



Global Services & Technologies Guide

Verantis Solves Industrial Environmental Control Challenges All Over The World.

As the global leader for industrial pollution control, thermal treatment, energy recovery systems and corrosion resistant blowers, Verantis Environmental Solutions Group delivers innovation that goes far beyond compliance. We help you to solve tough challenges that meet industry and local regulations as well as improve efficiencies and maximize ROI along the way.

No matter the size, scope, or complexity of your environmental control or industrial process challenges, Verantis Environmental Solutions Group has the answers. With a global presence and more than a half century of experience, we understand the continually evolving environmental regulations in your part of the world and your industry. And, we have the expertise to help you comply with them. Whether you are designing a facility or retrofitting an installation at your existing plant, you can count on Verantis and our proven, patented technologies to give you cost-effective, long-lasting, guaranteed results.



Engineering and Consulting Services

Our in-house environmental engineering and consulting group lets us build our solutions around you.

Meeting the most complex and technically demanding environmental control challenges takes much more than off-the-shelf equipment. Verantis Environmental Solutions Group provides one of the largest and most experienced in-house team of engineers and consultants in the industry. Our experts work closely with you to identify and develop optimal systems that are specifically tailored to your needs. We aim not only to help you comply with regulations, but also to help you achieve higher efficiencies while maximizing your return on investment. It's our engineering and consulting expertise that makes Verantis the go-to firm for the most difficult, demanding, and multifaceted pollution control challenges impacting the industries around the world.



Products

- Incinerators
- Electrostatic Scrubbers (IWS)
- Packed Towers
- Crossflow Scrubbers
- Tray Towers
- Fluid Bed Scrubbers
- Venturis
- Aerosol Filters
- FRP Centrifugal and Axial Fans
- Tower Packing
- Quenches
- Wet Cyclones
- Bag Houses
- Custom Integrated Systems



Markets

- Chemical Processing
- Commercial Waste Management
- Semi-Conductor
- LCD Production
- Pharmaceutical
- Metal Processing and Refining
- Food Processing
- Mining
- Fiber Optics and Specialty Glass
- Polysilicon
- Alternative Energy
- Petrochemicals
- Fertilizer
- Wastewater Treatment
- Automotive/Foundries

Incineration Equipment

Verantis can help you choose from the following types of incinerators to process your commercial, industrial, hazardous, or medical wastes.

Rotary Kilns:

Flexible solutions for processing mixed hazardous waste streams.

- Ideal for all types of hazardous waste.
- Simultaneously dispose of liquids, solids, and sludges with large variations in heating value.
- Complete packages include waste storage, feed systems, complete combustion systems, and continuous ash removal options.

Liquid Waste Incinerators:

Efficiently dispose of contaminated solvent, aqueous wastes, and bulk liquids.

- Ideal for a wide range of industrial, chemical, pharmaceutical and hazardous waste applications.
- Horizontal or vertical down-fired configurations available.
- Complete packages include combustion system, liquid waste feed system, and controls.
- Combine with vent gas or fume streams for simultaneous processing of liquid and gaseous waste streams.



Fume/Vent Gas Incinerators:

Effectively process contaminated vent gas and fume streams.

- Designed for industrial, refinery, chemical, and pharmaceutical applications.
- Direct-fired thermal treatment systems can be combined with energy recovery boilers to generate steam.
- Complete packages include combustion equipment, controls, and process vent gas and fume delivery systems.

Controlled Air Incinerators:

Intermittent or continuous duty solutions for processing solids, packaged sludges, and liquids.

- Ideal for processing all types of industrial and clinical waste streams.
- Capable of processing at feed capacities from 25 kg/hr up to 1,000 kg/hr.
- Complete systems include multiple waste feed and ash removal configurations and fully integrated combustion systems.





The Verantis Ionizing Wet Scrubber (IWS[®]) system is a proven technology for fine particulate control, opacity reduction, and the removal of problem pollutants from industrial process gas streams. Our patented system combines wet scrubbing with electrostatic particle charging for simultaneous collection of particulate to submicron diameters and absorption of gaseous pollutants. Unlike traditional electrostatic precipitators, the IWS[®] will collect particles with either high or low resistivity. Verantis IWS[®] system charges the particulate before it enters a packed bed scrubber section containing Tellerette[®] packing. Some of the particulate is captured on the ionizer plates, while the majority of particles are captured within the packed bed via image force attraction and electrostatic principles. Acid gases are also absorbed.

