

From the house of

www.ornatenaturale.com



ORNATE
Naturale

AQUADION™

WATER SOLUTIONS





INTRODUCTION

Ornate Naturale is proud to introduce a new Water Treatment System under the brand name AQUADION™ in the market that is ideally suited for Drinking water applications. This is a new generation of water treatment system that can treat ground or surface water containing high dissolved salts to produce clean potable water that meets WHO standards.

Traditionally ground water treatment is done using Reverse Osmosis Technology. This technology wastes lots of water during treatment, uses more power and chemicals and has a high operating cost for delivering drinking water.

AQUADION™ is an excellent alternative to this technology. This is a high recovery system where water wastage is just 20% as against 70% from a RO system. It does not use any chemicals, consumes less power and has the lowest operating cost for treating water when compared to any system in the market today.

AQUADION™ is based on a technology called Capacitive Deionization (CDI). This innovative technology is used to desalinate water without using resin or membrane filters. It does not require chemicals to treat water and uses less power to separate salts in water.

THE UNIQUE FEATURES ABOUT THIS PRODUCT ARE :

LOW WATER WASTAGE :

Compared to conventional RO systems that waste more than 50% of water, the maximum water wastage in AQUADION is 20%. This results in long-term conservation of ground water.

LOW OPERATING COST :

AQUADION™ uses no chemicals and has low consumables for operation. It consumes less power and the total cost of producing treated water works at less than 5 paise per liter.

SIMPLISTIC OPERATION :

AQUADION™ has a built in controller that automates the working of plant in typical Indian conditions. There is no major skill required to operate the plant. The system can be managed and operated by local resources where AQUADION is installed.

HANDLES MULTIPLE CONTAMINANTS IN WATER :

AQUADION™ reduces all dissolved salts like Calcium, Magnesium, Fluoride, Nitrates, Arsenic and other contaminants typically found in ground water – but yet retains the desired levels of minerals required for human body.

ENVIRONMENT FRIENDLY:

AQUADION™ does not use any chemicals for treatment. The drain water coming from the system does not contain any chemicals that are hazardous to environment. This ensures safe release of water back to the environment.

PRODUCT OVERVIEW

AQUADION™ is based on a technology called “Capacitive Deionization”. Capacitive Deionization is a technology for removing salinity from water.

The system takes out the following salts (not limiting) in a single process. By controlling the flow and managing the contact time, it is possible to ensure the required salts be retained in the output water that is good for consumption.

Table below shows some examples of salts and metals removed using AQUADION™.

SALTS	METALS	OTHERS
<ul style="list-style-type: none">▪ Total Dissolved Solids▪ Total Hardness▪ Calcium Carbonate▪ Magnesium Carbonate▪ Sodium Chloride▪ Phosphates▪ Sulphates▪ Chlorides▪ Nitrates▪ Fluoride ...	<ul style="list-style-type: none">▪ Chrome▪ Iron▪ Arsenic▪ Nickel▪ Copper▪ Zinc▪ Cadmium▪ Mercury▪ Manganese▪ Lead▪ Vanadium....	<ul style="list-style-type: none">▪ Bacteria▪ Ammonia▪ Chromium 6 ...

WORKING OF CDI

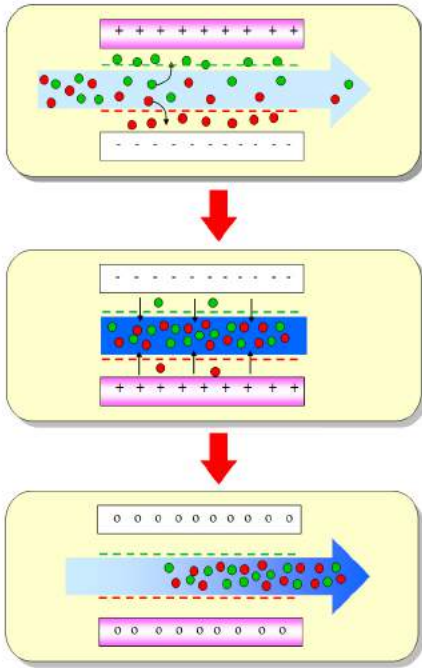
CDI Cells uses different coupled electrodes contained in a pressurized container, supplied with direct current at a potential difference of 1.6 Volt. The electrodes are placed at a distance at an order of magnitude of 0.1mm.

By powering the electrodes, an electrostatic field is created. The salts contained in the water, having an electric charge, will be attracted by the electrode with opposite charge.

Operating at low voltages, electrolysis and gas production will not occur. The result is the partial or total demineralization of the water (Step 1 in picture below)

Once the electrodes are saturated with ions, the system will automatically short-circuit the electrodes (Step 2 Picture below) releasing the ions and after that will reverse the polarity and move all the salts to the drain (Step 3 picture below) in a small amount of water (around 20% of incoming water). At the end of step 3, electrodes are regenerated, the polarity is reversed back to normal and the cycle starts again.

THE WHOLE PROCESS TAKES PLACE AUTOMATICALLY AT A FREQUENCY OF ABOUT ONE MINUTE.



Step 1
Ion removal

When Water passes between the electrodes, the ions get attracted to opposite charged electrodes. The water void of these salts and metals come out of the system

Step 2
Regeneration

With more and more ions sticking to the electrodes, they become saturated – when this happens, the system automatically changes the polarity. The ions sticking to the electrodes fall off.

