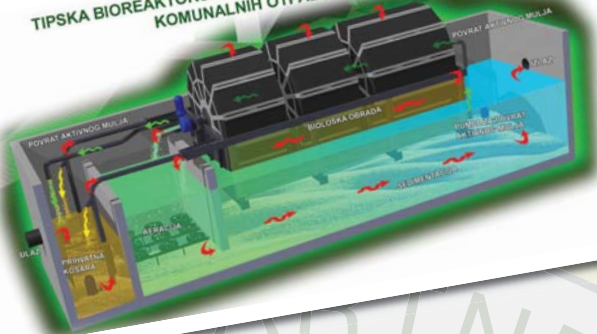


TIPSKA BIOREAKTORSKA POSTROJENJA ZA PROČIŠĆAVANJE
KOMUNALNIH OTPADNIH VODA



TEHNOLOGIJE I UREĐAJI ZA PROČIŠĆAVANJE OTPADNIH VODA

TECHNOLOGY AND EQUIPMENT
FOR WASTE WATER
PURIFICATION

2017

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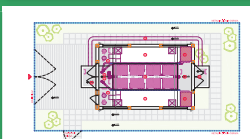
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SPECIJALNI PROIZVODI I OPREMA / SPECIAL PRODUCTS AND EQUIPMENT

VIŠE OD 25 GODINA RAZVOJA MORE THAN 25 YEARS OF DEVELOPMENT



VODEĆA EKO INDUSTRIJA U GOSPODARENJU OTPADOM I VODAMA
LEADING ECO INDUSTRY IN WASTE AND WATER MANAGEMENT



Poštovani,

Više od 25 godina Tehnix je prisutan na području pročišćavanja otpadnih voda. Na osnovi fizikalnih, bioloških i kemijskih postupaka, razvijene su vlastite tehnologije primjenjene u širokoj paleti uređaja, koji su svoju vrijednost dokazali na tržištu.

Naziv Tehnix usko se veže uz pojam SEPARATOR i BIOROTOR, zahvaljujući činjenici da su dominantni sastavni dijelovi izvedenih sustava odvodnje u zemlji, i značajno prisutni u regiji. Kao temeljni uvjet života voda je i dalje naša fascinacija i predmet istraživanja te razvoja novih tehnologija

S poštovanjem,

Đuro Horvat, predsjednik kompanije

Dear Business Partners,

For more than 25 years Tehnix is present in the field of waste water treatment. On the basis of physical, biological and chemical methods we have developed our own technologies that are implemented in a wide range of devices, which have proven their value on the market.

The name Tehnix is closely linked to the terms SEPARATOR and BIOROTOR, due to the fact that they are dominant components of drainage systems constructed in the country and are significantly present in the region. Being a fundamental precondition for life, water continues to be our fascination and the subject of research and development of new technologies.

Yours Sincerely,

Đuro Horvat, President of Company



UKRATKO

Osnovan 1991.

Sjedište
- Donji Kraljevec

Direktor
- Đuro Horvat (CEO)

Zaposlenici
- 2017: 350

Prihod
- 2016: 35.000.000,00 €

Djelatnost
- razvoj i projektiranje
- proizvodnja
- servis i održavanje

Instalirani separatori i mastolovi: 4000

Instalirane biojame i biorotori: 750

BRIEFLY

Established in 1991

Headquarters
- Donji Kraljevec

Director
- Đuro Horvat (CEO)

