



EVEREST AERATION SOLUTIONS AQUACULTURE

The goal of most fish farmers is to maximize production and profits while holding operating costs to the minimum. In most aquaculture operations, aeration offers the most immediate and practical solution to water quality problems encountered at higher stocking and feeding rates. Aeration means addition of oxygen to water. This process is accomplished either by exposing the water to air or by introducing air into the water. Oxygen is the first limiting factor for growth and well-being of fish. Fish require oxygen for respiration, which physiologists express as mg of oxygen consumed per kilogram of fish per hour (mg O₂/kg/hr).

Air contains 20.95% oxygen. At standard barometric pressure (760 mmHg) the pressure or tension of oxygen in air is 159 mmHg. The pressure of oxygen in air drives oxygen into water until the pressure of oxygen in water is equal to the pressure of oxygen in the atmosphere. When pressures of oxygen in water and atmosphere are equal, net movement of oxygen molecules from atmosphere to water ceases.

The water is said to be at equilibrium, or at saturation, with dissolved oxygen (DO) when the oxygen pressure in the water equals the pressure of oxygen in the atmosphere.

The DO concentration in water at saturation varies with temperature, salinity, and barometric pressure. As water temperature increases, DO concentration at saturation decreases. At a given temperature, the DO concentration at saturation increases in proportion to increasing barometric pressure. The concentration of DO at saturation decreases with increasing salinity.

Water also may contain less DO than expected at saturation. At night, respiration by fish, plants and other pond organisms causes DO concentration to decline. Thus, during warm months, night-time DO concentrations in ponds often are below saturation. **In production ponds, DO may decrease by 5-10 mg/L at night, and in unaerated ponds, DO concentrations at sunrise may be less than 2 mg/L.**

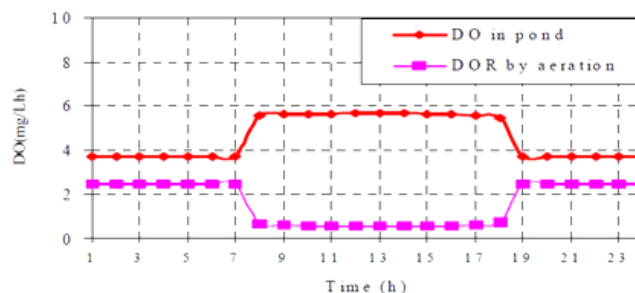


Fig: Dissolved Oxygen (DO) Concentration in the pond at different times of the day & Dissolved Oxygen (DO) replenishment by Aeration.



Aerators are of two basic types: splashers and bubblers. Splasher type splashes water into the air to effect aeration. Splashing action also causes turbulence in the body of water being aerated. Bubble aerators rely on release of air bubbles near the bottom of a water body to affect aeration. A large surface area is created between air bubbles and surrounding water. Rising bubbles also create turbulence within a body of water. Circulation of pond water by aerators is an additional benefit of aeration.

Diffused-air system aerators use a low pressure, high volume Everest Side Channel Blowers to provide air to diffusers positioned on the pond bottom. The minimum permissible system pressure becomes greater with increasing depth of water above diffusers, because enough pressure must be available to force air through the piping system and cause the air to exit from the diffuser against the hydrostatic pressure at the discharge point.

Diffused-air systems that release fine bubbles usually are more efficient than those that discharge coarse bubbles. This is because fine bubbles present a greater surface area to the surrounding water than larger bubbles. Oxygen diffuses into water at the surface, so a large surface area facilitates greater oxygen absorption.



The diffused or bubble aeration process consists of contacting gas bubbles with water for the purpose of transferring gas to the water. The most used diffuser system consists of a matrix of perforated tubes arranged near the bottom of the pond to provide maximum gas to water contact.

