

# *Technical Manual for Installation, Operation and Maintenance*

## **Air Washer**



**VENTEC AMBIENTAL EQUIPAMENTOS E INSTALAÇÕES LTDA**

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## 1 – INTRODUCTION

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The recommendations provided in this manual have been prepared based on the data of the project involved and experimental laboratory know-how that made it possible to apply the products supplied.

However, the user has additional information about hands-on operating conditions and about the workplace. Therefore, the user can join this know-how to the hands-on recommendations in this guide, information and more specific details on each component supplied by the manufacturer and prepare a good installation and operation scheme and a safe maintenance program.

Several data sheets specific to the sets and to key accessories are part of this Manual. They indicate the most relevant technical and construction characteristics.

Besides the recommendations in this manual, which must be considered as supplementary, we recommend not leaving aside the usual norms relating to good operation, maintenance and installation techniques.

It must be pointed out that the use of qualified personnel, both in operation and in maintenance of the equipment means eliminating countless problems.

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## 2 – GENERAL CONCEPTS

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The equipment includes a metal shell made of carbon steel, a spraying system and a droplet elimination area made of polypropylene. This set must be installed in a brickwork cabinet to be built by the customer according to a project by Ventec Ambiental.

The spraying system includes a set of cells which are submitted to continuous water jets by spraying nozzles. This provides high filtering efficiency and air saturation.

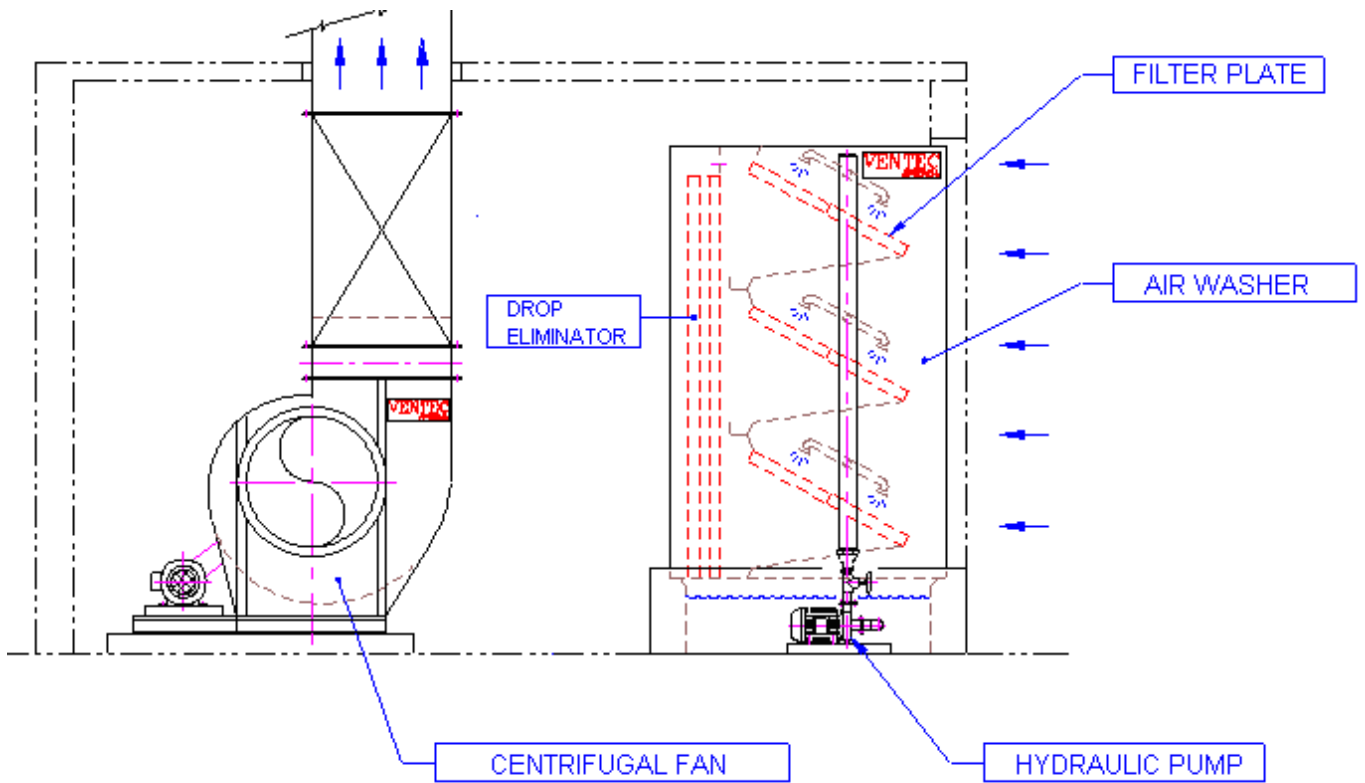
The drop eliminator retains water droplets from wet air coming from the cells and sends only saturated air to the environment.