Step 3
Flush

Water is then flushed between the electrodes and the wasted ions are flushed to drain. The Polarity is reversed back and the Ion removal process (Step 1) starts again

Figure 1: Steps in water purification using CDI

ADVANTAGES OF AQUADION™ OVER REVERSE OSMOSIS

CONVENTIONAL RO SYSTEMS	AQUADION
60% of water is wasted during treatment process. This reduces ground water sources quickly. Most systems need to be shut in summer	Maximum of 20% wastage during treatment. Can be reduced further based on water conditions
Do not retain adequate minerals required for body. Technology takes out all minerals from water	Adequate minerals are retained that is good for body. Water delivered is as per WHO standards
Systems need adequate power for treatment	Low power requirement makes it easy to use alternate energy sources in power scares places.
Requires frequent use of chemicals for cleaning membranes.	Uses diluted Citric Acid - an organic acid from lemon tree for cleaning. Safe environmental discharge of waste water.
Skilled personnel required to manage systems	System is automated to maximum possible extent to ensure minimum interference from operators
Operating cost comes to 10-12 paise per liter	Operating costs comes to 3-4 paise per liter
Membranes required to be changed frequently	CDI cells will run for 8-10 years without any replacement

WATER TREATMENT PROCESS

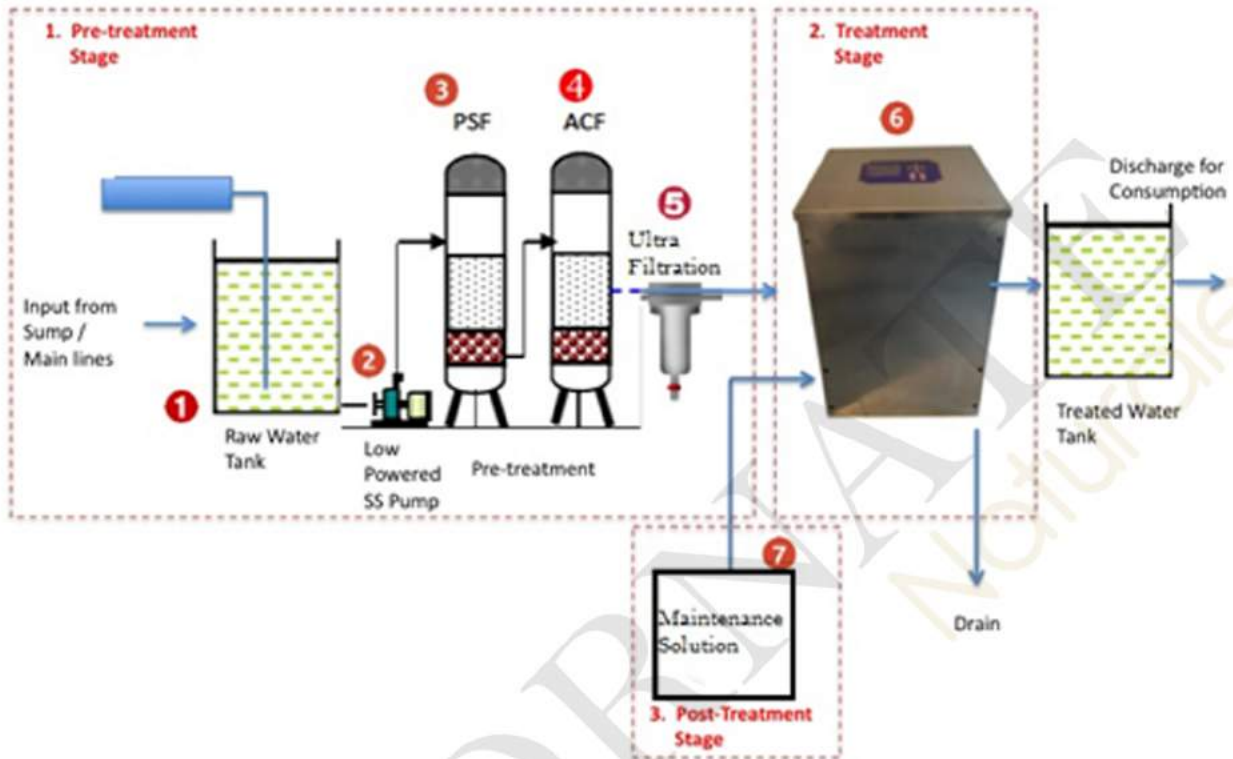


Figure 2: Schematic representation of the water treatment process

WORKING OF CDI

1. Pre-treatment stage

Pre-treatment is a crucial component for water treatment. Proper pre-treatment is required to ensure smooth operation of the plant and lesser maintenance of the system.

AQUADION™ has the following pre-treatment steps (Stages 1-5 in Figure 2)

I. Raw water tank

Input from the Sump/Main lines enter the Raw water Tank

II. Low pressure pump

This is used to deliver suitable pressure to the sand filter and carbon filter and rest of the unit.

III. Pressure Sand Filter (PSF)

PSF is used to remove any turbidity in water. The PSF is filled with a mixture of gravel at the bottom, followed by fine sand and then a layer of Anthracite for good turbidity removal from water.

IV. Activated Carbon Filter (ACF)

Water then passes through activated carbon present in a pressurized vessel. ACF is used to take out any organics in water and it also takes out any residual Ozone / chlorine present in water and restores taste.

V. Ultra Filter

A 0.001 micron, Anti- Bacterial Ultra-Filter is used to trap any residual carbon that may be coming out from the ACF. This filter also blocks any dirt / silt that might have accidentally passed through the PSF and ACF.

2. Treatment Stage (Stage 6 in Figure 2)

Once water passes through the pre-treatment stages, it enters AQUADION™ for treatment. AQUADION™ systems are built modularly and delivered as a box. Each of these boxes will have a capacity to produce 4000 LPD of treated water. By building the system modularly we will ensure simpler maintenance and ease of installation.

Water coming out of AQUADION™ is directly sent to the output tank from where it will be discharged for consumption.

3. Post treatment stage (Stage 7 in Figure 2)

Post treatment ensures the electrodes in the cells are kept clean. This process is done automatically.

AQUADION™ can be programmed to run continuously for a period of 5 / 10 / 20 hours. After running for these durations, the system is programmed to rest for 1 / 2 / 4 hours respectively.

During the rest period, the system automatically sucks in a desired quantity of Maintenance solution (the duration of which can be set based on water condition). The system then cleans the electrodes with this solution. The entire cleaning operation takes about 5 minutes after which the system rests till the rest cycle is complete. This cleaning extends the life of the cells.

