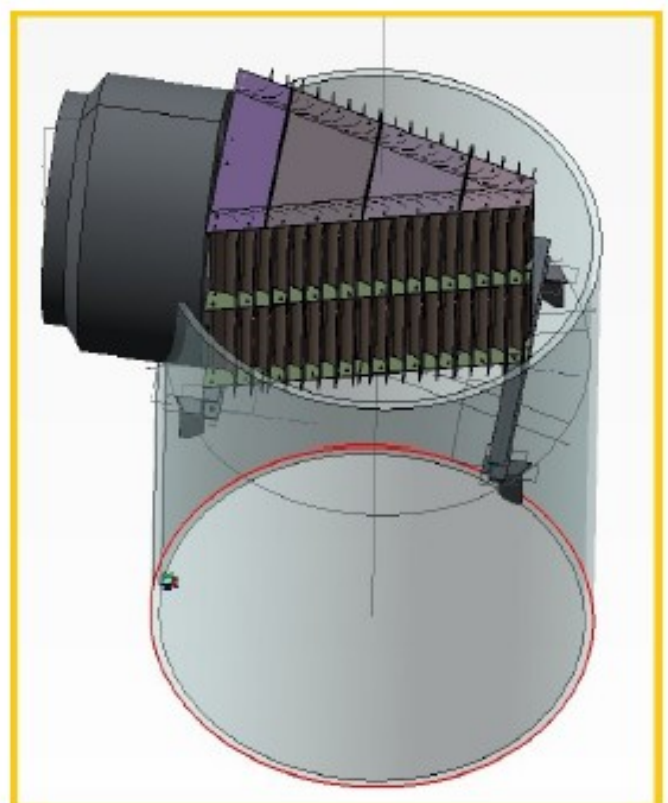
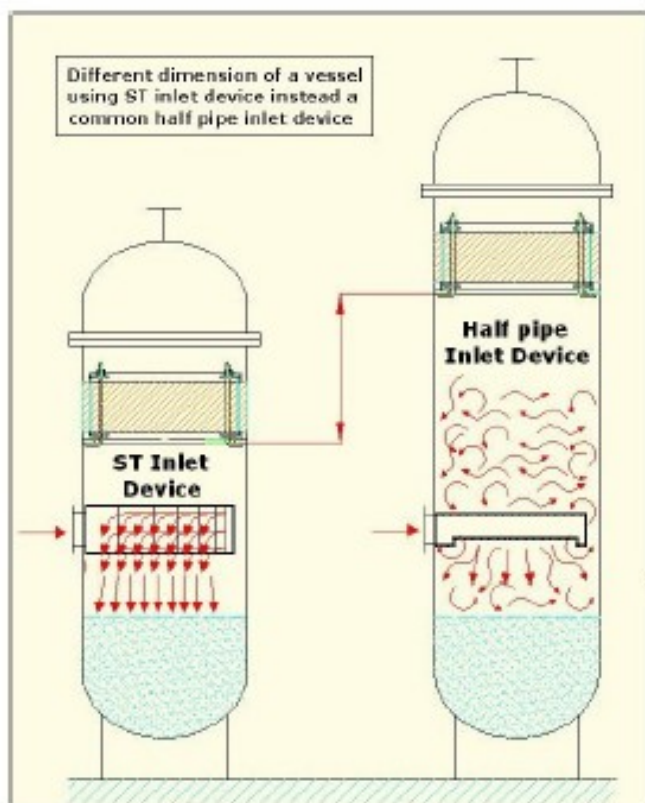
The two most important effects of the ST inlet device on the flow are:

- a first separation between the liquid and the gaseous phases.
- obtain a regular and optimal distribution of the gas flow through the vessel

## - ADVANTAGES -

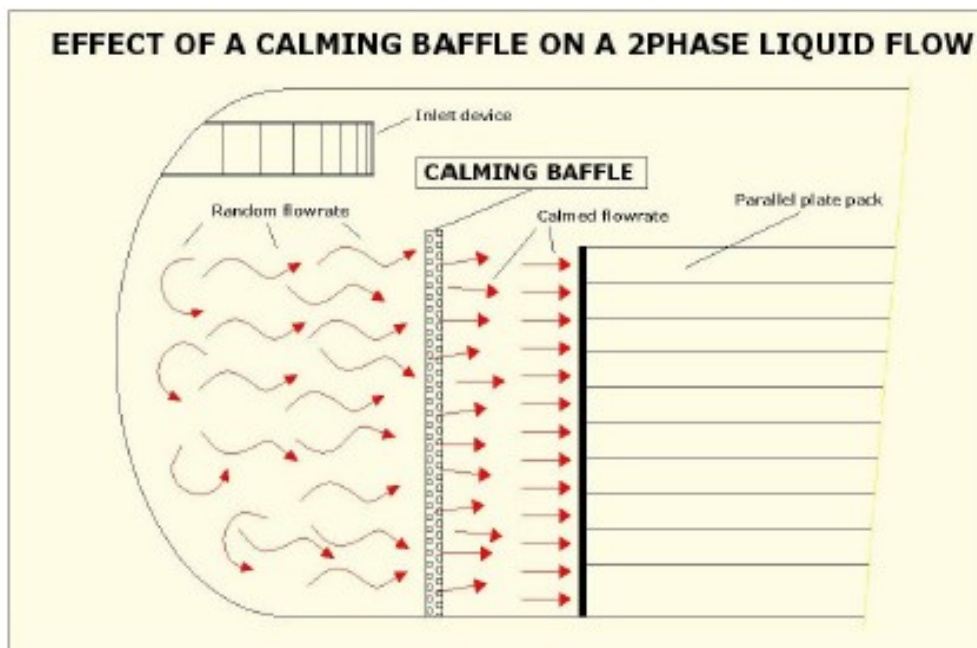
The main advantages provided by ST inlet devices are:

- reduction of the vessels dimensions with a significant saving of material, transport and installation costs.
- reduction of the diameter of the inlet nozzle
- reduction of the stress due to the flow, in order to obtain a primary separation of the phases.



