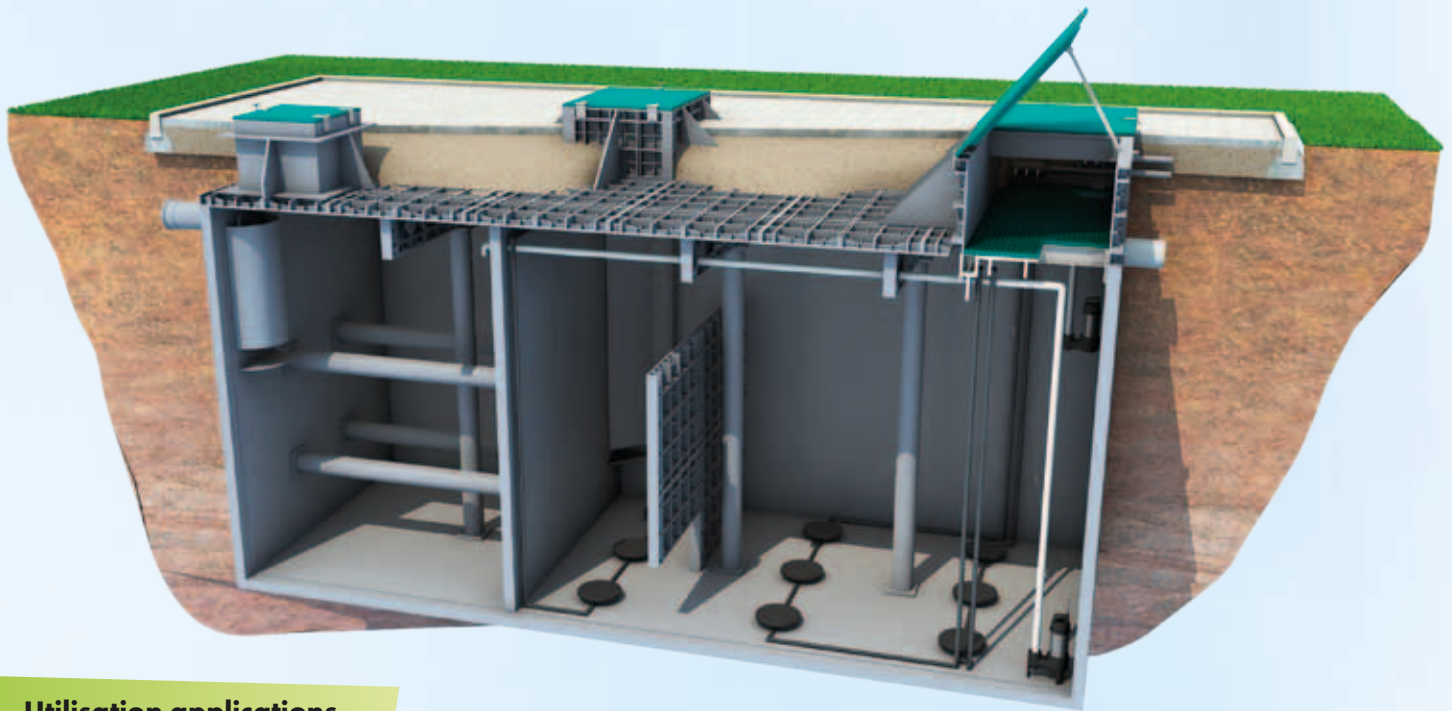


BIOLOGICAL WASTEWATER TREATMENT PLANTS FOR 60 TO 300 PE

AS-HSBR

AS-HSBR biological wastewater treatment plants (further as the WWTPs) continue the product ranges of WWTPs AS-VARIOcomp K and N, AS-KLARO and AS-IDEAL, well proven in practice, manufactured and operated by ASIO, spol. s r.o. since 1993. Due to our long-term experience, we are able to offer a high professional standard in the sphere of design and implementation stages of the WWTP supply in the so-called turnkey projects.



