

FIBREGLASS

PRODUCTS FOR AQUACULTURE

HATCHERY SYSTEMS · CULTURE TANKS · RAS EQUIPMENT · WALKWAYS & STRUCTURES



■ CONTENTS

03	General Information	16	Fish Sorting Cradle
04	Contact Molding & Vacuum Infusion	17	Land-Base Farming with RAS
05	Important Features	18	RAS — Set-up & Advantages
06	Important Features (cont.)	19	RAS System Equipment
07	Area of Applications	20	GFRP Fish Tanks for RAS
08	Introduction to Hatchery	21	Tank Properties Comparison
09	Live Food for Marine Fish Larvae	22	GFRP Bio-Filter Tanks
10	Hatchery — Broodstock & Rearing	23	GFRP Degassifier Tanks
11	Artemia / Rotifier & Incubation Tanks	24	GFRP Walkways & Staircases
12	Culture Circular & Rectangular Tanks	25	GFRP Cable Trays & Pipe Trays
13	Live Fish Transport Tanks	26	GFRP Light Truss Bridge
14	GRP Oxygen Cone	27	Contact Us
15	Oxygen Cone — Dimensions		

■ GENERAL INFORMATION

Our molded tanks are developed for corrosive applications where light weight, free maintenance, corrosion resistance and an eco-friendly tank are required.

CONTACT MOLDED TANK

Open molding is the most flexible of all composite fabrication processes. Part size and design options are virtually limitless — ideal for very complex parts, or parts produced in low volumes that cannot justify higher automated mold costs.



QUALITY MANUFACTURED PRODUCT

Our factory is an ISO 9001:2015 certified company. The tanks are manufactured complying with BS 4994 and BS EN 13121-3 standards.

Every tank is subjected to a number of quality-assurance inspections. Complete traceability of resin batches and glass is maintained and can be provided as needed. Chemical-resistance tests and hydrostatic water tests are routinely performed.

■ CONTACT MOLDING & VACUUM INFUSION

The open-mold process uses a surface coating called a gelcoat, applied directly to the mold by spray or manual application, giving a high-quality, durable surface. The back-up reinforcement and binder resin are then applied. Entrapped air is removed from the resin/reinforcement mixture, and additional laminate layers are added to build thickness and strength as required.



VACUUM INFUSED MODULAR TANK

For large tanks of dia 10.0 m and above, vacuum infusion is a major step up in structural quality.

Zero Osmosis Risk (void-free laminate): hand lay-up gives 5–10% air voids that can catch water, trigger osmotic blistering and harbor bacteria. Vacuum infusion drops voids to under 1%.

High Glass-to-Resin Ratio: infusion yields a tighter laminate (60–65% glass / 35–40% resin by weight), increasing tensile strength and allowing thinner, lighter walls that handle hydrostatic loads.



■ IMPORTANT FEATURES



1. Corrosion Resistant

Resistant to sea water from -40°F to 300°F. Unlike steel or concrete, GRP needs no coating. Corrosion resistance comes from the gelcoat/polyester resin, enhanced by a chemical-resistant surface veil on the inner liner in contact with sea water.



2. Light Weight

GRP weighs 1/3 the weight of steel, resulting in lower installation cost.



3. Expansion & Contraction

Concrete expands and contracts, causing corrosion and cracks over time. Fiberglass does not expand or contract.



4. Maintenance Free

GRP does not require any blasting or coating.



5. Low Thermal Conductivity

Very low compared to steel (240 times less) — excellent for chilled-water applications. Insulation cost for GRP is much less than for steel.

GRP is engineered for the punishing conditions of aquaculture — *constant water contact, temperature swings, and biological exposure* — while remaining *lightweight and virtually maintenance-free*.



■ IMPORTANT FEATURES (CONT.)



6. Bacteria & Algae Resistance

A smooth, non-porous interior combats bacteria accumulation and algae. The fish-friendly surface eliminates fin and scale damage; mounds and solids move quickly to the drains, helping maintain optimal water quality.



7. Microbial Induced Corrosion

Fiberglass resists hydrogen sulfide, which creates sulfuric acid — a common cause of deterioration in concrete (MIC).



8. Installation Time

Fiberglass tanks can be transported on a single truck and delivered to site as a finished product, making installation easier and faster.



9. Water Quality

Genuine food-grade material, suitable for aquaculture application.

Engineered to the same rigorous standards across every product in the Leadergrate GFRP range.

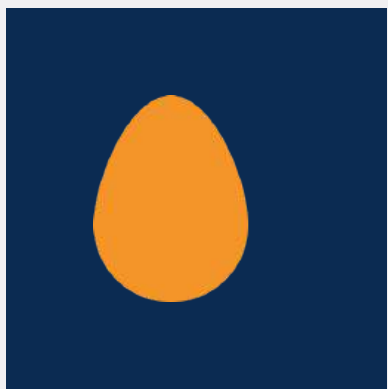


■ AREA OF APPLICATIONS

Our Aquaculture GFRP Tanks systems are designed to accommodate a wide variety of applications, such as: Fish Hatcheries.