## - CALMING BAFFLE -

Calming baffle is a particular kind of perforated plate commonly used to prevent and eliminate flow turbulences inside the treatment plants and to introduce the two phases liquid flow into the settling compartment with laminar flow regime as in the picture above.



The calming process of the flow rate is very useful because it allows to obtain the best performances from the parallel plate pack located after the calming baffle because, when the liquid flow enters with regular distribution and velocity, the separation process can start from immediately.

Without the use of a calming baffle the liquid distribution can be very chaotic and the performance of the plate pack decrease a lot

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## - DOUBLE CALMING BAFFLE -

In some particular case it is possible to use a Double Calming Baffle usually made by two different calming baffles in series.

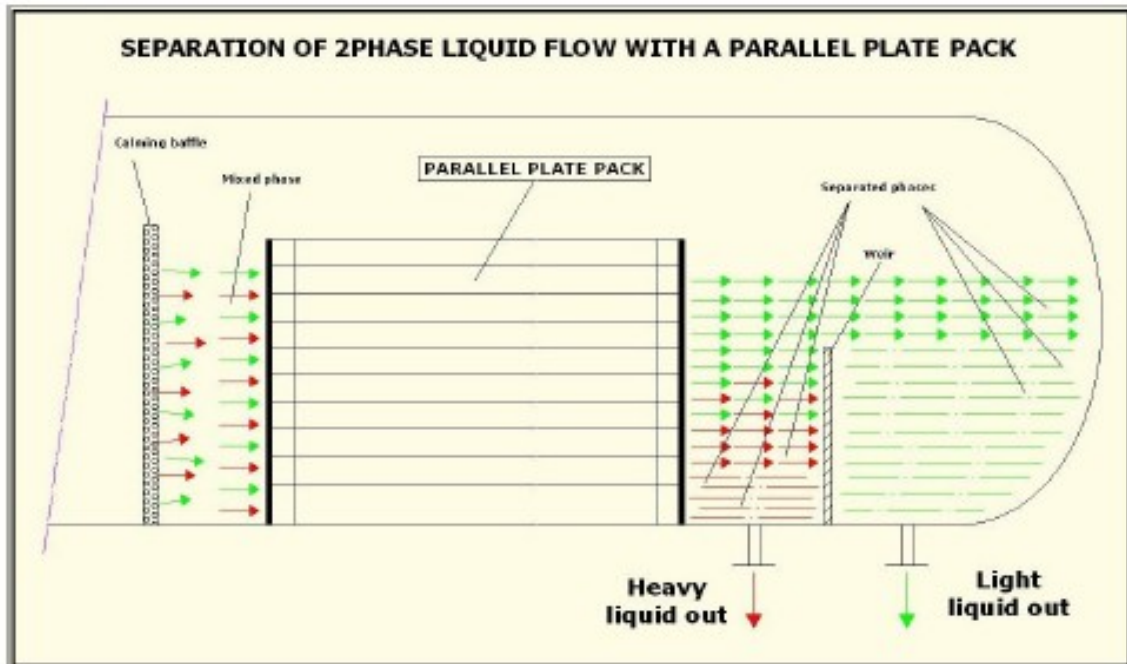
This configuration allows to increase a lot the calming effect on the flow rate but, on the other side, requires more space and it's more expensive.





## - PARALLEL PLATE PACK -

This kind of internal is commonly used to separate a liquid-liquid mix exploiting the different densities of the two liquids. They are often used in many three-phase separators where the flow is composed by gaseous phase, heavy liquid phase (ex. water) and light liquid phase (ex.: oil).

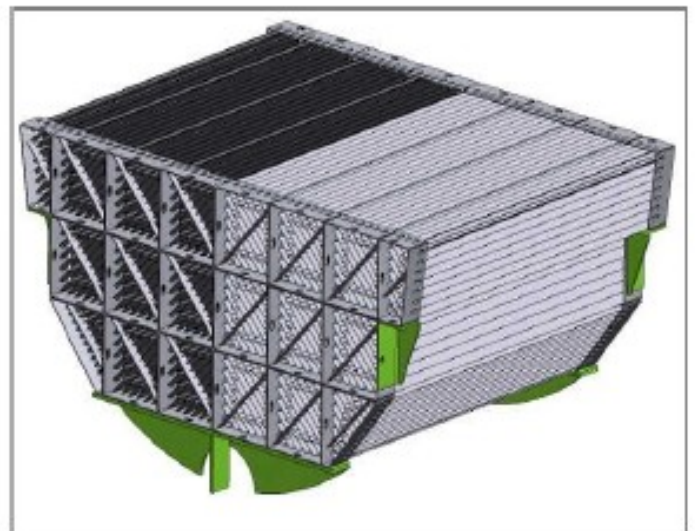


The plate pack coalescer is composed by canals between long parallel plates at a fixed angle. Passing through this canals with correct velocity is possible to obtain the separation of the light phase (for ex. oil) and the heavy phase (for example water). At the exit of the pack the light liquid is placed above the heavy phase and can be separated using a weir (see the scheme).

## - ADVANTAGIES -

Comparing with a common gravity separator the main advantages are:

- smaller separated droplets with higher efficiency of separation process
- reduction of the dimensions of the vessel because with this coalescer is possible to obtain the same separation in a shorter space
- decreasing of residence time in the vessel with an important increasing of the production.



