

# SBR

Sequential Batch Reactor information pack

Innovating Wastewater Solutions



| wastewater treatment | industrial wastewater treatment | BOD and  
suspended solids removal | nitrification | variable flow management |  
| storm water treatment | population equivalent up to 100,000 |

## SBR

Achieving total wastewater treatment in the minimum footprint at the lowest whole life cost is the goal of design teams working on behalf of all sectors of industry and commerce concerned with the treatment of waste effluents.

Whether the requirements of the client are to satisfy stringent discharge consents imposed by the Environment Agency or for long term reduction in trade effluent charges with short payback times, the SBR is the ideal process for almost every application.

With the SBR, WPL are able to offer a robust and proven process that has been conceived and developed for over 15 years in the USA where more than 80 plants are in operation. Through detailed value engineering, process design and optimisation, WPL have improved on the original version and are able to offer SBR technology that meets the needs of commercial, industrial and water companies for the lowest capital outlay of any competing batch wastewater treatment supplier.

## Benefits

- True sequencing batch system.
- Modular design facilitates simple works extensions.
- Easy installation - packaged option available.
- Reduced sludge volumes from integral aerobic digester.
- Automated control minimises operator attendance.
- Ideal for sensitive applications
- High and low flow modes to enable both storm water processing and extended periods of low demand.
- Full access to PLC software available to end user allowing on site adaptation to long term increases or decreases in flows and loads. Software upgrades available.
- Pre-screened effluent prevents pump blockages
- Minimal visual impact - eliminates settlement tanks
- Cost effective operation - no media costs and accurate control of retained activated sludge
- Excellent performance meeting environmental specifications.
- Automated control
- Integral aerobic digester reduces sludge volumes
- Remote monitoring and process control capability
- Accommodation of load variations without degradation of effluent
- Flow equalisation and balancing
- Cycle sequencing can be configured to ideally match batch industrial processes and save on upstream balancing
- Nutrient removal capability
- Bespoke designs to deal with seasonal flow and load variations.



### Motorway Service Station

This system was installed to cope with the variable flow rates created by seasonal visitors and the specified BOD requirement.



The SBR has been designed as a flexible wastewater treatment system to meet the stringent and often changing demands of each application, allowing it to meet high treatment standards for BOD, NH<sub>4</sub>, SS and nitrate removal.

It can be constructed in either steel, concrete or glass coated steel tanks (for larger population equivalents).

### Typical installation sites include:

- Industrial wastewater applications
- Water Utilities
- Motorway service stations
- Trade waste
- Small towns and villages



## Scottish Water Installation - Cove

The SBR was specified at this location because of its ability to cope with high storm water flow infiltration and also the plants flexibility in being able to adapt with an increasing local population.

The modularity of the SBR has enabled it to have a 50% increase in treatment capacity since it was first installed.



## Process Description

### PHASE 1

**Fill/React Cycle:** The incoming pre-screened wastewater to the reactor is aerated whilst the tank is filling. The blower is programmed to turn on and off as required to prevent filamentous organisms proliferating in the reactor.

### PHASE 2

**React Cycle:** After the Fill / React Cycle is complete, the React Cycle will begin. The React Cycle will consist of the tank being further aerated for a total kinetically calculated design phase timing. Blowers may be pulsed or constant running dependent on process requirements.

### PHASE 3

**Settle Cycle:** During the settle cycle the air is turned off, allowing the activated sludge floc to settle to the bottom of the tank leaving the clarified supernatant at the top of the tank. After the settle cycle is complete, the decant cycle begins.

