



# Environmental deodorization plants



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# Environmental deodorization plants

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Throughout its lengthy experience PPA has supplied more than 200 environmental deodorization plants, always meeting the most stringent quality requirements and with its trademark design.

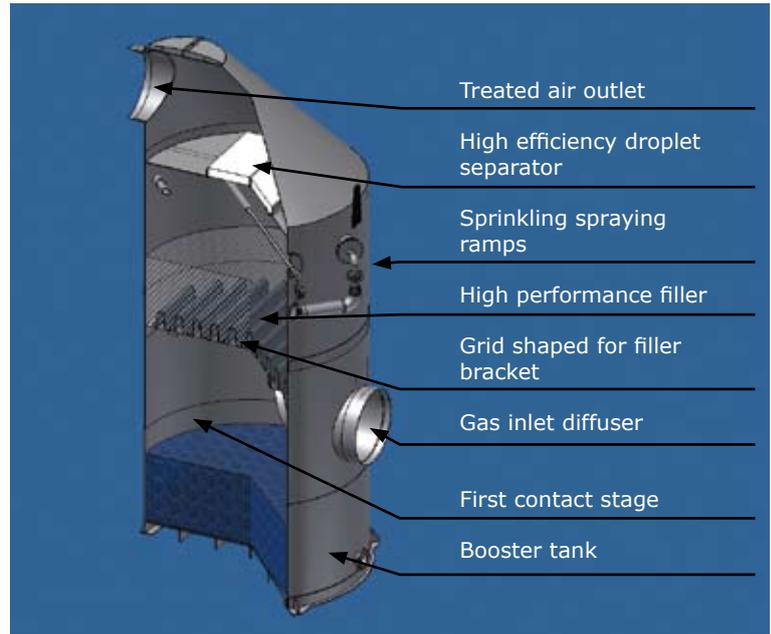
The difference with other industry standards is undoubtedly the high quality craftsmanship, performance and operation of the equipment supplied by PPA.

## 1. Design

PPA bases the design of its deodorization plants on two columns. Effectiveness in the deodorization process and energy efficiency.

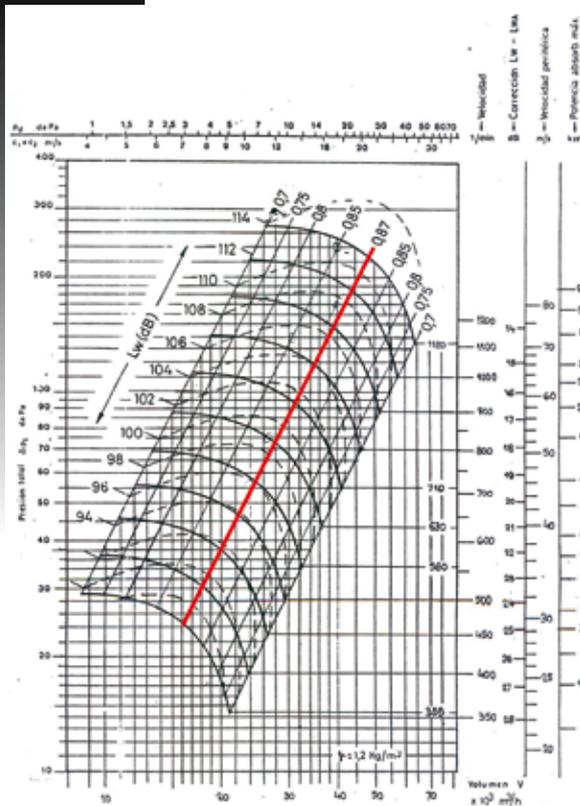
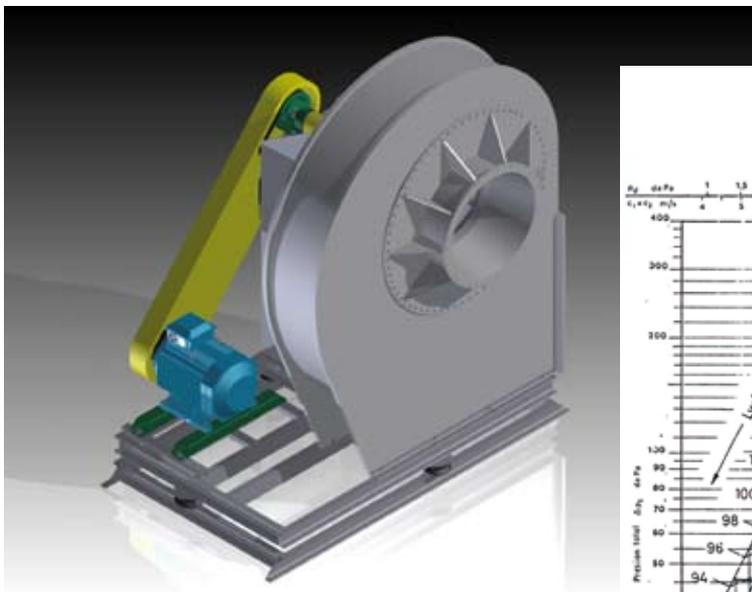
The PPA deodorization plants incorporate elements designed for high efficiency, such as scrubbers, compact activated carbon equipment and biofilters.