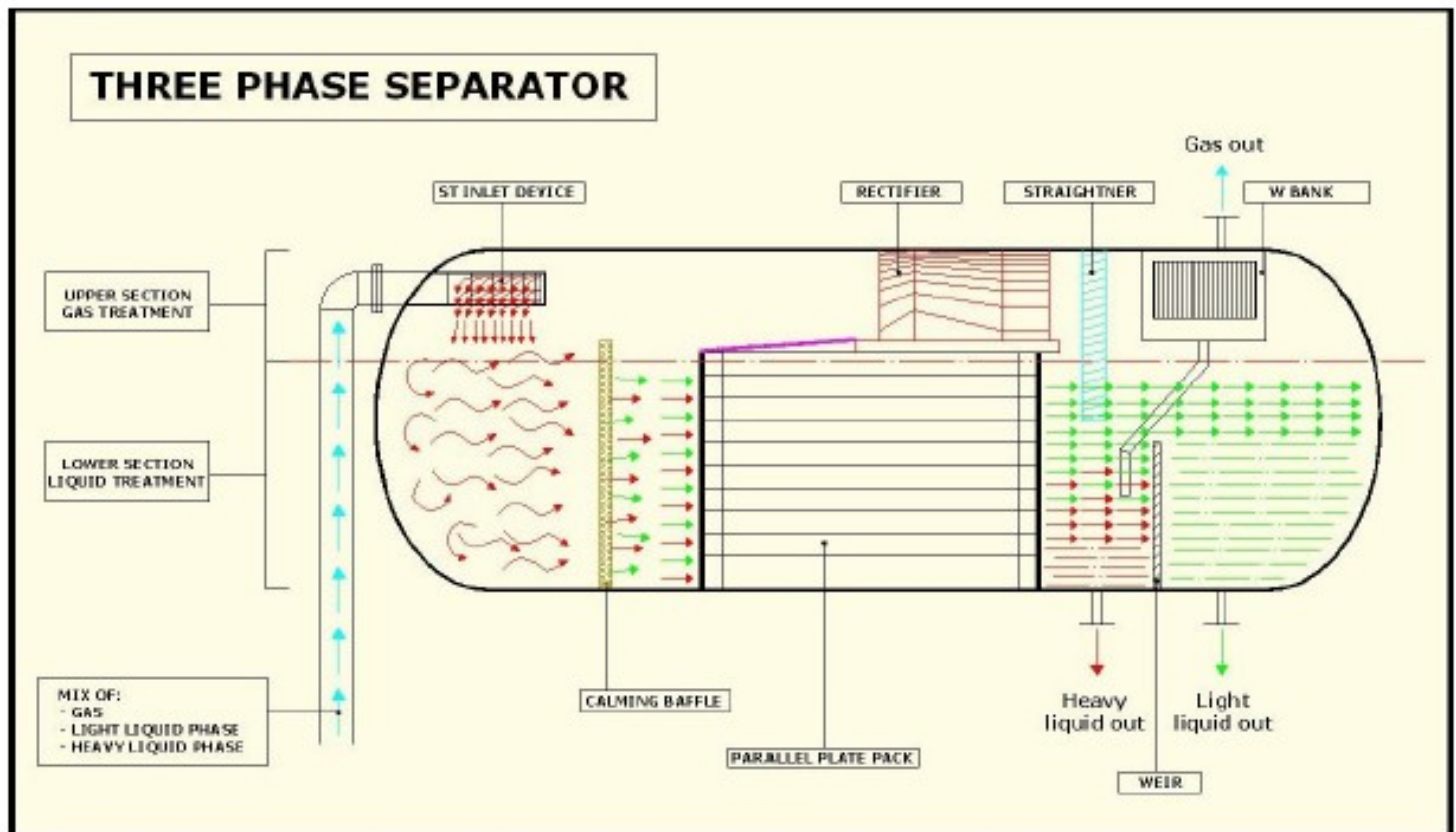


## - 3 PHASE SEPARATION -

The three phase separation consists in the treatment of a flowrate composed by three different phases. Usually one of them is in aeriform state and the other two are in liquid state. So, in general, we have:

- gas phase: as for example methane, hydrocarbon gas, natural mixed gas;
- liquid light phase: as oil;
- liquid heavy phase: as water;

The scope of the 3Ph separation is to obtain a gas flow without a big quantity of entrained liquid droplets and two separated flows of liquid light phase and liquid heavy phase.



**PROCESS:** In general a ST inlet separator is used to calm and distribute the flow at the entrance of the vessel and, to obtain the separation of the three phases, the flows are forced to pass through some internals at the same time but in two different sections of the vessel:

- the upper section where the gas flow is treated with, for example, a rectifier, a straightner and a vane pack.
- the lower section where the liquid flow is treated with, for example, a calming baffle, a plate pack coalescer and a weir

**INTERNALS:** the composition of the internal set can change on the base of the characteristic of the fluids and of the required performances. A sample of separator is, for example, the so called "Gravity separator", where the only used internal is usually a ST inlet device and there is not separation between the light and heavy liquid phase.

