Ventilex

CREATIVE SOLUTIONS IN DRYING TECHNOLOGY

FLUID BED TECHNOLOGY
- DRYERS
- COOLERS
- DRYER/COOLER COMBOS
- STEAM STRIPPERS

STEAM DECONTAMINATION
- CONTINUOUS STERILIZERS
- CONTINUOUS PASTEURIZERS

BELT DRYER TECHNOLOGY
DEHUMIDIFICATION SYSTEMS
PROCESS CONTROLS

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FLUID BED TECHNOLOGY

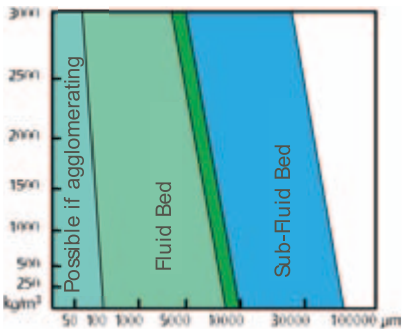
Ventilex Fluid Bed Dryer/Cooler

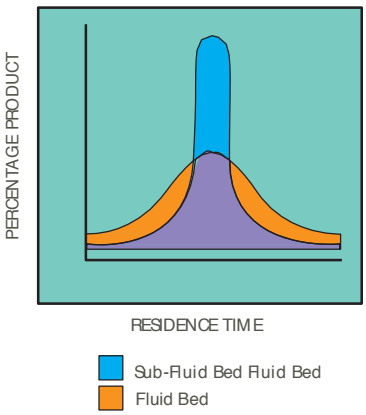
FLUIDIZATION

In a Fluid Bed, a product or solid is made fluid by an upward-moving flow of gas. The mechanical movement of the Fluid Bed strengthens this effect. Thus, the gas and product are intensively mixed, so that high heat transfer and an optimum physical reaction speed are achieved.

By choosing a good combination of gas speed and mechanical movement (if necessary), you can process granular products with a wide range of grain sizes successfully while forming a minimum amount of dust.

Both the static and mechanical Ventilex Fluid Bed can function at temperatures ranging from 5ºF (-15ºC) to 1,112ºF (600ºC). The gas speed can vary from 0.7 fps (0.2 m/sec) to 9.8 fps (3.0 m/sec).





SUB-FLUIDIZATION

Longitudinal mixing occurs during the fluidization process. As a result, if the process time is long, the difference in residence time of the individual particles is too great. This can lead to damage to the product.

Yet there are products that require long processing. So this would have to occur in a Fluid Bed with a very high length to width ratio. This is usually undesirable because, among other things, it takes up too much space.

Our solution for this problem is sub-fluidization. In this process, the product remains on the verge of fluidization. Our unique drive concept, combined with the rotary weir, makes residence times up to 2 hours possible. The layer thickness of the product can vary from 2" (5cm) to 24" (60cm) with this process method.

Advantages of the Sub-Fluid Bed:

- There is hardly any or no longitudinal mixing. Differences in residence times are kept to a minimum and the various particles are processed uniformly.
- Less fluidization gas is needed for the process than with complete fluidization. This means smaller peripherals and lower energy consumption.

With a Fluid Bed and Sub-Fluid Bed a range of products can be processed which previously could only be processed with a belt dryer.

The Ventilex Sub-Fluid Bed has amply proved its quality in processing such products as:

- Cereals
- Croutons
- Extrusions
- Seeds
- Cheese
- Pellets
- Nuts
- Meat
- Recycled Plastic
- Beans
- Fibers
- Granulates

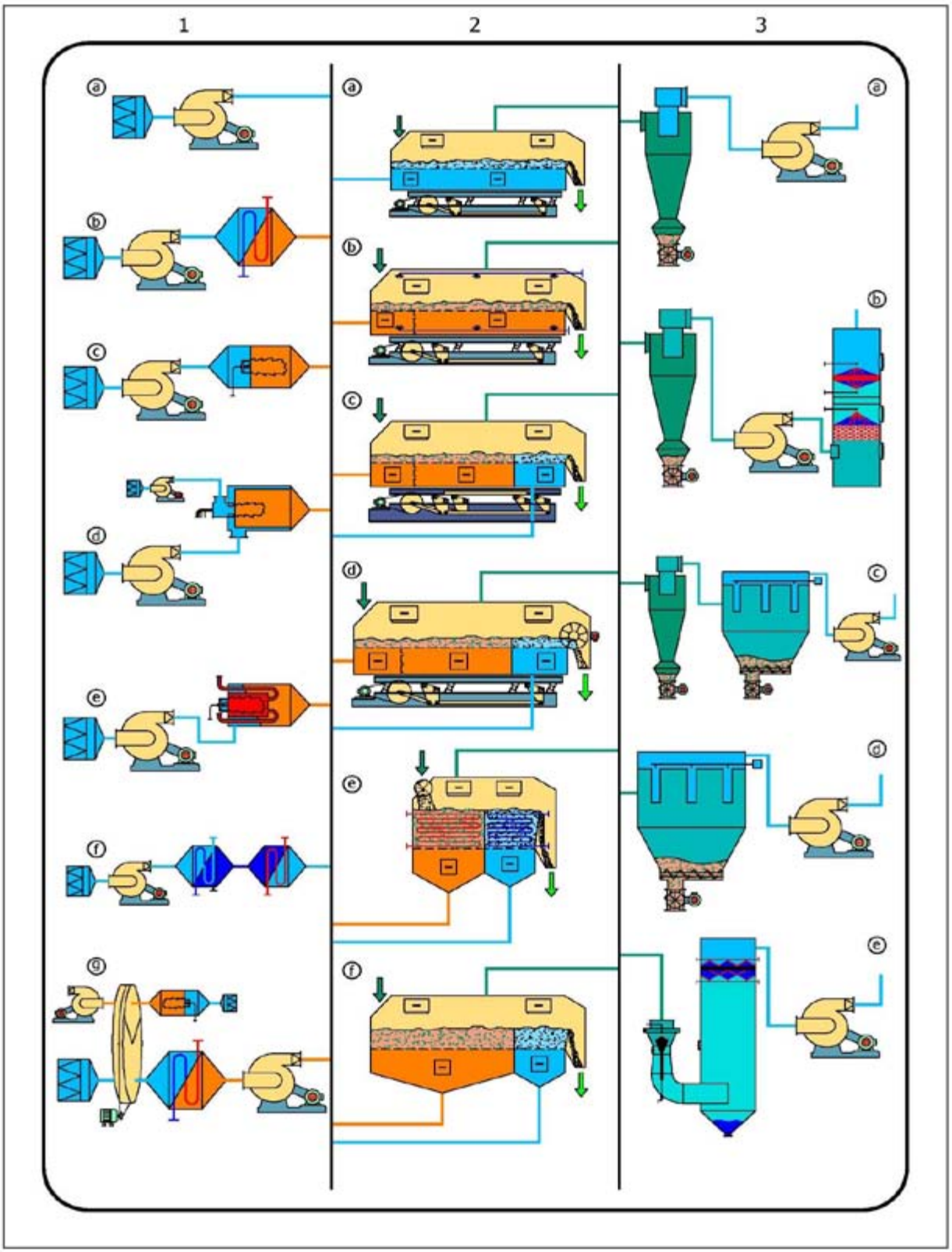
Each product has its own, specific characteristics. By means of careful testing in our laboratory, we determine the most effective and efficient processing method. The installation is then designed and built internally by Ventilex.