Fish Farm (Land Base)



Fish Hatcheries



Government Marine Research Institute



Laboratory at University



Public Aquarium & Underwater Zoo



Theme & Water Parks

Every installation is engineered to project-specific requirements — *size, capacity, water chemistry and site conditions.*

■ INTRODUCTION TO HATCHERY

BIOLOGY & LIFE HISTORY

Gilthead Seabream

Sparus aurata is a perciform fish of the family Sparidae, genus *Sparus*. Breeding season ranges from October to December.

It is a functional male in the first two years and, at sizes over 30 cm, becomes female. After spawning, the spherical transparent eggs (slightly under 1 mm) each present a single large oil droplet.



European Seabass

Dicentrarchus labrax is a perciform fish of the Moronidae family, genus *Dicentrarchus* — a predator consuming small fish and invertebrates.

Sexes are separate; there is one breeding season per year, in winter (December to March) in the Mediterranean. Spent females are replaced by new breeders as new egg batches are required.



■ LIVE FOOD FOR MARINE FISH LARVAE

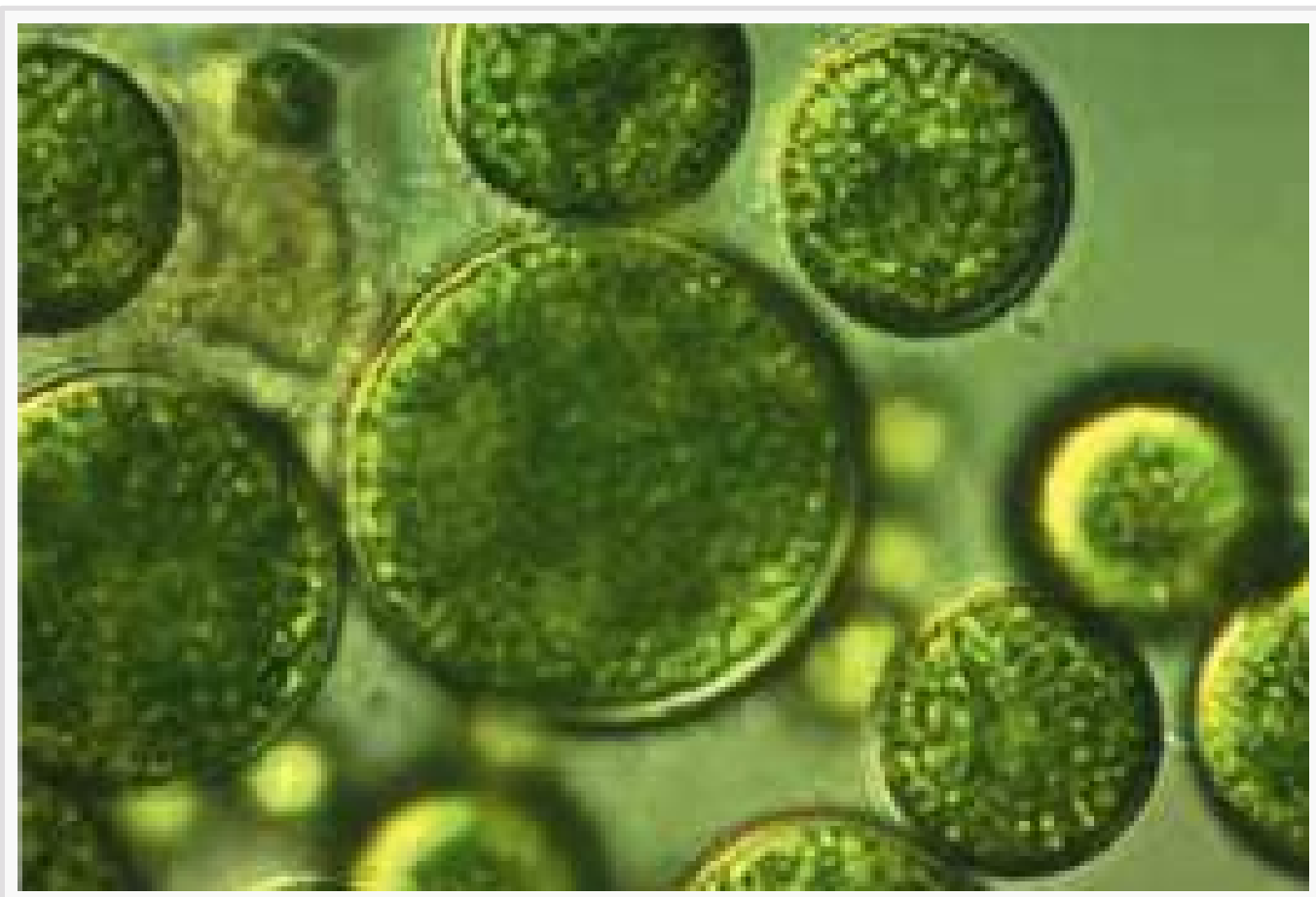
The timely, adequate supply of high-quality live food is essential in rearing the early larval stages of many marine organisms.