In other cases, to satisfy the required performances, some special internals are required. For example:

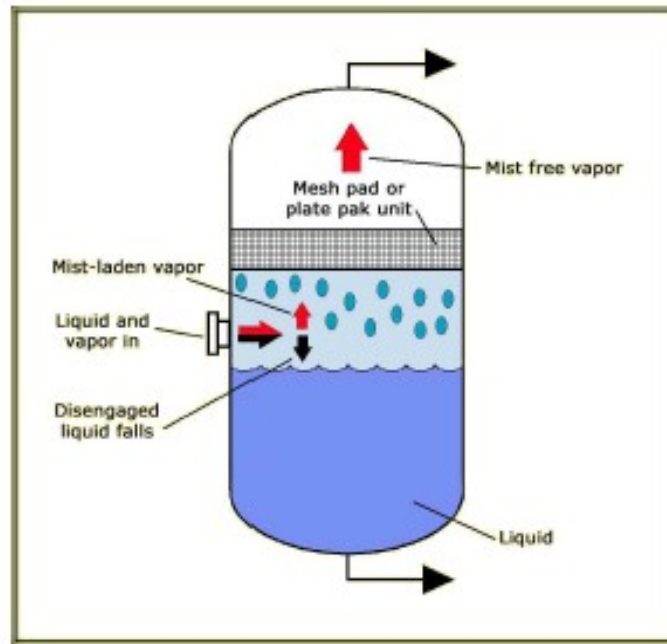
- a double calming baffle can be required instead of a simple one;
- a wire mesh coalescer can be required instead a parallel plate pack;
- a wire mesh demister is required instead a vane pack;

**SIZING:** the sizing of a 3ph separator and of the its internals is a complex process needing to consider some different parameters as:

- characteristic and property of the fluids as density, viscosity, chemical composition, molecular weight etc.;
- required residence time inside the vessel;
- required dimensions of the vessel on the base of location and other needs like, for example, existing piping;
- required performances of the process as, for example, the minimun diameter of the separated liquid droplets by the vane pack or the wire mesh demister.



## - 2 PHASE SEPARATION -



### - GAS/LIQUID SEPARATION -

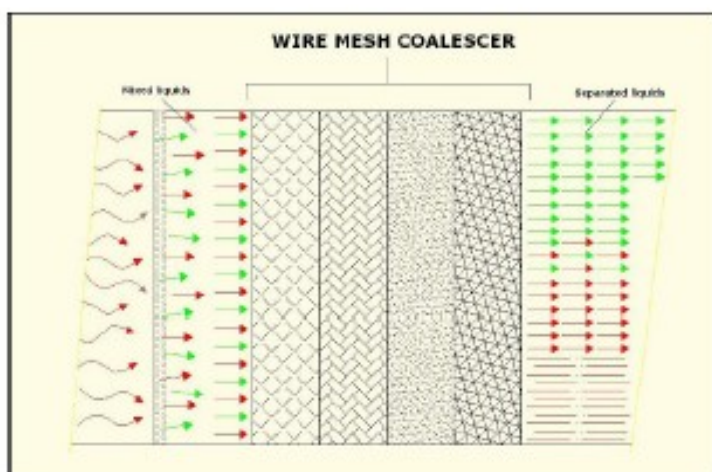
- **Wire mesh pads:** the metallic wire mesh layers form a very dense cellular structure. Passing through it, the liquid drops are captured by the coalescent effect of the mesh. Then they are eliminated by gravity.
- **Vane packs:** this separators are made with a variable number of vanes (with or without hooks). Vanes and hooks intercept and separate the liquids droplets passing through the pack.
- **Efficiency:** wire mesh separators can separate smaller droplets (usually till 3 microns of diameter) compared with vane packs (usually till 8/10 microns).
- **Velocity:** on the other side wire mesh demisters usually work with a very low velocity and vane packs can afford velocity very much higher

### - LIQUID/LIQUID SEPARATION -

- **Wire mesh coalescer:** made by wire mesh as the demisters but with different kind of layers and a bigger thickness.
- **Plate pack separators:** made by parallel plates crossed by the liquid flow.
- **Velocity and performances:** as in the case of gas/liquid separation the wire mesh internal needs crossing speed lower than plate plate but allows higher performances.

#### Advantages:

- reduction of dimensions and costs of vessels
- increasing of the purification of products
- decreasing of the loosing of glycol, ammine and other expensive chemical elements

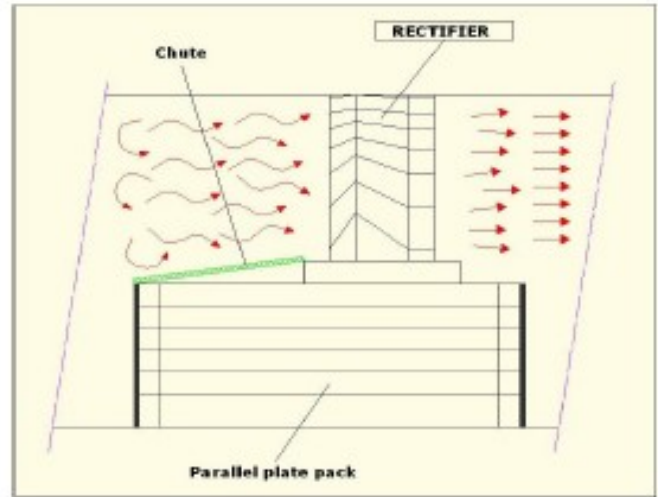


### - GAS/SOLID SEPARATION -

Some common application are:

- desalination plants, where salt is separated from the air flow. The intercepted droplets of salt become solid inside the mesh pad and, after some time, the demister needs to be changed.
- air filtration and purification needed in a lot of different industrial and food process
- filtration of solid particulate coming from some mechanical processes like, for example, drawing of metallic wire.

## - RECTIFIER -



This special kind of vane pack is made with some vanes forming large canals with the scope to rectify the chaotic gas flowrate coming from the inlet.

Passing through the rectifier the gas is calmed and the flow rectified. This is very important to obtain a proper distribution of the flow at the inlet of the other gas separator as straighteners and vane packs. The rectifier is not designed to separate liquid droplets from the gas flow but just to calm the flow.