All these elements are designed to obtain optimal results in the deodorization process and minimum consumption of reagents and or consumables (activated carbon, biofiltration mass etc).



*Internal scrubbing towers.*

In terms of energy consumption, the use of elements designed to minimise load drop of the plants and the design of our high performance medium-high pressure centrifugal fans (up to 87%), guarantee plants with minimum energy consumption as compared to other market solutions.

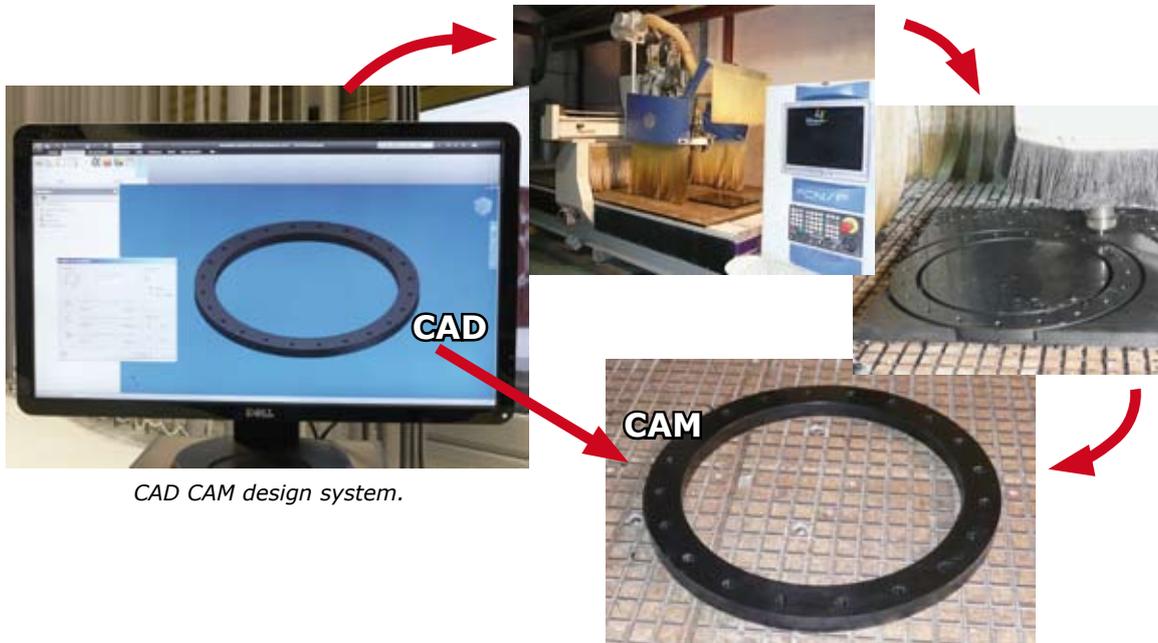


*Fan-characteristic curve.*

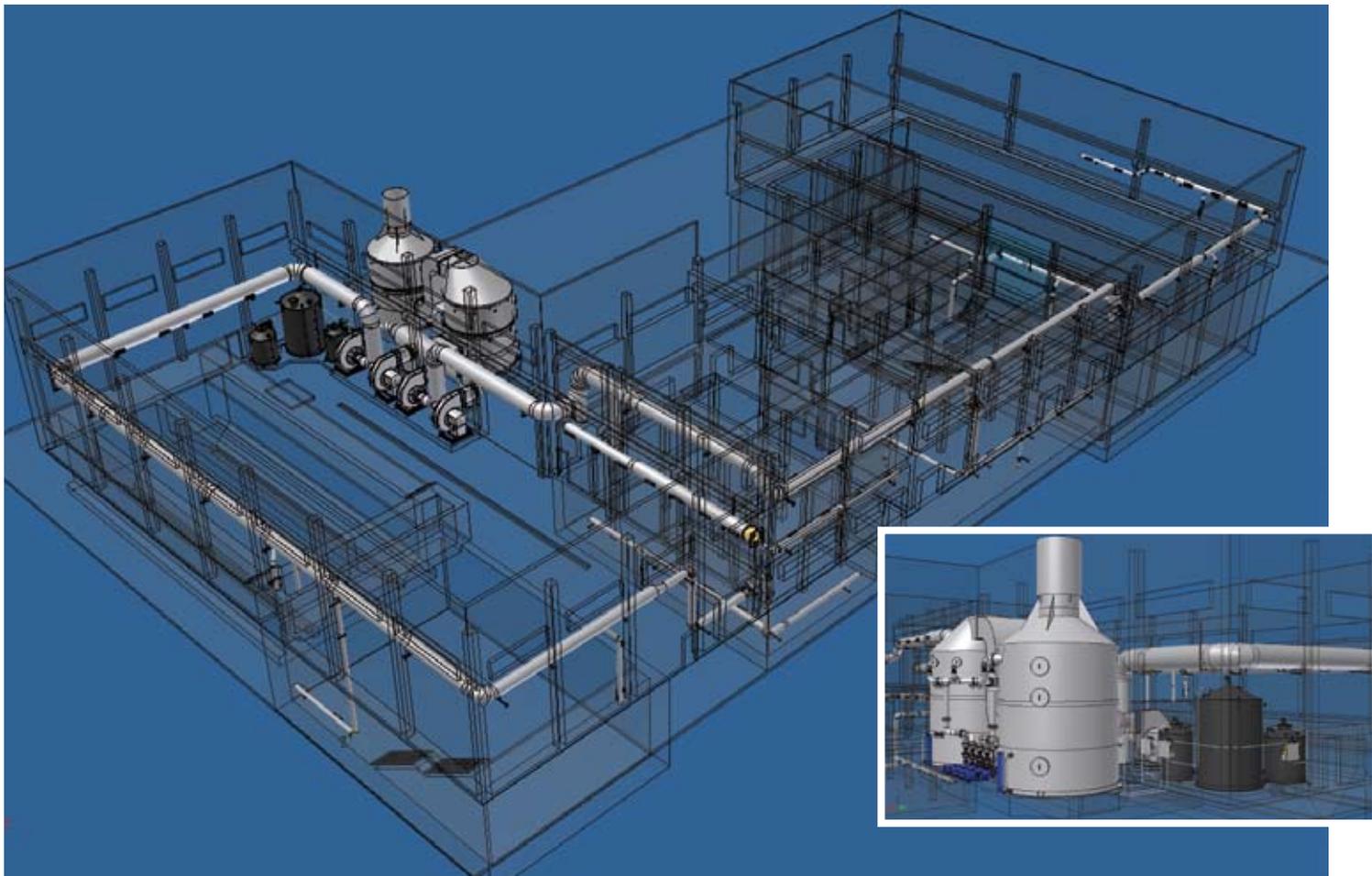
PPA has the most modern CAD/CAM systems to design its plants.