Utilisation applications

This WWTP is intended for purification of domestic wastewater produced in apartment houses, hotels, lodging houses or various facilities rendering similar services. The advantage of this WWTP consists in its easy adaptation to local conditions and the possibility to operate the plant at its capacity from 50 to 110 %. Based on non-standard requirements, we have prepared for you a WWTP that can cope with removing of NH_4 , N_{total} and P content parameters.

We are offering an integrated product range of wastewater treatment plants intended for purification of sewage. This WWTP can be used from 51 to 300 PE units (people equivalent). The technology solutions of these treatment plants are based on stable and reliable service at a minimal energy consumption. This technology utilises aerobic biological processes that are well proven in practice by a long-standing service. At WWTPs with the PE rating above 300, an individual design of the plant will be necessary.

Advantages

- Complex supply (all included in the price)
- Low operating costs and energy consumption
- High adaptability for the given service
- High operating reliability
- Warm-padded and lockable cover, tiltable on stainless steel hinges
- Simple attendance and maintenance procedures of the plant
- Due to a unique design of the SBR reactor and cleaned water draw-off by air-lift pumps, an accumulation space for newly incoming wastewater is provided
- Simple operating settings, possibility of running at a half loading capacity of the plant
- Customer support and servicing



Process description, plant types

• AS-HSBR

Wastewater flows into the settling section of the plant, which serves at the same time as a surplus sludge reservoir. In this place, floating and sedimenting impurities are entrapped and consequently exposed to anaerobic decomposition. The pre-treated wastewater flows to a modified activation reactor, where all phases of the purification cycle take place: aeration phase, phase of activated sludge sedimentation, cleaned water separation, and drawing the cleaned water and surplus sludge off in the end.

• AS-HSBR PROFI

As compared with the previous conventional version, the PROFI type range is additionally fitted with an oxygen probe with the automatic oxygen control in the plant activation section, plus a sludge pump for the internal recycle at the period of low loading capacity of the plant, measurements of operating hours and orientation flowrate of cleaned wastewater, remote monitoring and failure alarms through SMS or a web application.

• AS-HSBR P

The plant is equipped with a device for phosphorus precipitation. Due to this additional process we are able to guarantee the concentration of $P_{\text{total}} = 2 \text{ mg}$ per litre at the discharge.

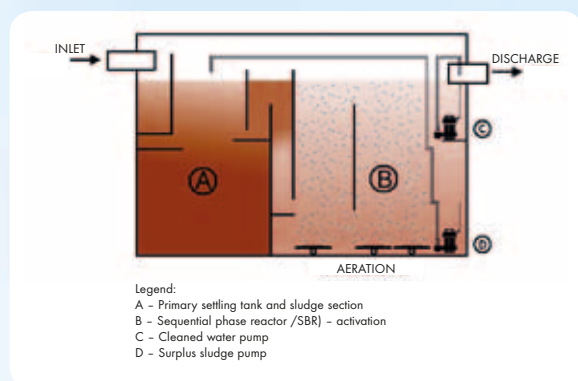
• AS-HSBR PUMP

As compared to the basic type of AS-HSBR, this plant contains in addition a built-in pump sump, which is equipped with a sludge pump and a screen basket. Against the conventional type, the plant is by longer by one meter (max. to the size of 125 PE). The inlet pipe can be placed lower than at the conventional type.

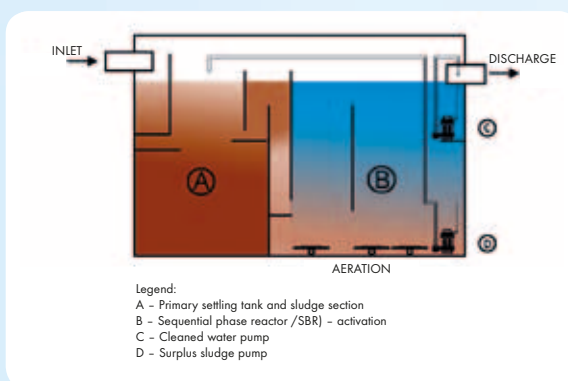
• AS-HSBR DENITRI

The plant is additionally equipped with the wastewater denitrification treatment stage.

