



SIRMET

ENGINEERING & MANAGEMENT



COMPACT MUNICIPAL WASTEWATER TREATMENT PLANT

using SBR technology

COMPACT MUNICIPAL WASTEWATER TREATMENT PLANTS USING SBR TECHNOLOGY

SIRMET Ltd has extensive experience in the field of wastewater treatment and offers integrated, efficient and reliable compact biological treatment units for small hotels and lodgments with **50, 150 and 300 population equivalents (SB50, SB150 & SB300 respectively)**. The systems offered can also be modified to treat sewage in the case of remote residences.

The plants are delivered ready for installation, connection and start-up with all equipment pre-mounted onto a compact tank.

The ideal solution for the following cases:

- ✓ **Condos**
- ✓ **Small and medium-sized hotels**
- ✓ **Tourist lodgments**
- ✓ **Camping and recreational camps**
- ✓ **Small or medium-sized housing settlements**
- ✓ **Remote military camps**

The systems offered utilize the Sequential Batch Reactor (SBR) method, which uses the conventional process of activated sludge (suspended growth) in a single reactor where all stages of processing (filling of influent, anoxic mixing, aeration, sedimentation) take place in sequence. Compared to the conventional biological treatment systems, the SBR technology can achieve the same high quality effluent using smaller footprint reactors. The effluent quality is such that complies with most environmental legislation in Europe for wastewater re-use.

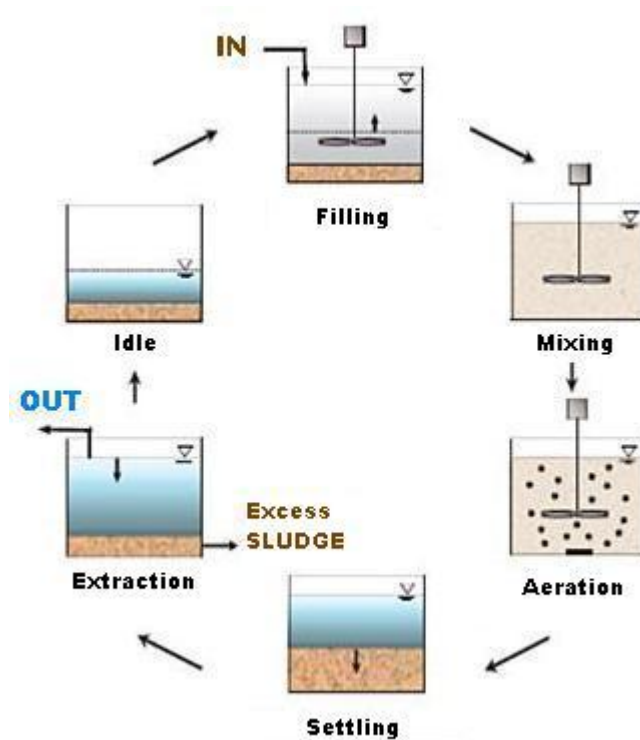
The SBR technology stands out for the following benefits it offers:

- ✓ **Low cost of operation – no chemicals required.**
- ✓ **Fast, easy, instant and odorless operation. The offered plants are to be placed below the ground level.**
- ✓ **No monitoring / operator needed and minimal maintenance required.**
- ✓ **Flexibility in influent variations (quantitative-qualitative).**
- ✓ **High performance process – reduced energy requirements**
- ✓ **Small space requirements and no visual impact.**
- ✓ **Exploitation of treated water for irrigation or secondary / firefighting purposes**

The SBR technology

The SBR technology is the conventional activated sludge biological treatment modified so that all stages of processing take place in a single tank. Prior to the biological treatment, the influent enters a tank for pre-sedimentation, in which all large suspended particles and inert solids settle and separate from the supernatant. The influent then flows by gravity to the second tank (equalization), where pumps and level switches provide the feed to the bio-reactor in a timely manner, avoiding spikes in the hydraulic loading.

The pumps from the equalization tank feed the bioreactor, where the biological treatment is performed in cycles with durations ranging from 4-8 hours. The SBR cycle is shown in the next diagram:



The stages of treatment, are:

1. Filling of the reactor, using the influent pumps from the equalization tank.
2. Anoxic mixing of the reactor, in order to remove nitrogen.
3. Aeration, in order to sustain the biological degradation of the incoming load to carbon dioxide, water and nitrates.
4. Clarification/settling, where the activated sludge is left to settle at the bottom of the tank.
5. Extraction of sludge, using a submersed pump, towards the equalization tank, in order to maintain the sludge concentration in the system.
6. Extraction of the supernatant clarified water towards the end use (irrigation, storage, etc.).
7. After stage 6 the reactor is ready for another cycle.

The different stages, their duration and their sequence, can be modified according to the specific needs of each case, using the PLC at the main control panel.

