FIBREGLASS STORAGE TANKS FOR ALL INDUSTRIES
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6  •  Choice of Tank

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LG molded, Filament wound and hot pressed tanks are developed for corrosive applications where Light weight, free maintenance, corrosion resistant and Eco friendly tank are required.

**Quality Manufactured Product**

*Leadergrate is an ISO 9001 certified company, The tanks are manufactured complying with ASME RTP-1, ASTM D3299, ASTM D4097, BS 4994, BS EN 13280 standards. Every tank is subjected to a number of quality assurance inspections. Complete traceability of resin batches and the glass is maintained and can be provided as needed. Chemical resistant tests and hydrostatic water tests are routinely performed.*

**Filament Wound Tank**

Continuous, resin-impregnated fibers or roving are wound on a rotating mandrel in a predetermined pattern, providing maximum control over fiber placement and uniformity of structure. In the wet method, the fiber picks up the low-viscosity resin either by passing through a trough or from a metered application system. In the dry method, the reinforcement is impregnated with resin prior to winding.

**Contact Molded Tank**

Open Molding is the most flexible of all composite fabrication processes. Part size and design options are virtually limitless for open molded parts. Typically, the open molding process is used for very complex parts that cannot be produced in more automated processes, or for parts that are produced in low volumes and cannot justify the higher mold costs of the automated processes. The open mold process frequently utilizes a surface coating called a gelcoat or topcoat. The gelcoat is applied directly to the mold using a spray process or manual which results in a high quality durable surface. After the coating is applied, the back-up reinforcement and binder resin is applied, either by spray or manual application. Entrapped air is removed from the resin/reinforcement mixtures, and additional layers of laminate are added to build thickness and strength as desired.

**Hot Pressed Tank**

The high-pressure molding process produces high strength, complex parts in a wide variety of sizes. Matched metal molds are mounted in a hydraulic or mechanical molding press. The material charge of choice is placed by robotics or hand in the open mold, the heated mold halves are closed, and pressure up to 2,000psi (137 bars) is applied. Cycle time, depending on part size and thickness, ranges from one to five minutes. Features such as ribs, bosses, inserts and attachments can be molded in. Compression-molded composites are characterized by net size and shape, two excellent finished surfaces, and outstanding part-to-part repeatability. Trimming and finishing costs are minimal.
1 **Corrosion Resistant** Resistant to more than 1000 chemicals and combination of chemicals from 5 °C to 150 °C. Unlike Steel or concrete, GRP does not require coating. The corrosion resistance is achieved by the choice of the resin and is enhanced by adding chemical resistant surface veil to the inner Liner in contact with chemicals.

2 **Light weight** GRP weighs 1/3 the weight of steel, resulting in lower installations cost.

3 **Expansion and 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 application. Hence the cost of insulation for GRP is much less than for the steel.

6 **Bacteria and Algae resistance** Fiberglass has a smooth interior finish and is not porous making it a perfect environment to combat bacteria accumulation and algae from forming.

7 **Microbial Induced Corrosion (MIC)** Fiberglass is resistant to hydrogen sulfide which creates sulfuric acid, a common cause of deterioration in concrete.

8 **Installation time** Fiberglass tanks can be transported on a single truck and are delivered to the site. As a finished product making installation easier and faster.

9 **Water Quality** Genuine food grade material, suitable for drinking water application.
LEADERGRATE Tanks systems are designed to accommodate a wide variety of applications, such as:

» Chemical vertical aboveground storage tanks for Desalination plants, chemical plants, STP.
» Scrubbers vertical vessels for Odor Control plants.
» Oil Water cylindrical vertical tanks for Petrochemical plants.
» Chilled water tanks for District cooling plants.
» Diesel & Fuel Underground horizontal tanks for petrol stations.
» Irrigation underground horizontal tanks for landscaping projects.
» Sewage holding underground horizontal tanks for villas, labor camps.
» Domestic Underground horizontal cylindrical tanks for villas, labor camps.
» Brine Underground horizontal tanks for RO plants & Oil Drilling.
» Fishery above ground vertical cylindrical tanks for Aquaculture hatchery project.
» Fishery above ground horizontal rectangular tanks for Aquaculture hatchery project.
» Fire fighting above ground Sectional tank for Residential, commercial Bldgs, factories & showrooms.
» Domestic above ground Sectional domestic tank for Residential, commercial Bldgs, hotels & Hospitals.
» Irrigation above ground Sectional water tank for Residential, commercial Bldgs, hotels & hospitals.
» Purified water sectional water tank for hospitals.
» Chlorinated water sectional water tank for swimming pools.
CHOICE OF RAW MATERIAL

Resins can be divided into two broad classes:

**THERMOSETTING AND THERMOPLASTIC.**

**THERMOPLASTIC** resins have a definite melting point, whereas thermosetting resins cure to produce an infusible solid material that does not melt when heated. They soften, but they do not liquefy.