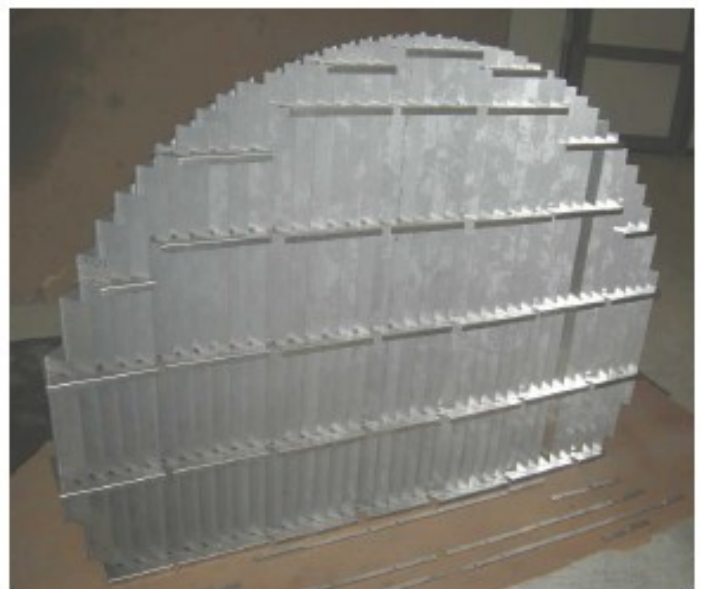
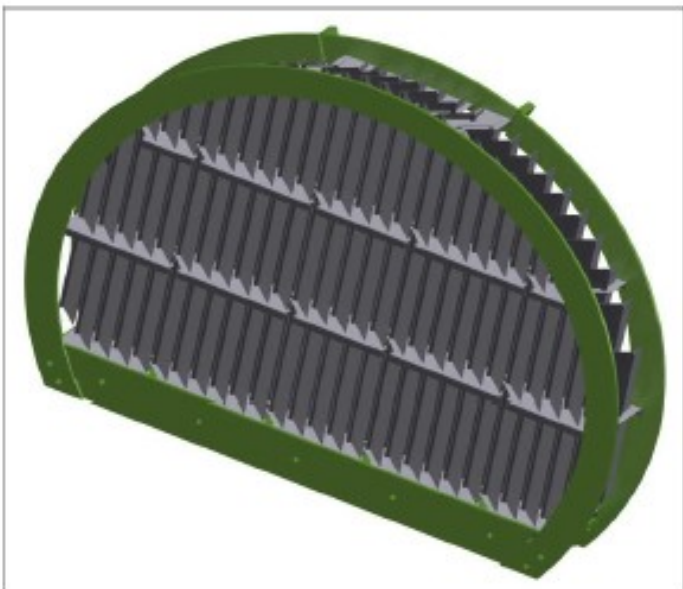
This elements are usually located over the parallel plates pack in order to intercept and redirect the gas flow. Usually, before the rectifier, is placed a "chute" to intercept the gas and introducing it in the rectifier.

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## - STRAIGHTNER -

The straightner is a particular kind of vane pack used to break the foam and to calm the gas flow. Often this internal is placed between a rectifier and vane pack separator or a wire mesh demister.

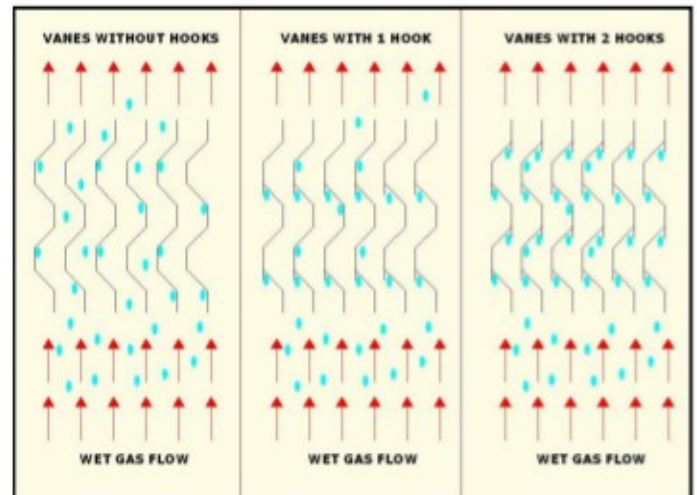
A secondary positive effect of the straightner is a primary coarse separation of the liquid droplets from the gas flow. Usually the diameter of the straightner is equal to the vessel diameter but the other characteristics (kind of vanes, thickness, pitch of the vane etc) can be designed on the base of process condition.





## - STANDARD VANE PACK -

Vane packs, with wire mesh separators, are the most widely used internals when the need is to separate liquid droplets carried by gaseous streams.



- **SEPARATION:** vane packs are composed by sets of vane profiles where the gas passes through and, changing direction, it clashes on the vanes and are captured by the hooks. Liquid droplets slide down along the vanes and are drained down by a tube into the liquid section of the vessel.
- **CROSSING SPEED:** usually, compared with wire mesh separators, the crossing speed is higher and that allows to reduce the crossing area and the vessel diameter.
- **PERFORMANCES:** on the other side, the diameter of the smallest separated liquid droplet is bigger then in a wire mesh separator. For this reason vane packs are not indicated when high performance of separation are required.