WEB INTERFACE AND REMOTE MONITORING

The complete system works automatically and is web enabled, when connected through an internet, the system can also be accessed from anywhere for monitoring and maintenance purposes.

WEB INTERFACE

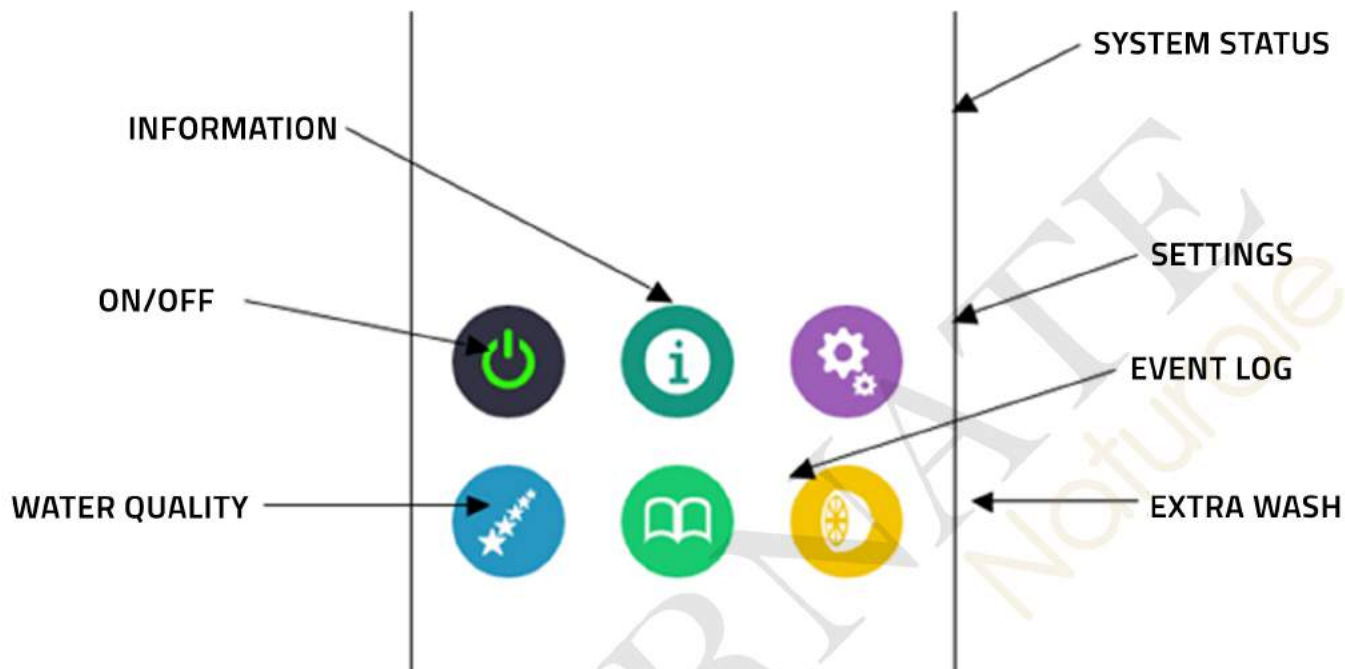


Figure 3 : Web interface

Users will be able to access the system through a tab, smartphone or computer using the web interface shown above. All functionalities of the machine including setup, status and performance parameters can be viewed using this screen.

AQUADION™ is also enabled for an IoT (Internet of Things) architecture which will allow users to operate and maintain the plant from anywhere once it is connected to the local area network.

All parameters such as flow, conductivity, pressure and any errors caused by the system can be seen using this interface and suitable action at site can be planned accordingly.

WORK SITE REQUIREMENT

1. The total weight of the unit will be approximately 500 kgs (including all equipment shown). A suitable manual pallet lifter may be required to down load the equipment and take it to work place
2. AQUADION™ would need an enclosed space – preferably in a cooler place not next to any boilers or heat generating equipment
3. Total enclosed space dimension would be 6 feet x 6 feet by 8 feet (height).
4. Water to the outlet tank will be delivered at a maximum pressure of 1.4 Kg/cm² (BAR). This would allow the water to climb up to a maximum height of 2 meters. The outlet tank must be suitably placed to ensure this discharge.
5. A single phase power connection is required with 4 direct 15/5 Amps Sockets. The connection has to be well grounded and if there are fluctuations then a Servo Stabilizer is required for the plant.

The complete system is warranted for 12 (twelve) months from the date of dispatch against any manufacturing defects and for satisfactory operation within the design parameters, subject to the equipment being operated and maintained as per the operation instructions specified by us and under normal use.

The warranty is limited to replacement / rectification of the defective components / system at the discretion of Ornate Naturale.

Liability is limited solely to the repair of the plant and we are not liable for any incidental or consequential damages sustained in connection with this product, and no recoveries can be allowed towards the losses suffered due to usage of these products.

The warranty does not apply to normal wear and tear, abuse, accidental damage, alteration, unauthorized service, or other factors not due to defects in materials and workmanship.

All original warranties of the equipment or components purchased by us and used in the plant are passed on to the customer. Electrical components and micron filter cartridges elements are excluded from warranty.

NOTE :

1. THE MAXIMUM INLET CONDUCTIVITY ACCEPTED BY THE SYSTEM IS 2000 MICRO SIEMENS
2. THE MAXIMUM INLET HARDNESS ACCEPTED BY THE SYSTEM IS 500 PPM.
3. MAXIMUM OPERATING TEMPRATURE: 50 DEGREES CENTIGRADE
4. MINIMUM OPERATING TEMPRATURE: 4 DEGREES CENTIGRADE

ORNATE NATURALE DOES NOT WARRANTY PERFORMANCE OF THE SYSTEM FOR WATER GREATER THAN THE ABOVE PARAMETERS.