As the diagrams on the following page show, there are several versions of the air supply system, the fluid bed, and the flue/discharge gas system. They can be configured in a variety of ways:

Configuration Matrix

AIR SUPPLY SYSTEMS:	VERSIONS OF THE FLUID BED:	FLUE/DISCHARGE GAS SYSTEMS:
1a Ventilator/fan	2a Cooler	3a Cyclone
1b Ventilator/fan in combination with heat exchangers	2b Dryer	3b Cyclone in combination with wet scrubber
1c Ventilator/fan in combination with direct burner (gas/oil)	2c Combination dryer/cooler	3c Cyclone and filter
1d Ventilator/fan in combination with direct burner (gas/oil)	2d Combination dryer/cooler with rotary weir	3d Filter
1e Ventilator/fan in combination with indirect burner (gas/oil)	2e Static dryer/cooler with internal heat exchangers	3e Venturi scrubber
1f Dehumidification by cooling	2f Static dryer/cooler	
1g Dehumidification by adsorption		

FLUID BED SYSTEM CONFIGURATIONS



Ventilex Fluid Bed Steam Stripper

CONTINUOUS STEAM STRIPPING

Steam Stripping – Solvent Recovery:

Steam stripping is the removal and recovery of volatile substances out of a product stream. Many high value compounds including morphine, caffeine, and other plant extracts, as well as substances such as crude oil, can be washed/dissolved out of a raw material like sand, using various solvents.

The Ventilex steam stripper provides the solvent recovery stage of the process. The volatile solvents are driven off the waste material stream from the extraction process using live steam.

The Process:

The steam acts as a fluidizing medium, combining with the shaking mechanism of the Ventilex steam stripper to create an intense mixing of product and steam and ensuring product transport through the equipment.

The exhaust gases created by the process are collected and condensed to reclaim the solvent and steam (as water).

The product exiting the steam stripper contains <5ppm of the extraction solvent and 10% - 40% moisture (depending on inlet conditions). Making it possible to be safely disposed of, or re-processed, as non-hazardous material.

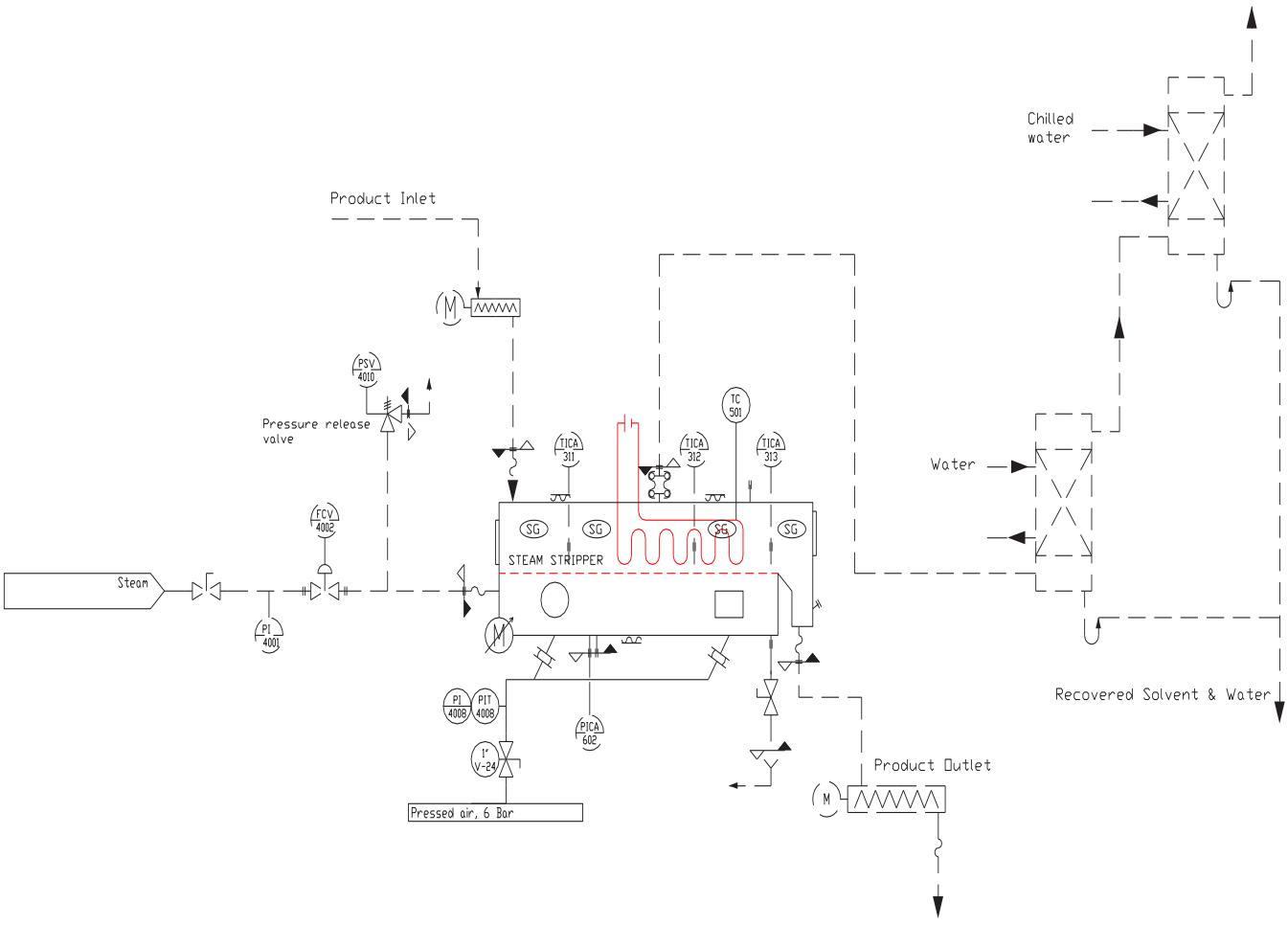
Ventilex can also provide a fluid bed drying stage after the solvent recovery process to reduce the moisture content of the product if required.

The airtight-sealed steam stripper ensures a relatively low ATEX rating (ATEX II 2G) for the production space around the equipment, while the oxygen-starved process space saturated with live steam provides an intrinsically safe environment inside the solvent recovery process.

Ventilex can supply a complete solvent recovery process including the Ventilex steam stripper, exhaust gas condensers, product inlet and outlet airtight seals, steam supply, and process/ equipment control.

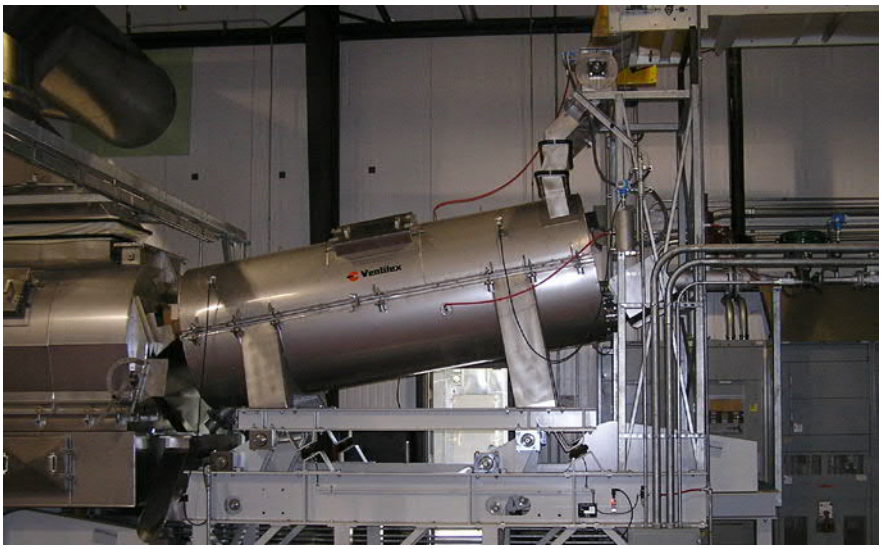
Ventilex can also work closely with a customer to provide only key components and allow the customer to locally source their preferred suppliers for other equipment.

Capacities typically range up to 11,000 PPH (5,000 kg/h) of product, or up to 2,200 PPH (1,000 kg/h) of solvent recovery. Larger processing capacities are possible and the specialized engineers of Ventilex are always available to discuss your application.



