



Founded in 1966 to develop the high-pressure depth filter sector, WIE now serves three global market segments: the Municipal market, the Commercial market and the Industrial market. One part of WIE specializes in the design, manufacture and supply of IFAS/MBBR Bio Systems and equipment which is used in the treatment of domestic and industrial wastewater (including water reuse), as well as innovative package plants with a very small footprint.

WIE'S advanced technology products include membranes, as well as screening, sedimentation, ultra filtration, water clarification, TDS reduction and sludge treatment equipment - plus complete headworks as containerised units - that are recognised for both performance and low whole of life costs. Through innovation and collaboration, WIE provide well established cutting edge technologies, with an extensive installation base of equipment worldwide.

We are now able to add a range of process technologies and solutions that are focused towards serving the needs of small to medium sized communities. Serving a global customer base, WIE are one of a few companies equally experienced and able to offer a full range of products and solutions for both markets that enhance plant performance and improve the environment, whilst reducing clients capital and operating costs.



2. STAGES OF TREATMENT

The quality of the treated effluent produced by the WIE units exceeds all AS, EU and ASTM standards for wastewater disposal. For the increasing number of cases where wastewater reuse is required, there are highly reliable technologies allowing safe reuse for irrigation, groundwater enrichment, toilet flushing, industrial service water and other uses for which potable water is not necessary.

WIE PACKAGE PLANTS are Automatic, Autonomous, Prefabricated Treatment Units - highly efficient, in compact form and ready for installation and operation. The necessary stages of treatment in all Wastewater Treatment facilities are:

Pre-treatment, Secondary treatment (usually Biological Treatment), and Tertiary treatment for high-quality effluent and Bio-sludge management. WIE PACKAGE units offer solutions for each one of the treatment stages separately or in combinations of more than one stage depending on the size of the facility and the effluent quality required.



1. WASTEWATER PRE-TREATMENT (HEAD-WORKS) The Compact SF pre-treatment units offer combined functions such as: Screening compaction & dewatering; Grit removal, washing & dewatering and Grease & oil removal using fine screen filtration (~350 micron) and DAF technologies. The units are made of coated mild steel or stainless steel to ensure long life, and are completely sealed to minimize any adverse effect to the environment.

2. SECONDARY BIOLOGICAL TREATMENT. The Biological Treatment of Municipal or Industrial Wastewater is performed by high-speed Package units in the form and size of a container. These units are standalone prefabricated biological treatment plants incorporating all necessary components such as bioreactors, electrical and mechanical equipment, as well as control systems.

The technology used in High-Speed Package plants is that of the Moving or Fluidised Bed. This method is based on the combination of two highly reliable and proven processes: Attached Growth in Biofilm (AGB), and Suspended Biomass – Aerobic Treatment (SBAT). The MBBR (Moving Bed Bio-Reactor) method combines both technologies and utilizes their advantages whilst designing out their disadvantages. This technology is ideal for small & medium size facilities as it provides high-rate wastewater treatment in smaller tanks with excellent performance, and with all the practical features that a Package Containerized Plant offers. AMB® Bio-carrier, the MBBR technology used, is an excellent and effective treatment method with many applications and installations in 45 countries around the world.

As opposed to most biofilm bioreactors, the MBBR method uses the total volume of the tank- bioreactor, just like activated sludge systems. As opposed to the latter, it does not require extensive sludge recirculation. In order to achieve these features, a special bio-media is placed inside the bioreactors which act as a biomass growth carrier. In the aerobic reactors, this media (bio-film carrier) moves within the tank due to the mixing caused by air bubble shear forces, while in anaerobic and anoxic zones, movement is due to a vertical agitator. Special screening arrangements keep the bio-carriers within the boundaries of the reactors.

Different carrier media are used by WIE - such as AMB®, WOI, and others, depending on the application. The bio-carrier media used have total contact surface area of $850\text{m}^2/\text{m}^3$ and active "protected" surface are of $560\text{m}^2/\text{m}^3$. The filling percentage and therefore the active surface area may vary depending on the application, and this is one of the greatest advantages of the method since it ensures great flexibility for the treatment systems. Moreover, such flexibility places this method among the most suitable for extension of existing plants, as by increasing the "filling" factor, we increase the capacity of the plant (to a limit of 70%) so as to allow effective movement and mixing of the carriers within the reactor.