**THERMOSETTING** resins used for GRP are typically purchased in liquid form and are reacted to a solid with chemical additives. The most commonly used thermosetting resin systems:

- Vinyl ester
- Bisphenol-A fumarate polyester
- Terephthalic polyester
- Isophthalic polyester
- Orthophthalic polyester

Information can be provided on the recommended resins, ranging from orthophthalic polyester resins (which have good resistance to acidic conditions) to the improved resistance of isophthalic polyester resins. Also available are the more sophisticated and expensive bisphenol modified resins and vinyl ester resins, which are designed for exceptional all-round chemical resistance.
The following table is included as a guide to help in choosing the best tank for a particular application:

<table>
<thead>
<tr>
<th>APPLICATION TYPE</th>
<th>Molded tank</th>
<th>Filament wound Cylindrical tank</th>
<th>Sectional Hot pressed rectangular tank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drinking water</td>
<td>Good</td>
<td>Excellent</td>
<td>Excellent</td>
</tr>
<tr>
<td>Sewage, Effluent</td>
<td>Good</td>
<td>Excellent</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>Excellent</td>
<td>Average</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Sea water</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Good *</td>
</tr>
<tr>
<td>Chemicals</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Diesel / Fuel</td>
<td>Good</td>
<td>Excellent</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Underground</td>
<td>Good</td>
<td>Excellent</td>
<td>Not recommended</td>
</tr>
<tr>
<td>Fire fighting</td>
<td>Good</td>
<td>Excellent</td>
<td>Good **</td>
</tr>
<tr>
<td>Irrigation TSE water</td>
<td>Good</td>
<td>Excellent</td>
<td>Average ***</td>
</tr>
<tr>
<td>Chilled water</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Good</td>
</tr>
<tr>
<td>Odor control</td>
<td>Good</td>
<td>Excellent</td>
<td>Good</td>
</tr>
<tr>
<td>Biological reactor</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Average</td>
</tr>
<tr>
<td>Irregular L, U shape in confined space like mechanical floor, parking, pump room</td>
<td>Not recommended</td>
<td>Not applicable</td>
<td>Excellent</td>
</tr>
<tr>
<td>Elevated towers</td>
<td>Average</td>
<td>Good</td>
<td>Excellent</td>
</tr>
<tr>
<td>Islands or seaside</td>
<td>Good</td>
<td>Excellent</td>
<td>Average</td>
</tr>
</tbody>
</table>

* - for sea water application, tank shall be reinforced externally. SS shall be strictly not allowed inside the tank.

**- for fire fighting application, customer shall ensure water is never stagnant inside the tank as it becomes very corrosive. Water shall be circulated min 8 hours / day. It is always recommended to have a combined system Domestic & fire fighting application.

*** For irrigation tank, TSE water can contain high content of TDS, Chloride and even bacteria which can speed up the corrosion rate of internal SS reinforcement. Regular maintenance 1 every 3 months is required for internal components of the tanks. In case of internal corrosion, water treatment should be provided.
The sectional tank panels are hot press moulded in glass reinforced plastics (GRP) using isophthalic unsaturated polyester resins and electrical glass fiber reinforcement.

The panels are moulded at temperatures up to 150°C under strict quality control disciplines. The process results in strong, consistent panels which are fully cured, dimensionally accurate with sharply defined profiles and smooth surfaces on both faces. Drilling and finishing of the panels is undertaken in a purpose built controlled area, where high technology automated drilling equipment is used to complete production to exacting tolerance levels.
**GRP ABOVEGROUND SECTIONAL TANKS**

**FEATURES**

- **INTERNATIONAL STANDARD:**
  Manufactured to international standard BS 4791, SS245 :1995, BS EN 13280, BS 6920.

- **FREE CAPACITY DESIGN:**
  Sectional tanks fit into any limited space as its structure utilizes horizontal and vertical spaces at the maximum through the use of diverse sizes of panels: 1mx1m, 1mx0.5m, 1mx0.3m, 0.5mx0.3m, 1mx1.5m, 0.5mx1.5m, 1mx2m, 0.5mx2m.

- **EASY & FAST CONSTRUCTION:**
  The standardized panels and accessories improve the economical and operational efficiency in the transportation and construction.