Ventilex Steam Stripper – Example Flow Diagram

STEAM DECONTAMINATION



Ventilex Steam Pasteurizer

CONTINUOUS STEAM STERILIZERS & PASTEURIZERS

Spices, herbs, seeds, nuts, and dehydrated vegetable substances bring a world of flavors, aroma, and colors to food.

The potential for pathogens like salmonella, yeasts, molds, bacteria, and spores to get into the food supply has resulted in the trend towards more stringent “Good Agricultural Practices” and regulations. Spices and herbs are sourced worldwide and they may be heavily contaminated from the soil where they were grown and harvested.

These microbes often remain after local processing due to simple treatments and processing at low temperatures. If left untreated, these products may encounter continued microbial growth that can easily lead to spoilage and customer health issues. There are many commonly used methods to decontaminate natural products, such as ethylene oxide (EtO) and irradiation, but most have been, or will soon be, restricted due to their potential health risks and adverse consumer acceptance.

Ventilex Steam Sterilization Benefits:

- A natural, renewable, process that utilizes steam and is accepted worldwide as safe and wholesome.
- Continuous decontamination of bacteria and pathogens (5 log kills are typical).
- High-temperature, short-time, processing (HTST) which protects the taste, texture, and color of the product with a minimal loss of volatile oil.
- Very gentle, for leafy (friable) products.

Ventilex Continuous Steam Sterilization – Natural Elimination of Bacteria:

The use of steam is ideal as it is natural, inexpensive, and can be produced in an unlimited supply. It is a natural "organic" process that does not leave behind any chemical residue, or create toxins.

Steam sterilization/pasteurization systems are the most effective "natural" method for reducing or eliminating bacteria, pathogens, and other food-borne causes of sickness. Effective steam treatment will eliminate listeria, salmonella, E. coli, and a variety of other bacteria and pathogens.

As a result, many of the world's largest spice, herb and nut processing companies have selected Ventilex continuous steam sterilizers/pasteurizers. More than 100 systems have been supplied worldwide.

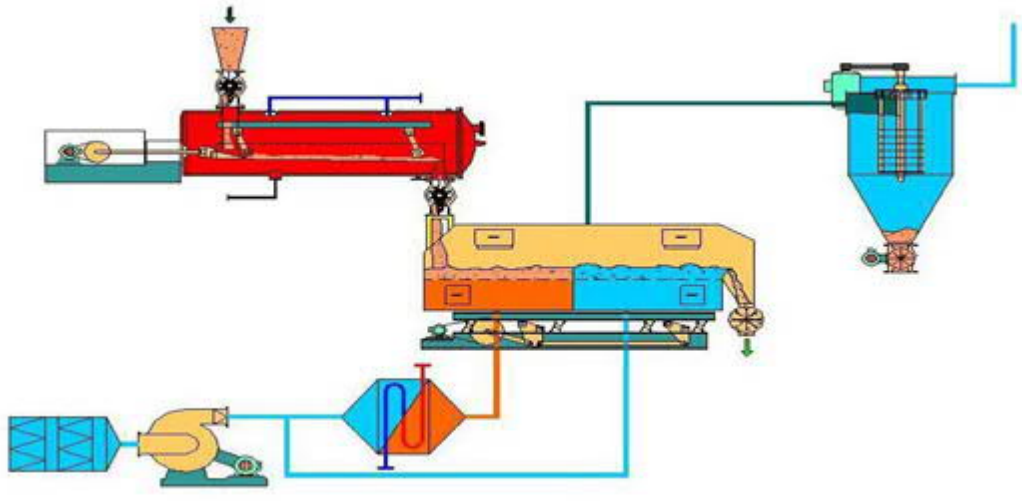
Modern, Hygienic, and Chemical Free Steam Treatment Process:

With the Ventilex system, you get a continuous "inflow" of high pressure steam that results in the elimination of undesired micro-organisms while causing the minimum harm to the organoleptic characteristics (flavor, color, texture, or taste) of spices, herbs, and nuts.

The Ventilex system can be used to process chili powders, whole and ground pepper, paprika, garlic, cloves; and a variety of herbs, seeds, and other spices. We can do leafy spices without harm to the leaf due to our gentle shaking action – there is no screw conveyor or unnecessary vibrations that can damage the product.

The continuous system treats powders as well as whole spices, which is a unique feature of the Ventilex system. In addition, steam treatment is effective in the deactivation of enzymes, e.g. amylase and lipase. This cannot be done with irradiation or ethylene oxide treatment. These enzymes have been shown to cause a breakdown of fat and starch components in sauces, salads, and many ready-made meals.

The heart of the nut is left natural and alive – it will germinate. This makes it possible for the "organic" food label to be applied and for certain products to be labeled as "pasteurized".



Typical Ventilex Sterilization System Flow Diagram

Steam Sterilizer or Steam Pasteurizer?

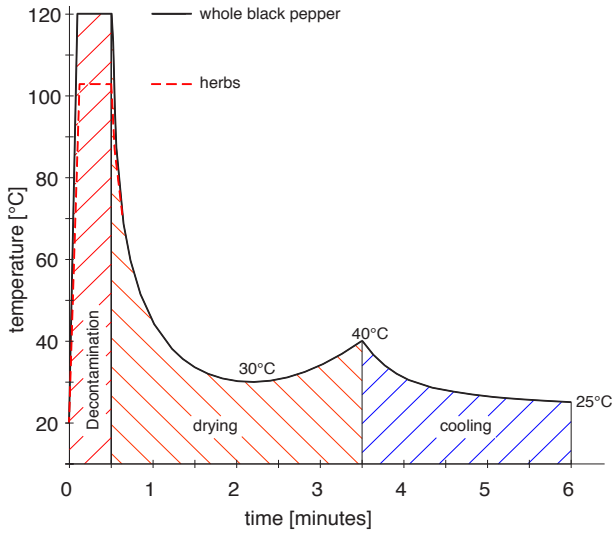
We offer two different technologies of decontamination systems commonly referred to as “steam sterilizers” and “steam pasteurizers”. The main difference is that “sterilizers” do their work in closed pressure vessels (autoclave) at up to 45 PSI (3 bar) and “pasteurizers” work at atmospheric pressure with super-heated steam. The selection of the appropriate technology depends on the size of the product itself and the type of pathogens to be eliminated.

We offer some standard sizes of sterilizers and pasteurizers to span the range of commonly specified capacities, but each system is customized to meet the client’s specific requirements.

We typically work with a “Process Authority” or the client’s microbiologist who performs the microbiological testing and sets the process parameters to be validated for regulatory compliance. Our role is to supply equipment meeting these specifications. To facilitate the validation process, we offer a testing service to process samples inoculated with surrogate pathogens for process parameter development.

How Does Ventilex Steam Decontamination Work?

Ventilex Continuous Steam Sterilization/Pasteurization Systems are designed for High Temperature, Short-Time (HTST) decontamination. Steam is the fastest possible way of heating product to an exact preset temperature.



Product Time/Temperature Curve

The HTST process exposes material that are considered contaminated to high temperature steam for just a short time. The material is then dried and cooled. This is a simple idea, but is one of the most practical and effective methods for treating products in the industry.

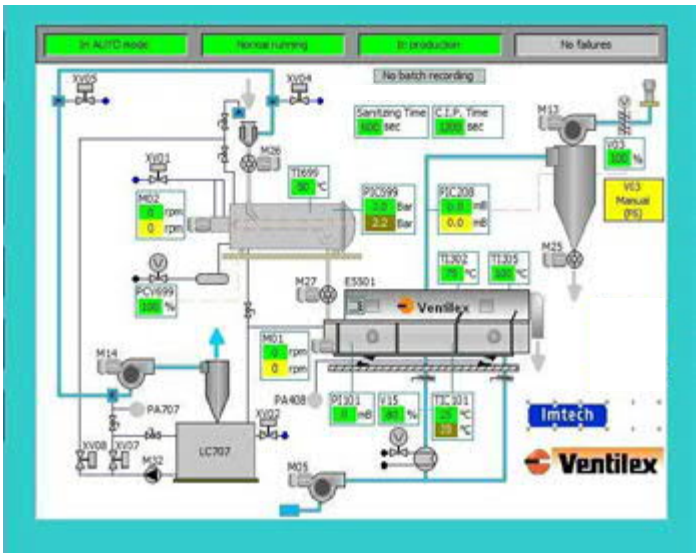
The process works by feeding and discharging the product through a self-cleaning rotary valve that isolates the pressurized autoclave from the ambient room. Inside this autoclave, a shaking table transports the product through a steam-pressurized chamber at a specific speed and creates a thin layer of product. Condensation builds on the product surface and this imparts high energy into the surface of the product. This kills unwanted bacteria and pathogens.