### PHASE 4

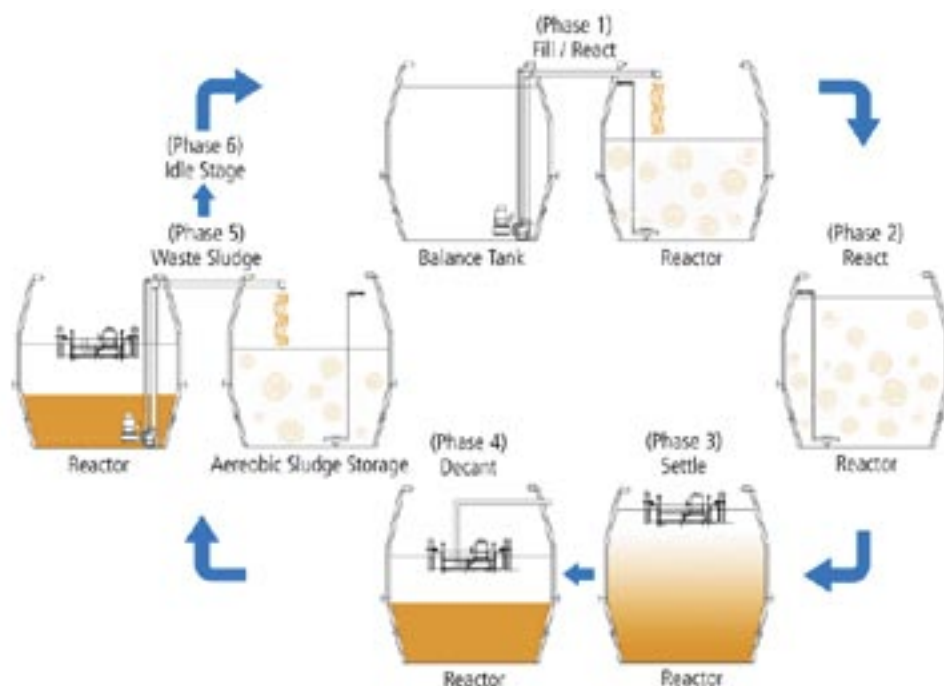
**Decant Cycle:** The treated effluent is decanted from the reactor by one of two floating decant draw offs, designed to draw liquid from a point below the surface water level, thus preventing entry of solids and scum. The decant pumps will only run for design cycle time or until THE level is at duty set point, (Bottom water level), whichever is sooner.

### PHASE 5

**Waste:** The waste period determines the MLSS within the reactors and takes place at the end of the decant period.

### PHASE 6

**Idle:** The idle period is used when the system is waiting for enough effluent to process. During this period the reactor compressors are pulsed to keep the influent aerated.



## Additional Options

- Nutrient removal options
- Final effluent equalisation tank
- Simple low cost retrofit of existing works to SBR operation, to meet changing loads or tighter consent standards
- Tertiary treatment
- Automated grease management.

## Health & Safety

- Tanks fully covered in galvanised gridding for safe operator access
- Galvanised handrails installed on above ground plant
- Bespoke "cut-away" sections of gridding for ease of access to service valves
- Diffusers removable by quick release for operator maintenance
- Davit sockets provided for the removal/lowering of equipment into the unit

## Standard Design Parameters

Average daily flow (ADF) per person, per day = 200 litres

Design Full Flow to Treatment (FFT) = Three times ADF for two hours in 24 hours

Biochemical Oxygen Demand (BOD) per capita = 60 grams

De-sludging Frequency = 30 days

Discharge Standard = 20 mg/l BOD : 30 mg/l Suspended Solids

Sizes assuming:

- 240 minute cycle
- aerated F / M ratio : 0.4 d-1
- design SVI : 175 ml/g
- minimum clear water zone 0.5m

## Typical Sizing Configurations Based on Standard Design Parameters

Population Equivalent	500	1000	1500	2000	4000
ADF m <sup>3</sup> /day	100	200	300	400	800
FFT l/s	3.47	6.94	10.40	13.90	27.80
Balance tank volume m <sup>3</sup>	34	69	104	138	276
No. of reactor basins	2	2	2	4	2
Total reactor volume m <sup>3</sup>	27	114	171	228	456
Digester volume m <sup>3</sup>	57	114	171	228	456
Reactor compressors m <sup>3</sup> / hr	38	77	116	154	308
Number of reactor fine bubble diffusers	16	32	48	64	128
Decant rate l / s	5.5	11	17	22	44
Digested sludge yield m <sup>3</sup> / d	0.75	1.50	2.30	3.00	6.00

Approximate steel tank dimensions: width 3m, total height 3.5m\*. Concrete construction: length 11.5m, width 4m, total depth 5.5m

WPL is recognised internationally as a principle designer and manufacturer of high quality package and turnkey sewage treatment systems, and grease management solutions.

It has over 14 years' industry experience and services an extensive customer portfolio comprising the UK's major water utilities, all areas of the commercial sector and the domestic market place.

The company's consistent focus on ecology, coupled with extensive research & development into new technology, have enabled it to far exceed all existing and proposed discharge consent standards enforced by the Environment Agency, SEPA and other regulatory authorities.



Distribution opportunities and trade discounts available. Please contact WPL for further details.

WPL Limited  
Units 1 & 2 Aston Road  
Waterlooville  
Hampshire PO7 7UX  
United Kingdom.

**Tel: +44 (0) 845 4504822**  
**Fax: +44 (0) 23 92242624**  
email: domestic@wpl.co.uk  
www.wpl.co.uk



WPL Limited registered in England & Wales NI 2583411 VAT No. 568 3801 15. WPL Limited has a policy of continual product development and the above information may be subject to change without notice. WPL Limited are fully compliant with the British Water Code of Practice.