Employees
- 2017: 350

Income
- 2014: 35.000.000,00 €

Activity
- development and design
- production
- maintenance and service

Installed separators and grease traps: 4000

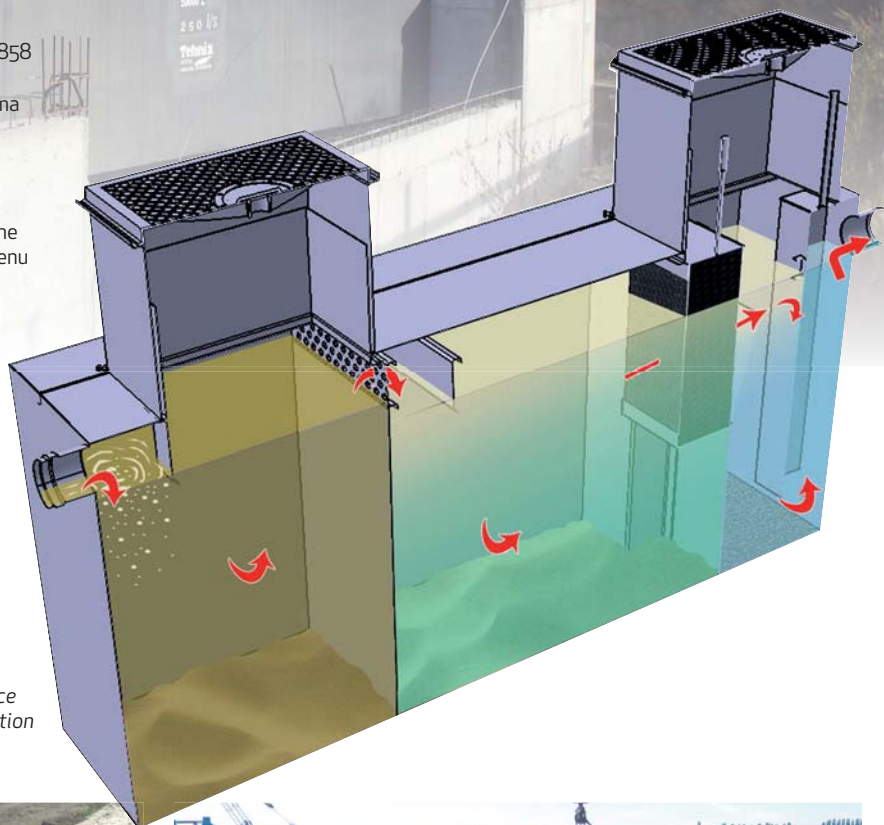
Installed bio cesspits and biorotors: 750





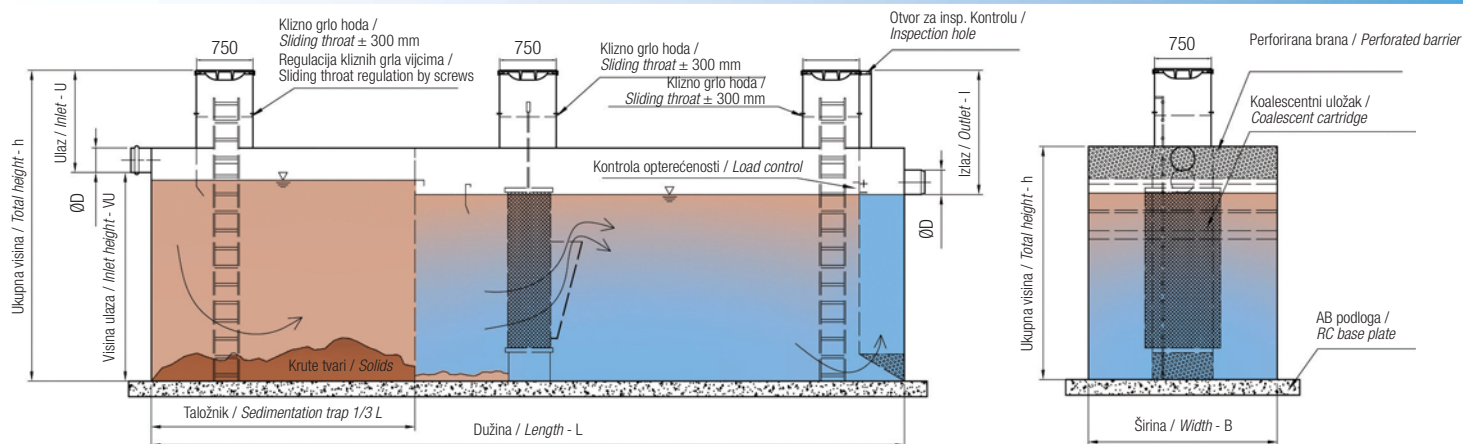
- Namijenjeni su za pročišćavanje zauljenih i zamašćenih voda
- izrađeni su i usklađeni sa hrvatskim i euro normama HRN EN 858
 - antikorozivno su zaštićeni specijalnim katran eposi smolama
 - kategorizirani su u I. klasu separatora prema važećim normama
 - klizna grla prilagođavaju se koti terena
 - integriran taložnik i koalescentni uložak
 - koncentracija rezidualnog ulja na izlazu manja od 0,5 mg/l
 - mogućnost ukopane i nadzemne ugradnje
 - mogućnost ugradnje u zelenu površinu ili ispod nosive površine
 - dubina ulaznih i izlaznih priključaka prilagođena stanju na terenu
 - jednostavno upravljanje, održavanje, pražnjenje i čišćenje