Ventilex Continuous High Pressure Sterilizer (Autoclave)

The time, pressure, and steam temperature within the chamber is tightly regulated such that the minimum amount of each required to achieve the desired kill is applied. Afterward, in the dryer the temperature is tightly controlled so that the product is returned to a precise moisture level. In this way, the final moisture content can be specified and controlled to maximize yield.

We understand how critical temperature, treatment time, and pressure are when decontaminating a product. All three of these parameters can be set individually depending on the particular product and the pathogens to be eliminated. Repeatability is required to validate a system and ensure effective decontamination. Our systems are designed with advanced PLC controls to facilitate this. The operator simply chooses the proper recipe from a menu and all process parameters are controlled, measured, and logged for traceability.

	Choose	Menu	
	1	Pepper	✓
	2	Turmeric	
	3	Chili	
	4	Ginger	
	5	Blend A	



Data Logging and PLC Instrumentation

Ventilex Steam Sterilization/Pasteurization System Features:

- Automated controls provide for minimal operator intervention. The operator simply selects the proper recipe – the system parameters and set points are always the same.
- PLC instrumentation assures repeatability. Data logging stores all critical data permanently for traceability and verification.
- Automatic Sanitary Clean-In-Place (CIP) design. The Ventilex system is the fastest cleaning system on the market today.
- Recipe based controls for processing multiple validated products in the same machine.
- Hygienic design with minimal cracks and crevices, rounded welds, and high quality surface finishes.
- Product is decontaminated, dried and cooled.
- Shortest duration of steam of any commercial system in use today – product still “natural”.
- Low energy consumption and low maintenance costs.
- 5 log kills are typical.
- Deactivation of enzymes.
- Minimal loss of flavor, color, and volatile oil.
- Available in a wide range of sizes:
  - Sterilizer: Up to 2.75 TPH (2.50 MTPH)
  - Pasteurizer: Up to 11.0 TPH (10.0 MTPH)

Ventilex Continuous Steam Pasteurizer

BELT DRYERS

Ventilex Belt Dryer

Ventilex helps the industry to produce better quality products by controlling the temperature and humidity of the environment while minimizing utility usage and maximizing production rates. Ventilex dryers precisely control temperature and humidity levels irrespective of air inlet conditions; and are designed for durability, sanitation and reliability.

The demand for high quality dehydrated products having properties similar to those found in the original product is increasing every day. Additionally, the drying process must have low operating costs and minimal environmental impact.

Ventilex belt dryers can be used for the drying of flaked, stripped, noodled, cubed, and granular materials. Ventilex belt dryers are used to dry a vast array of products, including:

- Biomass
- Synthetic Rubber
- Pharmaceuticals
- Roots
- Pet Food
- Organic Pigment
- Sludge
- Meat
- Digestate
- Gelatin
- MSG
- Fish
- Wood
- Fruit Products
- Herbs
- Feed Granules
- Charcoal
- Propylene Fiber
- Vegetables
- Chemicals
- Potatoes
- Mushrooms
- Plastics
- CMC

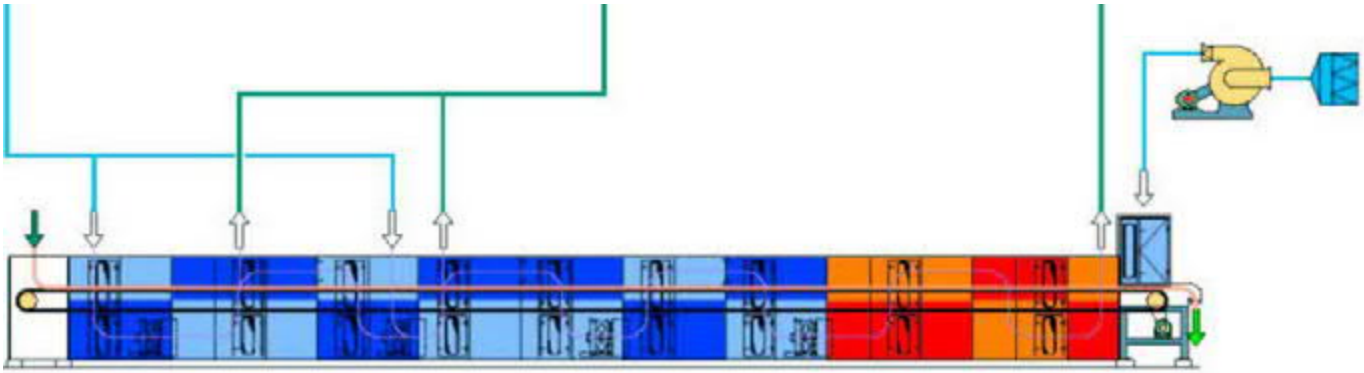
Ventilex belt dryers are highly efficient and have low energy requirements. The design and selection of the dryer is based on the product's wet and dry flow characteristics, lump/crust for mation tendency, and thermal sensitivity. The dryer's capacity, size and performance depend on the available heat transfer area and operating condition limitations of the specific product.

The combination of temperature cycles and drying times can be adjusted as necessary to control the final product's physical properties. The internal conveyor consists of single or multiple layers of stainless steel belt. Because the drying air flows through the belt, heat exchange is complete and even resulting in high production efficiency and exceptional final product quality.

Inside View of the Drying Tunnel

General Description of the Ventilex Belt Dryer:

The raw material is spread evenly across the conveyor belt by means of a suitable auxiliary mechanism such as a distributor, vibrating belt, pulverizer, or granulator. The drying tunnel is divided into zones, each maintaining a different temperature. Each zone contains an air heating and recirculation system, and if necessary, a moist air exhaust system. As the belt conveyor passes through each zone, hot air passes through the material from top to bottom, then bottom to top, producing a uniformly dried product. An example of a belt dryer with several zones is shown below:



Depending on the product, the tunnel can be equipped with a cooling section and vibration device in the outlet to lower the final product temperature for convenient and timely packaging. Naturally, Ventilex belt dryers are corrosion-resistant. We use various materials such as stainless steel and aluminum, depending on the properties of the product to be processed.

Discharge of Ventilex Belt Dryer

Before designing the dryer, the product is tested in our laboratory. Here a variety of parameters are evaluated to identify the optimum process conditions. This is necessary for many processes to prevent damage to the product. In our laboratory, samples can be subjected to temperatures ranging from -22ºF (-30ºC) to 572ºF (300ºC). After careful analysis of the results, each installation is custom designed and manufactured.

The Ventilex Belt Dryer offers many operational benefits, including:

- Custom made construction tailored to your specific process.
- Optimum time/drying curves for each product.
- Continuous drying system.
- Suitable for granular, fibrous, preformed, sticky, and extruded wet materials.
- High energy efficiency.
- Minimal footprint as compared to competitive designs.
- Uniform and gentle drying.
- Modular system, flexible and easy to ship and install.

Ventilex provide in-house engineering, manufacturing, as well as full installation and start-up services. Ventilex is capable of full process responsibility – or we can provide just the equipment. The choice is always yours!

DEHUMIDIFICATION SYSTEMS

Ventilex Polykath Dehumidifier

The Polykath Dehumidifier – the "Standard System"

The Polykath dehumidification system was specially developed to serve the changing needs of industrial, institutional, and commercial users. The conditioner and regenerator are built on one sump and, together with the pumps, plate and frame heat exchangers and DrySol piping, built on one frame with fixed dimensions. This means that a Polykath system is easy to install, integrate, and relocate. The Polykath unit is available in four standard sizes.