AS-HSBR version



Aeration and biological treatment phase



Phase of sedimentation and cleaned water draw-off



Table AS-HSBR sizes

WWTP size	Capacity (PE)	Nom. daily flowrate (m ³ /day)	Nominal loading (kg BOD ₅ /day)	Length x width x height L x B x H (mm)	Inlet height / discharge height Hv (mm) / Ho (mm)	Tank weight (kg)
60	40 - 65	6,0 - 9,9	2,4 - 3,9	4160 x 2440 x 2980	2630 / 2430	1800
80	53 - 88	8,0 - 13,2	3,2 - 5,2	5160 x 2440 x 2980	2630 / 2430	2100
100	67 - 110	10,0 - 16,5	4,0 - 6,6	6160 x 2440 x 2980	2630 / 2430	2300
125	83 - 135	12,5 - 20,6	5,0 - 8,1	7160 x 2440 x 2980	2630 / 2430	2600
150	100 - 165	15,0 - 24,7	6,0 - 9,9	8160 x 2440 x 2980	2630 / 2430	2900
200	135 - 220	20,0 - 33,0	8,1 - 13,2	2 pcs 6160 x 2440 x 2980	2630 / 2430	2100+2500
250	167 - 275	25,0 - 41,2	10,0 - 16,5	2 pcs 7160 x 2440 x 2980	2630 / 2430	2300+2800
300	200 - 330	30,0 - 49,5	12,0 - 19,8	2 pcs 8160 x 2440 x 2980	2630 / 2430	2700+3000

Table of guaranteed values – according to BAT

Parameter	Values
BOD ₅ (mg/l)	25
COD (mg/l)	90
Insolubles (mg/l)	30
N-NH ₄ ⁺ (mg/l)	10
P _{total} (mg/l)	- *

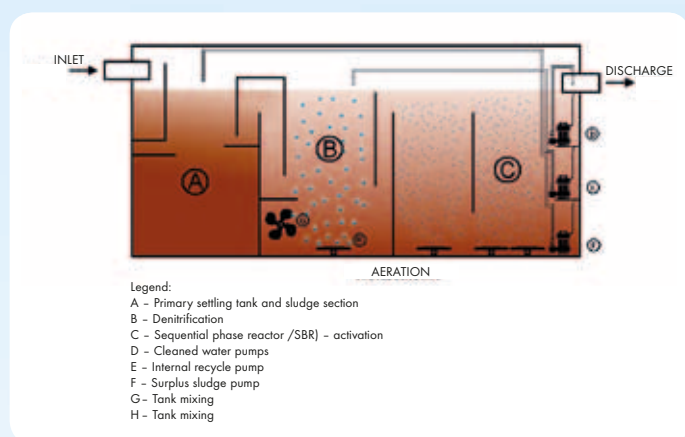
*... if the additional dosing device for phosphorus content reduction is used 2 / 4

The guaranteed values at the discharge from the WWTP AS-HSBR plant will be maintained if the design parameters, installation conditions and operating rules are observed as laid in the submitted Draft Operating Rules.

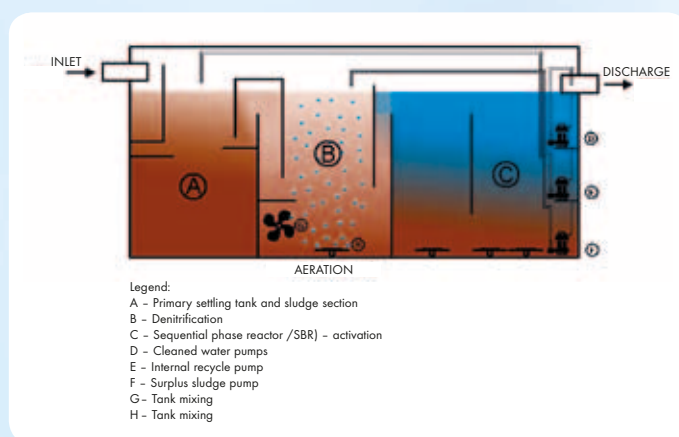
AS-HSBR DENITRI version

Wastewater flows into the **primary tank with settling and sludge sections**, where floating and sedimenting impurities are entrapped and consequently exposed to anaerobic decomposition. From the settling section, pre-cleaned water continues over an overflow, which is equipped with baffles, to the WWTP denitrification tank upstream the other processes. This tank is filled with a mixture of wastewater and activated sludge. Under anoxic conditions, the **denitrification** process takes place here, i.e. the reduction of nitrates contained in the water to gaseous nitrogen. In this way the AS-HSBR DENITRI plant provides not only for the reduction in the ammonia nitrogen content, but also for the total nitrogen content in wastewater. The denitrification tank is stirred continuously and for the AS-HSBR DENITRI 60÷150 sizes, the stirring is provided with coarse-bubble aeration.

