What is a Bio Filter?

A device that removes diverse pollutants by decomposing harmful materials using biological application of microorganisms.

As a method of processing biologically the pollutants in the gas, it is an economic and environmentally friendly processing work method that decomposes through pollutants, water, carbon dioxide and harmful dye from metabolic activity of microorganisms fixed in the porous organic and inorganic compound carrier. Composed of inorganic substances where organic substances and physical chemistry environmental control needed stable growth of the initial microorganisms is possible, the applied carrier is a functional microorganism carrier that provides optimum generation of microorganism according to type and concentration of the odor and VOCs. Especially, as a microorganism that shows optimum vitality for processing of odor and VOCs, the asepsis cultivated microorganism must have optimum efficient deodorization equipment. It is also called a Bio Reactor.

Source of Pollutants (Applied Area)

Odor

Sewage, waste water, livestock wastewater and human waste disposal plant, sewage sludge, composting, food waste disposal plant, waste storage and processing facility, cigarette manufacturing, food processing, fodder manufacturing factory, waste storage and disposal facility, agricultural and marine wholesale market and joint market

VOCs

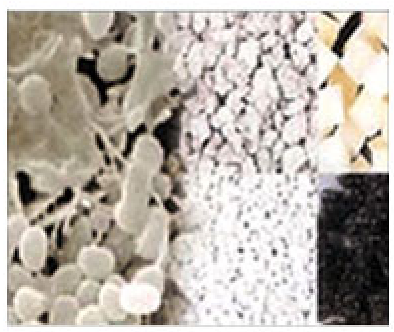
Paint manufacturing factory and painting factory, petrochemistry manufacturing, oil refining factory, vehicle manufacturing, elastic manufacturing process, tire manufacturing process, landfill gas removal facility, oil storage, gas station, washing facility and vehicle maintenance industry

Pollutant Decomposition Principle of Bio Filter

Odor Material
Ammonia, hydrogen sulfide, mercaptan, amino

VOCs material
Toluene, xylene, acetone, alcohol

+ O_2



Microorganisms + carrier

H_2O — CO_2 — Salts

The gas that has odor and volatility VOCs is absorbed to the bio film formed in the carrier surface while passing filter response tower and the pollutants are biologically decomposed by aerobic microorganisms within the bio film.

Bio Filter Composition

This equipment passes odor gas in the compound bio deodorization device with wet cleaning device, 1st and 2nd bio filter liquid chemical (cleaning) device. By processing the odor gas in order physically, biologically through a deodorization process, an efficient deodorization of odor gas can take place.

01 Ventilator
02 Humidifying section
03 oder gas distribution system
04 filter material
05 water supply unit

By classifying odor gas into alkali odor and acid odor and by neutrally removing according to water property of the odor substance in the upward and downward flow interval of the odor gas, the odor substances can be removed efficiently. Also, with the removal of alkali and acid substances, by optimizing growth environment of microorganisms growing in the porous ceramic carrier layer to the microorganism property, the vitality of the microorganism is maintained in the best conditions. It must be in the structure of increasing removal efficiency of survival rate odor gas.

Advantages and Disadvantages of Bio Filter

Advantages	Disadvantages
Can be applied to diverse concentration scopes High capacity response possible Simple installation Effective compound pollutant disposal High efficient removal of odor gas and VOCs possible Simple operation and maintenance due to the simple structure Cheap operation costs Long life expectancy	Wide site area needed Large initial construction cost when disposing large capacity

Microorganism Carrier

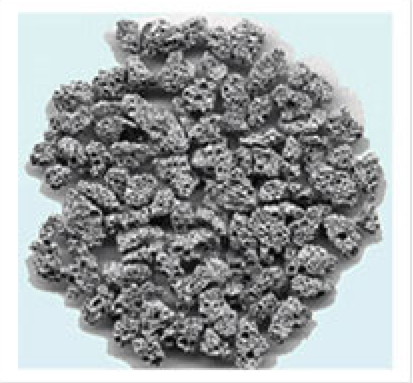
Carrier characteristics	- Provides nutrients needed for the growth of microorganisms - Porous material that has specific area for the increase of microorganism density - Hypobaric filter media that has gas pocket of 100~1000 um - Configuration of high storage quality regarding consolidation and low pressure loss - Appropriate pH and supplementing ability
Conditions for carrier	**- Chemical Property** · Resistance of strong alkali or strong acid must be secured · No other chemical reaction must occur · No damage due to repetitive chemical shock due to abandonment **- Physical Property** · A constant pressure strength and abrasion resistance must be maintained · The distribution of gas pocket must be diverse and it must not be a close pocket · The surface roughness must be excellent · Stability regarding heat shock must be secured · The softening correlation must be maintained and secondary pollution must not occur during operation. **- Environmentally Friendly Property** · Damage according to water temperature change or natural light must not occur. · It must be of material that has excellent microorganism affinity