Rotifer Use in Aquaculture



An excellent first food for larval marine fish — small size, slow swimming speed, staying suspended in the water column, high fertility and salinity tolerance.

Microalgae



Large rotifer production requires parallel marine microalgae (phytoplankton) on which rotifers feed. Selected species also act as an immunological stimulus and water-quality conditioner.

Artemia Use in Aquaculture



As larvae grow, rotifers are gradually replaced by larger freshly-hatched nauplii of brine shrimp (*Artemia salina*), which protect against dehydration and extreme temperature/salinity.

■ HATCHERY- BROODSTOCK & REARING

Broodstock

Any hatchery should secure a reliable and sufficient supply of good quality fish eggs. Most Mediterranean hatcheries have established their own broodstock units, where breeders of different age groups are kept under long-term stocking. Post sex-reversal, gilthead seabream can lay 20,000–80,000 eggs daily for up to four months. In seabass, the optimal age for female parent fish is between 5 and 8 years, whereas for males this range is 2-4 years.



Weaning System

Metamorphosed fish (45 days old) grow to 2–3 g and become fingerlings. Weaning uses large round or rectangular fiberglass tanks of 10–25 m³. Biomass becomes significant, reaching up to 20 kg/m³.



Larval Rearing System

The first 4–6 weeks of seabass and gilthead seabream life are spent in a dedicated larval rearing unit — commonly round fiberglass tanks of 6 to 10 m³ each.



Fry Transport

At 2–5 g, weaned fry leave the hatchery for pre-growing tanks or floating cages. Trucks carry several insulated rectangular closed fiberglass tanks of 1600–2400 L with an oxygen supply system.



■ GRP ARTEMIA / ROTIFIER TANKS

The early life stages of seabass and gilthead seabream are zooplankton feeders. Successful rearing depends on high-quality live feeds — rotifers (fed on unicellular algae) and brine shrimp (*Artemia* spp). Mediterranean hatcheries use circular fiberglass tanks with a smooth, glossy NPG gelcoat interior (1–10 m³). A round tank with conical bottom is widely adopted for good circulation and particle sedimentation.



GRP Egg Incubation Tanks

Round tanks with conical bottom and 100–250 L capacity — the most common hatchery solution. The cylindro-conical shape gives good circulation and separates non-viable eggs and debris.

GRP Live Food Holding Tank (Insulated)

Thermally-insulated round fiberglass tanks with a conical bottom — the most common technical solution adopted by hatcheries for holding live food.



■ CULTURE CIRCULAR & RECTANGULAR TANKS

Circular Tanks

Fiberglass circular fish-culture tanks come in various sizes — sectional or one-piece, with or without pedestals. Reinforced top lip and conical bottom. The smooth, gel-coated interior eliminates fin and scale damage, which can increase susceptibility to infection. Walls are slightly tapered to allow nesting for economical shipping.



Rectangular Tanks

Fiberglass rectangular fish-culture tanks come in various sizes, one-piece, with or without pedestals. Reinforced top lip and a bottom sloped toward the drain. The smooth, gel-coated interior eliminates fin and scale damage, which can increase susceptibility to infection. Walls are slightly tapered to allow nesting for economical shipping.



■ GRP LIVE FISH TRANSPORT TANKS

The basin of the live-fish transport tank is made from fiberglass insulated with 50 mm polyurethane and S. steel internal reinforcement. The internal surface is a glossy NPG gelcoat, smooth with no sharp edges at internal corners.

The outlet can be a large ball valve or a sealed removable gate. Additional accessories such as outlet chutes are available.

The upper lid can be flat or with an air chamber. Top surfaces are anti-slip, allowing staff to stand on the roof for servicing.



■ GRP OXYGEN CONE

Our oxygen cones mix oxygen into the water. The shape makes saturation efficiency very high — up to 95%. Water and oxygen enter the cone top at high speed; the stream pushes oxygen bubbles down until fully dissolved. 25 mg/L of dissolved oxygen is reachable at 1 bar G. At higher pressure, water becomes supersaturated and should be blended with the main stream to prevent oxygen intoxication.