- Intended for purification of oily and greasy water
- made in compliance with Croatian and European norms HRN EN 858
 - corrosion protection with special tar epoxy resins
 - categorized as 1-st class separators according to current norms
 - separator sliding throat adaptable to site level
 - integrated sedimentation trap and coalescent replaceable cartridge
 - residual oil concentration at the outlet is less than 0,5 mg/l
 - possible underground and above ground installation
 - possible installation in green surface or under bearing surface
 - depth of inlet and outlet connections adaptable to site situation
 - easy operation, maintenance, emptying and cleaning

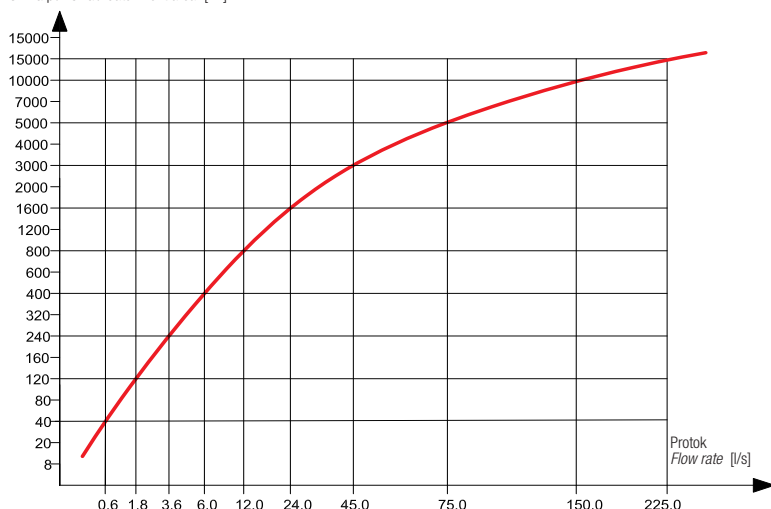


SEPARATORI LAKIH TEKUĆINA

LIGHT LIQUID SEPARATORS



Slivna površina / Catchment area [m²]



Dijagram srednje opterećenosti zauljenosti vode
Diagram of average water oiliness



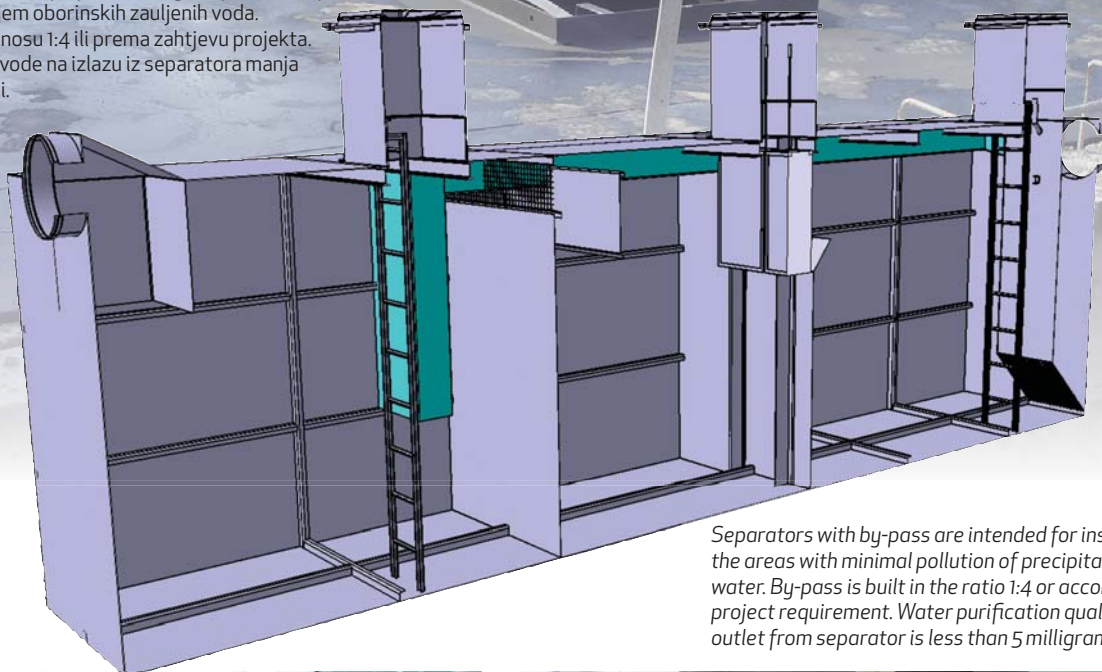
Održavanje je minimalno i svodi se na kontrolu količine ulja u separatoru i zbrinjavanje sadržaja separatora. Separator podijeljen u tri komore, a u zadnjoj-trećoj komori se izdvaja glavna ulja, prilikom pražnjenja separatora ne ispušćava se kompletni sadržaj, već se radi o cca 1/2 ukupnog volumena separatora. Separatori Tehnix zaštićeni specijalnim premazom na bazi tekuće plastike otpornim na agresivne tekućine. Vanjski dio separatora na zahtjev može biti premazan tekućim resitolom, te kompletno obložen hidroizolacijskom ljepljenkom V4.