COMPARATIVE STATEMENT OUR TECHNOLOGY V/S REVERSE OSMOSIS

SL NO	HEAD	100000 LPD		REMARKS
		AQUADION	RO	
1	Water Requirement Total Yield per day Liters/day Water Recovery Inlet water Req'd Liters/day	100,000 80% 125,000	100,000 40% 250,000	
2	Capital Cost Cost of Equipment Interest Rate Period of Repayment (years) Total EMI	10,444,000 13% 5 237,633	7,525,000 13% 5 171,217	Cost of Fully automated system
3	Operating Cost Number of days Operational/month Monthly maintenance cost(AMC) Power Consumption Hours of running Power rating(KwH) Power cost per unit Total Power cost/day Total Power cost per month Consumables(monthly cost) Descaler/Maintenance Solution Sand/Carbon media Cartridge cost Membrane cost Total Monthly Operating cost	30 12,500 20 3.00 6 360 10,800 1,342 250 150 3,000 28,042	30 12,500 10 6.00 6 360 10,800 16,500 250 300 41,250 81,600	Assume same for both 5.5/cum for RO 5.5/cum for RO
4	Water Cost(Unit cost of water) Total Water cost per month	0.03 112,500	0.03 225,000	3 paise/liter
5	Savings Computation Cost per liter(including CAPEX) Cost per liter(Excluding CAPEX) Yearly Operating Cost(with CAPEX) Yearly Operating Cost(without CAPEX)	0.13 0.05 4,538,100 1,686,503	0.16 0.10 5,733,802 3,679,200	Including Water Cost Water costs Included
6	Net savings per year (with CAPEX) Net savings per year (without CAPEX) Total Water Wasted Per year Liters of Water Saved per year Water Savings in Rupees	1,195,703 1,992,697 9,000,000 45,000,000 1,35,000	54,000,000	

**EXTRACT FROM NODAL AGENCY REPORT

**ORNATE NATURALE'S
DISINFECTION SYSTEM FOR DRINKING WATER**

ORNATE NATURALE'S DISINFECTION SYSTEM FOR DRINKING WATER

- **Disinfects drinking water from bacteria and viruses**
- **Large flow rates - ideal for schools and community**
- **No storage tanks required - directly connect to taps**



Ornate Naturelle's Disinfection System is an innovative bacterial treatment technology to deliver clean drinkable water which is 100% free of pathogens.

Bacteria and virus are removed through a 3-stage filtration process comprising of a sediment, carbon, and an Ultra-filtration system.

The unit incorporates a self-cleaning mechanism and is driven by a pump that is auto-controlled whenever the tap is opened for drinking water.

The system is ideally suited in applications where there is a need for large-scale discharge of drinking water without the need for storage tanks like schools, public places, temples, convention halls, etc.



PROCESS DESCRIPTION



SPECIFICATIONS

Ultra-Filtration Module

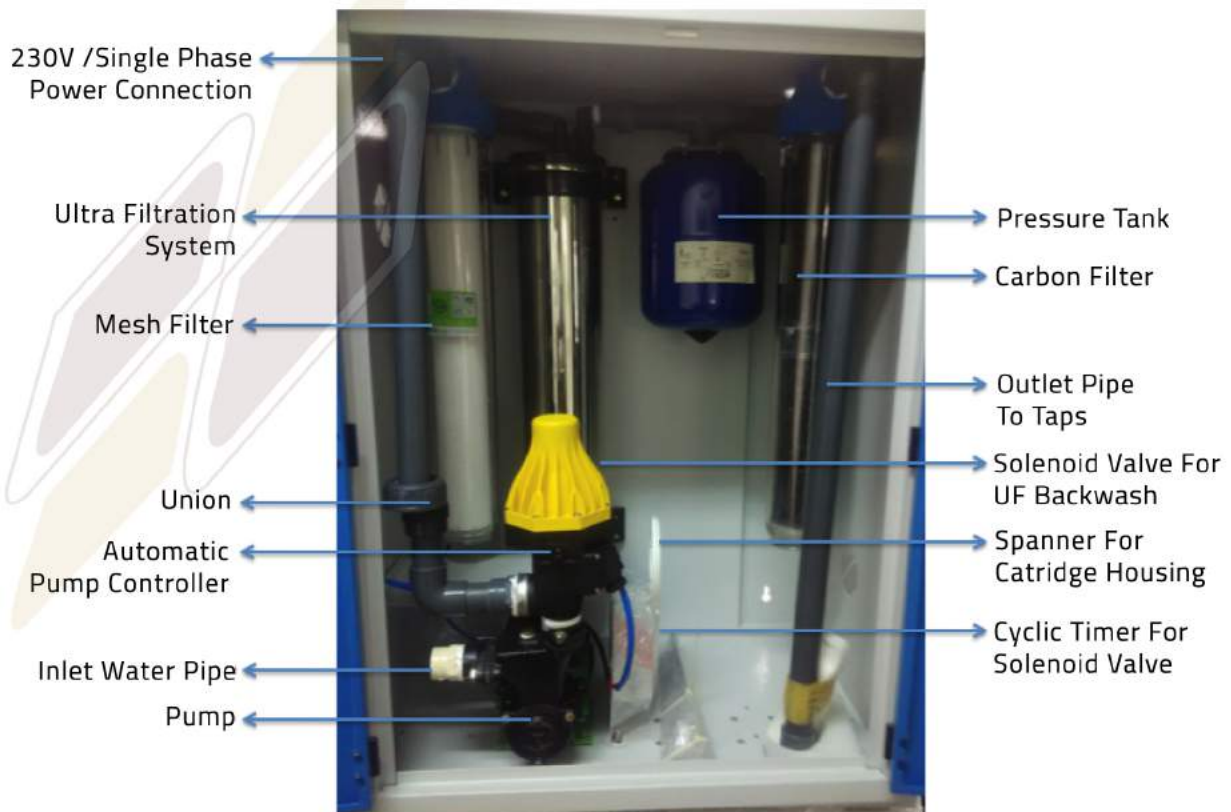
- UF Membrane Material - PAN or alloy PVC - NSF Certified.
- Standard Pore Size: 0.01 micron
- UF case stainless steel 304 filter housing
- Automatic cleaning of UF filter based on defined timings
- Peak Flow rate of up to 50 l/min.
- Pressure range 1-3 BAR
- NSF certified 20 inch cartridges
- Pump (0.5hp) with automatic pump controller
- Inlet / Outlet connection 1 inch. Outlet can be connected to 5-6 taps