PERFORMANCE

Model	Max Flow (l/min)	O2 @1bar (kg/h)	O2 @1.5bar (kg/h)
LG-OC 30	500	0.8	1.2
LG-OC 60	1000	1.6	2.4
LG-OC 90	1500	2.5	3.6
LG-OC 110	1833	3.1	4.4
LG-OC 140	2333	3.8	5.6

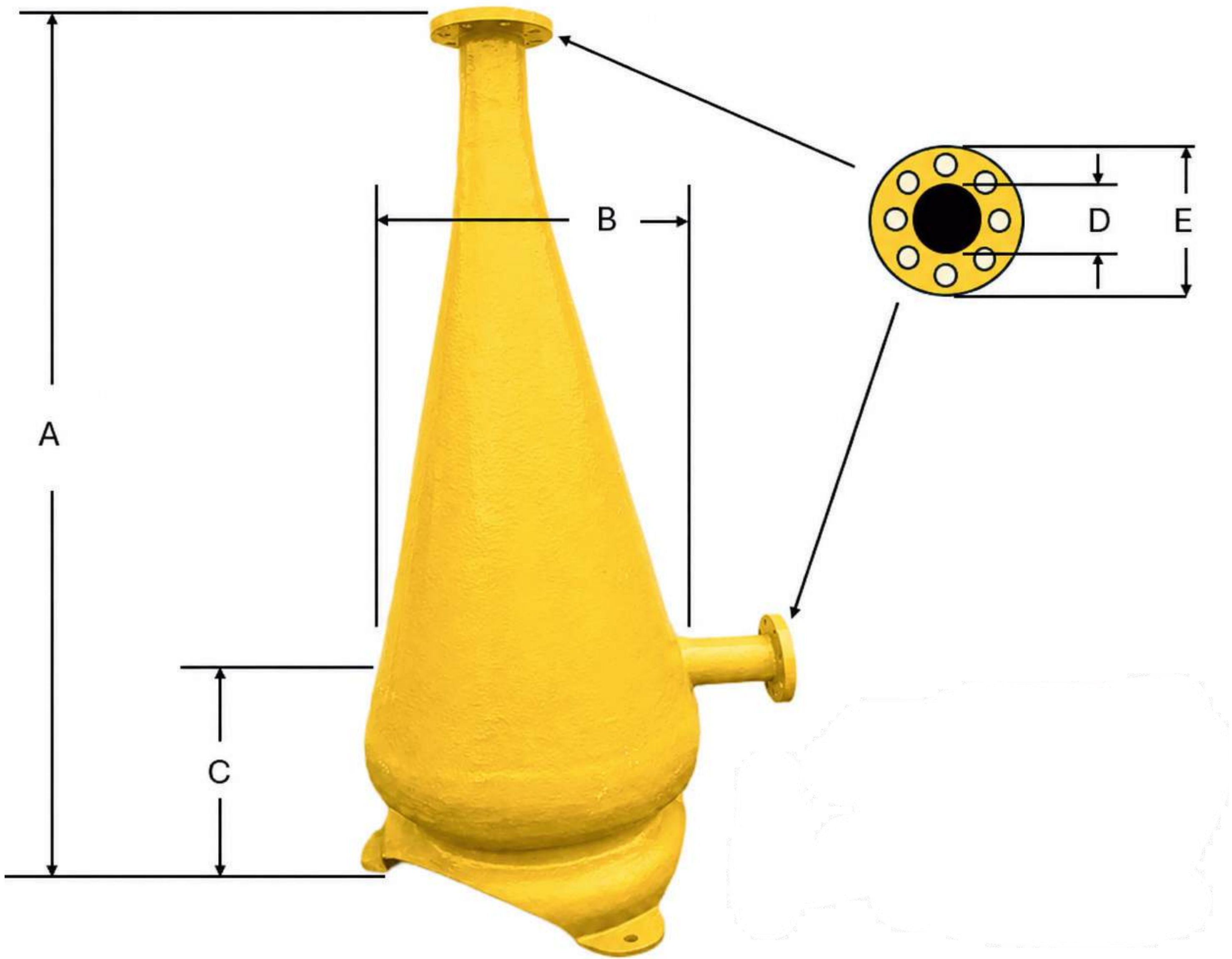
Design pressure	1.5 · 2 · 4 bar G
Material	Glass fiber
Saturation efficiency	95 %



■ OXYGEN CONE – DIMENSIONS

Model	Wt (kg)	A	B	C	Flange
LG-OC 30	27	172	60	36	DN100
LG-OC 60	52	219	80	42	DN100
LG-OC 90	57	220	90	47	DN125
LG-OC 110	61	270	100	49	DN125
LG-OC 140	61	270	100	49	DN125

DIMENSION REFERENCE SKETCH



■ GRP FISH SORTING CRADLE

The fish sorting cradle is used for manually sorting larger fish from smaller (8 to 110 g). It is equipped with a range of PVC pipes with slots varying from 1.5 mm to 16 mm. Two types are available: Type A (Standard) and Type B (Floating).



