EnviroCare

VenturiPak™ Gas Scrubbing Systems for Wastewater Applications

Breakthrough Technology Replaces Conventional Scrubbers and Wet ESPs.

US Patents #5,279,649, #5,759,233, #6,719,829 B1

EnviroCare has created breakthrough technology that replaces not only conventional wet scrubbers, but can also eliminate wet ESPs from your flow sheet—all in a single component that is more effective on fine particulate, condensables and toxic metals, and will meet tomorrow's more stringent emission regulations at a fraction of the cost.

Typical VenturiPak™ Efficiency

	MULTIPLE HEARTH		FLUID BED	
Particulates	99.5%	< 0.2 lb/dT	99.9%	<0.1 lb/dT
Condensables	99.0%	< 0.12 lb/dT	99+%	<0.1 lb/dT
Heavy Metals	94-99+%	< All Regs	95-99+%	<All Regs
Hydrocarbons	N/A	< 60 ppm	N/A	<50ppm

Test conducted at Belmont WWTP, Indianapolis, IN, by IT Corp.

Typical test results

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Advantages

The Advantages

- **40 Percent Less Power** than a single high-energy venturi.
- **65 Percent Less Fuel** by operating at 25 percent vs. 100 percent excess air.
- **65 Percent Less Capital Cost** than venturi/wet ESP combinations.
- **Easily Retrofit** existing scrubbers without affecting layout or footprint.
- **Consistent Collecting Efficiency** regardless of furnace operation.
- **Stable Draft Control** independent of gas flow or scrubbing efficiency.
- **Compliance** and smoke free stack even during furnace upset conditions.
- **Protect Your Investment** now with tomorrow's particulate control technology.

Elements of VenturiPak™ Scrubber

The VenturiPak™ Scrubber addresses the deficiencies of conventional scrubbers by dealing with their basic design flaws. The result is a patented technology that exhibits high collection efficiency on submicron particulate and condensables, with high turndown capabilities and excellent energy recovery.

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Separate Scrubber Effluents

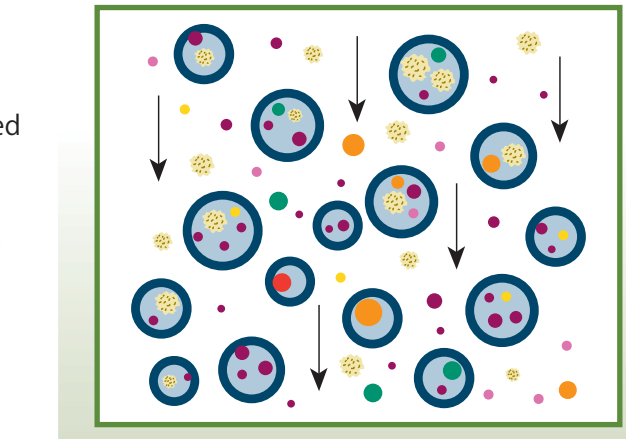
The VenturiPak™ Scrubber differs from conventional designs in that it segregates the various stage effluents. In a very practical way, the system is designed with separate drains for the quench, the subcooler and the collection stages, allowing for greatly reduced water treatment requirements, efficient re-use of effluents, selective alkali scrubbing, and reduced toxic effluent processing.

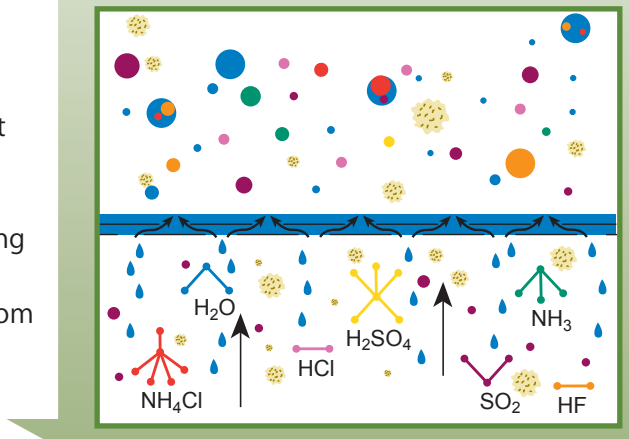
STAGE ① Quenching

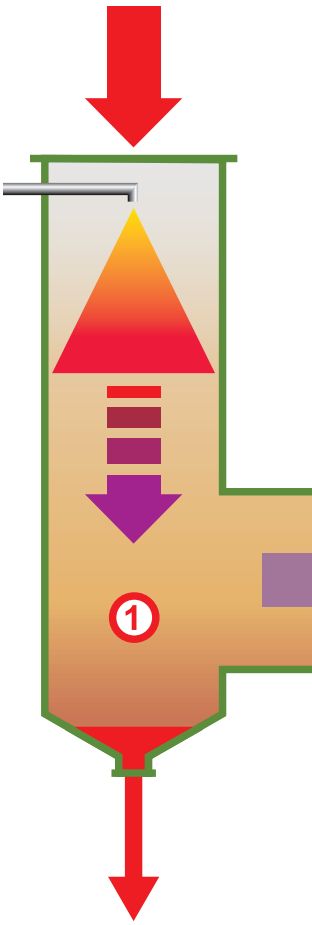
Gases are quenched to saturation with energy efficient atomizing nozzles. Eliminates bulk (95 percent) of particulate.