- **RELIABLE QUALITY IN STRENGTH & DURABILITY:**
  A structure analysis has been carried out based on the F.E.M (Finite Element Method) to pursue an optimal design and thus secure reliability for the strength of the reinforcement system and panels.

- **BEST HYGIENIC PROPERTIES:**
  The WRAS certified GRP panels, of which surface is uniformly smooth without getting any sediment, and prevent the growth of any algae and fungi by blocking light transmission.

- **WATER TIGHTNESS:**
  The joints of each panel are perfectly sealed with sealing tape which has good weathering resistance and restorative ability.

- **COMPLETE DRAINAGE:**
  The dome shaped bottom panels with a concave drain panel facilitate complete and fast drainage.

- **SPECIAL SHAPE:**
  Irregular shapes are possible especially in mechanical floors and basement, where columns and walls become an obstacle. The possible shapes are: Rectangular, square, L shape, U shape, Z shape, Hollow shape around concrete column.
OUTSTANDING THERMAL EFFECT:

The heat insulation panel with 3-layers (SMC+PU+GRP cover) structure protects dew condensation and minimizes temperature variation of the stored water. The insulation provides U value of 0.6W/m²K, CFC and HCFC free.

CAPACITIES: 1 M³ To 10,000 M³

COMPOSITION OF WALL PANELS PER HEIGHTS:
**GRP ABOVEGROUND SECTIONAL TANKS**

**ACCESSORIES OF TANK:**

- **TANK FOUNDATIONS:**

- **SKID FRAME:**

  The tank leveling is achieved by a bottom skid frame made from MS galvanized beams, fixed on the concrete beams foundation and below the tank bottom panels.

- **GRP ACCESS MANWAY COVER:**

  Man access 600mm diameter hinged or lift off lockable SMC lid.

- **GRP ACCESS LADDERS:**

  All tanks deeper than 1.5m shall be fitted to client requirements with internal stainless or GRP and external standard GRP or GI access ladders: to BS4211 with hooped safety cage.
• **LEVEL INDICATOR**: All tanks deeper than 1.5m shall be fitted to client requirements with glass clear tube level indicator or with mechanical type level indicator.

• **GRP ROOF SUPPORT**: The roof panels support are made from GRP pultruded vertical SQ tube.

![Glass clear tube level indicator](image1)  ![Mechanical type level indicator](image2)

• **TOP ROOF GI SAFETY HANDRAIL**: The GI handrail should be considered to meet particular contract needs.

![GRP Aboveground Sectional Tanks](image3)
• NAME PLATE AND MAINTENANCE INSTRUCTION BOARD:

A name plate will be fixed on the tank with following min details:

• Manufacturing date
• Warranty expiry date
• Net capacity of tank
• Tank dimensions
• Design temp
• Testing date

A maintenance board will be fixed on the tank with following instructions:

• Cleaning frequency.
• Water parameters.
• Inspection procedures.
• Repair procedures for leakages.
• Emergency contact details for supplier.

• VORTEX INHIBITOR:

Fire fighting water tanks require a large, fast flowing volume of water with a vortex inhibitor playing a key role in preventing air being drawn into the system and reducing the flow. Vortex inhibitors are fitted to the outlet pipe of the pumped water system.

• FLOAT VALVE CHAMBER:

Float valve chambers can be provided with central hinged or lift off lockable SMC lid, with options of 180mm, 300mm and 500mm depth, where appropriate provision for type AB air gap compliance with BSEN13077:2008.
• PIPE CONNECTIONS:

Connections can be supplied as PVC or GRP flanged stools to BS4504 standards, or, for small pipework, screwed sockets to BS1387. The connections are inlet, outlet, overflow, drain, balancing line, Re-circulation, return & test line (Fire fighting).
VARIOUS STANDARD MOULD CONFIGURATIONS ARE AVAILABLE IN:

- Circular Tanks
- Rectangular Storage Tanks
- Conical Bottom Tanks

Circular Fiberglass Aquaculture Tanks
Circular fiberglass aquaculture tanks are designed and built with the customer in mind. Every tank goes through a 4 set process when being fabricated; Gel-Coating, Skim Coating, Main Lay-up and Installation of Accessories. Each step along the way is documented to ensure a high quality tank is being produced. Material batch numbers, cure times, room temperatures and thickness of parts are recorded and filled.