Model	Width (mm)	Length (mm)	Height (mm)	Slot Size
LG-CSM–G1.5	524	630	395	1.5 x 135
LG-CSM–G2.0	524	630	395	2.0 x 135
LG-CSM–G2.5	524	630	395	2.5 x 135
LG-CSM–G3.0	524	630	395	3.0 x 135
LG-CSM–G3.5	524	630	395	3.5 x 135
LG-CSM–G4.0	524	630	395	4.0 x 135
LG-CSM–G5.0	524	630	395	5.0 x 135
LG-CSM–G6.0	524	630	395	6.0 x 135

■ LAND-BASE FARMING WITH RAS

In conventional aquaculture — land or sea based — living conditions depend on flow-through of clean, unused water from freshwater sources or coastal currents. Flow-through and open culture have benefits, but also depend on ample high-quality water and are exposed to seasonal variation, pathogens and parasites, disease spread, medicinal residues, and fish escape into the environment.

A traditional flow-through system for trout uses around 30 m^3 of fresh water per kilo of fish per year — a 500-ton farm needs about $1,712 \text{ m}^3/\text{h}$. New super-intensive RAS farms inside a closed insulated building use as little as 300 litres per kilo per year, equivalent to just $17.12 \text{ m}^3/\text{h}$ for the same example.

30 m^3

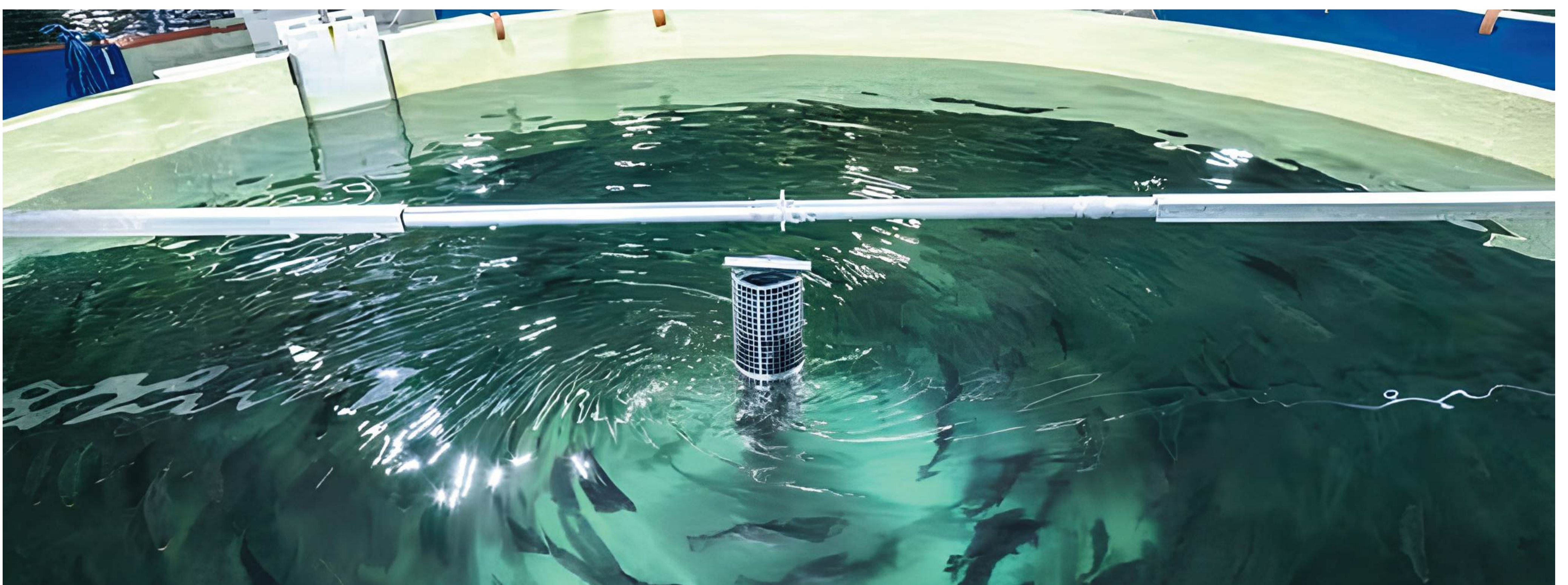
fresh water / kg / yr — flow-through

$1,712 \text{ m}^3/\text{h}$

new water · 500-ton flow-through farm

$17.12 \text{ m}^3/\text{h}$

new water · same farm with RAS



■ RAS — SET-UP & ADVANTAGES

Effluent water leaving the rearing tanks is treated and refreshed before returning to the tanks, radically reducing external water requirements.