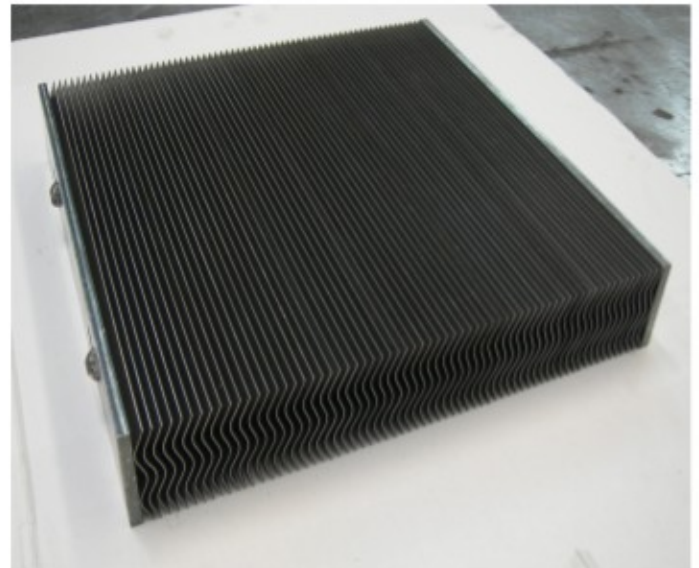
## - W BANK -

The so called "W bank" is a particular kind of vane pack used when to shorten the length of the tank is a priority. Thanks to its particular "V" shape it's possible, with half length of the pack, to obtain an equivalent crossing area and so, with the same performances, reduce the dimension of the vessel.

The W bank maintain all the characteristics and qualities of normal vane packs and so it's possible assembly packs with different style of vanes or stick on a wire mesh agglomerator to increase the performances.



## - DRYER FOR CYCLONE -



This kind of special vane pack are often used in "steam drums" located over cyclones to eliminate small liquid droplets drained by vapour stream.

They can be made with different shapes and profiles to obtain the best performances in terms of droplets separation and pressure drop.



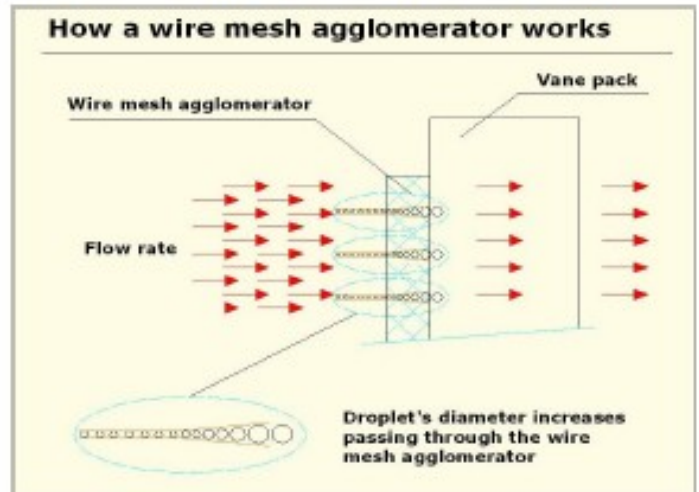
# - HIGH PERFORMANCES VANE PACKS -

## 1 - VANE PACK WITH MESH PAD AGGLOMERATOR

Sometimes happens that:

- the dimension of the droplets is too small to be intercepted by the vanes (for example 4/5 microns)
- the flowrate speed is too high for a normal wire mesh demister and with it is not possible to entertain the droplets and they are teared over the mesh
- the required efficiency is high
- the diameter of the vessel is too small to install a properly sized wire mesh demister

In this particular case the solution is to apply a properly sized wire mesh agglomerator before the window of the vane pack. As showed in the scheme below, the droplets, passing through the agglomerator, increase their dimension arriving at the vane pack with the correct speed and diameter.



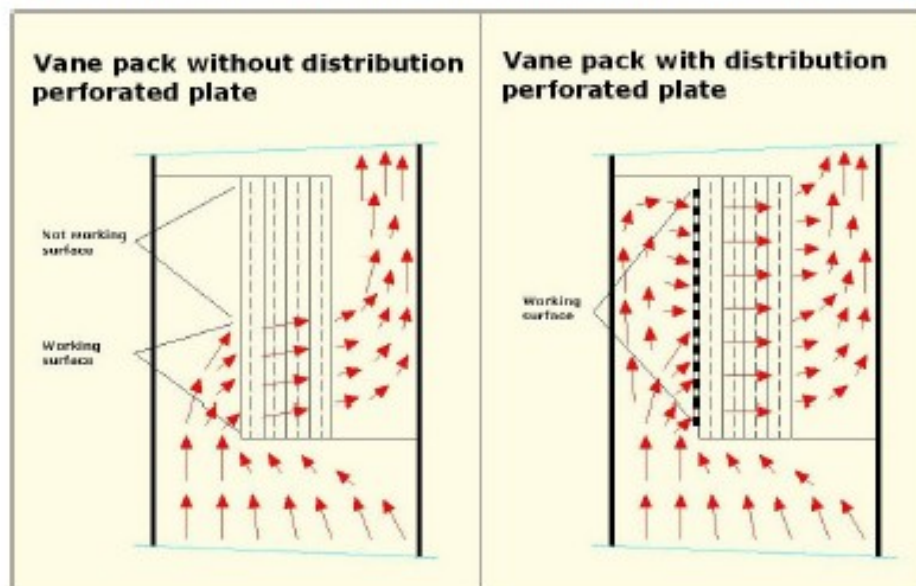
## 2 - VANE PACK WITH DISTRIBUTION PERFORATED SHEET

When the diameter of the vessel is too small to allow a correct distribution of the flowrate there is the risk that the gas passes through only a fraction of the available area of the vane pack window.

This bad distribution of the gas flow generates two problems:

- a too fast speed of the gasflow through the vane pack
- a lower efficiency of the process because many droplets can be captured by the vanes and they are teared over the mesh.

To solve this problem is possible to apply a distribution perforated sheet that force the flowrate to be distributed all over the available area of the vane pack window (see the scheme below).





## - SPECIAL INTERNALS -

AFP Tech can provide some special internals like support grids, liquid distributors, wire mesh candles and inlet distributors generally made on the base of customer's design and drawings.