KEY FEATURES OF THE SYSTEM

- **100% Bacteria / Virus removal**
The UF module filters this out ensuring no harmful pathogens gets into water
- **3 Stage Filtration**
20 Micron filter, followed by Ultra Filtration and Activated Carbon
- **Direct to Taps - No Storage tanks required**
The System can be connected directly to multiple taps to deliver bacteria free water on-demand
- **Low Maintenance**
System uses standard materials that is easy to maintain and does not require skilled personnel to operate
- **No Chemical Use**
The System does not use any chemicals in its treatment process
- **Low Power consumption - Can use Solar**
Requires 2 BAR pressure, which is delivered either through gravity or using a low power pump

COMPONENT DESCRIPTION

EXTERIOR LOOK OF THE SYSTEM



PROCESS DESCRIPTION

- The ON-500/1000 systems are designed to disinfect water on demand. This unit does not require a storage tank and system will deliver clean drinking water whenever the tap is switched on.
- Water enters the system through the pump placed inside. This is a small 0.5 hp pump that is controlled by an Automatic Pump Controller. The Automatic pump controller switches On/Off the pump whenever water is required (when taps are on). It also switches off the pump when there is no inlet water. This ensures there is no dry run in pump.
- From the pump, water enters the Mesh filter placed in a 20-inch cartridge. This is a 50 micron cleanable mesh filter used to take out any dust / sediments in the inlet water. Whenever the cartridge gets dirty (visually to be checked), it can be removed from the housing (using the spanner provided) and cleaned manually.
- Water from the mesh filter then enters the Ultra Filtration module placed in a Stainless Steel housing. The UF module does a 0.01 micron, absolute filtration that takes out all bacteria and viruses from the water.
- The output from the UF module (inside-out principle) then enters the carbon cartridge before it reaches the outlet pipe for consumption.
- A small pressure tank (5 Liters capacity) is placed between the UF and the carbon filter. This pressure tank stores clean water that will be used for automatic back washing of the UF system.
- A solenoid valve is placed at the drain side of the UF and is operated using a cyclic timer. The system automatically backwashes the UF every one hour for 5 seconds. This ensures the UF is kept clean at all times.
- The carbon cartridge placed after the UF is meant to restore taste in water. The carbon media is placed in a canister and can be replaced time to time
- The outlet from the carbon cartridge is then connected to taps outside of the system for consumption.

CONSUMABLES WHICH NEED TO BE LOOKED AT

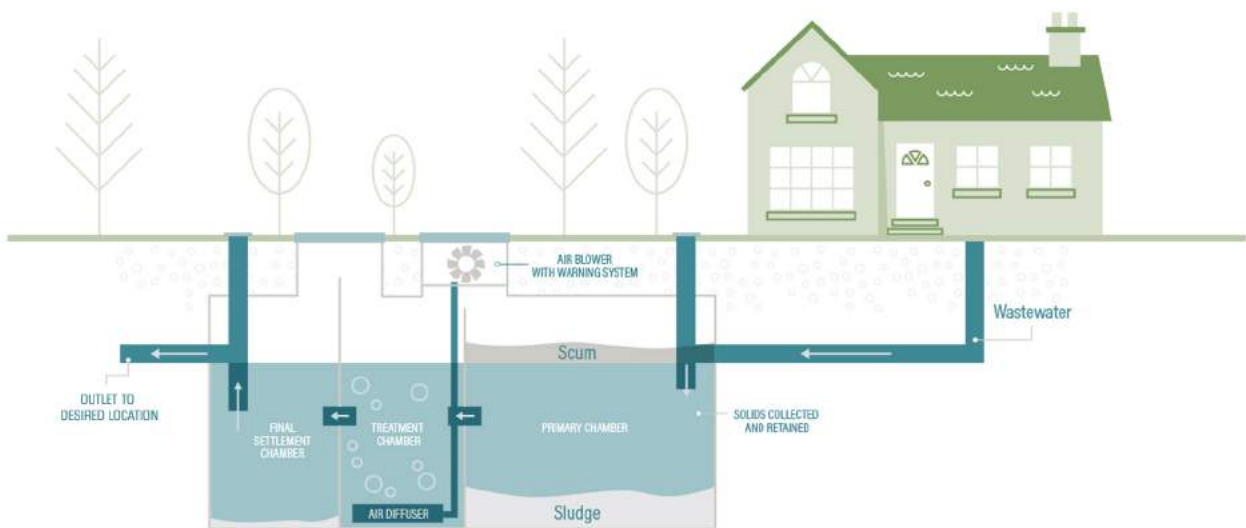
MESH FILTER	REPLACE ONLY WHEN BROKEN
CARBON MEDIA	TO BE REPLACED ONCE IN 60-70 DAYS. TAKE MEDIA OUT OF THE CANISTER. CLEAN THE NEW MEDIA AND REPLACE IT IN CANISTER
UF MEMBRANE	ONCE IN 2 YEARS

IMAGES OF KIOSK



THE NEXT GENERATION SEWAGE TREATMENT SYSTEM INTELLIGENT SBR TECHNOLOGY

How a Typical Sewage Treatment Plant Works



THE NEXT GENERATION SEWAGE TREATMENT SYSTEM INTELLIGENT SBR TECHNOLOGY

- No effective Sewage Treatment System available to manage waste water in Individual homes / small communities
- Most systems are manual and inconsistent – requires too much attention
- eSBR systems addresses these issues and is a great improvement on normal SBR technology
- Highly Scalable system – from small (1 KLD) to Big systems (500 KLD)
- Totally Automated – No manpower required to manage plant – Global Best Practices have been incorporated
- Low Power & Energy Saving - treats only incoming water as per load
- 98% cleaning of waste water in 6 hours
- No Chemical use - Fully Biological treatment
- Space Saving – Entire Plant can be placed under the ground
- Retrofit-able in existing septic tanks