Features and Benefits:

- Collects particles of almost any size or composition: organic, inorganic, metallic, solid or liquid and with either high or low resistivity.
- High turn-down capabilities: collection efficiency improves with turn-down from 100% to near zero load.
- Low energy consumption: pressure drop through a single stage IWS[®] is only 0.50 to 1.5 inches WC. Energy for particle charging is low; approximately 0.2 to 0.4 KVA per 1,000 ACFM.
- Particle collection/gas absorption: particles of any size or composition are collected by image force attraction with high efficiency—from 0.05 to 2 microns and larger. Simultaneously, noxious gases are removed through absorption or absorption in concert with chemical reaction.
- Modular design permits expansion. Multiple stages/trains can be employed for higher efficiency performance.
- Demonstrated particulate removal for applications as diverse as hazardous waste incineration and veneer drying to glass manufacturing.
- Uses Verantis Tellerette[®] packing that combines low pressure drop with high particulate removal efficiency.
- Corrosion resistant construction.
- Various types of alloy and fiberglass construction are available depending on the corrosiveness of the environment.
- Pilot units are also available for on-site testing to optimize design.



Packed Bed Scrubbers

Countercurrent Vertical

This scrubber is most commonly used for the removal of acid and other noxious gases from process ventilation and exhaust streams. It is designed for high collection efficiencies and maximum corrosion resistance. The unit is compact—ideal where floor space is at a premium. Availability of standard models reduces design, engineering and drafting time, and shortens delivery.

Crossflow Horizontal

Flexible and efficient for removing pollutant gases from exhaust streams. This scrubber design is characterized by low liquid irrigation rates, high volume gas flow and low pressure drop. It is ideal where ceiling height is limited or where roof mounting is required.



Features and Benefits:

- Effectively removes particles down to 7 microns through inertial impaction.
- Removes gaseous contaminants at high efficiency rates depending on bed depth, liquid flow rate and scrubbing liquid composition.
- Lower portion of scrubber shell serves as integral sump providing recirculating liquid supply.
- Multi-Bed designs can remove two or more gaseous contaminants. Independent packed bed sections can accommodate different scrubber solutions.
- Standard units include all component parts: access doors, spray headers, piping connections and nozzles, internal structure supports, Tellerette® tower packing, support plates and hold-down lugs.
- Can be customized for special process requirements.
- Standard capacities from 100-100,000 ACFM. Higher flow rates are available.

Specialized Scrubbers

Sieve Tray Scrubbers

Used for recovery and concentration of acid gases or other soluble gaseous contaminants. Will handle relatively high inlet solids loading while using less water than packed bed scrubbers.

Features and Benefits:

- Sieve Tray Scrubbers employ step-wise contact on a number of trays arranged to disperse the gas stream through a layer of liquid on each tray. Liquid flows downward from stage to stage while gas rises through perforated trays.
- Standard models can be customized to accommodate individual requirements depending on rate of mass transfer and overall removal efficiencies desired.
- For many applications, Sieve Tray Scrubbers do not require a recycle pump since low liquid rates provide for once through operation.
- Low plugging tendencies.



Fluidized Bed Scrubbers

Fluidized Bed Scrubbers effectively remove micron and submicron particulates and can also achieve high-efficiency gas absorption and mass transfer. They contain special packing that literally lifts or fluidizes in a certain velocity range, producing a highly turbulent zone that prevents solid build-up while achieving intimate contact between the gas and liquid.

Features and Benefits:

- Capacities from 1,000 to 100,000 ACFM.
- Simultaneous removal of gases and particulate.
- Low fouling design reduces maintenance and packing change-out.
- Low energy consumption compared with conventional particulate scrubbers.
- Effective for direct-contact heat transfer.
- Corrosion resistant construction.
- Pilot test units available for new applications.

Particulate Scrubbers

Verantis offers a complete line of high efficiency Venturi Scrubbers and can custom engineer any of these solutions to give you the right answer to your pollution and emission control needs.

Fixed and Variable Throat Venturi:

Our Fixed or Variable Throat Venturi systems are used for removal applications ranging from large particle sizes down to the submicron range.

Features and Benefits:

- Removes particulates and soluble or reactive noxious gases.
- Design promotes thorough mixing and contact of entrained particles in gas the stream with absorption liquid droplets.
- Can be used as quenching chamber and evaporator.



Eductor Venturi:

The Eductor Venturi is recommended for the removal of particulate matter and noxious gases where a compact, highly efficient scrubber is required. Ideal for tank venting, gas scrubbing and low volume exhaust applications.

Features and Benefits:

- Collection efficiencies of 80% to 90% per eductor stage where gas is highly soluble or reactive with scrubbing liquid using a single stage eductor. High removal efficiencies can be achieved by using multiple eductors in series.
- Can achieve inlet static pressures up to 10 inches WC.
- No fan required.