Through the use of the 3D CAD design systems a high grade of pre-manufacturing is obtained minimising installation times and errors.

The 3D CAD systems are invaluable aids when obtaining plants with avant-garde aesthetics inherent to all PPA products.



*CAD CAM design system.*



*Deodorization Plant, integrated within the 3D of the civil engineering works.*

## 2. Environmental deodorization systems

Six techniques may be considered for the elimination or control of gaseous odours. These techniques are:

- **Absorption**

Absorption is a technique where the odorous compounds of the gas current are dissolved (and hence eliminated) in a corresponding reagent liquid solution. Normally the absorption and chemical oxidation appear simultaneously in the same odour elimination apparatus.

- **Thermal oxidation**

Thermal oxidation is performed when the gas temperature rises to a level at which the odour causing compounds are burnt in oxygen. Normally the oxides produced have a low odour as compared to the original compounds.

- **Adsorption**

Adsorption is usually performed with activated carbon or biofiltration elements. With this technique the odorous compounds are trapped on the surface of a solid particle. In the case of biofiltration these odorous compounds are fuel for the bacteria inoculated in the biofilter bed.

- **Chemical Oxidation**

Chemical oxidation consists of oxidising the odour causing compounds using chemical reagents

- **Dilution**

Dilution consists of mixing the odorous gases with sufficient fresh air to reduce the detectable odour to a concentration below the detection threshold.

- **Masking**

Masking is a technique where another odorous compound typically with a pleasant odour is added to the gas current so as to cover or mask the unpleasant odour.

PPA is specialised in deodorization systems where chemical oxidation and absorption techniques as well as adsorption techniques are used



*Deodorization and Ventilation Plant  $Q=18,100 \text{ m}^3/\text{h}$ .*



*Deodorization Plant using Chemicals  
 $Q=35,000 \text{ m}^3/\text{h}$ .*

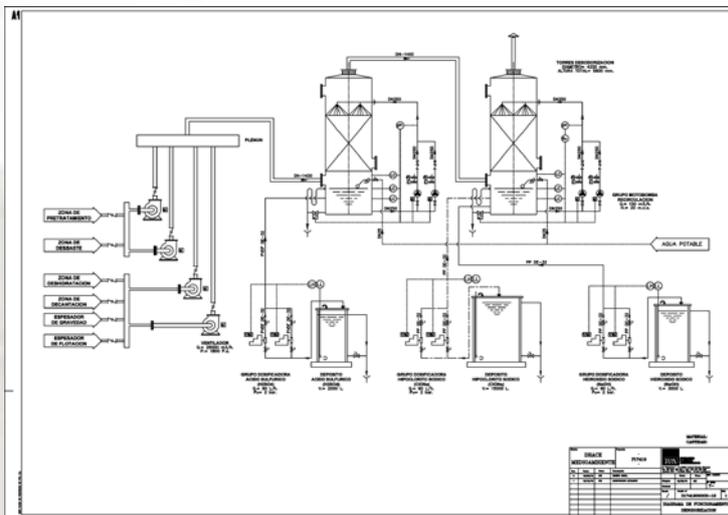
The deodorization plants which PPA manufactures and installs are divided into:

### 2.1 Environmental deodorization using chemicals:

Are plants which use chemical oxidation and absorption techniques to eliminate odours.

The chemical oxidation and absorption processes are performed in the scrubbers, where a counter flow of the odour-laden gases and aqueous solutions with the corresponding reagents are recirculated.

