Introduction of TEENWIN sewage treatment plant

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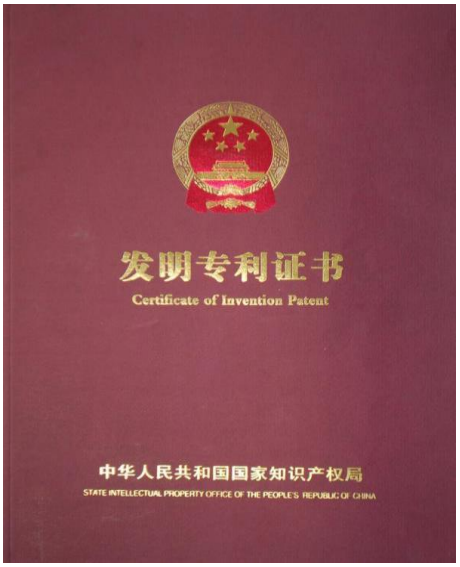
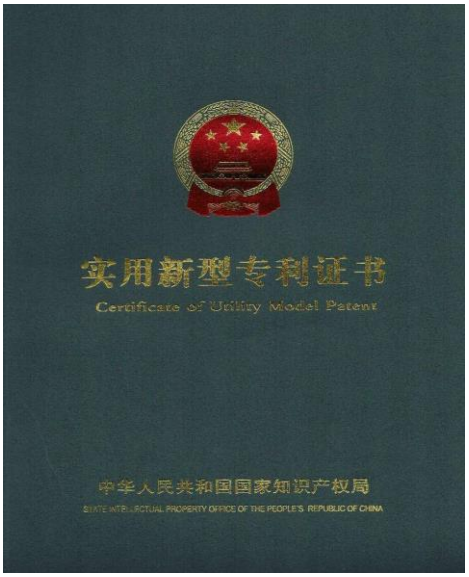
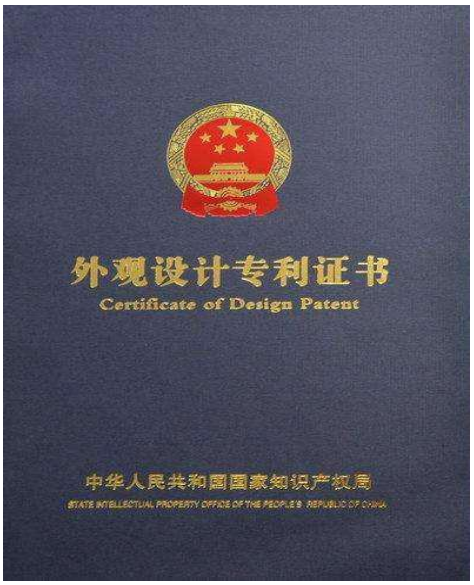
2. Parts of TEENWIN certifications







3. Introduction of TEENWIN wastewater treatment plant

The principle of TEENWIN wastewater treatment system:

Utilizing the principle of natural ecological circulation, create a better environment for the survival of microorganisms by artificial intervention. To achieve the purpose of high efficient treatment of wastewater by taming the quantity and quality of specific microbial flora, meanwhile, this kind of flora will continue to multiply and survive in the system forever and the longer the time is, the stronger the ability to deal with sewage, so our system is a one-time investment and lifelong benefit. The system also applies advanced electrical control technology, fluid mechanics, water supply and drainage technology and so on; the whole system has the advantages of compact structure, high treatment efficiency, compared with conventional technology several times higher. The system is an advanced new technology in the sewage treatment industry, it will be widely promoted.

The patent design of TEENWIN wastewater treatment system:

Teenwin developed moving bed bio film filter will added in the anaerobic tanks, which suspend in the tank is a high polymer fiber that the anaerobic bacteria can attach on. The fiber is actually the home of the bacteria. With this fiber the bacteria can't flow away with the water. The media does not need to be plugged up over time; it is fixed in the tank. At the same condition (same temperature, same waste water etc.) our organic loading rates (kg/m3/day) should be better than other tanks, because our tank has the "media". The longer time moving bed bio film filter in the tanks, the better water treatment result. No electric consumption, no maintain and no consumables.