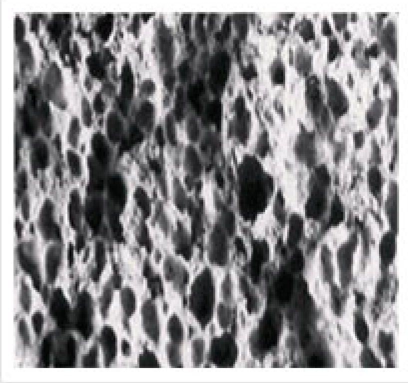
Filter Media of Excellent Performance

Has excellent contact area, microorganism absorption ability, nutrient, supplementation ability, hypobaric and pH adjustment ability

Foam Porous Ceramic

It has excellent alkali and acid resistance properties and is a carrier use most frequently as bio filter carrier. To add, the weight is about 0.4~0.5 lighter as it is foam porous ceramic and can be used semi-permanently as inorganic carrier.





Apparatus by Process

Deodorization Tower (Main Body)

It is a separated or integrated type of structure that is composed of the wet cleaning part (small dusts, foreign substance dust, water soluble odor removal, high temperature gas temperature reduction), first and secondary bio filter part (as a two stage filter layer, increases deodorization efficiency, adjusts PH automatically and self-neutralizes using limestone carrier) and liquid chemical cleaning part (deodorization efficiency increase, applied broadly to alkali/acid gas through the removal of non-odor).

It is a structure where carrier packing and replacement is easy and sufficient strength must be maintained.

It does not receive much influence from the installation space and must use excellent sealing materials with excellent internal and external stiffeners so that the construction is excellent.

There must be a man hole at the upper part for repair and when inserting carrier. There must be an inspection frame on the sides to inspect the insides.

FILTER MEDIA

A filter media is a package layer that is inoculated to maintain and fix the microorganism within the bio filter. This media minimizes the pressure drop of package layer like the foam resin and the condensation of media must be blocked. The form must be maintained with its own supporting ability and the gas flow must be uniformly distributed to the entire system. It must be excellent in terms of attachment and vitality maintenance of the microorganisms.




· To broaden the contact area of the odor, polling must be packed with appropriate height on the wet cleaning part and liquid chemical (cleaning) part.

· Limestone of 3~4cm diameter must be increased by 20cm at the lower part of the first and secondary bio filter.

· By packing porous ceramic filter media at an appropriate height at the upper part of the limestone's package layer of the first and second bio filter, it must be distributed so that the best environment for microorganism activity is made.

Water Storage Tank and Water Supply Device


· Must be produced with a corrosion-resistance material.

· A circulating pump must be installed.

· To maintain freeze prevention and appropriate temperature, heat retaining must be done on the exterior and electric heater must be embedded to raise the temperature.

· The water pipe must be of structure of circulating to the water storage tank by emitting to the lower part after spraying (spray uniformly) inside the deodorization tower.

· The spray and nozzle must use corrosion resistance material and with a structure with no blockage, the performance and spraying phenomenon must be uniform.

· The water supply must be formed of bypass pipe that is automatically supplied by high and low level gauge.

Differential Pressure Detection Device and Control Panel


· By installing a differential pressure gauge between the inlet port and the outlet, the inflowing odor gas and processing gas pressure is detected and if a differential pressure that exceeds the set value is found, the operation of the ventilator or other attached equipment must be stopped to protect the bio filter. The inside of the control panel must be in the structure of double door to prevent leakage.

· The console panel must be composed of a system that can control properly the operation, stoppage, water supply, drainage, differential pressure and temperature of the deodorization panel.

· The scope is from each equipment of deodorization machine at the onsite control panel to the construction of power supply and control cable.