SET-UP MUST ADDRESS

- Control of intake water
- Tight biosafety to prevent disease proliferation
- Continuous removal of dead fish and dissolved solids
- Removal of nitrogen wastes (bio-filtration)
- Management of dissolved gases (O₂, CO₂, N₂)
- Management of pH, alkalinity and temperature
- Monitoring and control systems

THE ADVANTAGES

- Farming in a controlled environment
- Flexibility in choosing inland locations
- Flexibility in choosing species
- Farming with high fish density
- Water conservation — only 5–10% exchange per day
- Waste and nutrient utilization for energy, aquaponics and feed



**Environmental
Advantages**



**Economic
Benefits**



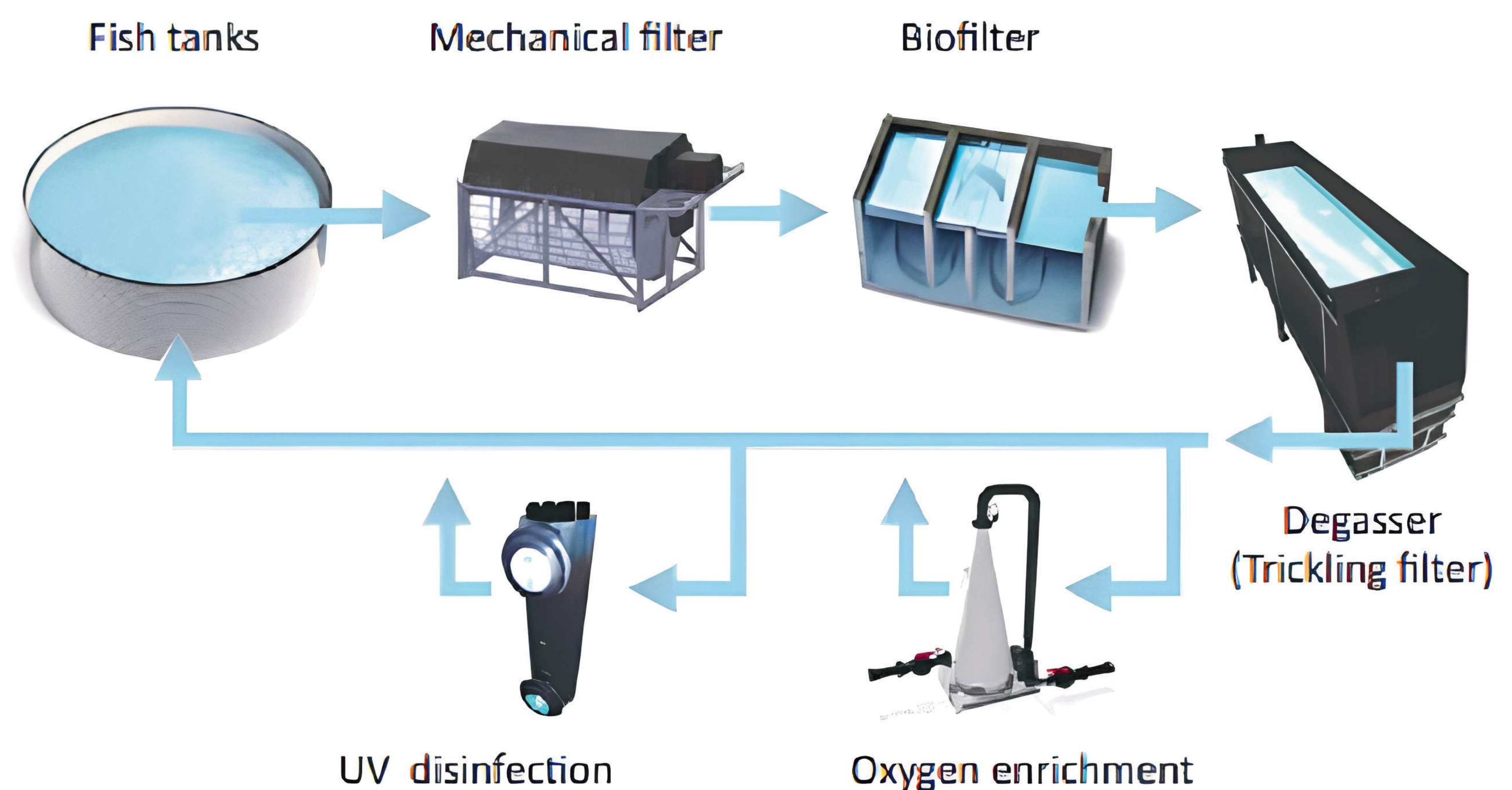
**Biosecurity
and Disease
Control**

■ RAS SYSTEM EQUIPMENT

All modern RAS systems generally include the following components:

- Pump
- Solids collection (rotating drum filter)
- GFRP CO₂ degasser
- UV sterilization points
- Temperature control (heat pump / cooling)
- Oxygen injection system
- GFRP Bio-filter
- Foam fractionation / protein skimmer
- Nitrate filter
- Tank drainage separating wastes
- Heat exchange of effluent waters
- pH control & alkalinity dosing

Principle: water flows from the tank outlet to a mechanical filter, then a biological filter, before being aerated, stripped of CO₂ and returned to the tanks. Options such as pure-oxygen dosing, UV/ozone disinfection, automatic pH regulation, heat exchange and denitrification are added per requirement.