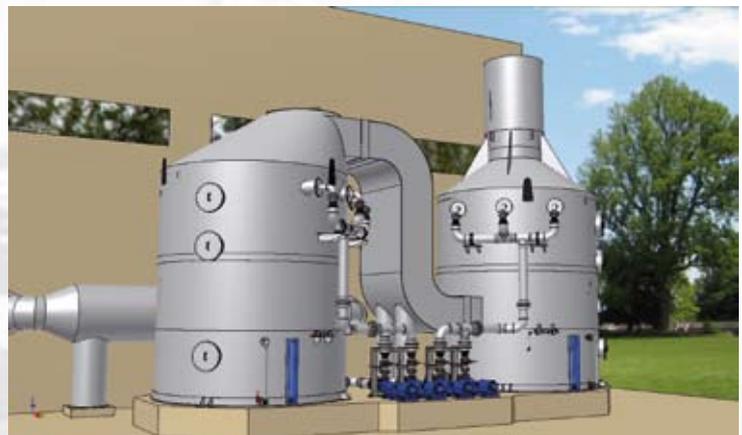
This type of plants can be two or three stage plants, whether or not a simultaneous final stage or chemical oxidation and absorption process takes place. The most commonly used reagents in this type of plants are: For absorption, sulphuric acid ( $H_2SO_4$ ) and sodium hydroxide ( $NaOH$ ) and sodium hypochlorite ( $NaClO$ ) for chemical oxidation, although it may vary depending on the concentration of the various odour causing compounds in the gas current.



Two stage deodorization installation using chemicals flow chart.

This deodorization plant using chemicals is often supplemented with reagent storage tanks, pumps and dosage pipes of same.

The deodorization system is commonly used in flow ranges from 25,000 up to 150,000  $m^3/h$ .



3D Design.

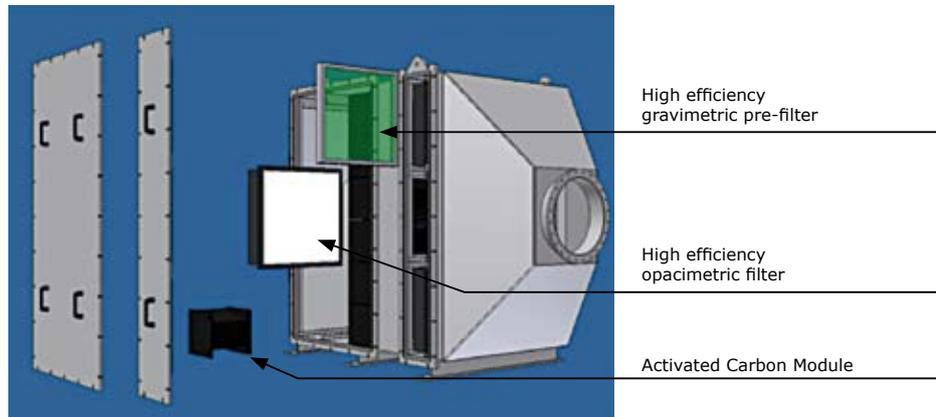


End installation.

## 2.2 Activated carbon environmental deodorization

These are plants which use adsorption techniques to eliminate odours. The odour particles are captured on the surface of the activated carbon due to physical entrapment. This forces the regeneration or substitution of the activated carbon bed from time to time to maintain its deodorization capacity.

PPA has developed the ECA (compact activated carbon equipment) to facilitate the extraction and regeneration of activated carbon operations.

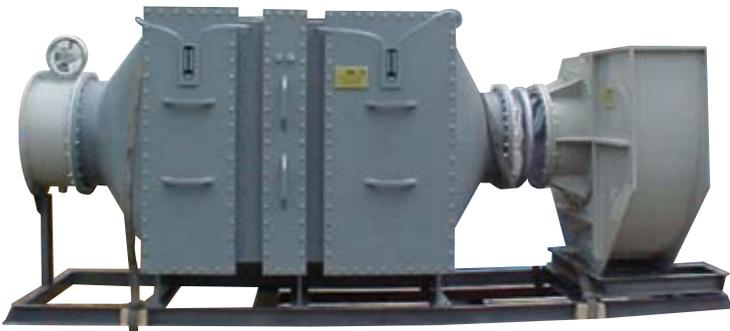


*Compact Activated Carbon Equipment*

In this equipment, the activated carbon has cells which allow for an easy manual extraction for its subsequent transport to its place of regeneration. It is immediately substituted by other equipment which has already been regenerated, minimising the operational down time of the plant.

With the use of the ECA equipment PPA ensures a smaller load drop and therefore greater energy efficiency.