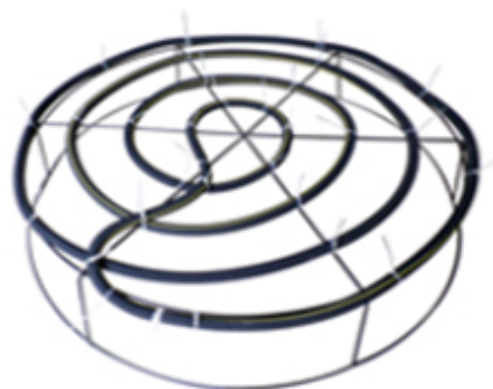


Fig: Everest Turbo Aeration Plate



Turbo Division of Everest Blowers have developed an innovative energy efficient aeration system, operated by a reliable Side Channel Blower with constant pressure rather than Mechanical Aeration as in a Paddle High Pulsating Aeration, rendering it completely safe, light and simple to operate.

EVERST TURBO ENERGY EFFICIENT DIFFUSED AERATION SYSTEM FOR AQUACULTURE comprise of a unique Side Channel Blower powered by an Energy Efficient Motor, combined with Microporous Aeration Hose connected in parallel through connectors.

The new aerator comes with Zero Maintenance Side Channel Blower made out of high grade Aluminum alloy (ADC12) driven by an energy efficient electric motor and connected to a grid of high-grade rubber microporous aeration hose through plastic pipes.

Everest Turbo Side Channel Blowers are used in areas where Pulsation-Free vacuum and pressure services are required. Features to benefits include:

- 100% Oil Free
- Flexibility of installation - Horizontal or Vertical, Indoor or Outdoor
- Aluminium die-cast M.O.C. makes it suitable for rugged applications and continuous duty operation
- Sealed for life bearings
- Air-cooled single/three phase rugged application centric motor and contact free impeller ensure productivity and zero down time maintenance
- Complies with environmental norms - free from any operating liquids or lubricant.
- Silent Operation due to built-in inlet & outlet muffler
- Less power cost - Blowers are fitted with energy efficient motors



Fig: Everest Turbo Side Channel Blower



The Microporous Aeration Hose is mounted on Aeration Plates. The layout of the aeration plates in an aquaculture system has an important influence on the performance of the system. Pond geometry, aeration hose submergence, aeration plate density, and placement of aeration plates are all considered in the system design.

Full floor grid arrangement is used; Full floor grid arrangement is defined as any total floor coverage by aeration plates. This is entirely new type of oxygen enrichment method, radically different from the traditional paddle wheel, featuring constant aeration and low power consumption. The advanced design enables oxygen enrichment with better energy efficiency.

To maximize aeration efficiency in a system, an aerator must create fine bubbles while expending a minimum amount of energy.

Everest Microporous Aeration Hose technology meets both goals and does so with a long life & low maintenance system.

Majority of all Aquaculture problems including diseases are caused by poor water quality and, in turn, most water quality problems can be resolved with proper aeration (Oxygenation).

Aeration plays a crucial role. Oxygen is the limiting factor in both recirculating and traditional aquaculture systems. Less than required levels lead to poor water quality, poor feed conversion ratios, reduced growth and increased mortality. With higher energy prices, energy efficiency is becoming much more important when comparing aeration techniques and devices. Many of the traditional aeration devices like Paddle Wheels and Aspirator Style Aerators have a poor track record of reliability and higher overall energy requirements. Aerator graves have become a common sight throughout the industry as old aeration devices are replaced and discarded year after year.



Fig: Everest Turbo Microporous Aeration Hose

Everest Turbo Microporous Aeration Hose can solve all these problems with distinct advantages such as:

- Reduced energy costs by up to 75%
- Lack of moving parts resulting negligible maintenance
- Maintains higher dissolved oxygen (DO) levels
- Allows for high stocking densities
- Allows for higher feed rates
- Allows for more frequent feedings
- Faster growth
- Low start-up cost

Everest Turbo Microporous Aeration Hose has been used successfully with a wide range of Aquaculture species and in a wide range of production systems. Whether you are producing shrimp or fish, you can benefit from the efficiency & durability of Everest Turbo Microporous Aeration Hose.

High Density Cultivation would typically require about 8 Aeration Plates per 667 m² of pond area.

Similarly, Medium & Low Density Cultivation would require about 4 Aeration Plates for every 667 m² of pond area.

A typical 4000 Square Metre aquaculture pond would require a 2.2 kW blower coupled to 50 No. Aeration Plates with Microporous Aeration Hose. DO levels in the pond generally go down from 7:00 PM to 7:00 AM and then increase naturally from 7:00 AM to 7:00 PM. Hence the pond requires full aeration during night-time & partial aeration during day time.

