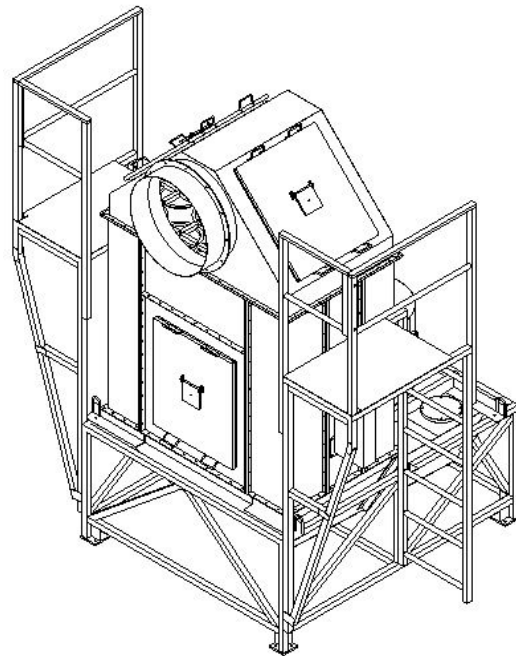


Multi Vortex Wet Scrubber

The multi vortex wet scrubber designed to capture and remove effectively from the gas flow different particulates, aerosols, vapors, and gas contaminants. The scrubber requires an external filter-ventilation system equipped with a fan, supply and discharge ventilation ducts, and water feeding and draining devices.



Main Features

The scrubber has minimal requirements for the cleaning liquid. The scrubber achieves the highest efficiency (above 99% when capturing particulates) with the cleaning liquid that contains up to 5% of solid contaminants like sand or even small rocks.

- While the momentary water consumption of the multi vortex wet scrubber is comparable to other scrubbers, it requires up to 10 times less water due to recirculation.
- The multi vortex wet scrubber design uses no nozzles, and no other parts are subject to abrasion.
- The multi vortex wet scrubber can work with heavy mineralized water (up to 33 oz/gal) without scaling.

The multi vortex wet scrubber has very low running cost, and can run longer than traditional scrubber systems without service downtime.

Technical Description

The air contaminants are effectively captured inside the multi vortex wet scrubber by mixing with water or other cleaning liquid.

The multi vortex wet scrubber basis is a dispersive grating of a special design. Contaminated air passes through the dispersive grating from the bottom upwards. The water is discharged free on the grating from the top. A turbulent dispersed gas-liquid layer (“boiling bed”) is formed as a result of mixing. The “boiling bed” intensively wets and captures particulates or reacts with gas contaminants, that results in effective air cleaning.

To remove the moisture, decontaminated air passes through the separators.

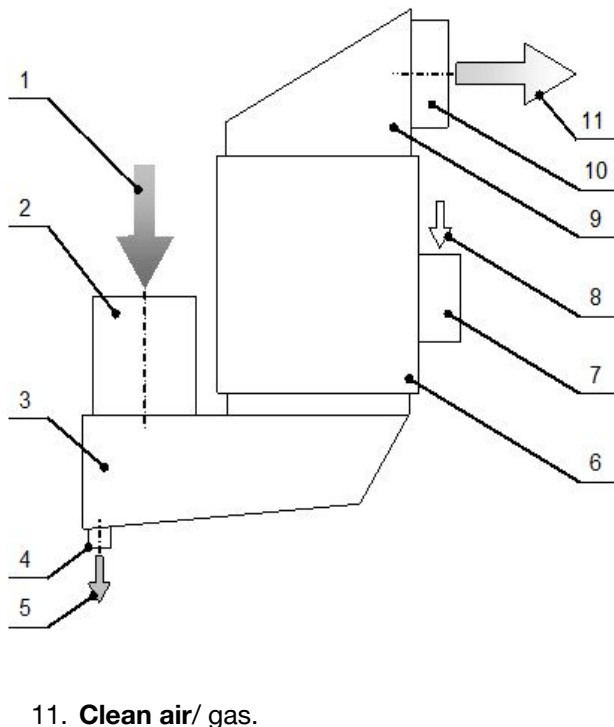


Figure 1. The multi vortex wet scrubber main components and the motion scheme of the air and the water.