For large diameter > 4.5 m, the tank is manufactured on site in one piece and the floor is laminated insitu, after placing the concrete screed on the floor with 2 degrees slop.
Rectangular Aquaculture Tanks

Our fiberglass tanks are rigid, durable, easy to clean and good looking. These high-quality tanks are constructed of FDA-approved materials and feature smooth gel coat interiors and light gray or white exteriors (custom colors available in quantity). The top lip is reinforced for strength. Fiberglass tanks are often preferred for long-term use because of their rigid durability. Rectangular tanks can come with PVC fitting in a variety of sizes for plumbing and clean out connections.

Free standing Conical Bottom Aquaculture Tanks

These tanks have the same features as the circular flat-bottom tanks and rectangular tanks with an added bonus – the bottom is cone shaped for total drainage, this allows easy clean-up for operators. These tanks must be supported with some type of stand, usually of PVC or GRP.
## DIFFERENT TYPES OF FISH TANKS

### GRP FREE STANDING FISH TANK

<table>
<thead>
<tr>
<th>Ref</th>
<th>Capacity</th>
<th>A(mm)</th>
<th>B(mm)</th>
<th>C(mm)</th>
<th>D(mm)</th>
<th>Empty Wt of tank</th>
<th>Full Wt of tank</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGFST-1</td>
<td>1 m³</td>
<td>1200</td>
<td>1000</td>
<td>870</td>
<td>1870</td>
<td>78 Kg</td>
<td>1,078 Kg</td>
<td>As per Client Request</td>
</tr>
<tr>
<td>LGFST-1A</td>
<td>1 m³</td>
<td>1200</td>
<td>700</td>
<td>870</td>
<td>1570</td>
<td>60 Kg</td>
<td>1,060 Kg</td>
<td>As per Client Request</td>
</tr>
<tr>
<td>LGFST-2.3</td>
<td>2.3 m³</td>
<td>1500</td>
<td>1300</td>
<td>870</td>
<td>2170</td>
<td>119 Kg</td>
<td>2,419 Kg</td>
<td>As per Client Request</td>
</tr>
<tr>
<td>LGFST-3</td>
<td>3 m³</td>
<td>1750</td>
<td>1300</td>
<td>870</td>
<td>2170</td>
<td>155 Kg</td>
<td>3,155 Kg</td>
<td>As per Client Request</td>
</tr>
</tbody>
</table>

### GRP FREE STANDING FISH TANK

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<th>Empty Wt of tank</th>
<th>Full Wt of tank</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGFST-5</td>
<td>5 m³</td>
<td>2400</td>
<td>1100</td>
<td>1483</td>
<td>400</td>
<td>550</td>
<td>203 Kg</td>
<td>5,203 Kg</td>
<td>As per Client Request</td>
</tr>
<tr>
<td>LGFST-12.5</td>
<td>12.5 m³</td>
<td>3500</td>
<td>1400</td>
<td>1783</td>
<td>500</td>
<td>800</td>
<td>368 Kg</td>
<td>12,868 Kg</td>
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</table>

### GRP IN SITU FISH TANK

<table>
<thead>
<tr>
<th>Ref</th>
<th>Capacity</th>
<th>A(mm)</th>
<th>B(mm)</th>
<th>C(mm)</th>
<th>D(mm)</th>
<th>Empty Wt of tank</th>
<th>Full Wt of tank</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>LGIST-50</td>
<td>50 m³</td>
<td>6000</td>
<td>2010</td>
<td>2000</td>
<td>900</td>
<td>900 Kg</td>
<td>15,900 Kg</td>
<td>As per Client Request</td>
</tr>
<tr>
<td>LGIST-75</td>
<td>75 m³</td>
<td>6500</td>
<td>2650</td>
<td>2640</td>
<td>1550</td>
<td>1550 Kg</td>
<td>76,550 Kg</td>
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### GRP WEANING RECTANGULAR FISH TANK

<table>
<thead>
<tr>
<th>Ref</th>
<th>Capacity</th>
<th>A(mm)</th>
<th>B(mm)</th>
<th>C(mm)</th>
<th>D(mm)</th>
<th>Empty Wt of tank</th>
<th>Full Wt of tank</th>
<th>Color</th>
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<tbody>
<tr>
<td>LGWRT-15</td>
<td>15 m³</td>
<td>6400</td>
<td>1800</td>
<td>1350</td>
<td>1580</td>
<td>791 Kg</td>
<td>15,791 Kg</td>
<td>As per Client Request</td>
</tr>
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</table>
DIFFERENT TYPES OF FISH TANKS