This may be accomplished by the following methods, thereby saving power worth **Rs 96,360 per year - your added profit**

1. Install two blowers of 50% capacity. Run both blowers during night-time and run only one single blower during the day time. The second blower shall also serve as a standby blower in case of any breakdown.

2. Install one blower of 100% capacity & control the operating speed through a Variable Frequency Drive. Blower may be made to run at 100% speed during night-time when DO levels go down & at reduced speed during day time.



Any level of automation may be accomplished using Fuzzy Logic Controllers or Programmable Logic Controller based automation systems, which can sense the dissolved oxygen levels in the pond at various intervals & control aeration system automatically, thereby making the system fool proof & man independent.

Matching standard of Everest Turbo Side Channel Blowers and Aeration Plates is as under:

- **2.2 kW Blower: 50-60 No. Aeration Plates**
- **3.0 kW Blower: 80-90 No. Aeration Plates**
- **4.0 kW Blower: 100-140 No. Aeration Plates**
- **5.5 kW Blower: 160-200 No. Aeration Plates**

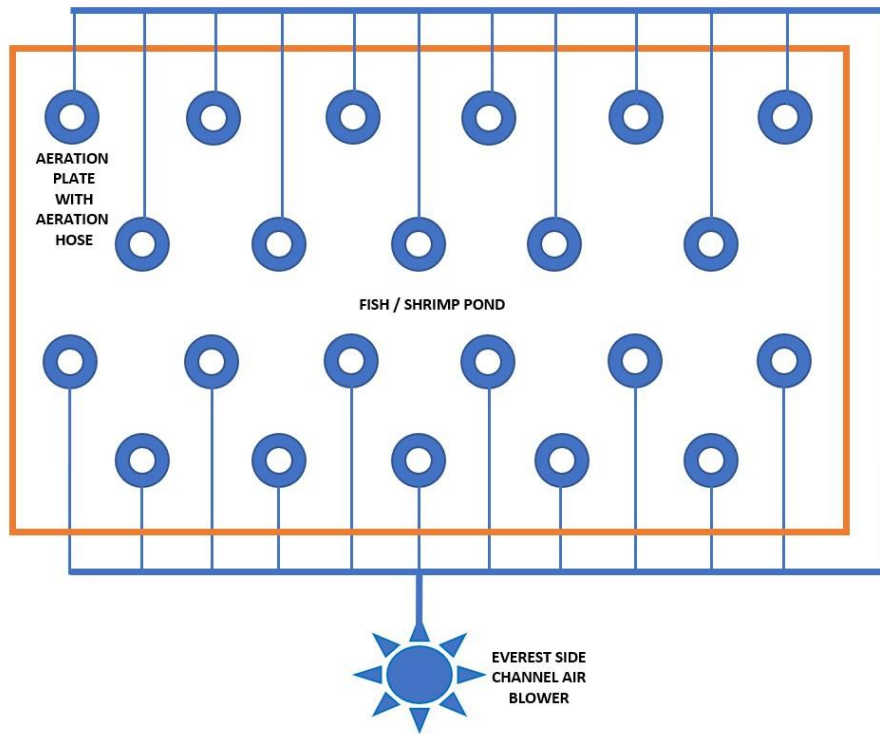


Fig: Typical Aeration Plate Grid & Blower Setup for an Aquaculture Pond

TECHNOLOGICAL BENEFITS OF EVEREST TURBO DIFFUSED AERATION SYSTEM

1. Dissolved oxygen enriching at a faster pace
2. Lower energy consumption
3. Straight forward logistics & Installation
4. Flexibility of operation
5. 100% Oil-free air

The new aerator is exceptionally lightweight and durable, thus enabling single personnel to carry and deploy aerators, thereby reducing the manpower cost of the aquaculture farms.