Air Volume Range: 2,750 CFM (4,650 m^3/hr.) – 10,600 CFM (18,000 m^3/hr.)
Moisture Removal: 125 PPH (57 kg/hr.) – 475 PPH (216 kg/hr.)

The Ventilex Polykath Dehumidifier offers many operational benefits, including:

- Cooling and heating occurs externally.
- Uses relatively inexpensive coolants, like well, river, and cooling tower water.
- Corrosion proof – constructed primarily of polypropylene.
- Microbiological decontamination.
- Compact construction.
- Four standard sizes – fixed dimensions.
- Competitively priced.
- Simple to engineer – easy to integrate.
- Minimal maintenance.
- Easy to relocate.
- Dual purpose – dehumidifier **or** humidifier.
- Very long life span.
- Energy efficient - low operating costs.

The Polykath Dehumidifier

The DryPac Dehumidifier – the "Custom-Made System"

The DryPac dehumidification system is a custom-made solution designed for low energy consumption. The DryPac system can handle very large volumes of air. The latest designs are constructed of corrosion-proof material and have incorporated the latest advances in heat and mass transfer technology. Its simplicity and choice of materials of construction make the DryPac a reliable air dehumidifier with a long life span.

Air Volume: Up to 82,400 CFM (140,000 m^3/hr.)
Moisture Removal: Up to 4,400 PPH (2,000 kg/hr.)

The Ventilex DryPac Dehumidifier offers many operational benefits, including:

- Cooling and heating occurs externally.
- Uses relatively inexpensive coolants, like well, river, and cooling tower water.
- Corrosion proof – constructed of industrial heavy duty plastic.
- Several conditioners can be used with one central regenerator.
- Good performance with a variety of airflow configurations:
  - Vertical Flows (VPT)
  - Counter-Current Flow (air-DrySol)
  - Horizontal Flow (HPT)
- Microbiological decontamination.
- High efficiency.
- Custom-made system.
- Performance reliability.
- Dual purpose – dehumidifier **or** humidifier.
- Very long life span.
- Energy Efficient - low operating costs.

The DryPac Dehumidifier

Ventilex have erection supervisors and commissioning engineers available worldwide to provide start-up assistance and operator training for our customers.

The Ventilex Dehumidifier Advantage:

Eliminates airborne micro-organisms – A Ventilex system offers more than just reliable control of humidity. Up to 97% of all airborne bacteria, viruses and molds are killed and removed as air is washed by the liquid desiccant solution. A unique benefit not available with dry desiccant dehumidifiers.

Saves energy and investment costs over other dehumidifiers – Ventilex systems are specially designed to minimize energy consumption and reduce upfront investment costs. A Ventilex system delivers air at the precise temperature and humidity regardless of air inlet conditions. No deep cooling or after heating is required as with air handling units (AHU). In most cases cooling is accomplished by inexpensive media such as cooling tower, river, or even well water. Refrigeration equipment (chillers) can often be eliminated altogether.

Comparison Example

Dehumidifying 14,700 CFM (25,000 m^3/hr.) of air, 77ºF (25ºC) from 50% RH to 20% RH:

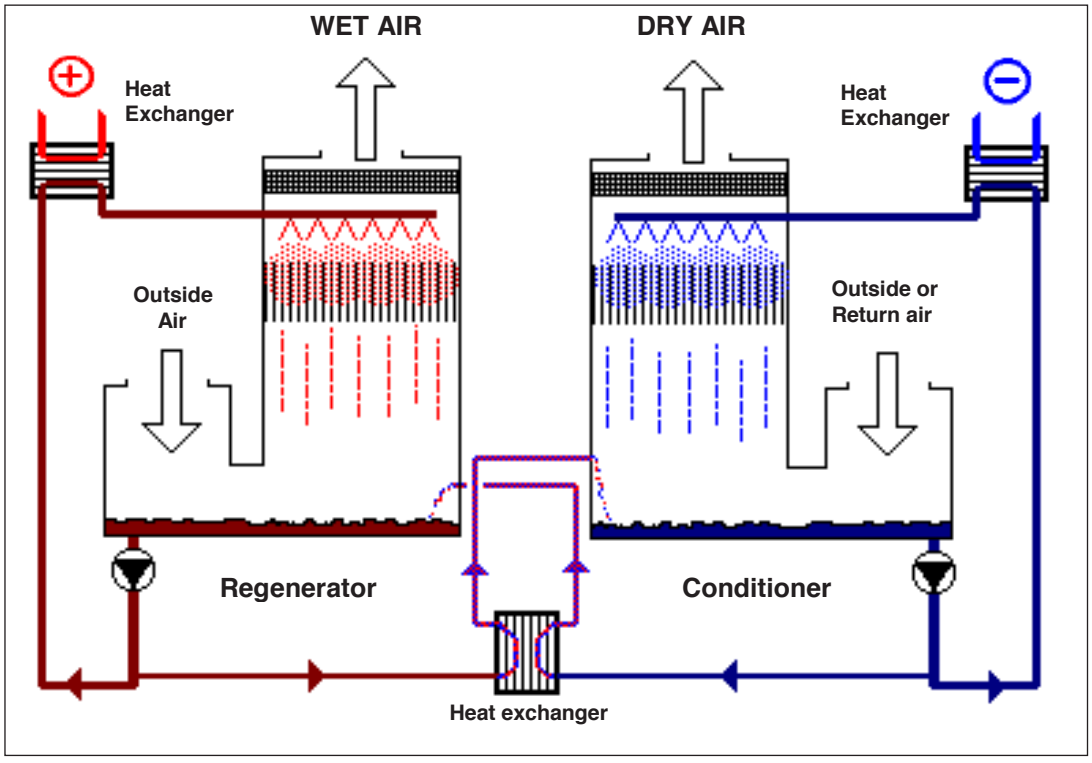
	Conventional (AHU)	Ventilex
Cooling Load	335 Kw	150 Kw
Cooling Medium Temperature	23ºF (-5ºC)	68ºF (20ºC)

Easy to Operate and Maintain:

Operating a Ventilex system is less complex. Maintenance is minimal. Preventive maintenance schedules include sending a solution sample to Ventilex to verify quality and assure maximum performance. The ability to monitor and adjust the desiccant over the life of the solution is unique to Ventilex dehumidifiers.

How the Ventilex Dehumidification System Operates:

Salt is a hygroscopic substance, even dissolved in water it is able to absorb moisture from the air. All the systems of Ventilex are based on this principle. The highly stable, non-toxic salt solution used is called DrySol. The amount of moisture the DrySol removes from the air is directly related to the concentration and temperature of the solution. Lowering the solution temperature produces dryer air as does increasing the solution concentration.



Working Principle of Ventilex Dehumidification System

Conditioner (dehumidifier):

The hygroscopic salt solution (DrySol) is pumped and sprayed into the dehumidifier (A). Humid air (from outside or recycled air) passes into the dehumidifier. This air comes into close contact with the hygroscopic DrySol solution spray, which absorbs the moisture present in the air. Dry air leaves the top of the unit. By subsequently cooling the salt solution, the air is cooled and dried simultaneously. Drip catchers at the air outlet of the dehumidifier ensure that the air stream does not contain any salt solution particles.

Regenerator:

To ensure a stable concentration of salt in the dehumidifier, the absorbed moisture has to be evaporated. Therefore, part of the (diluted) DrySol solution is pumped to the “regenerator” (B). Here the DrySol solution is pumped and sprayed again. At the regeneration side, water is evaporated by heating the salt solution. A minor secondary air stream, passing through the regenerator, absorbs this moisture and releases it outside. The concentrated DrySol solution returns to the dehumidifier. The process flow diagram shows that the “cold” (diluted) DrySol solution from the dehumidifier meets the “warm” DrySol solution in the regenerator.