Water is recirculated by a monobloc-type pump which is duly sized for the hydraulic network of distribution and spraying nozzles.

The water tank can be made of brickwork. It is to be built by the customer according to a project by Ventec Ambiental, or else it can be of metal construction built in the shell and equipped with sewage drain, water filter and level-regulating buoy.

### 3 – EQUIPMENT DRAWING

#### 3.1 – Typical Installation Drawing



## 4 – DESCRIPTION OF COMPONENTS

### 4.1 – Filtering Plates

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These are beehive-type filtering metal elements made of corrugated aluminum and equipped with an internal axle to prevent deformation. Retention of particulate takes place through these elements.

After some time the plates get impregnated with dust and require cleaning. This cleaning is made by water jets.



**Aluminum Filtering Plate**

### 4.2 – Frames

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These are metal supports that sustain the filtering plates and form a rigid set. The lower part is closed by a chute which, via metal pipes, makes water return to the recirculation tank.

### 4.3 – Hydraulic network

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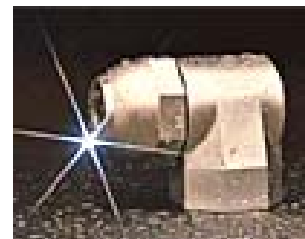
Water supply duct network made of galvanized steel.

Its sprinkling holes strictly follow the alignment of the filtering plates so optimum water distribution of wash water can be ensured. The nozzles are fixed by elbows also made of galvanized steel.

### 4.4 – Spraying nozzles

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The spraying nozzles are made of brass, full cone type. They are responsible for supplying water to the equipment wash system. The pressure is calculated so that the nozzles provide a perfect cone to cover 100% of the area of the filtering plates.



**Spraying nozzle**

### 4.5 – Water pump

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Monobloc type, responsible for recirculating water from the tank to the filtering area through the hydraulic network.



**Water pump**

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#### 4.6 – Recirculation tank

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Designed to supply the water flow forecasted for air wash, the recirculation tank is equipped with a sewage drain and a level-regulating buoy. The tank is at an angle so that the powder decanted at the bottom is easily dragged by the discharge drain when the recirculation water is fully or partially replaced.

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#### 4.7 – Tank sealing plate

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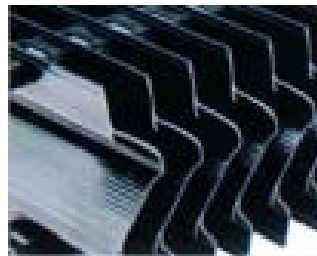
This is a plate anchored to the last row of filters in the washer body and dipped into the recirculation tank water to prevent dirty air to leave the air wash area.

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#### 4.8 – Drop eliminator

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These are elements made of polypropylene designed to eliminate clouding and droplets from the air spraying and washing system.



Drop eliminator

### 5 – ASSEMBLY

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#### 5.1 – Assembly of the Hydraulic Network

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- 1 - The network must be connected to the pump, and the pump must be connected to the tank so the wash recirculation water can be made.
- 2 - Fix the main piping close to the supports placed on the sides of the washer and correct the nozzles to the elbows installed at the ends of each branch.
- 3 - The position of spraying nozzles / pipes must be strictly aligned with the filtering plates.
- 4 - Install the sealing plate between the washer and the water tank, which must be partially dipped into the water so false air is prevented from entering.
- 5 - All water leaks in connections should be eliminated.

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#### 5.2 – Installation of Filtering Plates

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- 1 - Place filters in fixation frames.
- 2 - Fit filters in frames; fitting must be perfect to prevent leaks.
- 3 - Align filters with the spraying nozzles.