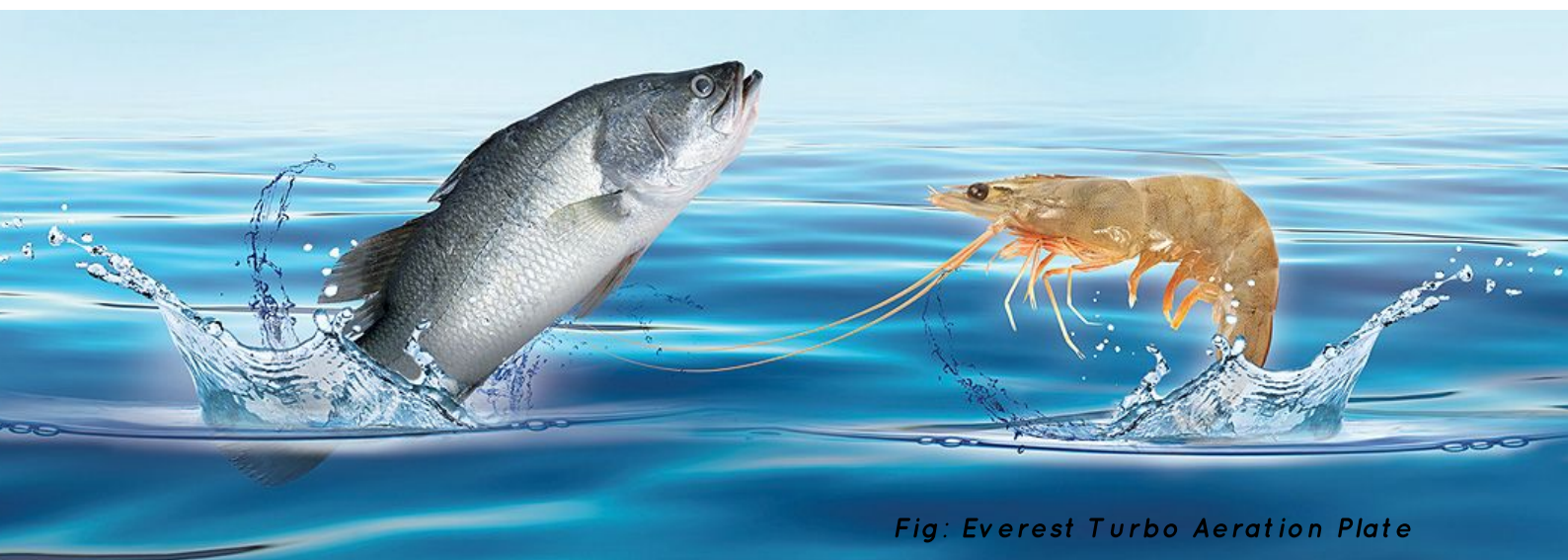


Fig: Everest Turbo Aeration Plate

100% Oil Free



100 % OIL FREE
BLOWER

EVEREST SIDE
CHANNEL BLOWER

DOUBLE LINE
AERATION HOSE

AERATION PLATE

Everest Blowers Group is the largest blower manufacturer in India producing a wide range of Positive Displacement, Dynamic Blowers, Dry Screw Vacuum Pumps & Industrial Vacuum Systems for various industries and applications.

We are equipped with two in-house DSIR (Department of Scientific & Industrial Research, Ministry of Science & Technology, Government of India) approved Research & Development centres which are engaged in innovative products, technologies and solutions for various industries and applications. All products are produced in-house at our state-of-the-art manufacturing facilities using advanced design & machining software & latest technology three axis & five axis CNC machines. Our Quality Management Systems confirm to ISO 9001:2015 standard. We also comply to ISO 14000 & OSHAS 18000 standards. Everest Group has two National Awards for Excellence in Research & Development and Energy Efficient Pumps to its credit.

Everest Blowers are committed to explore energy efficient products and technologies for various processes and industries, through their innovative engineering experience gained over four decades of presence in the Indian market.

In line with the **Blue Economy Drive by the Govt. Of India** and the fisheries departments of respective states, we have come-up with the system of providing quality aeration for enhancing productivity and safe working methods.

Package aeration kits, custom designed to your requirement are also available along with individual blowers & microporous aeration hose. Contact our technical team & we shall be glad to assist you with design, selection & supply of your aeration components & systems.

BLUE ECONOMY



Call: +91-7419990121
E: cmo@everestblowers.com
www.everestblowers.com