Just like in any other "attached growth" process, the main role in the process is played by the diffusion of the ingredients of the organic substrate from and into the biological layer (biofilm). Due to the ability of the substrate (organic constituents) to diffuse up to $100\mu\text{m}$ in depth, the ideal biofilm growth on the surface of the carrier should be a thin and well distributed layer. For that purpose, an intense turbulent flow must be maintained within the tank so that, on one hand, the transfer of the constituents to the



biofilm will be supported, and on the other hand, a thin layer of biological growth will be retained on the carrier by cohesive forces. The High-Speed WIE plants are constructed in a series of models which range in capacities from 200 P.E. (Population Equivalent) up to 2,000 P.E., while in multiple arrangements (in parallel) they will provide capacities up to 8,000 -10 ,000 P.E. and produce up to Class A water.

The prefabricated - autonomous High-Speed WIE bio-plants offer:

- √ High-Rate and Highly-Effective Performance
- √ Loads up to 10 Times higher in 1/5 of the Conventional Time
- √ Easy & Quick Installation
- √ Automatic Function And Easy Operation
- √ Lower Operating Cost by 30%-40%
- √ Remote Monitoring of Operation

3. TERTIARY TREATMENT - EFFLUENT UTILIZATION TECHNOLOGIES

Tertiary wastewater treatment is necessary when high-quality effluent is required in order to dispose the treated effluent or when the treated effluent is to be re-used for irrigation, industrial purposes, groundwater enrichment or other applications. For the applications where high quality effluent is required, WIE PTY LTD. recommends tertiary treatment with micro-filtration or ultrafiltration membranes and final disinfection with UV and/or ozone. Such systems are offered either as independent package units for tertiary treatment (sMBR) installed after the biological treatment and clarification stage, or as units combining biological and micro-filtration treatment, known as MMBR-sMBR technology. Such systems incorporate state of the art technology and the effluent quality is far greater to any other available technologies in wastewater treatment. MMBR-sMBR systems ensure high effluent quality with very low BOD. In the UltraClear™ treatment method, the membrane modules are submerged in separate chambers containing activated mixed liquor of solids concentration as high as 15,000-16,000 mg/l. This way the main biological treatment stage remains unaffected.

WIE uses UF membrane modules from accredited companies with long experience in the manufacture and use of membranes in the design and construction of UltraClear MMBR-sMBR systems. The knowhow of WIE in the design and construction of compact systems & equipment guarantees reliable and efficient operation of the plants. MMBR - sMBR plants are available in independent prefabricated units which can provide facilities from 200 up to 6,000-8,000 P.E. (People Equivalent) with Class A+ water output.



4. SLUDGE DEWATERING SYSTEMS

The excess biological sludge produced during wastewater treatment is one of the most significant problems in the management of the by-products of a wastewater treatment plant. The sludge produced by the WIE biological treatment systems does not exceed a concentration of solids about 1.0%-1.5%. Storing the sludge in a tank is only a temporary solution and requires frequent emptying and transportation of the liquid sludge to other treatment facilities. A new screw dewatering design allows WIE to construct innovative package dewatering plants in ISO Containers.

The Containerized Sludge Dewatering Plant (CSDP) incorporates all necessary equipment and systems for the collection, thickening, supply, flocculation, dewatering and disposal of the sludge in common waste bins. The plant also includes the systems for the preparation of polyelectrolyte solution, as well as the control systems for the whole plant. CSDP plants are delivered as autonomous and independent units with lighting, ventilation as well as odour removal system if required. The Containerized Sludge Dewatering Plants satisfy the sludge management needs of most package wastewater treatment facilities and can reach capacities up to 10 m³/h.

4. CONCLUSIONS

The implementation of modern wastewater treatment technologies such as MBBR and SBR allows the construction of complete wastewater and sludge treatment units with high efficiency levels, for sewage treatment facilities from 200 P.E to 10,000 P.E. The small footprint occupied by PACKAGE plants such as those of WIE, in combination with the project delivery speed, the low operational cost and the treated waste water reuse capability, will give a new boost to decentralized wastewater management and environmental protection.