Tip separatora Tip separatora Volumen [l]	Dužina Length L [mm]	Širina Width B [mm]	Visina Height H [mm]	Ukupna visina Total height h [mm]	Ulaz Inlet U [mm]	Izlaz Outlet I [mm]	Visina ulaza Inlet height VU [mm]	Cijevi Pipes ØD [mm]	Protok Flow rate Q [l/s]
800	1500	750	800	1300	620	675	680	Ø 110	1,6
1200	1500	850	1000	1500	620	675	880	Ø 110	2,2
2000	2000	1000	1100	1600	620	675	980	Ø 110	3,0
2500	2500	1000	1200	1700	635	700	1065	Ø 125	6,0
3500	2750	1100	1200	1950	920	1000	1030	Ø 160	10,0
5000	3000	1250	1300	2050	950	1050	1100	Ø 200	20,0
6000	3500	1300	1350	2100	1000	1125	1100	Ø 250	30,0
10 000	4500	1500	1500	2250	1000	1125	1250	Ø 250	40,0
15 000	6000	1500	1500	2500	1325	1485	1175	Ø 315	60,0
20 000	6000	2000	2000	3000	1325	1485	1675	Ø 315	80,0
25 000	6000	2250	2000	3000	1410	1610	1590	Ø 400	100,0
30 000	7000	2250	2000	3000	1510	1760	1490	Ø 500	125,0
35 000	8000	2250	2250	3250	1250	1500	2000	Ø 500	150,0
40 000	9000	2500	2500	3500	1300	1600	2200	Ø 600	200,0
50 000	10 000	2500	3000	4000	1300	1600	2700	Ø 600	250,0

SEPARATORI S BYPASSOM

SEPARATORS WITH BY-PASS

Separatori s bypassom namjenjeni su za ugradnju na lokacijama s minimalnim zagađenjem oborinskih zauljenih voda. Mimosvod se izvodi u odnosu 1:4 ili prema zahtjevu projekta. Kvaliteta pročišćavanja vode na izlazu iz separatora manja je od 5 miligrama po litri.



Separators with by-pass are intended for installation in the areas with minimal pollution of precipitation oily water. By-pass is built in the ratio 1:4 or according to the project requirement. Water purification quality at the outlet from separator is less than 5 milligrams per liter.