A heat exchanger placed between these flows will preheat the “cold” solution before it enters the regenerator. The “warm” solution will release heat, and thus cool down before it is used in the dehumidifier again.

Operating Advantages of Ventilex vs. Dry Desiccant Dehumidification:

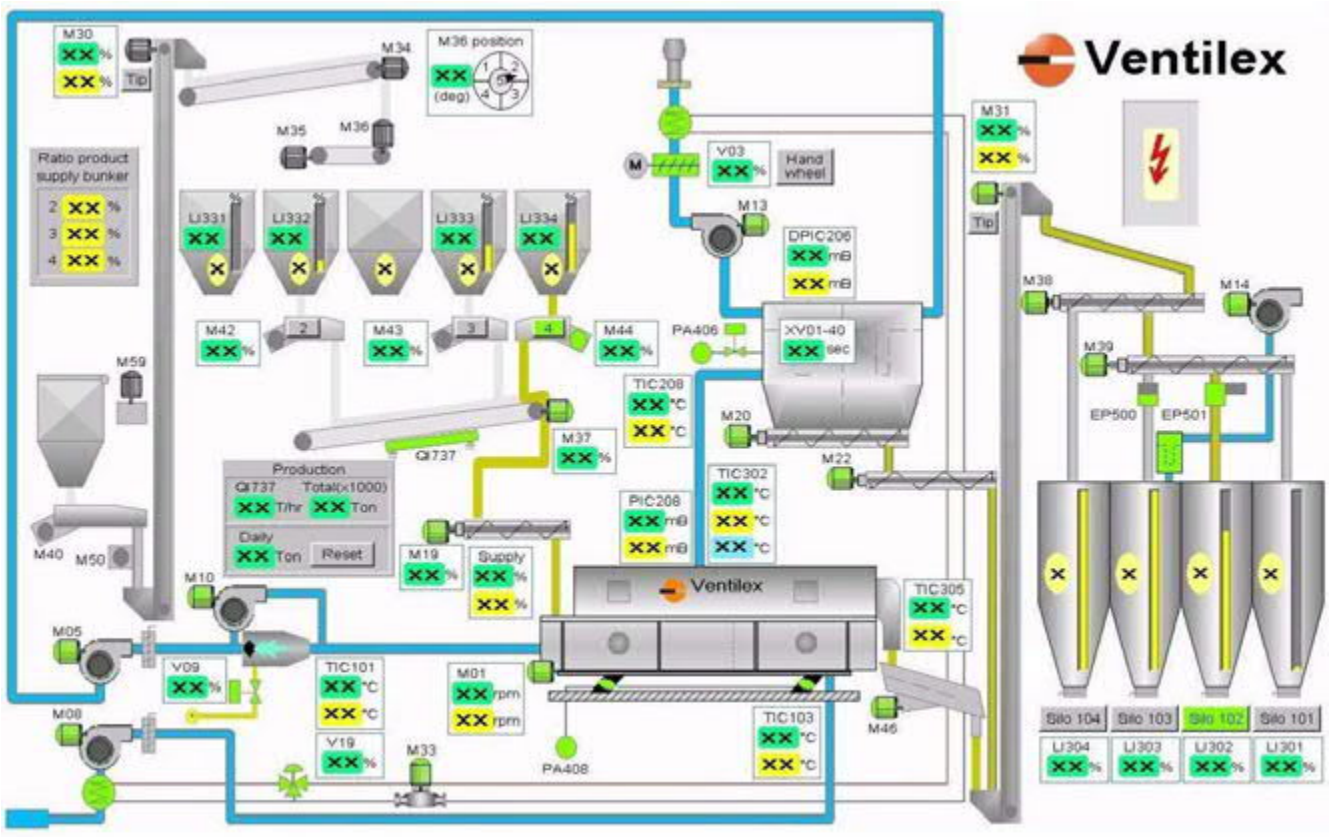
Since the conditioner and regenerator units are separate from one another, regeneration can be accomplished without mixing of the air streams. Moist air from the regenerator cannot leak into the conditioner air stream. The only connections between the conditioner and regenerator are small pipes that circulate the DrySol solution. Thus, these two components can be located separate from one another. This provides design flexibility, contributes to space savings, and lowers installation costs. In fact, several conditioners can be used in conjunction with one central regenerator.

Performance Benefits of a Ventilex Dehumidification System:

- Precise humidity control.
- Simultaneous air cooling and drying.
- Bacteria free air.
- Frost free cooling.
- Stable, long-lasting desiccant.
- High efficiency.
- Integrates well with cogeneration.
- Energy savings.
- Improves air sanitation.
- Corrosion-proof construction.
- Low maintenance – long life.

PROCESS CONTROLS

The Ventilex process control system is the result of years of development and refinement. Our controls are recognized by clients as the finest in our industry, ensuring predictable, repeatable product quality.



Industry leading PLC's run the dedicated operating software for our machines. We monitor the product temperature as materials dry, as well as the exhaust gas temperature during the process. Our proprietary algorithm allows us to "predict" the amount of energy needed to create the perfect end result. Any change in the moisture level of the feed is seen immediately in the exhaust air. This allows our machines to adjust much more rapidly to changes in inlet conditions than our competition, thereby conserving energy while still achieving the required product discharge conditions.

The Ventilex operating system and its proprietary algorithms are integrated with our sensor and PLC technology, resulting in the most energy efficient and cost effective drying solutions on the market today!

MAJOR MARKETS

MINERALS

To process most mineral products a strong, solid installation is required. The durable, corrosion resistant construction of the Ventilex Fluid Bed System makes it ideal for these applications.

Ventilex Fluid Bed Dryer/Cooler for Kaolin

Specific Characteristics / Advantages

For this industry it is important to be able to work at high temperatures. In the Ventilex Fluid Bed temperatures up to 1,112ºF (600ºC) can be achieved. Efficient consumption of energy is possible due to heat recuperation/recovery from the flue/discharge gases.

In addition, the Fluid Bed can be divided into different compartments. In this way it is possible to dry and cool (evaporative) within a single installation, which saves a lot of space.

Compared to a rotary dryer, the Fluid Bed system has a very short start-up and stopping time. Other advantages are substantially lower energy consumption, by drying and cooling within one machine, and a long service life of the installation. The installation functions fully automatically, even with varying entry humidity and product feed rates.

TYPICAL APPLICATIONS		
■ Aggregates	■ Blast Furnace Slag	■ Calcium Carbonate
■ Calumite	■ China Clay	■ Copper Slag
■ Ferrous Metals	■ Gypsum	■ Iron Slag
■ Kaolin	■ Limestone	■ Marble Sand
■ Non-Ferrous Metals	■ Rock Salt	■ Sand

FOOD, DAIRY AND NUTRACEUTICALS

There is not a Ventilex product that is not being utilized every day throughout the world in the Food, Dairy and Nutraceutical markets.

Ventilex Fluid Bed Dryer/Cooler for Cereal

Specific Characteristics/Advantages

Naturally, hygiene has top-priority in the food industry. The Ventilex sanitary design (FDA/USDA-GMP) ensures that our installations meet the high requirements of this industry. Our installations are completely made of stainless steel and all the product contact parts are polished and welded. The quick-acting closures and the CIP (Clean-In-Place) system make the installation easy to disassemble and to clean with minimal production interruptions. For processes that contain solvents or alcohols, Ventilex offers a closed-loop system. Inert gas blanketing along with solvent condensing and recovery can be provided as a complete system. Advanced oxygen analyzing is incorporated in our control system.