The characteristics of TEENWIN MBBR wastewater treatment system:

① Covers an area of small, can be installed on the ground, half buried,

buried

② Short installation time and short debugging period (3-6d),

③ The success rate is 100%, the longer the operation time, the better the treatment effect,

④ No need to add chemicals, low energy consumption,

⑤ The system runs automatically without manual operation,

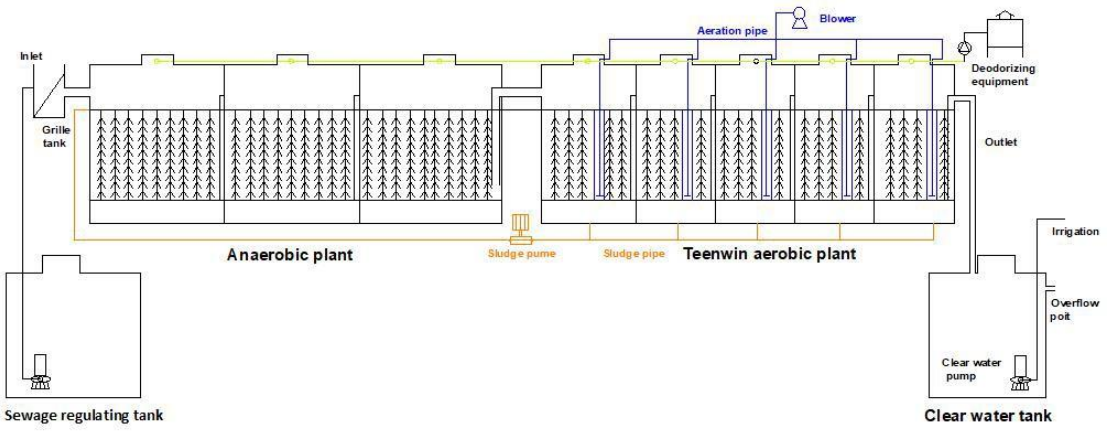
⑥ No additional pollution, such as: no odor, no excess sludge etc.

⑦ Simple structure, easy maintenance, low operation and maintenance costs

⑧ The main equipment are made of corrosion-resistant material, service life can be more than 30 years.

4. Process flow chart design Process:

Raw water → Anaerobic plant → Aerobic plant → discharge standards



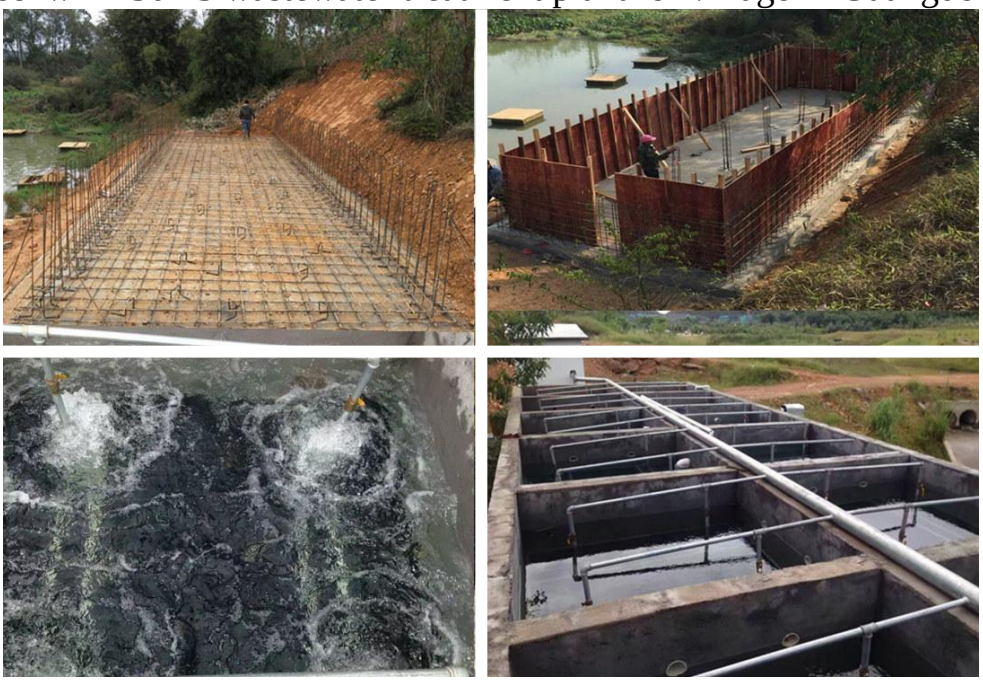
Raw wastewater first flow into anaerobic tank, most of the macromolecular organic matter is broken down into small molecules of organic matter in the anaerobic tank; this process can improve the biodegradability of wastewater greatly, then anaerobic tank effluent entering aerobic plant, most of the organic matter is decomposed by aerobic microbial, most microorganisms and organic matter were intercepted in aerobic tank, in

microbial bed aerobic plant, BOD COD fell more than 85%,NH4-N feel more than 98%,SS fell more than 99% in this process. Water from the aerobic tank can meet the discharge standards.