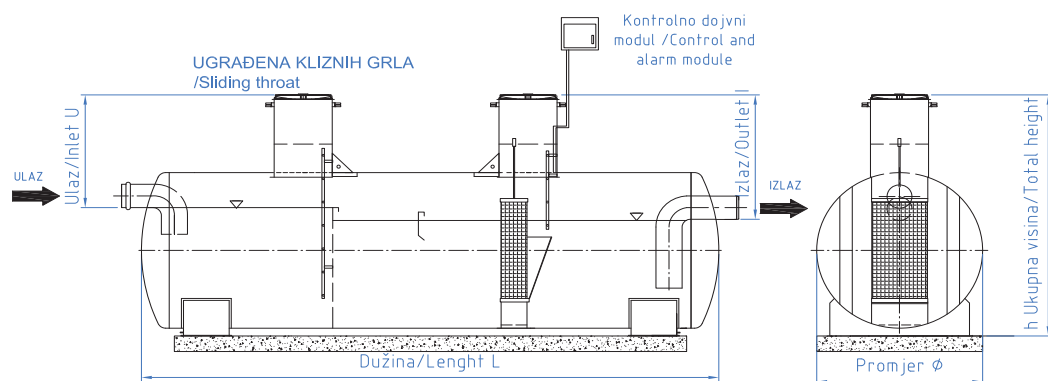


Tip separatora Tip separatora Volumen [l]	Dužina Length L [mm]	Širina Width B [mm]	Visina Height H [mm]	Ukupna visina Total height h [mm]	Ulaz Inlet U [mm]	Izlaz Outlet I [mm]	Visina ulaza Inlet height VU [mm]	Cijevi Pipes ØD [mm]	Protok Flow rate Q [l/s]
2000	2000	1000	1100	1600	635	700	965	125	3 / 12
2500	2500	1000	1200	1700	670	735	1030	200	6 / 24
3500	2750	1100	1200	1950	960	1050	990	200	10 / 40
5000	3000	1250	1300	2050	1000	1100	1050	250	20 / 80
6000	3500	1300	1350	2100	1075	1235	1235	315	30 / 120
10 000	4500	1500	1500	2250	1065	1220	1185	315	40 / 160
15 000	6000	1500	1500	2500	1160	1360	1090	400	60 / 240
20 000	6000	2000	2000	3000	1160	1360	1590	400	80 / 320
25 000	6000	2250	2000	3000	1160	1360	1490	500	100 / 400
30 000	7000	2250	2000	3000	1610	1810	1390	600	125 / 500
35 000	8000	2250	2250	3250	1300	1600	1950	600	150 / 600
40 000	9000	2500	2500	3500	1400	1800	2100	800	200 / 800
50 000	10 000	2500	3000	4000	1400	1800	2600	800	250 / 1000

SPECIJALNI SEPARATORI SPECIAL SEPARATORS

Namijenjeni su za odvajanje ulja i masti, taloga, pijeska, šljunka i pepela iz oborinskih ili procesnih zauljenih voda.

Intended for separation of oil, grease, sediment, sand, gravel and ashes from precipitation and process oily water.



Tip cilindrični	Promjer DN [mm]	Dužina L [mm]	Ukupna visina [mm]	Ulaz U [mm]	Izlaz I [mm]	Cijevi DN [mm]	Protok Q [l/s]
2500	1250	2650	1850	675	738	Ø 125	6
3500	1250	2740	1850	710	790	Ø 160	10
4500	1600	2450	2200	750	850	Ø 200	15
5000	1600	2820	2200	750	850	Ø 200	20
6000	1600	3740	2200	800	925	Ø 250	30
10 000	1600	5350	2200	800	925	Ø 250	40
15 000	1600	8570	2250	865	1023	Ø 315	60
20 000	2000	6960	2650	865	1023	Ø 315	80
25 000	2000	8450	2650	950	1150	Ø 400	100
30 000	2000	10120	2650	1050	1300	Ø 500	125
35 000	2500	7500	3200	1050	1300	Ø 500	150
40 000	2500	8800	3200	1050	1450	Ø 600	200
50 000	2500	10800	3200	1050	1450	Ø 600	250