Multi-Throat Venturi:

The Multi-Throat Venturi uses a rod throat design and is an ideal, cost effective way to achieve 99% and higher efficiencies for heavy particulate loadings.

Features and Benefits:

- Maximum collection efficiency with particulate loadings of 1 grain to 5 grains per ACFM and greater at minimum energy consumption and scrubbing liquid rates.
- Mist eliminator wash with self-cleaning, self-draining design minimizes maintenance.
- Easy pressure drop adjustment by adding or subtracting rods. Rod sections are easy to inspect and replace.

Aerosol Filtration Systems

High Efficiency Aerosol Filtration (HEAF)

Efficiently removes difficult-to-control aerosol emissions. HEAF Systems are ideal for filtering and removing sticky, oily, or liquid aerosol particulate matter from VOC-laden exhaust gas streams. Systems use a fiberglass or polyester filter media and the principles of impaction, interception, and Brownian Motion to achieve removal efficiencies of 99.99% or higher. HEAF systems provide an effective alternative in difficult applications, including those where bag houses plug due to the sticky nature of the particulate. HEAF systems are also useful for collecting particulate matter that is small, that cannot be easily removed from the collection plates in an electrostatic precipitator, or that has an improper resistivity to carry an electrostatic charge. HEAF systems are a cost-effective alternative to fume or vent gas incinerators.



HEAF Filtration Devices

- Manually-operated, affordable Mini-HEAF for gas flows between 0 and 5,000 ACFM.
- Fully automatic Flat-Bed HEAF for gas flows from 500 to 15,000 ACFM.
- Fully automatic Rotary Drum HEAF for gas flows from 9,000 to 100,000 ACFM.

Cleanable High Efficiency Aerosol Filtration Systems (CHEAF)

Extend filter life through continuous cleaning. Like HEAF systems, CHEAF systems efficiently remove difficult-to-control sticky, oily, or liquid aerosol emissions from exhaust gas streams with removal efficiencies of 99.99% or greater. CHEAF systems offer the additional advantage of continuously cleaning the filter media, which extends the filter life. CHEAF systems collect water-soluble submicron aerosol particulate and employ a liquid wash to clean the filter. They are particularly well suited to control emission from numerous sources, including ammonium nitrate and urea prill tower emissions, soda and borosilicate glass furnace emissions, phosphoric acid mists and phosphorus pentoxide fumes, emissions from inorganic chemical calciners and dryers, food product spray dryers, galvanizing fumes, and sulfuric acid mists. CHEAF systems are also highly effective at controlling insoluble particulate matter with a mean diameter of less than 1.0 microns, such as metallurgical fumes. They provide a cost and energy-efficient alternative to high-energy scrubbers or Brownian Motion controlled mist eliminators.

CHEAF Filtration Devices

- Continuously Cleaned CHEAF systems for non-acidic gas streams containing insoluble particulate matter and liquid particulate or water soluble emissions in acid gas streams.
- Renewable Media CHEAF systems for emissions with both soluble and insoluble particulate matter in acidic or strongly basic gas streams.
- Fixed or Candle-Type CHEAF systems for liquid aerosol control requiring Brownian Motion or candle-type mist eliminators.

Factory Assembled Systems

Verantis pre-engineered gas absorption scrubber systems are built to fit your specific needs. We design small footprint, self contained solutions to accommodate limited floor space and safety concerns. Each system is pre-wired, pre-plumbed, pre-assembled and pre-tested for fast delivery.



Mini Scrubber:

Designed for processing small to medium gas flows. Used for lab hoods, vents, core machines, chemical processing and a wide variety of applications.

Features and Benefits:

- Available in 7 sizes from 500 to 6,000 ACFM.
- Removal efficiency in the range of 95% -99%.
- Simple in design. Fabricated in corrosion-resistant polypropylene. Easy to install.
- Includes a built-in fan.
- Sparger type design eliminates the need for liquid circulation pump and spray nozzles.

G-Series Scrubbers

The G-Series Scrubbers are designed to handle small to moderate gas flows. Can be used to scrub organic and inorganic chemicals as well as HCL and chlorine.

Features and Benefits:

- GKP comes with an integral pre-installed fan with air flow rates from 900 to 10,000 ACFM.
- Emission removal efficiency as high as 99.99%.
- Fabricated in corrosion resistant thermoplastic.
- Fully featured complete pre-packaged scrubber systems.
- Easy to install, start-up and operate.