1. **Contaminated air/ gas**
2. **Inlet connection** evens the contaminated gas flow.
3. **Tray** receives the spent cleaning liquid from the Scroiler™ chamber and evenly distributes the contaminated gas on the way to the Scroiler™ chamber.
4. **Drain pipe** takes out the spent cleaning liquid.
5. **Spent cleaning liquid**
6. **Scroiler™ chamber**, where the decontamination process takes place, and where the gas/ air is released from the moisture dripping residual.
7. **Water intake unit** that can be equipped with the electronic water consumption control.
8. **Water** or other cleaning liquid.
9. **Box** is a clean air/ gas collector before discharge.
10. **Discharge pipe** directs the clean air/ gas flow.

The multi vortex wet scrubber design is very flexible. The dispersive grating of any desired area and configuration could be composed of the 12x12 inches grating blocks. Typically, but not necessarily, the cross-section of the multi vortex wet scrubber is rectangular. The boiling bed is uniform over the grating providing effective contaminants capture throughout the entire area of the grating. The block of the Box (9) and the Discharge pipe (10) could be designed as shown in Fig. 1 or rotated 90° to the right or to the left. The

dispersive gratings could be arranged in several layers, one above another inside the Chamber (6) to enhance the cleaning effect.

Operating Mode Selection

While designing the multi vortex wet scrubber we choose the number of dispersive grating blocks to fit the given air flow, water consumption, and pressure drop according to Figure 2. The multilayered design of the multi vortex wet scrubber requires more advanced calculations.