Available for
Individual homes to
entire community

WHAT'S DIFFERENT IN E-SBR SYSTEMS



Conventional SBR systems need high capacity blowers that are Energy inefficient and requires high maintenance



Our Systems uses Energy Efficient Compressors and are fully automatic

UNLIKE OTHER SYSTEMS OUR STP CAN BE PLACED UNDER THE GROUND



STP TANK PLACED UNDER THE WALK WAY IN D&B OFFICE CHENNAI



THE CONTROL ROOM OUTSIDE

RESULTS IN HUGE SPACE SAVINGS FOR OUR CUSTOMERS

VERY HIGH DEGREE OF SAFETY



INSIDE VIEW OF TANK



ALL ELECTRICAL PARTS KEPT OUTSIDE

NO MECHANICAL PARTS – ELECTRICAL PARTS – PUMPS INSIDE THE TANKS

FULLY AUTOMATIC SYSTEM

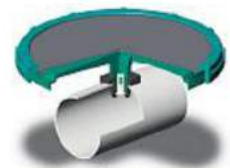
Fully Automated by Micro controller with pressure and level sensors– In a worst case scenario, if the controller fails, it can be fully replaced in 20Mins



Requires No Dedicated Personnel to Manage the Plant

HIGH QUALITY PARTS USED IN SYSTEM

- The **Best German Compressors**
 - Compressor from Busch/Gardner Denver Dry Running claw type with 500 cu.m/hr W 400 V, 3 phase
- The **Best Diffusers**
 - Membrane air diffuser, finely perforated, EPDM, Tube diffusers from Jaeger or Envirocon Germany
- All Piping in tank is made of **SS 304**
 - Including clamps and fittings for wall mounting in SS 304
- Electric Actuated Valve from **ASCO / Emerson**
- Temperature Sensor and Cooling fan arrangement from Rittal



Results in Low Failure Rates for our Customers

WEB MONITORING – SAVING IN MAINTENANCE TIME

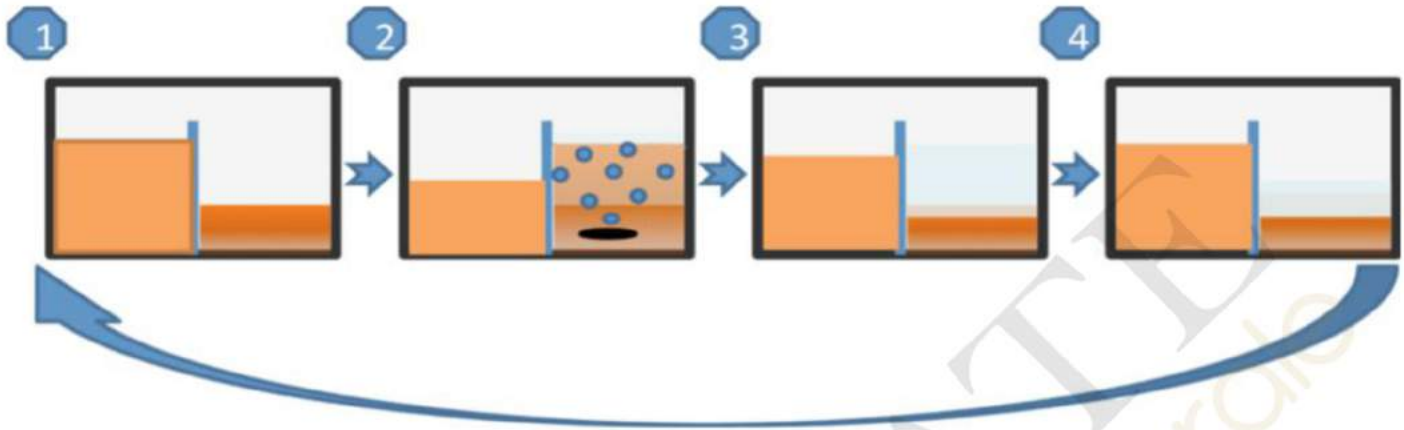
The Web Monitoring System gives Maintenance companies and Operators the option to monitor the treatment plants online, regardless of where they are ...

Reduced Maintenance Cost

VALUE WE WILL DELIVER

- Space and Money Savings
 - The SBR Tanks are placed underground and top can be used as a Garden or Pathway
 - No Smell whatsoever
- Very **Environment Friendly** System
 - No Chemical Use and Low Power Consumption
 - Meeting and Exceeding **Pollution Control Board Norms**
- **Scaled Deployment** and Running
 - Will work even with a **Single Occupant**
- **Maintenance Free** solution to your Customers
- Output Water can be treated for bacteria contamination and can be used for:
 - Agriculture
 - Bore well Recharge
 - Tertiary use like construction etc
 - Pavement Cleaning
- Total Saving in water works to almost 60%

HOW THE SYSTEM WORKS



1 CHARGING PHASE

THE WASTEWATER IS INITIALLY FED INTO THE SLUDGE TANK (1ST CHAMBER) WHERE SOLID CONSTITUENTS ARE REMOVED. FROM HERE, THE WASTEWATER IS THEN GRADUALLY LED INTO THE SBR TANK (2ND CHAMBER).

2 AERATION PHASE

THE SBR TANK IS WHERE THE ACTUAL BIOLOGICAL TREATMENT PROCESS TAKES PLACE. HERE, SHORT AERATION AND REST PHASES ALTERNATE WITH ONE ANOTHER WITHIN THE SCOPE OF A CONTROLLED CLEANING PROCESS. THIS MEANS THAT THE SO CALLED ACTIVATED SLUDGE WITH ITS MILLIONS OF MICRO-ORGANISMS CAN DEVELOP AND TREAT THE WATER THOROUGHLY.