Custom Skid-Mounted Systems

Custom System

In addition to pre-engineered systems, Verantis also provides customized factory-assembled systems to minimize field installation while still meeting all requirements for special applications, site conditions and plant regulatory requirements. Systems can be provided in single or modular skid arrangements to meet space restrictions and minimize installation cost. Control packages can be designed for fully-automated local control or tie-in to overall plant Distributed Control Systems (DCS) and utilize compatible plant Programmable Logic Controller's and instrumentation.



Aftermarket & Field Services

Verantis' highly-trained technicians are available to assist in the installation, start-up and testing of Verantis equipment, as well as training of customer personnel in equipment operation and maintenance. We also provide evaluations of existing air pollution control equipment to upgrade system performance and/or capacity to meet future emission requirements.

We offer total commitment to aftermarket services to keep your systems operational for the long run. From routine maintenance to verifying system performance and prolonging life, to 24/7 emergency assistance, Verantis provides expert field service to ensure ongoing maximum performance and value from your scrubbing systems and products.

Our highly trained technicians can service, troubleshoot, and repair Verantis pollution control equipment, as well as systems and fans supplied by others. We have been servicing, maintaining, and optimizing environmental control and incineration equipment for more than a half century, giving us the experience to correctly analyze your needs and quickly resolve any issues.

With Verantis field service, you get experts who are there when you need them. And you get quality workmanship that's always guaranteed. Verantis is experienced with every operational aspect of your scrubber, thermal treatment, or air handling solution. Our field service technicians can provide:

- Routine maintenance and troubleshooting.
- Process and mechanical engineering evaluations.
- 24/7 emergency service.
- Complete system and product rehab.
- Custom fabrication capabilities for equipment repairs, retrofits and upgrades.
- Internal instrumentation and control capabilities for servicing all types of control systems, including PLC Based, DCS, and SCADA.
- Fan rebuilding and field balancing.
- Equipment relocation.
- Operator education and training.
- Installation and start-up assistance.
- System testing.
- Fast access to a full line of spare parts from Tellerette® tower packing to pumps, gauges, valves, and spray nozzles.



Spare Parts

- Tellerette® Packing
- HEAF Filter Media
- Chevron Blade Mist Eliminators
- Mesh Pads
- Impellers
- Bearings
- Flexible Connectors
- Motors
- Flow Sensors
- Recirculation Pumps
- Metering Pumps
- Gauges
- Valves
- Spray Nozzles
- Control Systems
- Flow Meters
- Packaging Support Plates



Tower Packing



- 1 Liquid is collected by inertial impaction
- 2 Droplets form at countless interstitial holdup points
- 3 As each droplet falls, it strikes the next packing element and bursts, exposing fresh surface to gas
- 4 This agglomeration/dispersal cycle repeats continuously with no additional energy requirements
- 5 Contaminants are absorbed with exceptional efficiency

Tellerettes®

Tellerette® tower packings have a unique patented toroidal helix design that makes them dramatically more efficient than conventional packing in a wide range of mass transfer and particulate collection applications. Verantis Tellerette® tower packing is available in a wide range of materials including Polypropylene, Polyethylene, Glass Filled Polypropylene, PVC, CPVC, PVDF® and Xydar®.

Features and Benefits:

- High efficiency low packing depth in new columns and high absorption efficiency in existing columns.
- Greater gas flow capacity permits use of small diameter, low cost columns.
- Constantly renews and exposes liquid to the gas flow.
- High column stability. No classic flooding.
- No channeling when proper liquid distribution is used.
- Reduces operating costs.
- A shallow bed of Tellerettes® provides effective mist elimination.
- Available in 5 sizes/styles depending on the application.

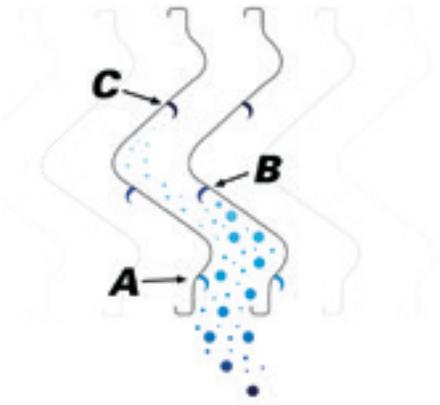
Normal Packing Size	Maximum Dimension O.D.	Loop Height	Free Volume (%)	Surface Area FT ² /FT ³	Average Packing Factor
No. 1R	1.810"	0.69"	87	55	36
No. 2R	2.875"	1.00"	93	38	18
No. 3R	3.750"	1.50"	92	30	18
No. 2K	3.250"	1.19"	95	28	11
No. 3K	4.125"	2.44"	96	22	9

Chevron Blade

Verantis mist eliminators remove liquid entrainment from gas streams, thus providing high efficiency and low pressure drops in scrubbers, cooling towers, air washers, gas absorbers and ventilation systems.