For the AS-HSBR DENITRI 200÷300 sizes, a propeller stirrer is used instead of the coarsebubble aeration. From the denitrification tank, the water stream flows by gravity and over an overflow to the **SBR (Sequential Batch Reactor) activation section**. In the SBR activation section, chronologically sequenced processes take place as follows: biological aerobic treatment of wastewater, where the mixture is aerated intensively, activated sludge sedimentation and cleaned water separation, and finally drawing-off of cleaned water to the discharge (by a pump).



Aeration and biological treatment phase



Phase of sedimentation and cleaned water draw-off

Table AS-HSBR DENITRI sizes

WWTP size	Capacity (PE)	Nom. daily flowrate (m3/day)	Nominal loading (kg BOD ₅ /day)	Length x width x height L x B x H (mm)	Inlet height / discharge height Hv (mm) / Ho (mm)	Tank weight (kg)
60	40 - 65	6,0 - 9,9	2,4 - 3,9	6160 x 2440 x 2980	2650 / 2430	2500
80	53 - 88	8,0 - 13,2	3,2 - 5,2	7160 x 2440 x 2980	2650 / 2430	2800
100	67 - 110	10,0 - 16,5	4,0 - 6,6	8160 x 2440 x 2980	2650 / 2430	3000
125	83 - 135	12,5 - 20,6	5,0 - 8,1	3160 x 2440 x 2980 + 7160 x 2440 x 2980	2630 / 2430	1300+2500
150	100 - 165	15,0 - 24,7	6,0 - 9,9	3160 x 2440 x 2980 + 8160 x 2440 x 2980	2630 / 2430	1300+2700
200	135 - 220	20,0 - 33,0	8,1 - 13,2	4160 x 2440 x 2980 + 2 pcs 6160 x 2440 x 2980	2630 / 2430	1500+2200+2100
250	167 - 275	25,0 - 41,2	10,0 - 16,5	5160 x 2440 x 2980 + 2 pcs 7160 x 2440 x 2980	2630 / 2430	1900+2400+2300
300	200 - 330	30,0 - 49,5	12,0 - 19,8	6160 x 2440 x 2980 + 2 pcs 8160 x 2440 x 2980	2630 / 2430	1900+2600+2600

Table of guaranteed values – according to BAT

Parameter	Values
BOD ₅ (mg/l)	25
COD (mg/l)	90
Insolubles (mg/l)	30
N-NH ₄ ⁺ (mg/l)	10
N _{total} (mg/l)	30
P _{total} (mg/l)	- *

* ... if the additional dosing device for phosphorus content reduction is used 2 / 4

The guaranteed values at the discharge from the WWTP AS-HSBR DENITRI plant will be maintained if the design parameters, installation conditions and operating rules are observed as laid in the submitted Draft Operating Rules.

AS-HSBR/R version

This is a self-supporting version of the WWTP for the tank installation in a half-embankment excavation and a half level of backfilling round the tanks. This solution is structurally most advantageous in terms of the elimination of external and internal forces; it is also suitable in the tank installation localities with higher levels of underground water.