3 REST PHASE

DURING THE 90-MINUTE REST PHASE, THE ACTIVATED SLUDGE THEN SETTLES ON THE BOTTOM OF THE TANK. A CLEAR WATER ZONE FORMS IN THE UPPER PART OF THE SBR TANK.

4 CLEARWATER EXTRACTION

THE SEPARATED CLEAR WATER IS THEN LED FROM THE SBR TANK TO THE RECEIVING WATER (STREAM, RIVER OR LAKE) OR INTO A PERCOLATION SYSTEM. AFTERWARDS, THE SLUDGE IS RETURNED TO THE FIRST CHAMBER FROM THE SBR TANK AND THE PROCESS STARTS AGAIN FROM THE BEGINNING.

AIR LIFT



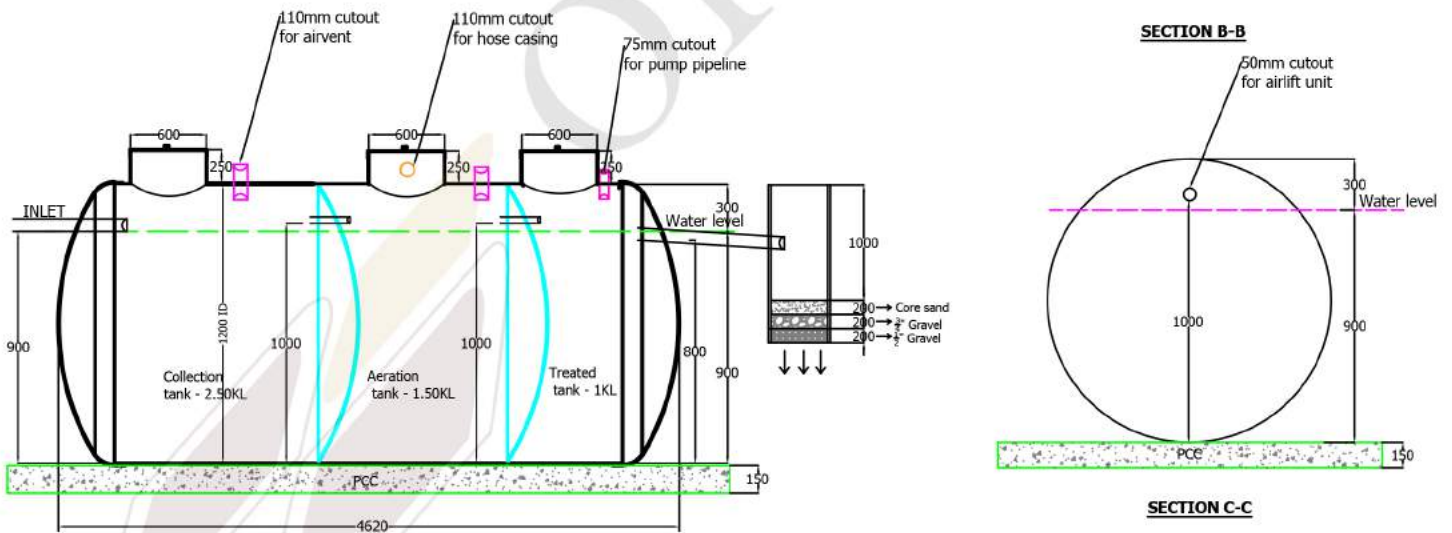
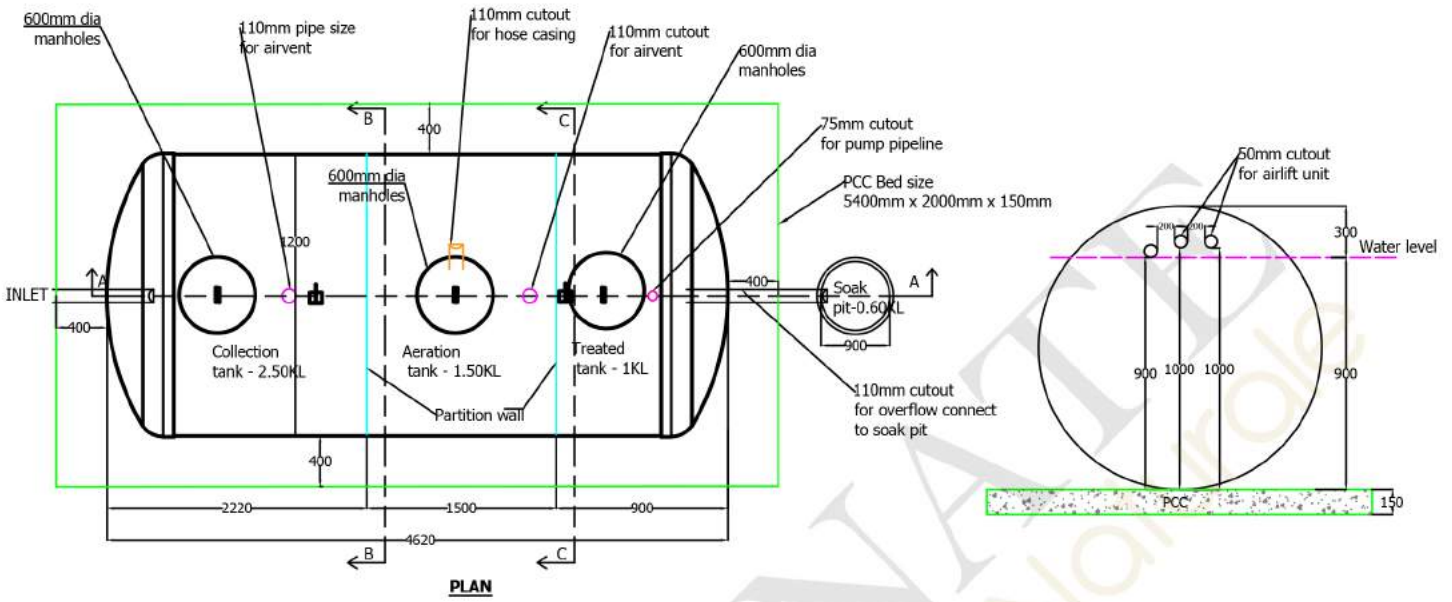
DIFFUSERS



