



Asio®

wastewater and water treatment

AS-GranBio® 100 – 100 000 EO

new technology of wastewater treatment



SMART AND PROGRESSIVE TECHNOLOGY FOR XXI. CENTURY WHICH MOVES CURRENT LIMITS IN THE FIELD OF WASTEWATER TREATMENT

Instead of expensive and operationally demanding membrane technologies, instead of the space of demanding and expensive methods DN, RDN, AnRDN or carousel activation a new technology is coming, which has been developed by intensifying biological processes in a natural way. Granular aerobic biomass technology - AS-GranBio®.

Aerobic granular sludge - introduction.

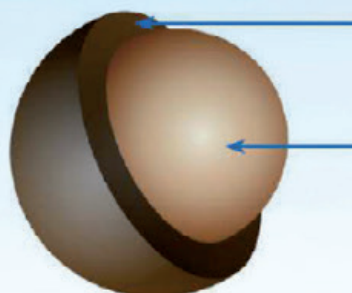
Wastewater treatment is based on the conversion of organic substances to final products of microbiological decomposition of CO_2 , H_2O and minor basic compounds. Microbiological degradation is provided by various types of bacteria that live in symbiosis. Bacteria that ensure removal of organic substances from waste water are called activated sludge. Nowadays, technology using flock-like bacteria is standard. This activated sludge structure will allow the bacteria to better cooperate in comparison to the free floating unrelated bacteria and, in particular, to allow the purified water to be separated from the activated sludge. The new GranBio technology will allow bacteria to exist in a new form, the so-called "granular sludge". The granulated sludge was first grown in anaerobic processes. The efficacy and efficiency of anaerobic purification using granular biomass has been greatly increased compared to flake anaerobic biomass.



Technology is protected by patent application PP 143-2018 and utility model certificate 8662 - 2020



Aerob granule and its parts:



Aerobic zone

- Biological oxidation
- Ammonium oxidation
- Phosphate removal

Anoxic / Anaerobic zone

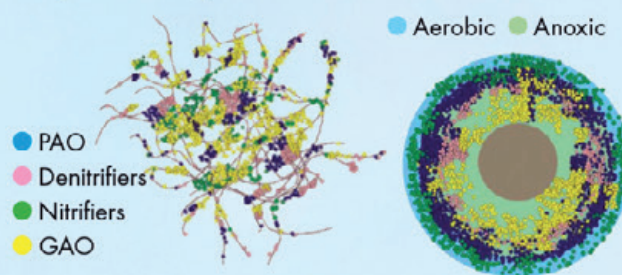
- NO_x reduction to Nitrogen gas
- Phosphate removal

Using AS-GranBio® technology, we can also create aerobic granular biomass (which is not as easy to create as anaerobic granular biomass) and thereby intensify the natural wastewater treatment processes. Granular biomass ensures better cooperation of individual bacterial species and thus increases the efficiency of cleaning and moreover, separation of purified water from activated sludge is many times faster and more efficient. For this reason, one technological element that is necessary for standard technology, namely the settling tank, is eliminated. The technology will make it possible to treat wastewater at a qualitatively higher level at lower investment and operating costs.

Benefits of granular sludge compare to standard technology:

- 2 to 4 times smaller total volume of WWTP
- 30 to 50% lower electricity consumption
- 30% less production of excess sludge
- 95% removal of P without the need for chemical precipitants
- 98% removal of NH_4^+
- 90% removal of total nitrogen

Distribution of nitrifying, denitrifying as well as PAO (polyphosphate accumulating organisms) and GAO (glycogen accumulating organisms) bacteria in floc and granular sludge