AS-HSBR advantages

- Quick installation of the plant without the necessity of concrete pouring around the tanks
- Reduction in the scope of earth movement works with resulting savings in construction costs
- Use of plastic tanks even in localities with higher levels of underground water
- Preservation of the compact single-tank design for WWTP sizes up to 150 PE (up to 100 PE for the DENITRI version)



Example of external reinforcement

Table AS-HSBR/R sizes

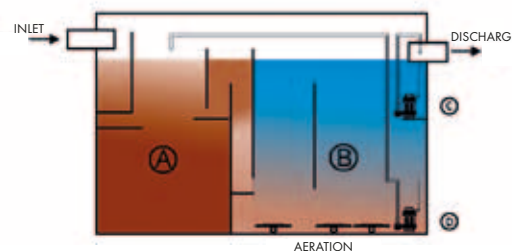
WWTP size	Capacity (PE)	Nom. daily flowrate (m ³ /day)	Nominal loading (kg BOD ₅ /day)	Length x width x height L x B x H (mm)	Inlet height / discharge height Hv (mm) / Ho (mm)	Tank weight (kg)
60	40 - 65	6,0 - 9,9	2,4 - 3,9	4280 x 2440 x 2980	2630 / 2430	1800
80	53 - 88	8,0 - 13,2	3,2 - 5,2	5280 x 2440 x 2980	2630 / 2430	2100
100	67 - 110	10,0 - 16,5	4,0 - 6,6	6280 x 2440 x 2980	2630 / 2430	2300
125	83 - 135	12,5 - 20,6	5,0 - 8,1	7280 x 2440 x 2980	2630 / 2430	2600
150	100 - 165	15,0 - 24,7	6,0 - 9,9	8280 x 2440 x 2980	2630 / 2430	2900

Table of guaranteed values – according to BAT

Parameter	Values
BOD ₅ (mg/l)	25
COD (mg/l)	90
Insolubles (mg/l)	30
N-NH ₄ ⁺ (mg/l)	10
P _{total} (mg/l)	- *

* ... if the additional dosing device for phosphorus content reduction is used 2 / 4

The guaranteed values at the discharge from the WWTP AS-HSBR/R plant will be maintained if the design parameters, installation conditions and operating rules are observed as laid in the submitted Draft Operating Rules.



Legend:
A - Primary settling tank and sludge section
B - Sequential phase reactor / SBR - activation
C - Cleaned water pump
D - Surplus sludge pump

Table AS-HSBR DENITRI/R sizes

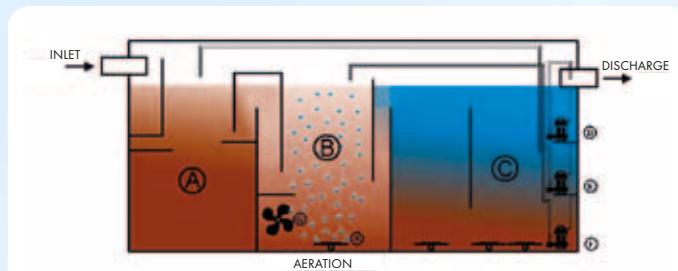
WWTP size	Capacity (PE)	Nom. daily flowrate (m ³ /day)	Nominal loading (kg BOD ₅ /day)	Length x width x height L x B x H (mm)	Inlet height / discharge height Hv (mm) / Ho (mm)	Tank weight (kg)
60	40 - 65	6,0 - 9,9	2,4 - 3,9	6280 x 2440 x 2980	2650 / 2430	2500
80	53 - 88	8,0 - 13,2	3,2 - 5,2	7280 x 2440 x 2980	2650 / 2430	2800
100	67 - 110	10,0 - 16,5	4,0 - 6,6	8280 x 2440 x 2980	2650 / 2430	3000

Table of guaranteed values – according to BAT

Parameter	Values
BOD ₅ (mg/l)	25
COD (mg/l)	90
Insolubles (mg/l)	30
N-NH ₄ ⁺ (mg/l)	10
N _{total} (mg/l)	30
P _{total} (mg/l)	- *

* ... if the additional dosing device for phosphorus content reduction is used 2 / 4

The guaranteed values at the discharge from the WWTP AS-HSBR DENITRI/R plant will be maintained if the design parameters, installation conditions and operating rules are observed as laid in the submitted Draft Operating Rules.



Legend:
A - Primary settling tank and sludge section
B - Denitrification
C - Sequential phase reactor / SBR - activation
D - Cleaned water pumps
E - Internal recycle pump
F - Surplus sludge pump
G - Tank mixing
H - Tank mixing