STAGE ② Subcooling

Subcool to convert condensable components into aerosols. Subcooling eliminates the moisture plume from the stack.







are VenturiPak™ Scrubber

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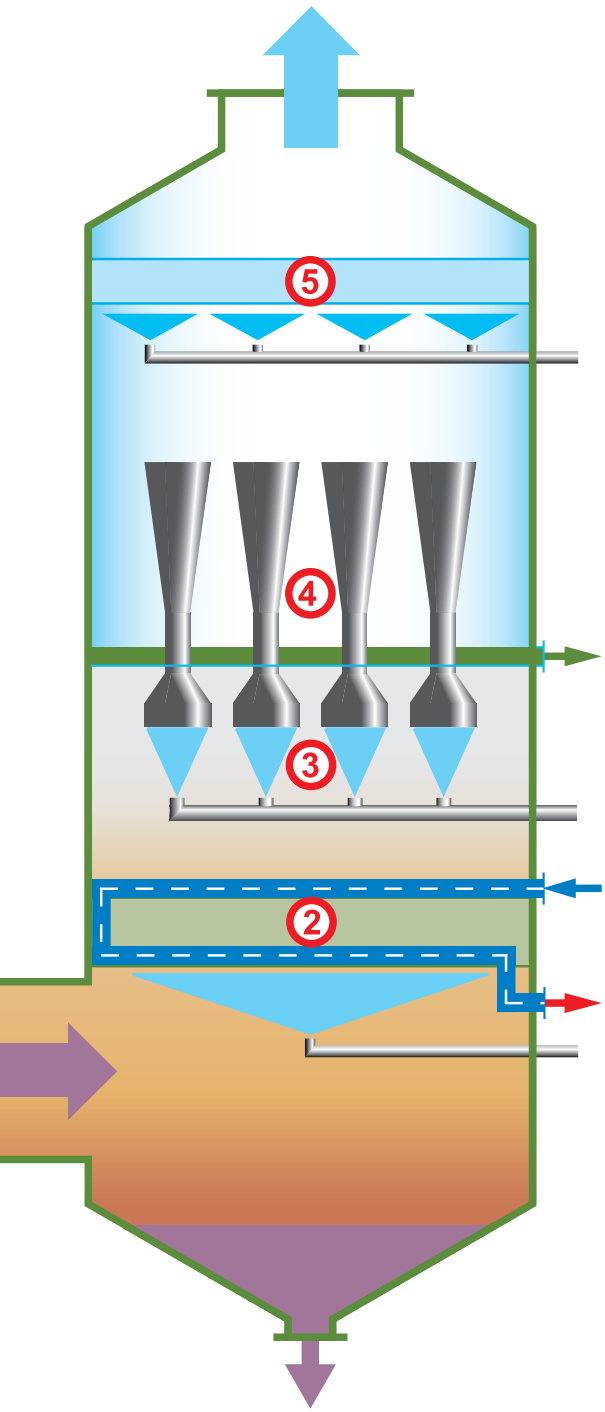
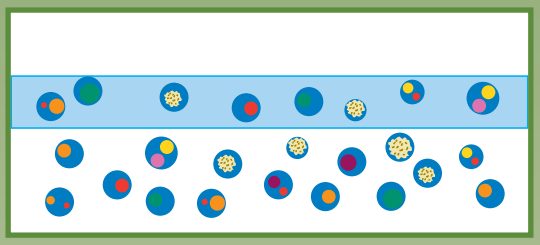
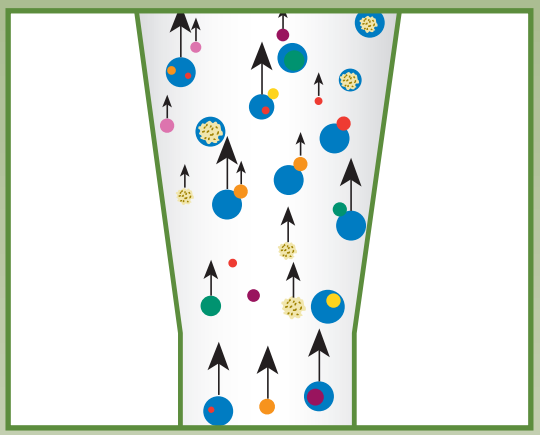




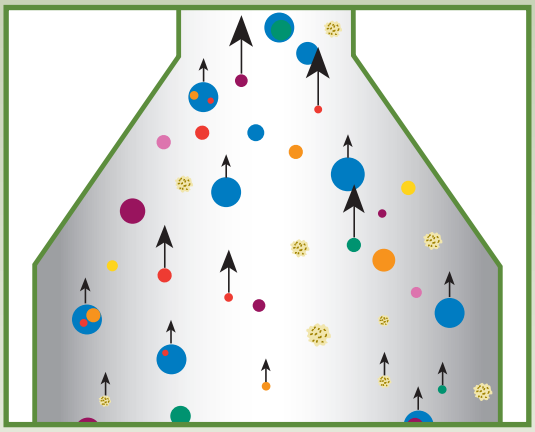
STAGE 5 Separation

High efficiency separator removes dirty droplets from the exhaust gases.