5. TEENWIN TYMBBR project cases

Teenwin 200m3 wastewater treatment plants for school in Mogolia, clean water reuse for toilet

Teenwin 150m3 wastewater treatment plant for village in Guangdong



Teenwin STP sewage treatment plant for resort in Ifuru Maldives

Teenwin wastewater treatment plant for resort in Faarufushi Maldives


Teenwin wastewater treatment plant for resort in Kurumba Maldives, clean water for vegetables





Teenwin wastewater treatment plant for brewery in Papua New Guinea


Teenwin 400m3 wastewater plant for Banawa Heights in Cebu Philippines



Teenwin water recycles treatment plant for Karongi Pension Plaza in Rwanda




Teenwin MBBR treatment plant export to Philippines client

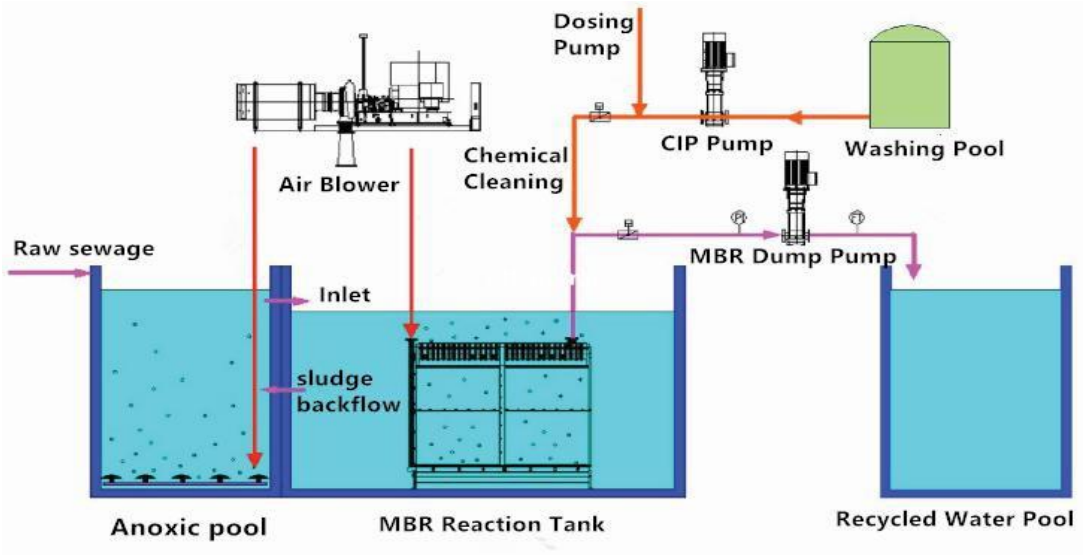
6. TYMBR plant

TEENWIN Membrane Bio-reactor is a new technology for sewage & waste-water treatment application, which is a combination of membrane separation & biochemical technologies. Hollow fiber module (in MBR sheet) separates the water from biochemical reaction tank. It is effective to separate water from mixed liquid & solid via a membrane hollow fiber with 0.1micron pore and the activated sludge will be always stayed in the tank, so it can degrade macro-molecular organics & digest nitrogen & phosphorus etc. Apply MBR technology, removal percentage of pollution can be up to: COD BOD≥93%,SS & Bacteria removal >99.99%;outlet water is with an excellent quality, the water can be recycle to car wash, garden, irrigation, toilet flushing, daily cleaning and even for drinking purpose after with further treatment with reverse osmosis.

Scope of application: village, villa, school, hospital, factory, slaughterhouse and farm etc.