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#### 5.3 – Assembly of the Drop Eliminator

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- 1 - The equipment must be assembled in panel shape externally.
- 2 - Fit the panel to the back of the shell by the appropriate bolted support.
- 3 - The panel must have as many blades as required to cover 100% of the air outlet area of the washer.

## 6 – OPERATION

### 6.1 – Internal Part of the Washer

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- 1 - Check filter anchoring. No filters should be loose or unfitted.
- 2 - The spraying nozzles should be centered on the filters with centralization tolerance of  $\pm 5$  mm.
- 3 - Check if pipes are well anchored.

### 6.2 – Hydraulic Network

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- 1 - Check if the pump is duly installed. Check also if nuts and bolts of flanges are duly set.
- 2 - Feed the water tank and inspect for dirt build-up from assembly operations.
- 3 - If there is dirt, drain the tank and re-feed it.
- 4 - Before actuating the pump, check if rotation is correct.
- 5 - Operate the system and eliminate leaks.

### 6.3 - External Part of the Washer

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- 1 - Check seals and access doors for perfect seating to prevent leaks.
- 2 - All bolts should be duly tightened to prevent leaks.
- 3 - Actuate the fan (closed valve) and check if rotation direction is correct.

### 6.4 - Washer Start-up

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Sequence of equipment operation:

The water circulation system must be the first one to be operated.

- 1 - The system must operate at full pressure to deliver nozzle spraying. Check all nozzles for normal operation.
- 2 - Make sure all access doors, passageways, ducts and other openings are closed, locked and bolted.
- 3 - Turn on the fan. The pressure will drop a little via the clean plates and the fan should start operating with the semi-closed valve so as not to overload the motor in the first hours of operation.
- 4 - This way, practically all the filtering area of the washer will be in non-stop operation. Loss of pressure continues to increase and gets close to 25 mmCA (projected pressure of the washer).
- 5 - The blow-in duct network must following the project characteristics.

### 6.5 - Instructions on How to Stop the Washer

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To stop the system, the following sequence of operation must be followed:

- 1 - First, turn off the fan.
- 2 - After the fan, disconnect the hydraulic network.

### 6.6 – Precautions

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While the washer is being operated, the following points should be checked:

- 1 - Conditions of lubrication of pump and fan;
- 2 - Abnormal vibration and noise in rotating parts;
- 3 - Make sure there are no loose bolts in the whole set;
- 4 - Check if there is good sealing between bolted parts, sides and tank, particularly in access doors for maintenance of equipment so there are no leaks;
- 5 - Check temperature of bearings of equipment such as fan and pump;
- 6 - Check wear in general (particularly rotating elements);
- 7 - Provide suitable water treatment.

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## 7 – MAINTENANCE

### 7.1 – Shell

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- All inspection doors must be tightly sealed. Any leaks should be immediately repaired.
- Renew painting whenever necessary to prevent corrosion.
- Perfect performance of the hydraulic network is important for good operation of the air washer. The pump and nozzles must be often watched, particularly as to clogging.

### 7.2 – Drop Eliminator

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- The droplet eliminating blades must be inspected monthly to prevent dirt build-up and consequent water leaks.

### 7.3 – Filtering Plates

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- The plates should be handled with maximum care.
- Periodical inspection of plate is advisable to make sure they are not damaged. If they are damaged, they should be immediately replaced. We recommend checking weekly as a minimum.

### 7.4 - Troubleshooting Guide

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#### 7.4.1 – High loss of load:

- Check if all nozzles are working correctly.
- Check if filters have a very thick layer of dust / particulates. If it occurs, this can be a consequence of:
  - A) The particulate material collected is not being removed from the tank:
    - Therefore, the tank water must be replaced as soon as a great amount of dirt builds up.
    - Tank angle should be towards the drain so powder can flow.
  - B) High gas flow: measure flow and regulate the valve for projected condition.

#### 7.4.2 – Low loss of load:

- Check if there are openings in the filter area and if they are correctly installed.
- Check system ducts for air leaks or clogging. Make sure all valves / grills of the system are correctly positioned to allow air to go through the washer.
- Make sure the tank sealing plate is duly installed and the shell has no holes, cracks or loose seals that might allow air to go through the washer without crossing the plates.

### 7.5 – List of spare parts for 2 years operation

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#### Spraying nozzles:

- 10 - 20% of the total amount.

#### Filtering Plates:

- 100% of the total amount.

**Note:** See technical data in the drawing of the set.