To obtain the greatest possible durability of the activated carbon under optimal conditions, the device has filters, pre-filters and electric heaters to ensure the maximum efficiency in the deodorization of our compact activated carbon equipment (ECA).



*Deodorization Plant using compact activated carbon equipment with heating stage,  $Q=12.380 \text{ m}^3/\text{h}$ .*

Additionally and when so required by the Project, PPA manufactures activated carbon towers, in which the activated carbon is added in large bulk quantities. This will normally result in a greater load drop of the deodorizer equipment and a lower durability

of the activated carbon due to its silting due to humidity. However, in this type of plants the maintenance operations of the activated carbon bed are made at longer intervals.

*Activated Carbon Deodorization Plant with Vertical Tower  
Diameter 3000,  $Q=20,300 \text{ m}^3/\text{h}$ .*

The deodorization system is commonly used in flow ranges from 1,000 up to 40,000  $\text{m}^3/\text{h}$ .



### 2.3 Environmental deodorization USING biofiltration:

Are plants which use adsorption techniques to eliminate odours. The odour particles are trapped on the surface of the biofilter bed elements and which are fuel for the microbial flora inoculated therein.

As with the deodorization using chemicals and unlike activated carbon deodorizations, it is a wet system. Consisting of bringing into contact the air with the humidity saturated odours using a fixed biomass bed. To obtain the saturation of the gas current, a humidifying tower is used before driving the air into the biofilter.

Biological filters may use different types of fillers or biomass: organics (pine bark, coconut...) lower economic cost and less durability and inorganic, increased economic cost and greater durability.

The major advantage of the deodorization using biofiltration as compared to traditional methods is its low operating costs, given that it does not require the addition of expensive and hazardous reagents or frequent replenishment of the biomass bed.

The deodorization system is commonly used in flow ranges from 50,000 up to 300,000 m<sup>3</sup>/h.



*Biofiltration Deodorization Plant, Q=72,000 m<sup>3</sup>/h y Q=50,000 m<sup>3</sup>/h; RSU treatment plant.*

### 3. PPA ventilation equipment



#### MEDIUM-HIGH PRESSURE CENTRIFUGAL FANS

High pressure series PPA-VA/RU-100-1000.  
Medium pressure series PPA-VM/RU-100-1800.

##### Features:

- Manufacturing materials: PP, PPS, HPDE, PPS-el, PVDF, FVRV.
- Maximum flow: 115,000 m<sup>3</sup>/h.
- Maximum pressure: 650 mm Wc.
- Maximum performance: 87 %.

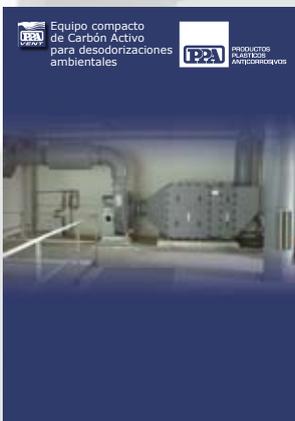
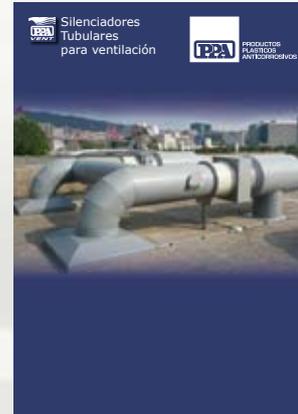


#### SCRUBBERS

PPA-SRV Vertical Scrubbers Series manufactured in PP, PPS, HPDE, PPS-el, PVDF, FVRV.

##### Features and accessories:

- Maximum flow: 150,000 m<sup>3</sup>/h.
- Grid shaped for filler bracket with 92% spacing.
  - Irrigation ramps, full cone sprayers included.
  - Vertical and high efficiency laminar flow droplet separator.
  - Visual level with electric level sensors.
  - Motorised valve for network water inlet.