TYPICAL APPLICATIONS		
Beta Carotene	Bread Crumbs	Calcium Gluconate
Cereal	Cheese	Cocoa Beans
Coffee	Confections	Crumb
Dextrose	GDL	Gelatin
Grains	Herbs	KGA
Lactitol, Sorbitol, Xylitol	Lactose	Licorice
Lycopene	Meat	Nuts
Potato Flakes	Powdered Milk	PUFA
Rice	Salt	Sausage Farce (rusk)
Seeds	Soya	Spices
Sugar	Tea	Tobacco
Tomato Pulp	Vitamin A	Vitamin C

BIOMASS, ANIMAL FEED, AND INORGANIC WASTE

Today more than ever, recycling plays an important role in the sustainability and preservation of the precious world in which we live. It is possible by means of Fluid Bed Processing to upgrade waste products and make them suitable for re-use.

Ventilex Fluid Bed Dryer for Bioplastics

Specific Characteristics/Advantages

The recycling industry often has to deal with products where the particle size varies greatly and the humidity is high. The Ventilex Fluid Bed assures a high evaporation rate at low temperatures and with minimal energy consumption.

Our unique drive allows us to design Fluid Beds large enough to meet the high capacity needs typical of this industry. By making use of product recirculation and mixing, we are able to process slurry-like products; and of course, Ventilex Fluid Bed installations are resistant to corrosion. Another important requirement of the Ventilex system is odor suppression. This is accomplished by utilizing a closed-loop air recirculation system, bio-bed, and/or thermal exhaust gas combustion (thermal oxidation).

TYPICAL APPLICATIONS		
■ Blood Meal	■ Bone Meal	■ Citrus Peel
■ Compost	■ Domestic Waste	■ Fish Feed
■ Fish Meal	■ Manure	■ Paper Waste
■ Potato Residue	■ Return Brood	■ Slaughter Waste
■ Sludge	■ Vegetable Pulp	■ Wood

CHEMICALS

Processing chemicals, while still protecting the environment can sometimes be challenging. Ventilex offer turnkey solutions with flue gas/discharge gas configurations designed with environmental protection in mind.

Ventilex Fluid Bed Dryer/Cooler for Aramide

Specific Characteristics/Advantages

Many industrial chemicals have extremely corrosive properties and can aggressively attack the surfaces of processing equipment, particularly when operating at high temperatures. Ventilex utilizes materials such as stainless steel, duplex & super-duplex stainless steel, titanium, and hastelloy; among others to assure long equipment service life in harsh environments and extreme operating conditions.

TYPICAL APPLICATIONS		
Ammonium Sulphate	Aramide	Butyl Rubber
Calcium Chloride	Carboxy Methyl Cellulose	Chromic Acid
Detergent Powder	Fertilizer	Flame Retardant
Herbicides	Hexamine	Penta Eritritol
Pesticides	Plastic Granulate	Polymers
Potassium Chloride	Potassium Sulphate	Rubber Pellets
Salts	Silica Gel	Sodium Sulphate
Twaron (Kevlar) Pulp	Vanadium Oxide	Zn Pb Granulate

TESTING & PILOT SCALE CAPABILITIES

We have found that it is best to test a sample of most clients' products to determine its characteristics and its drying curve. **We offer our clients an initial feasibility testing service FREE of CHARGE in our lab!**

We are able to simulate processes with varying parameters in our lab to determine the optimal specifications for product processing. We know that each product is different and we understand that the size of a product, as well as changes in density during processing and drying, affect the optimization of the process.

Our lab testing "scales up" perfectly. The test is a precise model of the conditions experienced by your product in a full size machine.

To thoroughly evaluate your product prior to final equipment sizing and selection, we offer the following alternatives:

Lab Testing at Ventilex USA Inc. (Middletown, Ohio)

Ventilex USA, Inc. Test Facility

Our testing lab in Middletown, Ohio has the equipment necessary to test most clients' sample products to determine their drying characteristics. From this testing, our application engineers can typically determine the process parameters that are ideal for a particular product. After this testing, our engineers can determine if fluid bed processing is feasible and provide our clients with a quotation for the appropriate production scale equipment.

Lab Testing at Ventilex BV (Heerde, Netherlands)

Ventilex BV Test Facility

Sometimes, more extensive testing is required at pre-production volumes to refine the client's process. In these cases, it is possible to conduct pre-production process development and refinement at the Ventilex Pilot Plant in The Netherlands. In this case, we can process pre-production volumes, typically up to one ton per hour. After processing, this material may be returned to the client for use in subsequent process development steps.

Lab System Rental for In-House Testing

In some cases, the drying process is a step within current plant operations and the conditions of the product can only be duplicated within the current plant operation. In these cases, we can come to you. We can provide a rental lab unit for process development on a weekly basis. We can also supply a qualified test engineer on a fixed daily cost to oversee the process.

Pilot Plant Pre-Production Volumes at Your Facility

In some case, clients need to be able to produce pre-production volumes at their plant location for startups or in conjunction with perfection of upstream and/or downstream processes. In these cases, Ventilex USA can supply a 10.8 ft^2 (1.0 m^2) rental dryer plus associated technical assistance from our application/process engineers. This provides a cost effective alternative to reduce risk before production scale equipment is specified and ordered.

Our equipment can be powered by steam, natural gas, or propane. We provide fans and duct work, as well as the controls. All you need is electrical power with steam or gas. Throughput rates are based on product type, but nominal throughput typically ranges from 550 PPH (250 kg/hr.) to 1,100 PPH (500 kg/hr.). If you would like to learn more about testing or pilot options, contact us to discuss availability and cost.

SPARE PARTS

At Ventilex, we never obsolete a part! We can furnish parts for any machine – no matter when it was purchased. To order spare parts, please contact:

SERVICE

At Ventilex, we understand the importance of uptime. We will make every effort to respond to your service needs as quickly as possible.

One way we minimize our maintenance response time is via **Remote Diagnostics**. The Ventilex control system is the heart of the equipment. A vast majority of service related issues can be resolved via the controls. Remote Diagnostics allow us to evaluate, monitor, and control your machine remotely via the internet. *Please note: The dedicated modem remains disconnected at all times until required for maintenance.*

Preventive maintenance is essential to assure long equipment life. Ventilex offer **Service Contracts** to help keep your machine in tip-top operating equipment. A service engineer will come to your facility at some regular interval – generally annually – to inspect and make maintenance and operational recommendations.

To obtain parts, schedule service, or to inquire about a service contract, please contact:

USA:
Ventilex USA, Inc.
4640 Emerald Way
Middletown, OH 45044
Phone: +001 513 217 5830
Fax: +001 513 217 5831
Service.Ventilex@Ventilex.net

Netherlands:
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P. O. Box 158
NL-8180 AD Heerde
Phone: +31 88 988 1500
Fax: +31 578 698 282
Service.Ventilex@Imtech.com