<table>
<thead>
<tr>
<th>REFERENCE</th>
<th>CAPACITY</th>
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<th>EMPTY WT OF TANK</th>
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<th>COLOR</th>
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<tbody>
<tr>
<td>LGFST-1</td>
<td>1 m³</td>
<td>1200</td>
<td>1000</td>
<td>870</td>
<td></td>
<td>1870</td>
<td>78 Kg</td>
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</tr>
<tr>
<td>LGFST-1A</td>
<td>1 m³</td>
<td>700</td>
<td></td>
<td>870</td>
<td></td>
<td>1570</td>
<td>60 Kg</td>
<td>As per Client Request</td>
</tr>
<tr>
<td>LGFST-2.3</td>
<td>2.3 m³</td>
<td>1500</td>
<td>1300</td>
<td>870</td>
<td></td>
<td>2170</td>
<td>119 Kg</td>
<td>As per Client Request</td>
</tr>
<tr>
<td>LGFST-3</td>
<td>3 m³</td>
<td>1750</td>
<td>1300</td>
<td>870</td>
<td></td>
<td>2170</td>
<td>155 Kg</td>
<td>As per Client Request</td>
</tr>
<tr>
<td>LGFST-5</td>
<td>5 m³</td>
<td>2400</td>
<td>1100</td>
<td>1483</td>
<td>400</td>
<td>550</td>
<td>203 Kg</td>
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<td>LGFST-12.5</td>
<td>12.5 m³</td>
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</tr>
<tr>
<td>LGIST-50</td>
<td>50 m³</td>
<td>6000</td>
<td>2010</td>
<td>2000</td>
<td>900</td>
<td></td>
<td>15,900 Kg</td>
<td>As per Client Request</td>
</tr>
<tr>
<td>LGIST-75</td>
<td>75 m³</td>
<td>6500</td>
<td>2650</td>
<td>2640</td>
<td>1550</td>
<td></td>
<td>76,550 Kg</td>
<td>As per Client Request</td>
</tr>
</tbody>
</table>

**GRP FREE STANDING FISH TANK**

**GRP IN SITU FISH TANK**

**GRP WEANING RECTANGULAR FISH TANK**
LG’s GRP cylindrical tanks are moulded on continuously rotating moulds to give a smooth internal (process) surface. The GRP laminate structure of each tank is controlled to meet the requirements of the final application in both laminate thickness (usually with fully integrated strengthening ribs on medium and large diameter underground tanks) and by using special resins for chemical resistance when required.

The laminate structure basically consists of four layers (listed from inner surface to outer surface):

- **Resin-rich corrosion barrier**
- **Resin-rich glass reinforced corrosion barrier**
- **Filament wound structural laminate**
- **Resin-rich water resistant barrier**

Synthetic veil / tissue material may be incorporated into the inner corrosion-resistant barrier for higher chemical resistant tanks. For underground tanks with strengthening ribs these are manufactured by incorporating rib formers into the main structural laminate layer. For above ground tanks a final pigmented coating layer providing UV stability is applied.
ABOVE GROUND APPLICATIONS

GRP tanks can be designed to stand in vertical position with a flat bottom or conical bottom supported by pedestals or they can be supplied horizontal with two dish ends in elliptical shape and the shell can rest on supports made either from Fiberglass or steel or concrete. These tanks can be either manufactured at factory if capacity < 250,000 liters or manufactured at site for larger capacity up to 6,000,000 liters.

THERMAL INSULATION

Should insulation be required, it is a simple task to equip the tanks with a 50 mm PU foam layer covered by a 5 mm GRP layer. This method of insulation produces a K value of 0.5 W/m2K. If needed the thickness can be adjusted, for example to 100 mm PU foam (0.3 W/m2K).
**GRP Aboveground potable water tank**

GRP Water Tanks are suitable for Potable water (drinking water), these tanks have been thoroughly tested by WRAS (Water Regulations Advisory Scheme) to ensure none of the Materials in the GRP leech into the water in any way or form, ensuring the water stays clean inside the GRP tank.

**GRP Aboveground Chemical storage tank**

Due to the application of GRP material, GRP storage tanks are chemical and corrosion resistant, they are designed for high abrasive resistance and be used in highly aggressive environments, operating at temperatures varying from -40°C up to +120°C. The tanks are mainly used to store HCL, NAOCL, NAOH, Sea Water, Sludge, Petrochemical or Organic fuel, Liquid fertilizer, oils …

**GRP Aboveground Scrubber tank**

Our GRP scrubbers are designed for chemical recovery and pollution control in industrial segments. These gas washers handle the full range of dynamic and hydrostatic loads for chemical environments in industries such as wastewater treatment, power generation and chemical processing.