The characteristics of TEENWIN TYMBR wastewater treatment system: The solid liquid separation can be carried out efficiently, the suspended matter in the waste water, the colloidal substance, the biological unit flow. The lost microbial flora is separated from the purified water, and the separation process is simple, the area is small, and the water quality is good. Generally, not need to be treated with three levels can be reused. The biomass can be maintained at high concentration in the biological treatment unit, so that the volume load is greatly improved. The high efficiency of the membrane separation makes the hydraulic retention time of the treatment unit greatly shortened, and the area of the bioreactor is occupied. Due to the prevention of the loss of a variety of microbial flora, it is conducive to slow growth of bacteria (Nitrification bacteria, etc.). The growth of bacteria, so that a variety of metabolic processes in the system smoothly.

Flow chart of TEENWIN Integrated TYMBR Bio-reactor



Description of the Process flow:

Raw sewage from septic tank first pass through screen to remove substances that may clog or scratch the membrane, then flow into homogenize pool, by adjusting the water quality and quantity in the homogenize pool, reduce the uneven drainage problem of the sewage,

sewage is pumped into the anoxic tank by the lift pump. In the anoxic pool, anoxic microorganism broken down the macro-molecular organic matter into small molecule organic matter, that make the sewage easier to be processed, meanwhile, can remove some pollutants such as COD BOD etc. The anoxic pool water overflow into the MBR bio-reactor, sewage with activated sludge mixed fully in the membrane separation tank, most of the organic matter is decomposed by aerobic microbial, and by the membrane separation, most microorganisms and organic matter were intercepted in MBR tank, that can keep high sludge concentration, MBR tank returned Sludge into anoxic tank for denitrifying denitrification. Sewage was pumped out from MBR tank after biochemical treatment, discharge environment after ultraviolet treatment.

The advantages of TEENWIN hollow fiber membrane in TYMBR system

- **Can withstand higher internal pressure**

Compared with ordinary PVDF hollow fiber reinforced membrane, TY-MBR Hollow fiber membrane super internal pressure greater damage pressure. Able to withstand long-term backwash operation without damage in the required conditions, has a longer service life.

- **Not easy to damage, more easier to clean**

The surface of TY-MBR hollow fiber membrane super scratch resistant ability, compared with the common PVDF hollow fiber reinforced membrane is not easy to damage. The cleaning process can be used in certain pressure water cleaning, cleaning more convenient, meanwhile, TY-MBR hollow fiber membrane with super hydrophilic modification of PVDF alloy as the main Filter material. The surface structure of the filter layer is compact, makes all kinds of impurities only stay on the surface of the filter membrane. It cannot enter Filter layer. During the cleaning process,

it is easy to wash, high capacity of flux recovery after cleaning.

- **Super large flux, good hydrophilicity, strong anti-pollution ability**

TY-MBR hollow fiber super membrane using modified PVDF as the main raw material, after hydrophilic treatment and anti-fouling modification, the increase of the bond strength between the PVDF filter and the reinforcing material is improved. Flux and anti-fouling ability of PVDF filter membrane. Fluxes and use life of TY-MBR hollow fiber membranes in the peer leading level. TY-MBR hollow fiber, compared with PP hollow fiber filter membrane, the flux of the super membrane increased by 3~5 times.

- **The filtration precision is high, and the retention is good.**

Currently for sewage treatment membrane on the market, mostly microfiltration membrane

TY-MBR hollow fiber super film belongs to asymmetric membrane, made of a thin, dense skin layer and a supporting sponge. The inner layer Stable structure, high surface filtration accuracy. It can filter out fine dust, rust, bacteria and yeast cells, large size, colloid and other impurities.

- **High strength and long service life**

TY-MBR hollow fiber super high strength support technology developed by Teenwin Company. The tensile strength and compressive strength of the product is much higher than that of the similar products. Tensile strength is greater than 120MPa,curtain type sewage treatment assembly, it is not easy to break the membrane wire in the using process. The service life is 2~3 times long than the hollow fiber filter membrane of PP material.

- **TY-MBR hollow fiber super membrane module can be used in the modular design**

Compact structure, less Use area, full size specifications, better replace the traditional process.

7. TEENWIN TYMBR project cases

Teenwin 300m3 wastewater treatment plants for school in Inner Mongolia

Teenwin 20m3 wastewater treatment plant for apartment in China,

Teenwin wastewater treatment plant for food factory in Philippines

Teenwin 30m3 wastewater treatment plants for factory in China


Teenwin wastewater treatment plant for Slaughterhouse in Ethiopia




Teenwin MBR treatment plant export to Mexico