### CANDLES

When it's necessary to treat a gas flowrate but, at the same time, the diameter of the vessel is not enough to guarantee a gas velocity included between the max and the min allowed velocity, the use of a candle can be the right solution. They can provide the right surface for the gas flow and, at the same time, they can work with the right gas velocity, reducing the vessel diameter as well.



### FEED DIFFUSERS

In many processes it's required a correct distribution of the gas flow inside a vessel as, for example, before some other process internals like wedge screens. In this cases it's possible to use a feed diffuser. There are many different kinds of diffuser and, on the base of customer's need, international standard and customer's design, we can draw and make some of them.



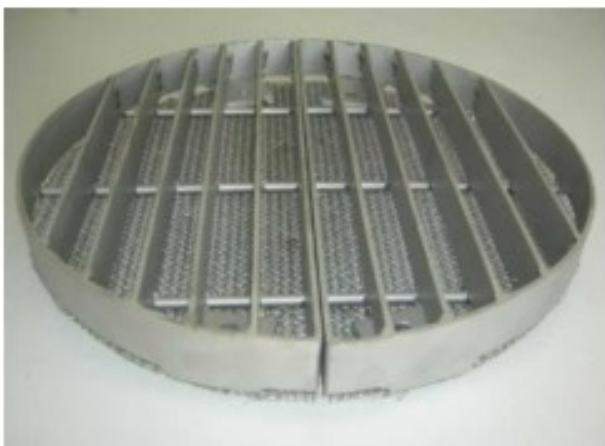
### LIQUID DISTRIBUTORS

In many columns are often used structured or random packing bad to promote the process. They need to receive a liquid flow equally distributed across the cross section because a good distribution is critical to obtain the best performances from the process. The right distribution is usually provided by liquid distributors designed in function of the process needs.

## - SUPPORT GRIDS -

Inside columns it's often necessary to install some support grids to support other internals like, for example, random packings or rings assuring the mechanical support but, at the same time, allowing the correct crossing of the grids by the gas flow without a big pressure drop.

There are many different types of grates also with different lines of wire mesh applied on the grid's structure. These grids are generally made on the base of customer's design and drawings.



## - ENGINEERING -

To obtain the best separation and pressure drop performances is very important a proper sizing of the separators. It's possible to choose two different ways:

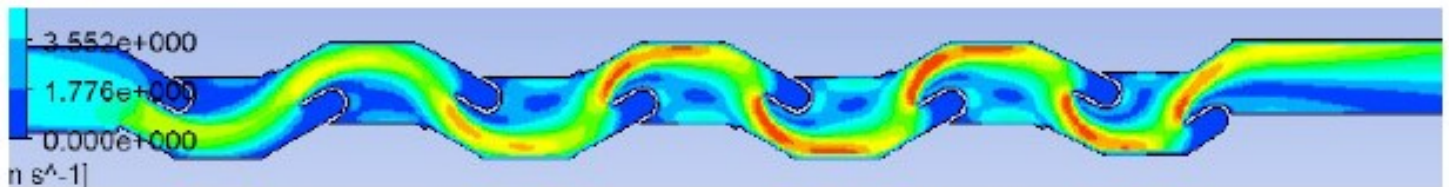
- **checking:** the customer supplies us the process datasheet and the features of the separator. Our technical office will check the separation efficiency and the pressure drop of the flow passing through the separator.
- **sizing:** the customer, giving us the process datasheet, needs to define the type of separator and its dimensions to reach the requested efficiency, the right pressure drop or satisfying some dimensional limits as well.

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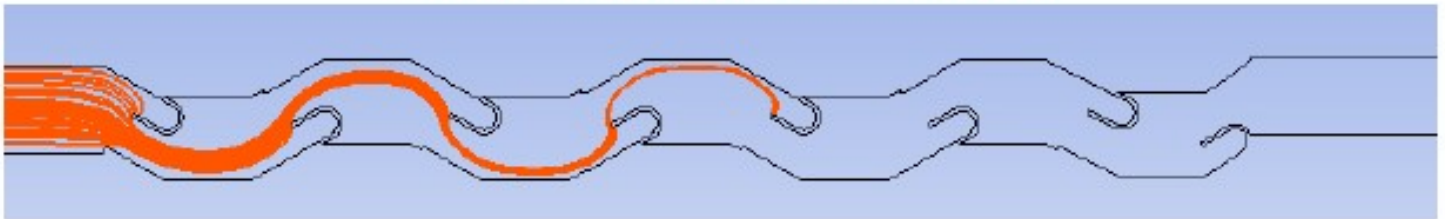
### - Resizing -

Sometimes happens that some parameters as vessel diameter, flow rate, droplets dimensions etc does not fully satisfy the process conditions and the requested efficiency.

In this case we are able to suggest the new vessel diameter or the max/min allowed flow rate through the separator or the maximum achievable performances with process conditions described in the datasheet.