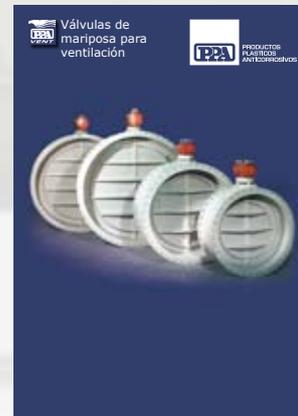
#### COMPACT ACTIVATED CARBON EQUIPMENT

PPA-PF-2+1 Series manufactured in PP, PPS, HDPE.

- Maximum flow: 40,000 m<sup>3</sup>/h.

##### Contact stages:

- High efficiency gravimetric pre-filters.
- High efficiency opacimetric filters.
- H<sup>2</sup>S odour elimination.
- Mercaptans odour elimination.
- NH<sup>3</sup>-animate odour elimination.



#### STORAGE TANKS

PPA TANK Series manufactured in PP, HDPE.

- Single and double wall.
- Volume up to 40 m<sup>3</sup>/h.
- Accessories: Visual level, overflow and emptying, filling tube, electrical sensors, tracing and lagging, agitator, baffle breakwater etc.



### ANTIVIBRATION COUPLINGS FOR VENTILATION

The PPA VENT antivibration couplings are manufactured in corrosion resistant materials, allowing its use in ventilation systems which convey gases and aggressive fluids.

Its flanged design prevents leakage in the connections with other elements of the ventilation system. It is likewise supplied with anti-collapse rings that prevent deformations in its use with high temperatures and negative pressures. It is manufactured tailored to the operational needs of each installation.

### TUBULAR SILENCER FOR VENTILATION

The PPA VENT tubular are designed to be assembled in industrial installations in corrosive environments. Its design achieves a high degree of noise attenuation at low frequencies with minimum loss loads. This helps ensure that the PPA ventilation systems have a noise level below that required by current regulations.

Constructed entirely in corrosion resistant plastic materials, allows its use in harsh environments and that they are suitable for ventilation systems that convey corrosive fluids.

### BUTTERFLY AND CHECK VALVES FOR VENTILATION

The PPA VENT butterfly valves regulate the air flow in a duct and are manufactured in corrosion resistant materials which allow its use in ventilation systems that convey gases and aggressive fluids.

### PREFABRICATED PANELS

PPA presents the prefabricated panels within its PPA TUBE range for the dosing, loading and sample taking of aggressive and hazardous chemical products. It includes all the accessories assembled onto a single frame. Plug and play. It also has a security protection against high impact-resistance polycarbonate splashes. It likewise incorporates a drip tray and mobile security settings.

### INSTRUMENTATION AND CONTROL APPARATUSES

- pH – Redox transmitters.
- pH / potential Redox controllers.
- pH and Redox probes.
- Irrigation controllers for biofilters.
- Level, temperature and pressure transmitters.

### HUMIDIFYING TOWERS FOR BIOFILTERS

- PPA-SHV Vertical Humidifying Towers Series manufactured in PP, PPS, HDPE, PPS-el, PVDF, FVRV.
- Maximum flow: 150,000 m<sup>3</sup>/h.
  - Irrigation ramps, full cone sprayers included.
  - Vertical and high efficiency laminar flow droplet separator.
  - Visual level with electric level sensors.
  - Motorised valve for network water inlet.

### BIOMASS SUPPORT SYSTEM IN BIOFILTERS

- BIOMASS SUPPORT PLATES manufactured in injected PP/PE.
- Transitory load: average resistance of 2,000 kg/m<sup>2</sup>
  - Support plate sizes: 1000 x 500 mm. and 50 mm thick, rectangular mesh type.
  - Support: Upon columns. Six brackets, support bearing per m<sup>2</sup>, which prevent the buckling of the plates. Height 700 mm.
  - Irrigation sprinkler system, automated programming.

### CONDUCTS AND FITTINGS FOR VENTILATION IN EN PP, PPS AND HDPE

- Solid and/or structured ventilation pipe series
- Plastic and/or aluminium grid with adjustable slats.
- Supports with cradle feet manufactured in plastic.



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