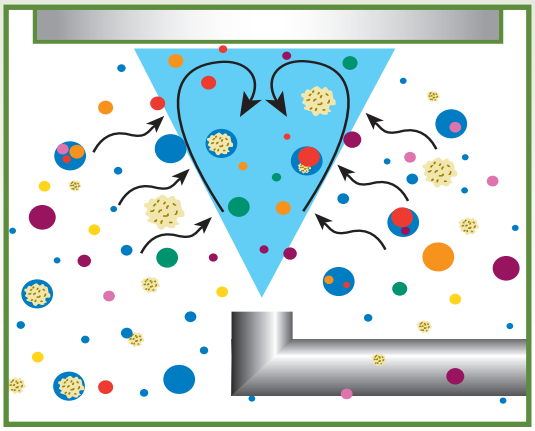
STAGE 4B Collection element outlet

After reaching equilibrium, scrubbing droplets shoot past aerosols and fines, causing further collisions and completing the collection process.



STAGE 4A Collection element inlet

Gas entrained aerosols and fines move faster than liquid scrubbing droplets, causing collision and particle capture.



STAGE 3 Atomization

Aerosols and particulate are induced into negative pressure flow field formed by MicroMist swirl nozzle.

VenturiPak™ Scrubber System

U.S. Patent #5,279,646, #5,759,233, #6,719,829 B1, #6,953,495 B2

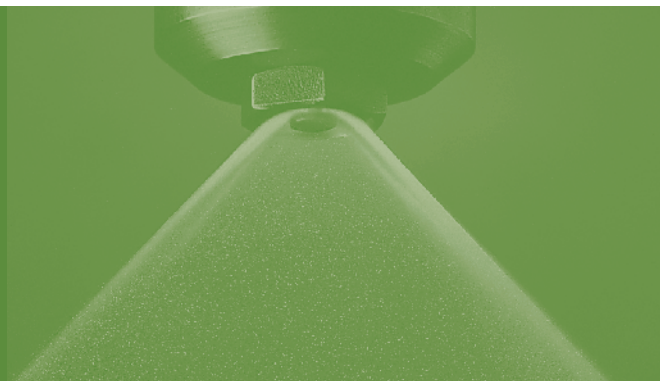
VenturiPak™ Scrubber and Fluid Bed Incinerators

Fluid Bed Incinerator off gases contain abrasive (sand) and fine ash particles from the efficient combustion process. The sand is very abrasive and thus will cause wear problems with 'traditional' venturi scrubbers. These types of scrubbers often require wear plate(s) and frequent service of the venturi hardware. The VenturiPak™ design eliminates this wear problem. The captured sand and the bulk of the particulate can be recovered in a dedicated separation device, if desired, because the quench water can be segregated from the rest of the scrubber water.

The fine ash can be difficult to capture in a 'conventional' venturi and require additional fan power to generate more energy in the venturi. The VenturiPak™ design locates the venturi tubes downstream in the separator vessel after condensation has occurred, thus greatly enhancing the capture of the submicron particles.

MicroMist™ Technology

At the heart of the system is EnviroCare's MicroMist nozzle technology. This technology allows for the proper atomization of the scrubbing liquid into optimally sized droplets prior to entering the venturi elements. The combination of atomization and differential high velocity in a low temperature environment results in increased collection efficiency of submicron particles and condensables.



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Elements

The Elements

- **Logical Placement** of the scrubber elements to quench and sub-cool condensables prior to removal by the venturi.
- **Utilization of an Ideal Venturi** for maximum scrubbing efficiency and minimum energy consumption.
- **Atomization of the Scrubbing** Liquid with MicroMist nozzle technology into ultra-fine droplets to capture sub-micron particles.
- **Active Control** of scrubbing liquid to maintain venturi throat velocity and high collection efficiency at low gas flow.
- **Atomization Control** linked to gas flow provides consistent collection efficiency.
- **Simplification of Furnace Control** by eliminating the draft/venturi interlock and control the venturi stage independent of the furnace draft.

Other MicroMist Applications

MicroMist atomization technology is used to enhance the efficiency of dust collection systems, to condense vaporized substances, to create a simulated evaporative load and for humidification. MicroMist systems can be found in Cement, Metals, Lime Plants, Sludge Drying, Basic Oxygen Furnaces, Electric Arc Furnaces, Glass Plants, Coal Drying Facilities and Mining Operations worldwide.

Mercury Separation
Gold Mining Operation

Particulate Control
Electric Power Utilities

Odor Control
Fertilizer Plant

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