■ GFRP FISH TANKS FOR RAS

The environment in the fish rearing tank must meet the needs of the fish, both in respect of water quality and tank design. Choosing the right tank design, such as size and shape, water depth, self-cleaning ability, etc. can have a considerable impact on the performance of the species reared. Tank outlets must be constructed for optimal removal of waste particles and fitted with screens with suitable mesh sizes. Also, it must be easy to collect dead fish during the daily work routines. Tanks are often fitted with sensors for water level, oxygen content and temperature for having complete control of the farm. It should also be considered to install diffusers for supplying oxygen directly into each tank in case of an emergency situation.

Circular Tank

Water moves in a circular pattern; organic particles have a short residence time, giving a self-cleaning effect.



Raceway Tank

Self-cleaning depends on fish activity. Bottom inclination eases draining. Oxygen is higher at inlet, lower at outlet.



D-Ended Tank

A hybrid 'D-ended raceway' combining the self-cleaning effect of the circular tank with efficient space utilization.



TANK PROPERTIES COMPARISON

Relative performance of the three GRP tank geometries across key operating properties.

GRP Tank Properties	Circular Tank	D-Ended Raceway	Raceway Tank
Self-cleaning effect	Very good	Good	Average
Low residence time of particles	Very good	Good	Average
Oxygen control	Very good	Very good	Good
Space utilization	Poor	Good	Very good