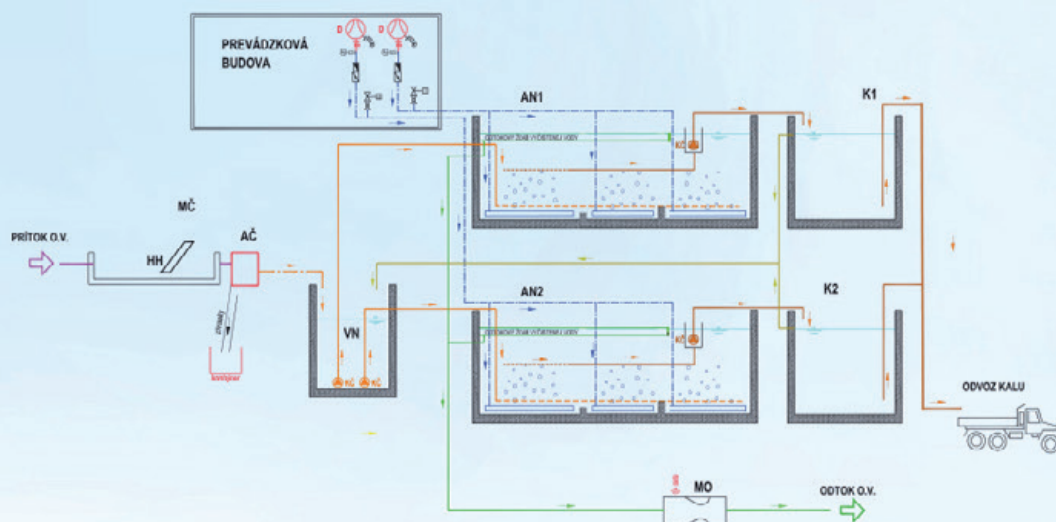
Description of technology AS-GranBio®:

WWTP is mechanical – biological WWTP, which remove organic compounds as well as nutrients N and P. Nitrogen is removed in nitrification and simultaneously denitrification process and P is removed in biological way – “luxury uptake” process.

The wastewater flow through automatic fine mechanical pretreatment to equalization tank. The wastewater from equalization tank is pumped to biological reactor due to operation system. There are two (three, four) AS-GranBio reactors. They have distribution system of wastewater on the bottom of each reactor, distribution system for removing of excess sludge and distribution system for removing clear water from biological reactors. That distribution system is calculated due to amount of treated wastewater and due to dimensions of reactor.

Pumping of wastewater to each reactor is done after the sedimentation phase of activated granular sludge. During sedimentation phase the activated granular sludge is divided from clear water. After this phase, activated sludge is in the bottom of the reactor and clear water is in upper part. During pumping of wastewater to reactor is clear water push out from reactor and activated sludge stay inside. Outflow of clear water is done through distribution system, which is precisely calculated for maximal flow of discharge water.

Technological scheme WWTP AS-GranBio® 3 000 EO:



After phase of outflow of clear water there is phase of aeration. In that phase the biomass remove organic pollution as well as nutrients. Aeration is regulated due to operation system and due to O_2 probe.

Biological process removing of organic process is lead thus that they are selection of bacteria which are able to remove phosphorus from wastewater. This process is called "luxury uptake". We are able to intensification of that process where we achieve 95 % of removal P only by biological way.

Technical parameters WWTP AS – GranBio® 100 – 700

Type	PE	Q_{24} (m ³ /d)	Volumetric organic loading (kgBSK ₅ /d)	Dimensions L x W x H (m)	M (kg)	Installed power (kW)
100	80-120	15	6	5 x 2,16 x 3	1700	4,0
125	110-140	18,7	7,5	6 x 2,16 x 3	1900	4,0
150	130-170	22,5	9	7 x 2,16 x 3	2200	4,5
200	170-220	30	12	9 x 2,16 x 3	1900+1200	6,8
250	220-270	37,5	15	12 x 2,16 x 3	1900+1900	7,6
300	270-330	45	18	7 x 4,32 x 3	2200+2200	7,6
350	330-370	52,5	21	7 x 4,9 x 3	2500+2500	7,6
400*	370-430	60	24	6 x 4,32 x 3 + VN	1900+1900	11,0
450*	430-470	67,5	27	6 x 4,32 x 3 + VN	1900+1900	11,0
500*	470-530	75	30	6 x 4,9 x 3 + VN	2100+2100	11,0
550*	530-570	82,5	33	7 x 4,9 x 3 + VN	2500+2500	11,0
600*	570-630	90	36	7 x 4,9 x 3 + VN	2500+2500	11,0
650*	630-670	97,5	39	7,5 x 4,9 x 3 + VN	2700+2700	13,0
700*	670-750	105	42	8 x 4,9 x 3 + VN	2900+2900	13,0

* without ET (equalization tank), which will be built as a separate concrete tank, in which the technology and M&R will be installed.