**Carbon scrubber**

Odorous compounds (H2S, Mercaptans, and other VOC’s), can be blown through beds of carbon media and are absorbed into the carbon surface. Virgin, activated, catalytic, chemically impregnated carbon is used depending on the application or customer specification. H2S removal is effectively handled until about 25% of the carbon pores are used.
ABOVE GROUND APPLICATIONS

Chemical scrubbers
We offer chemical scrubbers, that are efficiently and effectively designed to remove gas pollutants. Often these pollutants are chemicals such as ammonia, chlorine or sulfur compounds. Chemical Scrubbers work by dissolving or absorbing the pollutant into the scrubbing liquid. The scrubbing liquid used will depend on the properties of the targeted pollutant.

Bio Scrubbers
Similarly to all absorption processes, the odorous gases (H2S, Mercaptans and other VOC’s) are first dissolved into the liquid phase and then oxidized by the biomass. The microorganisms inside the packing consume the absorbed gases as food and yield by products that are free of odor. At the bottom section of the scrubber, the flourished bacteria remove H2S and at the top section, other type of bacteria flourish to remove Mercaptan and VOC compounds. The overall tower performance yields a min of 99 % removal of Hydrogen sulfides and about 95 % of other odor causing compound.
GRP tanks can be designed to be installed underground without any pedestals. They are supplied horizontal with two dish ends in elliptical shape and the shell can rest on backfill bed of min 300 mm of approved gravel.

These tanks are manufactured at factory up to a capacity of 250,000 liters, max Dia 4 m.
GRP Tanks are designed with Finite Element design according to BS 4994, ASME RTP-1 and ASTM D3299 (standard Specification for Filament wound Glass–Fiber-Reinforced Polyester Chemical–Resistant Tanks) for various combinations of loads:

<table>
<thead>
<tr>
<th>Load Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>Dead Load: Installed weight of the tank including internals, platforms, pippings, etc.</td>
</tr>
<tr>
<td>L2</td>
<td>Operating Live Load: Weight of the liquid at the maximum operating level</td>
</tr>
<tr>
<td>L3</td>
<td>Pressure Load: Internal or external load at the coincident temperature</td>
</tr>
<tr>
<td>L4</td>
<td>Thermal Load: Thermal loads caused by restraining thermal expansion/interaction of the tank and/or its supports</td>
</tr>
<tr>
<td>L5</td>
<td>Test Load: Weight of the test medium</td>
</tr>
<tr>
<td>L6</td>
<td>Piping and superimposed Equipment loads: Loads caused by piping (other than the dead load) and superimposed equipment</td>
</tr>
<tr>
<td>L9</td>
<td>Dynamic Loads: Loads caused by the action of vibratory equipment</td>
</tr>
<tr>
<td>L10</td>
<td>Earth load: Weight of earth burial over the tank</td>
</tr>
<tr>
<td>L11</td>
<td>Live Load: Load imposed by personal during erection and operation</td>
</tr>
<tr>
<td>L12</td>
<td>Buoyancy Load: Load imposed on tanks due to liquid (including rainwater) filling partially or completely the reinforced concrete containment</td>
</tr>
<tr>
<td>L13</td>
<td>Transportation Load: Load imposed during transport of tank</td>
</tr>
</tbody>
</table>
Analysis is based on the calculated number of cycles for a min 20 years service life, as determined in accordance with the rules of ASME Section VIII, Division, paragraph 5.5.2.

Stress analysis include the junctures: head to shell, Nozzle to shell, etc…
**GRP Underground Potable tank:**

GRP Water Tanks are suitable for Potable water (drinking water), these tanks have been thoroughly tested by WRAS (Water Regulations Advisory Scheme) to ensure none of the Materials in the GRP leech into the water in any way or form, ensuring the water stays clean inside the GRP tank.

**GRP Underground Septic tank:**

LG's septic tanks are manufactured with two stages offering primary settlement of wastewater and sewage allowing further settlement before discharge of the settled effluent to a soakaway.
GRP Underground holding tank:
Designed for wastewater storage only – not treatment.

GRP Underground Grease unit:
Our range of underground grease separators are 2 stage units designed in accordance with EN1825-1. The range of units is suitable for a variety of catering and food processing application.
**GRP Underground Rain harvesting tank:**
Rainwater harvesting is the collection of rainwater directly from the surface it falls on. This water would otherwise have gone directly into the drainage system or been lost through evaporation and transpiration. Once collected and stored it can be used for non-potable purposes. These include toilet flushing, garden watering and clothes washing using a washing machine.