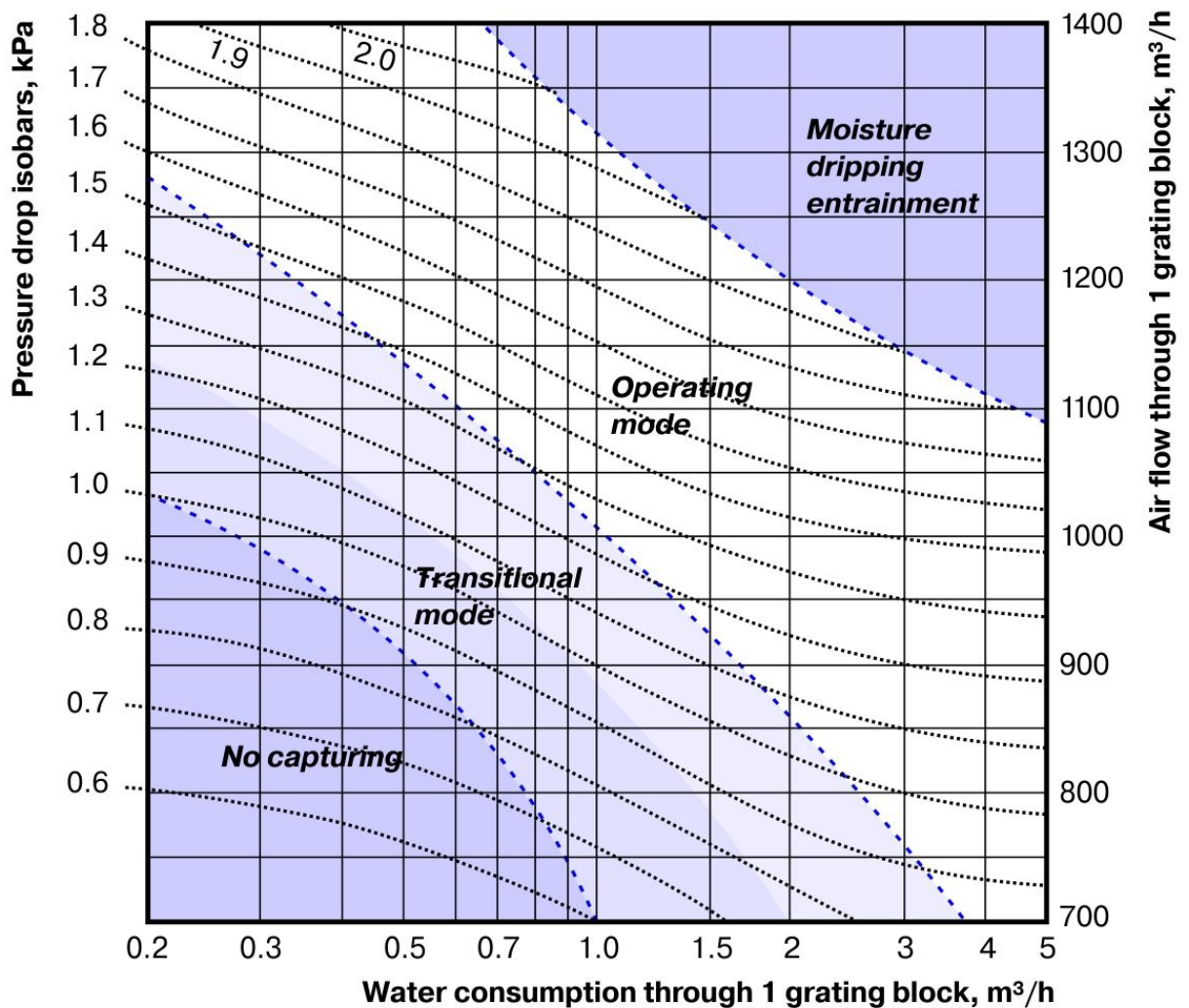


Figure 2. Operational modes and pressure drop as a function of the water and air flow through one 12x12 inches dispersive grating block of the multi vortex wet scrubber.

Dimensions and specifications

All data below is for the 11,800 cfm model.

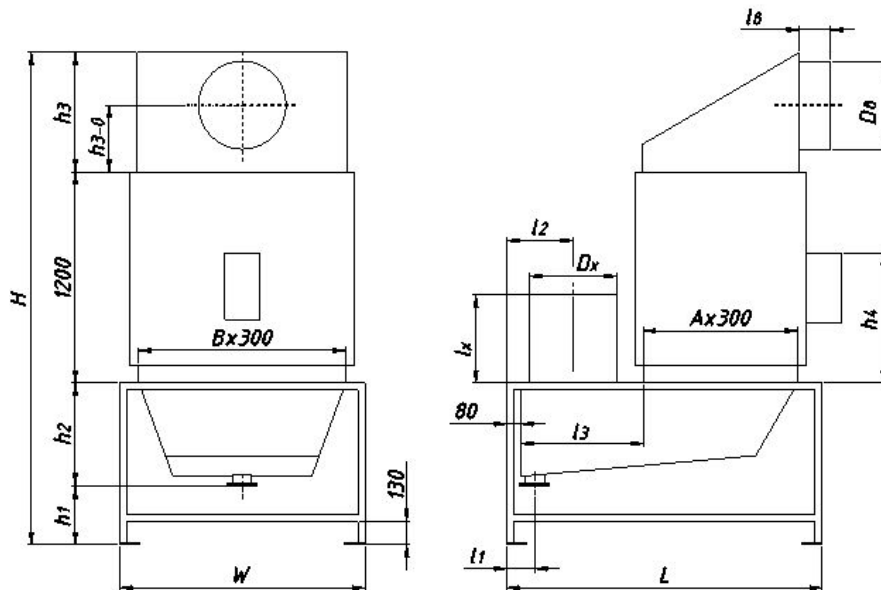


Figure 3.
The Scrubber Dimensions:

H, Height	98"
W Width	43"
L Length	59"
Dx Inlet diameter	20"
Db Discharge diameter	20"
Weight	992lb

The multi vortex wet scrubber could be equipped with the service ladders to provide the access to the top service hatch, and the scaffolding to provide for convenient multi vortex wet scrubber placement inside the ducts system. The ladder adds 24 inches to the multi vortex wet scrubber width.

	Units	Specification
Unit capacity	cfm	11,800
Momentary water consumption	cfm	<0.5
Operating temperature (max)	°F	482
Pressure drop	kPa	2.0
Noise level (@ 1 m from source)	dBA	<75
Particulate matter capturing efficiency	%	> 98.0