

Biological Scrubbers

For odourous gas removal

Aug 04



ARMATEC

PRODUCT DESCRIPTION

For the removal of odourous gases from airstreams. Designed for high treatment efficiency, maximum corrosion resistance. Biological scrubbing action minimises chemical consumption and offers low ongoing operational cost. The biological scrubbers are built to designs by Marc Deshusses, Professor of Chemical & Environmental Engineering, University of California. Marc Deshusses is a leading international researcher in biological techniques for air pollution control.

BIOLOGICAL SCRUBBING

A biological scrubber treats polluted air biologically. The principle of a biological scrubber is that the waste air is contacted with a scrubbing solution in a vessel packed with an inorganic support material. On the surface of the packing, a biofilm of pollutant degrading microorganisms forms, which aerobically degrade the absorbed pollutants. Since the packing is made of inert material, a continuous supply of mineral nutrients (N,P,K+traces) is needed.

FEATURES

- Gaseous contaminants can be removed to over 99% efficiency rate depending on the bed depth and scrubber design.
- Chemical consumption is eliminated or greatly reduced compared to a chemical wet scrubber. Only requirement is an occasional dosing of nutrients.
- Standard shell design provided for pressure range of vacuum -150 to +250mm WC (water column).
- Lower scrubber shell serves as integral sump for recirculating liquid supply.
- Corrosion resistant construction. Units fabricated in corrosion resistant fibreglass for low maintenance.
- Standard units include access doors, spray headers, piping connections, nozzles, internal structure supports, packing, support plates and hold-down lugs.
- Circulation pump can be mounted on side of scrubber to minimise footprint and site installation work.

PILOT PLANT AVAILABLE

A pilot plant is available for site trials using a representative stream of the air to be treated. This has the advantage of giving actual performance data allowing for accurate scale up to the full unit. A successful pilot plant trial gives all parties the confidence to proceed with the full scale unit. Please contact ARMATEC for details of pilot plant availability.

USES

- Wastewater treatment plants for hydrogen sulphide and odour control
- Pumping stations for odour control
- Rendering plants for odour control
- Pulp & Paper plants for odour control
- VOCs (volatile organic compounds)
- Food processing plants for odour control

AVAILABILITY

The biological scrubbers are available from:

New Zealand: Armatec Environmental Ltd
42 Egmont Rd, Bell Block, New Plymouth, NZ
Phone: +64-6-755-0410 Fax: +64-6-755-0410
www.armatec.co.nz

Australia: Environmental Group (Operations) Pty Ltd
3/9 Packard Ave, Castle Hill, NSW 2154, Australia
Phone: +67-2-8858-3400 Fax: +67-9899-3463
www.environmental.com.au



ARMATEC biological scrubber at fertiliser plant removes in excess of 97% of hydrogen sulphide from odourous air extracted from sulphur melter operation. This installation has a venturi scrubber for particulate removal ahead of the biological scrubber.

ARMATEC Environmental Ltd

P.O. Box 3046, New Plymouth, New Zealand.

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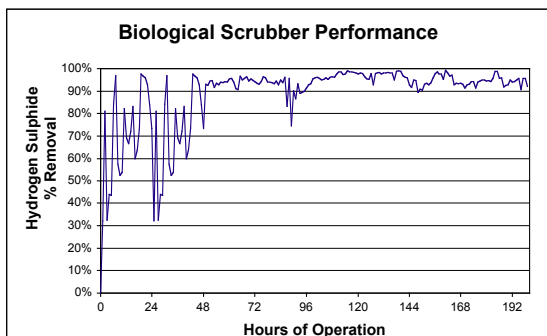
www.armatec.co.nz





SCRUBBER PERFORMANCE

Two biological scrubbers built and installed in New Zealand by ARMATEC gave hydrogen sulphide removal efficiencies in excess of 95% within a few days of being commissioned. The loads on the biological scrubbers were intermittent and ranged from 30ppm to 125ppm. The results of the first 8 days of operation of one of these is given below.



SPECIAL INORGANIC PACKING

A special inorganic packing is the support structure for the biofilm of pollutant degrading microorganisms.



Inorganic packing being installed by ARMATEC.

FAN LOCATION ALTERNATIVES

A centrifugal corrosion resistant fibreglass fan is used to provide the driving force for the air. It can be located before the biological scrubber for a layout with least ducting, or after the biological scrubber to place the fan in the cleanest air. A fan can either be a standard stand-alone centrifugal fan or an in-line centrifugal fan mounted on the scrubber body.

ADDITIONAL ODOUR CONTROL

The outlet gases from a biological scrubber typically have a low odour mushroom-type smell. Often this can be discharged directly to atmosphere. If a very low odour is required, then the biological scrubbers can be supplied complete with a carbon adsorption bed immediately after the biological scrubber. This carbon adsorption bed can be housed in the same body to achieve a compact layout, and due to the low level of odour, the carbon bed has a long life.

DEVELOPMENTS IN CALIFORNIA

- **Biofilters Have Disadvantages:** A relatively large number of studies have addressed the removal of hydrogen sulphide in biofilters. However, biofilters have inherent disadvantages such as higher pressure drop, and limited lifetime for the packing. Biofilters need be maintained above a pH of 2, and there are the continuing problems of packing aging, compacting or plugging of the organic beds.
- **Biological Scrubbers Overcome These Problems:** Biological scrubbers have been developed to address these problems whilst maintaining the advantages of biological treatment. The University of California led by Marc Deshusses has done work both in the University laboratories and at wastewater treatment plants.
- **Los Angeles Hyperion WWTP:** Pilot plant studies were done with a variety of packings and residence times. Hydrogen sulphide removal efficiencies in excess of 99% were achieved.
- **Orange County WWTP:** By May 2003, a total of five chemical scrubbers have been converted into biological scrubbers. After almost two years of continuous operation, the biological scrubbers still have hydrogen sulphide removal efficiencies of more than 98%. Details of one of these conversions is given below.

CHEMICAL SCRUBBER CONVERTED

Chemical scrubbers can be converted to biological scrubbers. This saves the use of expensive and hazardous chemicals. The Deshusses Group in California converted a 16,000 cubic metre per hour chemical scrubber in Orange County wastewater treatment plant pictured below and achieved 99% plus removal of hydrogen sulphide after 10 days of operation. Cost savings achieved are estimated at US\$10,000 to US\$30,000 per year in chemical costs. In addition there are health and safety benefits.



Chemical scrubber in Orange County wastewater treatment plant converted to a biological scrubber.

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