Circular Tank



D-Ended Raceway



Raceway Tank

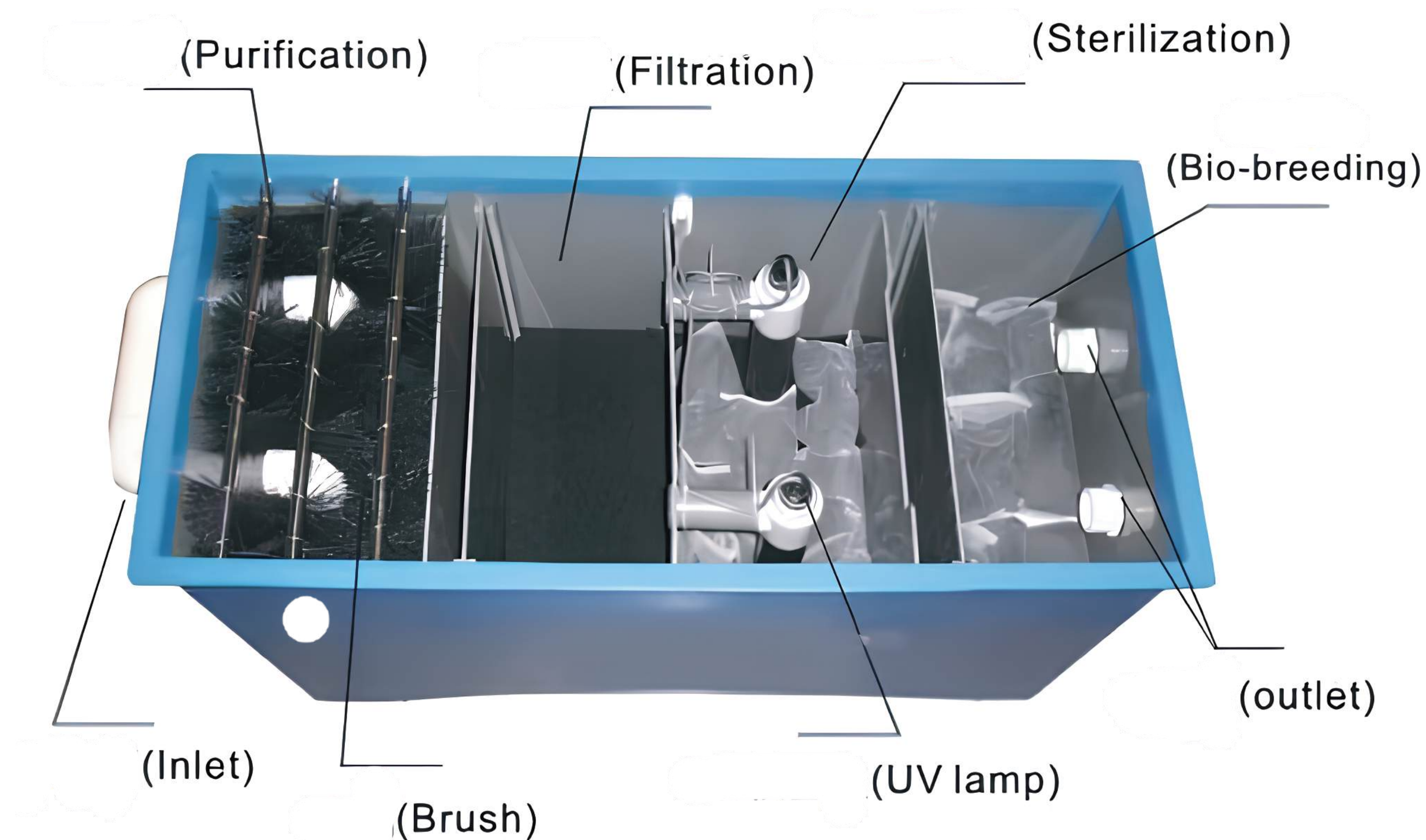


■ GFRP BIO-FILTER TANKS

Fish excrete ammonia (NH_3) via the gills and urea via urine — both dissolve in water, and urea also forms ammonia, harmful even at low concentrations. In RAS, biological filters convert ammonia in two steps: ammonia-oxidizing bacteria turn NH_3 into nitrite (NO_2^-), then nitrite-oxidizing bacteria convert it into relatively harmless nitrate (NO_3^-) — the end product of nitrification.

The oxidation of reduced nitrogen (NH_3) by bacteria is a natural process known as nitrification. Once established, biofiltration can continuously provide necessary nitrification for a recirculation unit without much maintenance, if the four requirements below are provided.

Of the four requirements of nitrification, fish supply the ammonia, of course, and the aqua culturist monitors pH and adds sodium bicarbonate as necessary. The design of the biofilter provides the surface area for colonization and it may help supply the oxygen, as well. Biofilters must also be self-cleaning, that is they must not clog as the bacteria proliferate. Surface area is created in all biofilters with inert media.



Nitrification Requires

- Ammonia — the 'food' that is oxidized
- Oxygen — combined with ammonia for energy
- Substrate for the bacteria to adhere to in order to maintain a sufficient biomass
- A pH greater than 7, which the bacteria require

Two Classes of Biofilter

As for oxygen, there are two classes of biofilter. Air-diffusion type — Rotating Biological Contactors (RBC's) and trickle filters lift wet media into the air; the vast surface area for bacteria is also used for diffusion of oxygen. Submerged type — the media stays submerged and all oxygen for nitrification must come from the water, increasing the demand on the system's gas exchange mechanism. Bead filters and suspended bed filters are examples.

■ GFRP DEGASSIFIER TANKS

When fish consume oxygen, CO₂ is released into the water. Excessive carbon-dioxide levels can negatively influence fish growth or even be lethal. It is therefore important that CO₂ is efficiently removed (degassed) from the culture water.

Why Degassing Matters

- Removes dissolved CO₂ from culture water
- Prevents growth suppression in fish
- Avoids lethal carbon-dioxide build-up
- Maintains healthy water chemistry



■ GFRP WALKWAYS & STAIRCASES

Fiberglass walkways are increasingly used as a durable alternative to conventional steel, with rising demand across aquaculture environments. A GRP walkway is a fully adjustable modular system assembled to meet the specific needs of an aqua culturist — comprising GRP beam profiles, column profiles, mini-mesh grating and handrails.

Standards

GRP walkways are made of isophthalic polyester (ISO-FR) profiles. Complies with EN-ISO 14122-3. Anti-slip guaranteed by the concave grating surface (ASTM E303, ASTM E-84).

Advantages

- Corrosion-resistant
- Fire-retardant
- Durable
- Anti-slip
- Lightweight (1/3 of steel)
- Maintenance-free
- Not electrically conductive
- Easy & quick installation



■ GFRP CABLE TRAYS & PIPE TRAYS

A non-magnetic, non-conductive and corrosion-free lightweight alternative to metallic systems, with a superior strength-to-weight ratio. GRP is maintenance-free, requires no periodic upkeep, and meets regulatory requirements for flame rating, propagation and self-extinguishing properties. Materials conform to NEMA FG1, BS 476 Part 6, ASTM E-184, ASTM D635 and IEC 60754-1.

Advantages

- Corrosion resistance for aquaculture
- Lightweight — easy to move and place
- Excellent electrical insulation
- Very high strength-to-weight ratio
- No earthing required
- Very low thermal conductivity
- U.V. resistant
- Impact resistant — no permanent deflection
- Non-toxic
- Easy to install
- Long life cycle



■ GFRP LIGHT TRUSS BRIDGE

Using GRP light-truss bridges over large concrete aquaculture tanks is an excellent choice. Aquaculture environments are notoriously harsh — highly humid, often saline and sometimes chemical-heavy which make traditional steel or wood prone to rapid degradation. GRP solves these durability issues while remaining lightweight enough to span large distances without requiring heavy expensive structural supports.

Key Benefits

- GRP has a very high strength to weight ratio — about 75% lighter than steel and 30% lighter than aluminum.
- Low bearing load: it places minimal dead-load stress on the walls of the concrete tanks.
- No heavy cranes: the truss can often be pre-assembled off site and lifted into place using light truck cranes or manual rigging, reducing installation cost.



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