**GRP Underground Fuel Diesel tank:**
LG has the expertise to design and manufacture single and double wall GRP tanks produced by filament winding process. Single or double wall tanks are supplied with a capacity of 250,000 liters, up to 4m diameter.
GRP Underground brine dilution and Backwash tank:
Prior to disposal of brine, the brine of salinity of 68,300 ppm coming as effluent from the desalination plant will be diluted in the dilution tank with seawater of salinity level 41,000 ppm being pumped from the beach intake borehole.

The dilution tank has two entry points:
- Sea water from beach seawater tank.
- Brine from RO desalinator and back wash water from sand filter.

If the brine of concentration of 68,300 ppm is discharged into the lagoon, it will adversely affect the marine ecosystem i.e the marine flora and fauna. It is therefore, imperative that the salinity of the brine should be reduced to an acceptable level (not exceeding 45,000 ppm) prior to discharge into the lagoon. This will be carried out by incorporation a GRP underground dilution tank into the design of the desalination plant system.
<table>
<thead>
<tr>
<th>CLIENT</th>
<th>CITY</th>
<th>COUNTRY</th>
<th>YEAR</th>
<th>CONSULTANT</th>
<th>PROJECT</th>
<th>PRODUCT</th>
<th>APPLICATION</th>
<th>TOTAL CAP</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ministry of Public work</td>
<td>Dubai</td>
<td>UAE</td>
<td>2015</td>
<td>Ministry of Interior</td>
<td>Control Room project</td>
<td>GRP sectional water tanks</td>
<td>Potable water</td>
<td>338 m3</td>
<td>2 Nos</td>
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<td>Ministry of Public work</td>
<td>Dubai</td>
<td>UAE</td>
<td>2015</td>
<td>HDP</td>
<td>Al Amal Psychiatric Hospital</td>
<td>GRP sectional water tanks</td>
<td>Potable water &amp; irrigation water</td>
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<td>Majid Al Futtaim</td>
<td>Dubai</td>
<td>UAE</td>
<td>2015</td>
<td>WSP</td>
<td>The mall of Emirates expansion, Dubai</td>
<td>GRP sectional water tank</td>
<td>Potable water</td>
<td>48 m3</td>
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<td>UAE</td>
<td>2015</td>
<td>Anaf</td>
<td>Fish farm Jebel Ali</td>
<td>GRP molded fish tanks</td>
<td>Aquaculture sea water</td>
<td>2400 m3</td>
<td>34 nos</td>
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<td>NAKKEEL</td>
<td>Dubai</td>
<td>UAE</td>
<td>2014</td>
<td>DAR GROUP</td>
<td>Dragon Mart District cooling Plant, Dubai</td>
<td>GRP sectional water tank</td>
<td>Make up water</td>
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<tr>
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<td>Agman</td>
<td>UAE</td>
<td>2014</td>
<td>MOPW</td>
<td>Sheikh Khalifa bin zayed hospital Agman</td>
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<td>Potable water</td>
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<tr>
<td>RTA</td>
<td>Dubai</td>
<td>UAE</td>
<td>2014</td>
<td>Systra</td>
<td>AI Sufouh Dubai tram</td>
<td>GRP sectional water tank</td>
<td>Domestic water</td>
<td>2 m3</td>
<td>12 Nos</td>
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<tr>
<td>Ministry of Public work</td>
<td>UM Qwian</td>
<td>UAE</td>
<td>2014</td>
<td>Core Alliance Engineering</td>
<td>Sheikh Khalifa Bin Zayed Center of Marine Research, Um Qwian</td>
<td>GRP molded fish tanks</td>
<td>Aquaculture sea water</td>
<td>590 m3</td>
<td>110 Nos</td>
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<tr>
<td>Dubai municipality</td>
<td>Dubai</td>
<td>UAE</td>
<td>2014</td>
<td>DM</td>
<td>Al Warans Sewage treatment Plant – Dubai</td>
<td>GRP filament wound vertical vessel</td>
<td>chemical odor control scrubbers</td>
<td>40 m3</td>
<td>2 Nos</td>
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<td>ADSSC</td>
<td>Abu Dhabi</td>
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<td>ADSSC</td>
<td>Maintenance Mafraq &amp; Zabteh WTW</td>
<td>GRP vertical tank</td>
<td>Chemical tank</td>
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<td>Ministry of public work</td>
<td>Ras Al Khaimah</td>