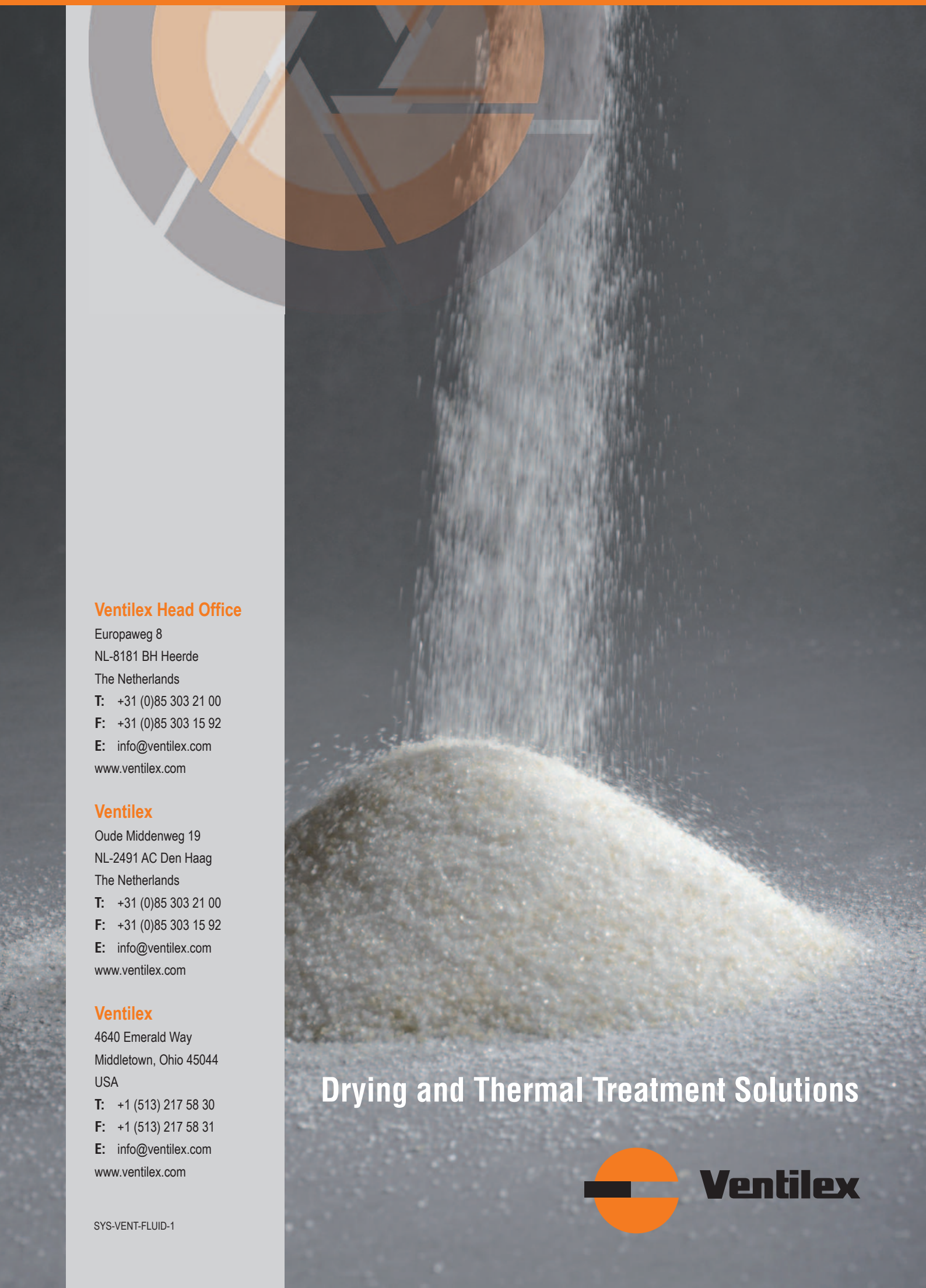
PRODUCT LIST		
Aggregates	Chocolate Granules	Gelatin
Almonds	Chromic Acid	Gelatin Capsules (Hard and Soft)
Aluminium Oxide	Chromite	Glass Fiber
Ammonium Chloride	Citric Acid	Glass Meal
Ammonium Sulphate	Clay Pellets	Grains
Anhydrous Caffeine	Cocoa Beans	Granite
Animal Feed (granular)	Coconut	Granular Glaze
Animal Feed (pellets)	Coffee	Gypsum
API (Active Pharmaceutical Ingredient)	Colored Sand	Haisol (NPK)
Aramid Polymer	Compacted Beef Plasma	Herbal Mix
Aramid Pulp	Compost	Herbicide
Aramide	Copper Powder	Herbs
Asphalt	Copper Sulfate	Hexamine
Barium Titanyl Oxylate	Corn Grit	Hydrohalite
Beer	Croutons	Hydroquinone
Berry Waste	Chalk (crushed)	Hydroxyl Ammonium Sulphate
Beta Carotene	DDGS (Distillers Dried Grains w/ Solubles)	Ion Exchange Resin
Bioplastics	Detergent Powder	Iron Oxide Pigments
Black Pepper	Dextrose	Iron Sulphate
Blast Furnace Lime	Digestate	Iron Sulphate Heptahydrate
Blood Meal	Dolomite	Kalium Sulphate
Bread Crumb	Domestic Waste	Kaolin Clay
Bromine	DSMA Dihydrate (herbicide)	Kevlar
Butyl Rubber	Effervescent Tablets	KGA
Cake Mix	Egg Shells	Lactitol
Calcium Carbonate	EPS Beads	Lactose
Calcium Gluconate	Feldspar	LAS
Calcium Hypophosphate	Fertilizer (encapsulated)	Lemon Zest
Calumite	Fertilizer (NPK)	Lexan (Polycarbonate)
Candies and Confections	Fiberglas Pellets	Licorice (extruded)
Caraway seed	Fish Feed	Lime (granulated)
Carboxyl Methyl Cellulose	Fish Meal	Limestone
Casings Collagen	Flame Retardent	Lithium Chloride
Catalyst	Flue Gasses	Lycopene Beads
Ceramic Granules	Formaldehyde (solid)	Macadamia Kernel
Cereal	Formic Acid	Magnesium Sulphate
Charcoal	Fruits	Magnesium Sulphate Heptahydrate
Cheese	Fungicides (granulated)	Maltodextrin
Chicken Manure	Garlic	Manure
China Clay	GDL (Glucone Delta Lactone)	Marble Sand

PRODUCT LIST (cont.)		
Meat	Propylene (fiber)	Sodium Carbonate
Medicine	Pumice	Sodium Chloride
Metal Salts	PVC	Sodium Gluconate
Milk (powdered)	PVDC	Sodium Lauryl Sulphate
Milk substitute	Quartz Sand	Sodium Pyrosulfite
Mono Sodium Glutamate	Rape Seed	Sodium sulphate
Mushrooms	Recycled Plastics	Sorbitol
Nuts	Resin Coated Sand	Soy Nuts
Onions	Return Brood	Soy Splits
Orange Zest	Rice	Soybeans
Organic Fungicide (granular)	Rice (un-puffed pellets)	Spices
Organic Fungicide (pelletized)	Rice Seed Treatment	Starch (granulated)
Panning (M&M chocolate)	Roots	Steel Coil Cooling
Paper Sludge	Rubber	Steel Grit
Paper Waste	Rubber (pelletized)	Stone Powder
Parboiled Rice	Rubber (synthetic)	Straw
Peanuts	Rusk	Sugar
Pentaerythritol	Salt	Sugar (granular flavoured)
Pepper (ground)	Salt (mineral)	Sugar (powdered)
Pepper (whole)	Sand	Sulfanilic Acid
Perlite	Sand (chromite)	Super Absorbant
Pesticides	Sand (coated)	Synthetic Fiber
Pet Food	Sand (colored)	Tagatose
Pharmaceuticals	Sand and gravel (mixture)	Talc
Pharmaceuticals (room conditioning)	Sand Slag	Talc (granular)
Photo Paper	Sausage Drying	Talc (pelletized)
Pigment (organic)	Sea Salt	TBBA
PMMA	Sea Weed Extract	Tea
Poly Unsaturated Fatty Acids	Seed Treatment	Tobacco
Polyester (granules)	Seeds	Tomato Pulp
Polymer Beads	Sewer Cleansing Silt	Urea
Poppy Seed	Silica Gel	Vanadium Oxide
Potash	Silica Sand	Vegetables
Potassium Chloride	Slag (blast furnace)	Vitamin A
Potassium Nitrate	Slag (copper)	Vitamin C
Potassium Sulphate	Slag (iron)	Wheat
Potato (fiber)	Slag (steel)	Wheat (germ)
Potato (flakes)	Slate Stone	Wood
Potato (residue)	Slaughter Waste	Xylitol
Process Gas	Sodium Bromide	Zinc/Lead Concentrate

APPLICATIONS

Following are some of the processes in which Ventilex equipment has been utilized:

- **Agglomerating**
- **Baking**
- **Blanching**
- **Calcination**
- **Coating**
- **Conditioning**
- **Cooking**
- **Cooling (Evaporative)**
- **Deactivating Enzymes**
- **De-dusting**
- **Drying with Inert Gas**
- **Fermenting**
- **Pasteurizing**
- **Reacting**
- **Roasting**
- **Steam Stripping**
- **Steam Sterilizing**



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Drying and Thermal Treatment Solutions

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