- Analysis of a gas flow rate through a vane pack section -



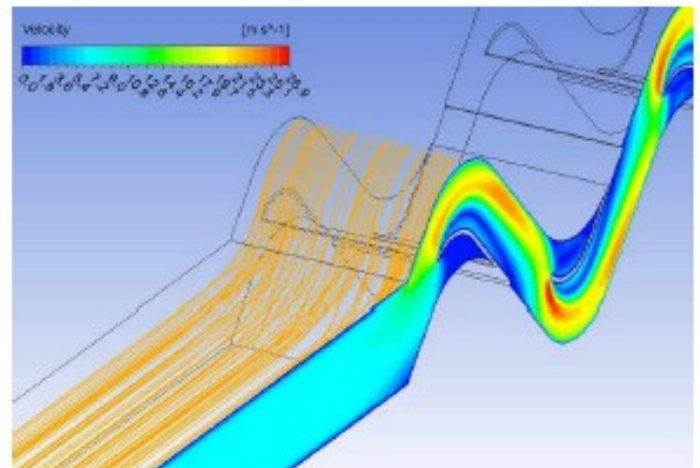
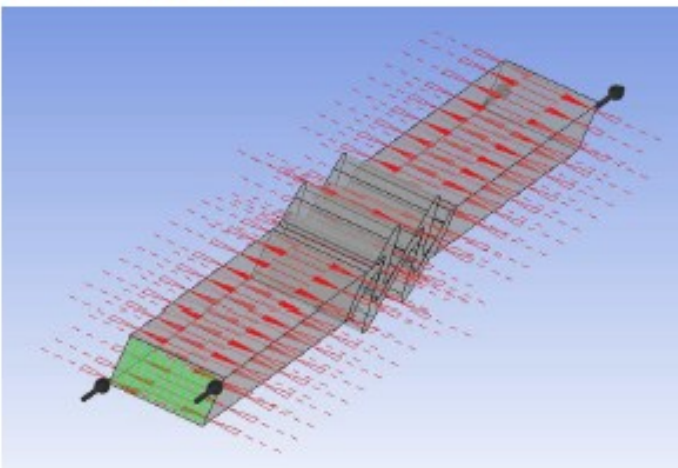
- Analysis of droplets interception through a vane pack -

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### - DATA SHEETS -

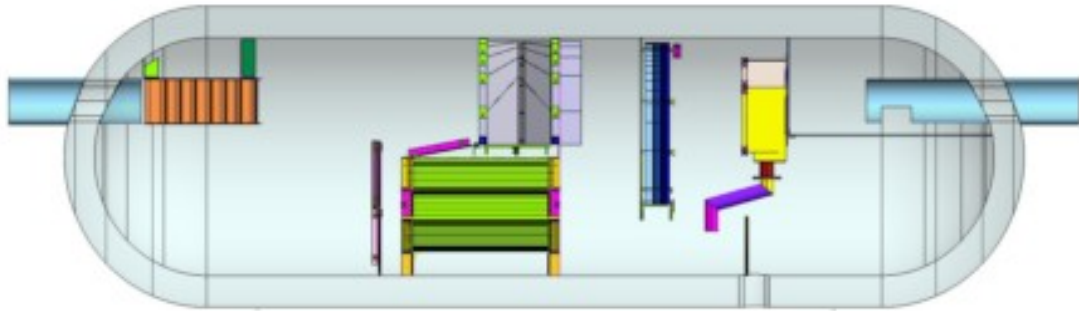
In order to make a correct sizing we need to know the working conditions (pressure, temperature, flows etc) and chemical description of gas and liquid. You can supply these information downloading the module and filling it. Sending us the filled module we will check and size the requested separator.

At the web address <http://www.afptech.eu/sizing.htm> you can find the links to download the module in .pdf or .ods format.





[www.afptech.eu](http://www.afptech.eu)

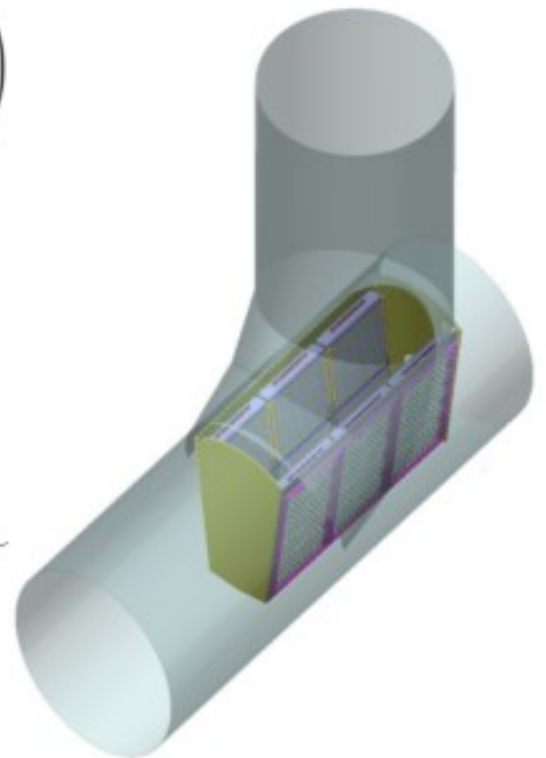
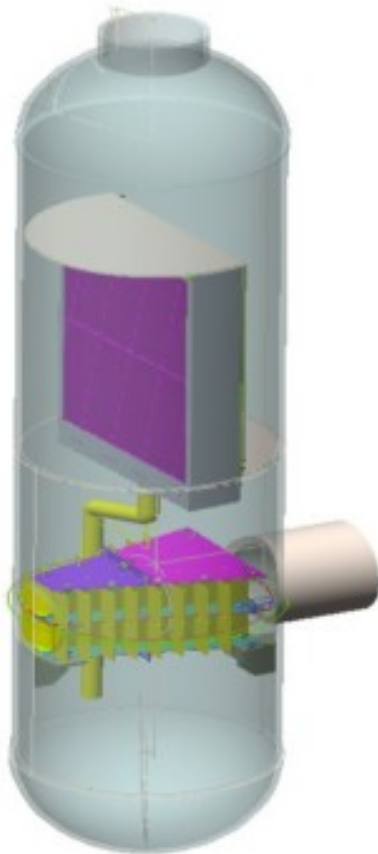


*Design &  
Engineering*

*Wire mesh  
separators*



*Internals  
for columns  
and vessels*



**- REFERENCES -**

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