The Chevron type offers high performance with mist removal efficiencies often approaching 100%. They also provide excellent resistance against plugging in applications with high solids loading.

Available materials of construction include FRP and stainless steel.



In the above illustration, the first liquid collection trough (Point A) is critically located to remove the majority of entrained moisture droplets and minimize pressure drop. Particles that miss the first trough impact on the second collection trough (Point B). Here they remain to drain, as there is insufficient velocity and energy to re-entrain the droplets into the air stream. Any droplets small enough to bypass both the first and second troughs are collected at the third trough (Point C). This third trough increases the overall reliability and collection efficiency of the mist eliminator.

Tower Accessories



Tower Internals

Verantis offers a complete line of packing support plates and spray nozzles to compliment our line of Tellerette® packing.

Features and Benefits:

- Packing support plates provide maximum free passage (open area), minimize solids deposit and allow easy flushing and cleaning.
- A complete line of full cone spray nozzles provide for uniform distribution.
- Various spray angles and flow rates are available.

Fiberglass Reinforced Plastic (FRP) Fans

Centrifugal and Axial Fans

As the industry's leading manufacturer of Fiberglass Reinforced Plastic fans, Verantis has been improving the way industries exhaust corrosive air in a variety of environments for more than half a century. Thousands of Verantis fans are in operation around the world today in conditions rated from mild to the most severe.

Housings and impellers are constructed of premium quality vinyl ester resin using "C" grade fiberglass surface veil inside and outside or optional Nexus veil for protection. Standard or custom engineered solutions are available to fit most applications.



Centrifugal

50-150,000 ACFM at static pressures of 36" for FRP and 60" for Hybrid. Many sizes ranging from 8" to 88" diameter.

Models:

- *CLUB Backward Curved Blades
- *CMHR Forward Curved Radial Tip Blades
- *CMHB Backward Curved Blades
- CMHP Radial Blades
- CHR Forward Curved Blades
- CHP Radial Blades



Axial

50-110,000 ACFM at static pressures up to 2.5"WC. Eleven sizes ranging from 1" to 72" diameter.

Models:

- *FL Propeller Blades, Duct Mounted
- *FLR Propeller Blades, Roof Mounted

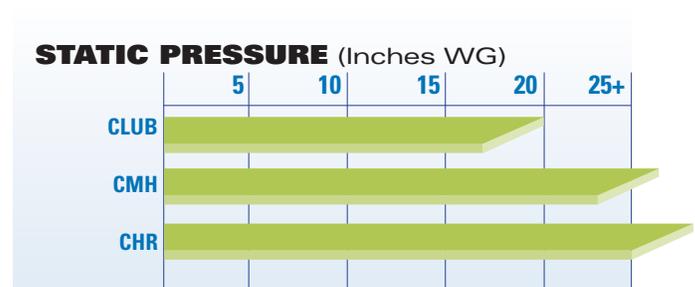


Fan Accessories

- Customer selected resin and/or veil system.
- Titanium, Hastelloy and other alloy shafts and impellers.
- Custom reverse transition.
- Access door.
- Shaft seals, stuffing box, Teflon, mechanical or special.
- Spark resistant coating.
- Inlet boxes.
- Acoustical treatments: housing insulation, silencers and enclosures.
- Dampers/inlet vane controls.
- Back vanes on impellers.
- Inlet/outlet bird screen.
- Variable frequency drive.
- Removable bearing assembly (axial fans).
- No-loss stack.
- Inertia bases.
- Misting system.
- Vibration monitoring equipment.
- Anti-spin brake systems.
- Powder coating, galvanizing, epoxy coats.
- Hybrid fans.
- Other custom accessories to meet your needs.

Features and Benefits:

- All surfaces have “C” grade fiberglass veil or optional Nexus veil to protect against weathering, fumes, spillage, and ultraviolet attack.
- Quality guaranteed to AMCA standards for performance and C-582 and D-4167 ASTM specifications for fiberglass fabricating procedures.
- Lightweight FRP Fans; structural requirements are significantly less than steel or alloy fans.
- OSHA FRP canopy, belt and shaft guard for longest life.
- UV/VIS top coat on outside for longest life.
- All fans are factory tested to the strictest quality control standards.
- Flexible construction/manufacturing for customer specific applications.



Contact Verantis

Contact Verantis for more information on how we can help you find the best environmental solution for your company.



Please visit us at www.verantis.com or email sales@verantis.com