Influent – Effluent Characteristics

Urban wastewater usually has the following features:

DAILY FLOW	Q_{IT}	150-250 Lt/ PE/ day
ORGANIC LOAD CONCENTRATION	BOD ₅	67gr/eq/day (~340 mg/l)
TOTAL SUSPENDED SOLIDS	TSS	70gr/eq/day/ (~350 mg/l)
TOTAL NITROGEN	N	11gr/eq/day (~40 mg/l)

The compact biological cleaning plants with MBR technology ensure maximum performance possible, achieving better effluent quality compared to the conventional systems or to the quality required by regulations for reuse for irrigation (DIN 19650, Joint Ministerial Decision [JMD] 145116, Government Gazette [GG] 345/B/2011):

		Performance	JMD 145116 - GG 354/B/2011 (limit values for unlimited irrigation)
BOD	mg/l	≤20	<10 to 80% of the samples
COD	mg/l	<50	
TSS	mg/l	<10	<10 to 80% of the samples
TKN-N	mg/l	<5	
pH		6.5-8	
TURBIDITY	NTU	< 2 NTU	<2 median value

The performance of the unit requires proper maintenance and operation according to the directions of SIRMET Ltd.

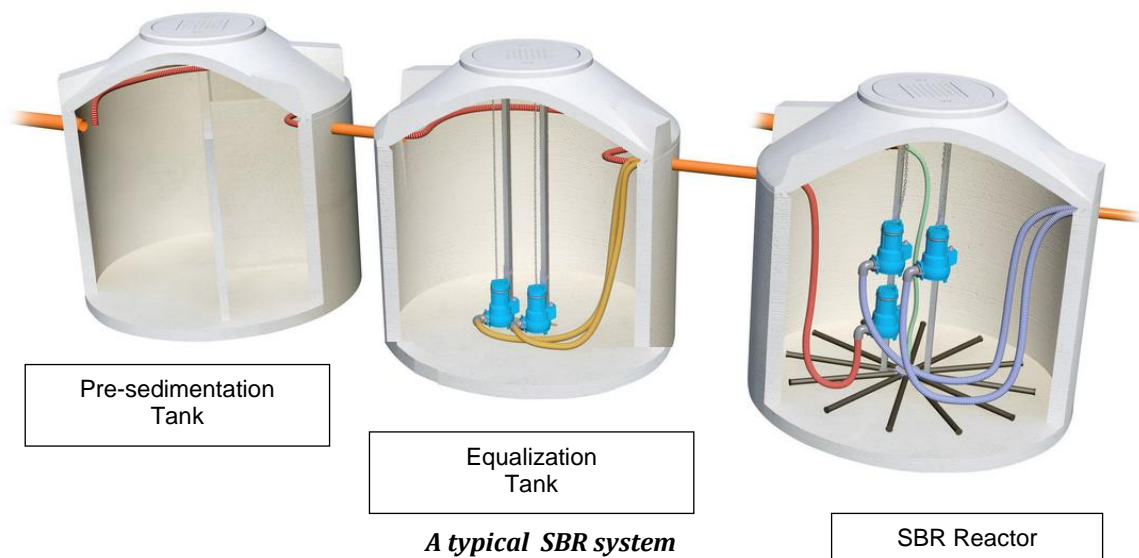
Unit description

The treatment plant consists of plastic (LDPE) tanks with appropriate capacities. The tanks can be placed under the ground level and have ready-made connections for the influent-effluent. Thus, it is not necessary to construct concrete tanks or extensive civil works. The whole equipment (mixer, diffusers, pumps, level switches) are already installed inside the tanks. The electrical connections are terminated in an electrical box, from where an electrician must connect the cables to the main control panel and the latter to the main power (3x400V). The final connection is the blower which must be connected to the aeration terminal and the control panel. The blower must be placed

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above ground in a small cabinet with the control panel. The system is then ready to be set in automatic operation by means of the PLC and the touch screen on the panel.

The equipment (blower, pumps, mixer, level switches) **do not require any maintenance**. The only requirement is the removal of the contents of the pre-sedimentation tank, once or twice per year.



Standard unit sizes

All compact units are delivered with all the necessary electrical and hydraulic equipment ready to be connected with the sewage flow, the effluent and the electrical power.

	SB50	SB150	SB300
DAILY FLOW (m ³ /d)	7.5 - 12.5	22.5 - 37.5	45 - 75
EQUIVALENT POPULATION	50	150	300
NUMBER OF TANKS	3	3	4
TANKS TOTAL CAPACITY (m ³)	20	50	120
TANKS DIMENSIONS (Ø x H m)	2 tanks Ø1.8x2.35m, 1 tank Ø2.4x2.8m	2 tanks Ø2.4x2.8m, 1 tank Ø3.6x3.4m	4 tanks Ø3.6x3.4m

INCLUDED EQUIPMENT: Pre-sedimentation, equalization and SBR tanks made of LDPE, anoxic mixer, aeration blower, aeration network (fine bubble diffusers), lifting (influent) pumps (1 working-1 stand-by), sludge pump (1 pc), effluent pumps (1 working-1 stand-

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by), electrical board with PLC and touch screen, with outputs for connection to SCADA/BMS. All necessary instrumentation and automation (level switches).

The delivery of the systems includes also a manual of operation and maintenance (Greek / English), as well as supervision of installation, connection, start-up and training. The civil engineering works (such as the construction of a base for placement) are not included and they are considered to be an obligation of the employer / pre-existing. The above quote does not include any provision for the treated effluent, which is considered within the scope of the employer.

Certifications

SIRMET Ltd H currently runs its 26th year of a successful, continuous and developing activity and the services and products they offer are certified with the international standard EN ISO 9001:2008.

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