CONTROL PANEL AND COMPRESSOR



1KLD ESBR FRP TANKS



Note :

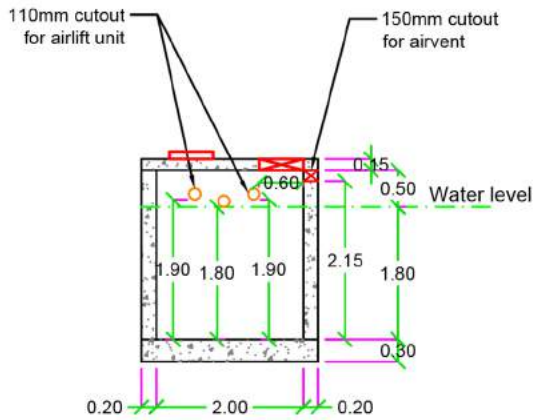
1. Inlet Level, If below from the mentioned depth as per site condition, a pump might be required
2. Sludge retention time in collection tank : 6 months

Notes :

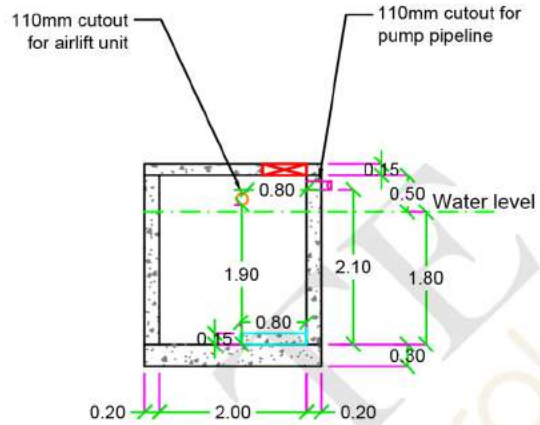
1. Dish & Dish shell joint are Lay-up process.
2. Fabrication by Filament winding process.

DIMENSIONS ARE NOT TO SCALE
ALL DIMENSIONS ARE IN MM

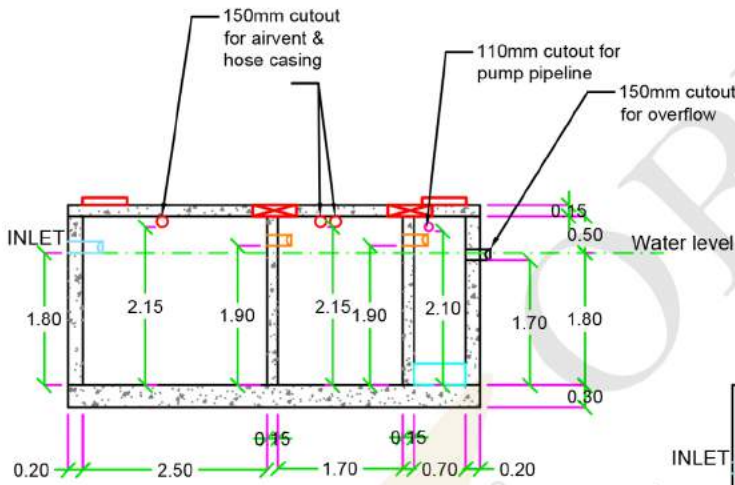
5KLD ESBR FRP TANKS



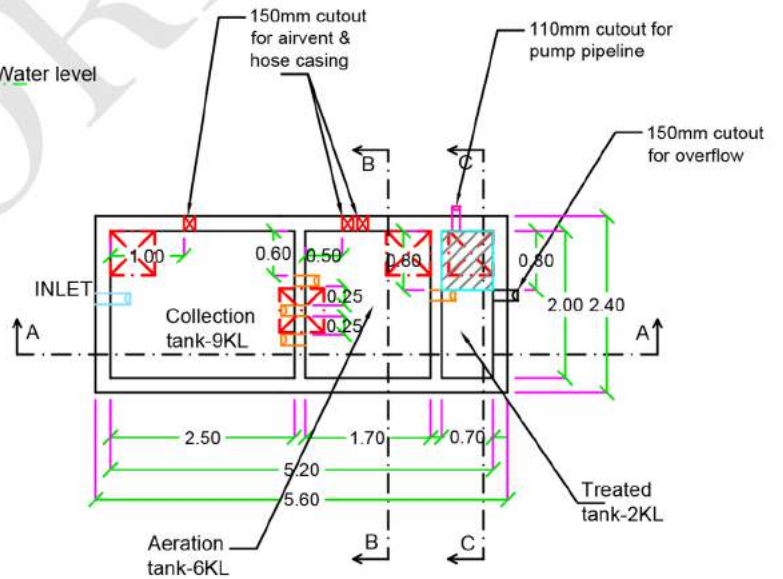
SECTION B-B



SECTION C-C



SECTION A-A



ALL DIMENSIONS ARE IN METERS

PLAN

NECESSARY TANK

NUMBER OF TANK	COLLECTION TANK	AERATION TANK	TREATED TANK
NUMBER OF TANK (NOS)	1	1	1
LENGTH (INNER) (M)	2.50	1.70	0.70
WIDTH (INNER) (M)	2.00	2.00	2.00
MAX WATER LEVEL (M)	1.80	1.80	1.80
CAPACITY OF WATER (M3)	9.00	6.12	2.52
MIN TOTAL CAPACITY (M3)	2.50	1.70	0.70
MIN TOTAL CAPACITY (M3)	11.50	7.82	3.22



9/4, "ORNATE HOUSE", Museum Road, Richmond Town, Bangalore - 560 001
Works : B-19, HMT Industrial Estate, Jalahalli, Bangalore - 560 013
M : +91 98807 84099, +91 89713 30099, +91 78306 20000 | P : 080 2555 0565
E-Mail : info@ornatenaturale.com | Website : www.ornatenaturale.com