Guaranteed outflow parameters for standard sewage, 24-hour time composite sample:

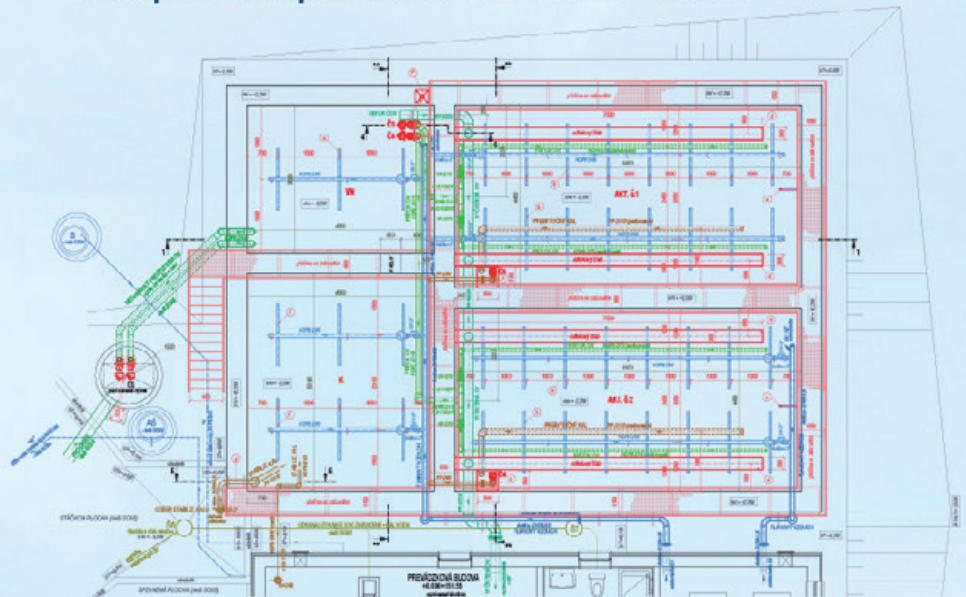
	sample „p“ (mg/l)	sample „m“ (mg/l)
COD	80	120
BOD ₅	20	40
SS	20	40
N-NH ₄ ⁺	10 mg/l ^(±1)	20 mg/l ^(±1)
N _{tot}	20 mg/l ^(±1)	30 mg/l ^(±1)
P _{tot}	1	2

In the case of a requirement for stricter parameters, we will make an individual design of the WWTP for the given source of pollution and the place of discharge.

Technical parameters WWTP AS – GranBio® 800 – 100 000

At the AS-GranBio® WWTP for more than 800 PE, the technical parameters of the WWTP and the specific set of mechanical pre-treatment facilities, biological line, tertiary final treatment, measurement and control facilities and sludge management are always designed on the basis of specific input qualitative and quantitative wastewater parameters. The specific design of the WWTP takes into account local conditions, requirements for the quality of treated water, requirements for the size of the built-up area and other specific requirements, which are taken into account in the processing of project documentation.

Example of floor plan of WWTP AS-GranBio® 1200 PE



Guaranteed outflow parameters for standard sewage depending on the requirements of the investor. With AS-GranBio® technology, we can go to the following outflow parameters of treated wastewater. 24 hour time composite sample:

	sample „p“ (mg/l)	sample „m“ (mg/l)
COD	35	80
BOD ₅	7	15
SS	10	20
N-NH ₄ ⁺	1 mg/l(z ¹)	5 mg/l(z ¹)
N _{tot}	6 mg/l(z ¹)	10 mg/l(z ¹)
P _{tot}	0,2	1

In the case of a requirement for stricter parameters, we will make an individual design of the WWTP for the given source of pollution and the place of discharge.

First references:

- WWTP Veľké Kostoľany 3000 PE – design and realization
- WWTP VAS – 10 000 PE – design and realization
- WWTP Veselé – 5000 PE – design
- WWTP Bansko - North Macedonia – 3000 PE – design
- WWTP Jasová 1200 PE – design
- WWTP Búč 2400 PE – design
- WWTP Dubník 1600 PE – design
- WWTP Rúbaň 1000 PE – design
- WWTP Ratkovce 1200 PE – design
- WWTP Žehra 4000 PE – design
- WWTP Bátorove Kosihy 4000 PE – design
- WWTP Báhoň 1990 PE - design

More information about this product as well as other products and technologies can be found here - load this QR code



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