<td>UAE</td>
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<td>MOPW</td>
<td>RAK secondary school</td>
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<td>Ministry of Public work</td>
<td>Khorfakan</td>
<td>UAE</td>
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<td>MOPW</td>
<td>Labor office in khorfakan</td>
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<td>Potable water</td>
<td>148 m3</td>
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<td>Ministry of Public work</td>
<td>Sharjah</td>
<td>UAE</td>
<td>2014</td>
<td>MOPW</td>
<td>Kuwaiti Hospital in Sharjah</td>
<td>GRP sectional water tanks</td>
<td>Potable water</td>
<td>36 m3</td>
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<tr>
<td>Ministry of Public work</td>
<td>Agman</td>
<td>UAE</td>
<td>2014</td>
<td>MOPW</td>
<td>Al Manana Police center</td>
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<td>TDIC</td>
<td>Abu Dhabi</td>
<td>UAE</td>
<td>2013</td>
<td>PARSONS</td>
<td>Saadiyat Island Cultural District project</td>
<td>GRP Filament wound tank</td>
<td>Break water</td>
<td>30 m3</td>
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<td>Al Bustan Co.</td>
<td>Riyadh</td>
<td>KSA</td>
<td>2013</td>
<td>Khatib &amp; Alami</td>
<td>Al Bustan II Utility Complex – Riyadh</td>
<td>GRP Filament wound buried tanks</td>
<td>Brine water, Rejected water</td>
<td>300 m3</td>
<td>3 Nos</td>
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<tr>
<td>Dubai municipality</td>
<td>Dubai</td>
<td>UAE</td>
<td>2013</td>
<td>DM</td>
<td>Al Warans Sewage treatment Plant – Dubai</td>
<td>GRP filament wound vertical vessel</td>
<td>Bio trickling odor control Scrubber</td>
<td>35 m3</td>
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<td>Directorate of Military works</td>
<td>Sharjah</td>
<td>UAE</td>
<td>2011</td>
<td>CMW</td>
<td>CMW-11076-001 Construction of Building for Falah Hospital</td>
<td>GRP sectional water tanks</td>
<td>Domestic water, Fire fighting, Irrigation, swimming pools</td>
<td>1061 m3</td>
<td>43 Nos</td>
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<tr>
<td>MIRK</td>
<td>Dubai</td>
<td>UAE</td>
<td>2011</td>
<td>Burthill</td>
<td>5 stars Palm Jumeirah Sofitel Resort</td>
<td>GRP sectional water tanks</td>
<td>Domestic</td>
<td>300 m3</td>
<td>2 Nos</td>
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<tr>
<td>EMAAR Properties</td>
<td>Dubai</td>
<td>UAE</td>
<td>2011</td>
<td>Anf &amp; Bintooq</td>
<td>J367-PJ High school Accommodation at sac Al Nahli – Abu Dhabi</td>
<td>GRP sectional water tanks</td>
<td>Domestic</td>
<td>108 m3</td>
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<td>ADNOC</td>
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<td>Al Torath Engineering</td>
<td>Al Torath Engineering</td>
<td>GRP sectional water tanks</td>
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<td>Luxury Real Estate Devlpt.</td>
<td>Abu Dhabi</td>
<td>UAE</td>
<td>2010</td>
<td>UPA/PSI</td>
<td>Mangrove Place Hotel – Shams</td>
<td>GRP sectional water tanks</td>
<td>Domestic</td>
<td>292 m3</td>
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<td>Al Mubadala Dvlc pt co</td>
<td>Abu Dhabi</td>
<td>UAE</td>
<td>2010</td>
<td>WSP</td>
<td>Rosewood Hotel – Al Reem Island</td>
<td>GRP sectional water tanks</td>
<td>Domestic</td>
<td>360 m3</td>
<td>2 Nos</td>
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<td>H.E Shk Ahmed Bin Saif Bin Mohd Al Nahyan</td>
<td>Abu Dhabi</td>
<td>UAE</td>
<td>2010</td>
<td>ACG</td>
<td>Novotel &amp; Ibis Hotels in Abu</td>
<td>GRP sectional water tanks</td>
<td>Domestic</td>
<td>3900 m3</td>
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</tbody>
</table>
COMPLETED PROJECTS

Al Bustan Complex - Riyadh

Rosewood Hotel - Abu Dhabi

5 stars Palm Jumeirah Sofitel Resort - UAE

Sheikh Khalifa Specialist Hospital Ras al Khaimah - UAE
The Index Tower @ DIFC - Dubai
Sheikh Khalifa Bin Zayed Center of Marine Research
Ibis & Sofitel Hotel - Abu Dhabi

Standard Chartered Bank HQ at Down Town - Dubai

Al Raha beach, Al Zeina Project