OPREMA ZA KONTROLU I DOJAVU OPTEREĆENOSTI
EQUIPMENT FOR CONTROL AND ALARM IN CASE OF OVERLOAD

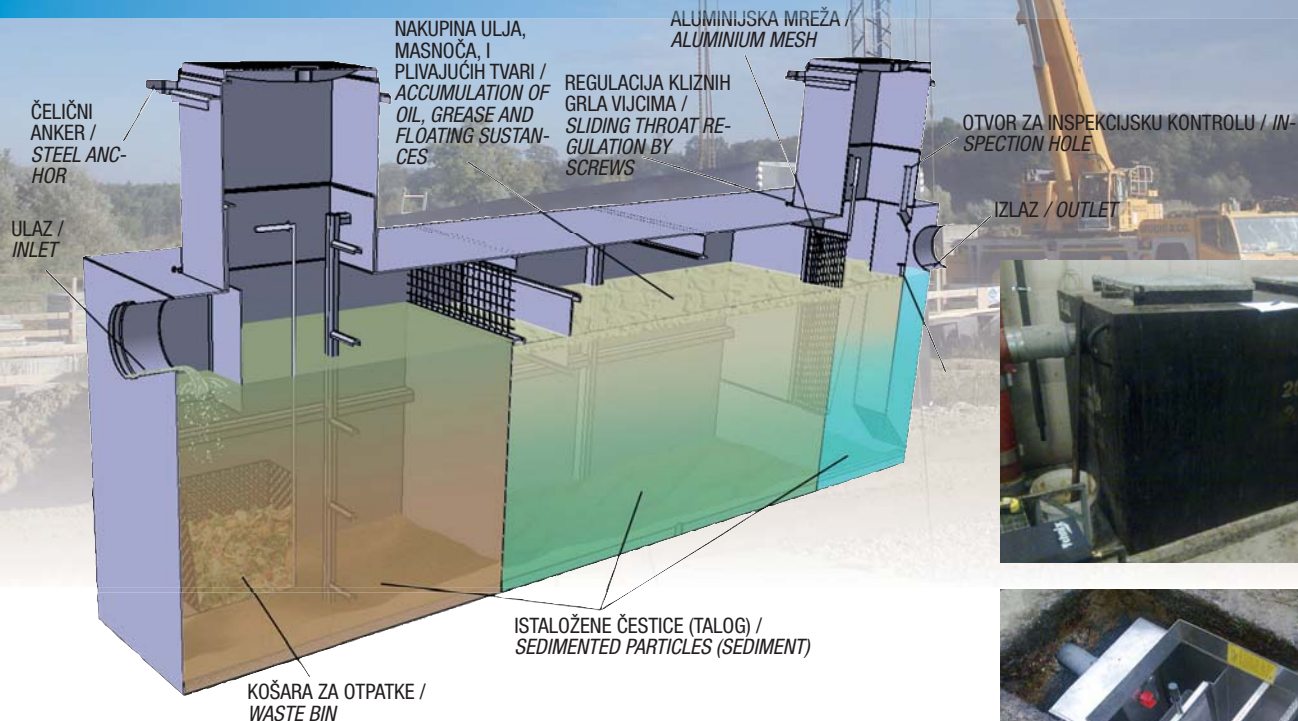


UPRAVLJAČKI ELEKTROPANEL
SPECIJALNOG SEPARATORA
CONTROL ELECTROPANEL OF
SPECIAL SEPARATOR



Prikaz ugradnje specijalnih separatora na terenu / Installation of a special separator on site

MASTOLOVI GREASE TRAPS



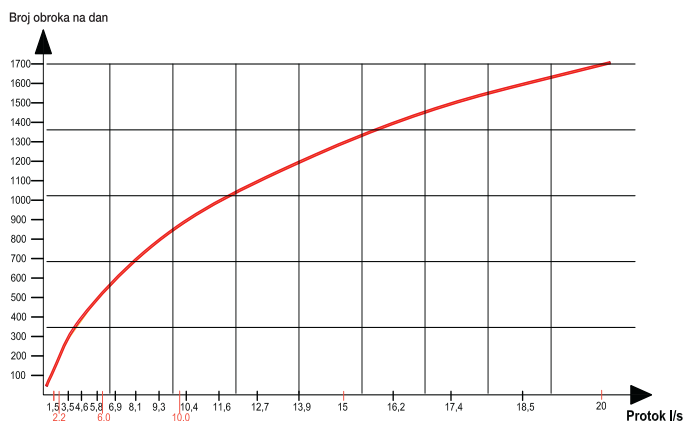
Mastolovi su proizvedeni prema normi HRN EN 1825.

Otpadne masne vode iz kuhinje, mesne i prehrambene industrije potrebno je pročistiti na mastolovu kao prevencija od začepljenja kanalizacijskog sustava.

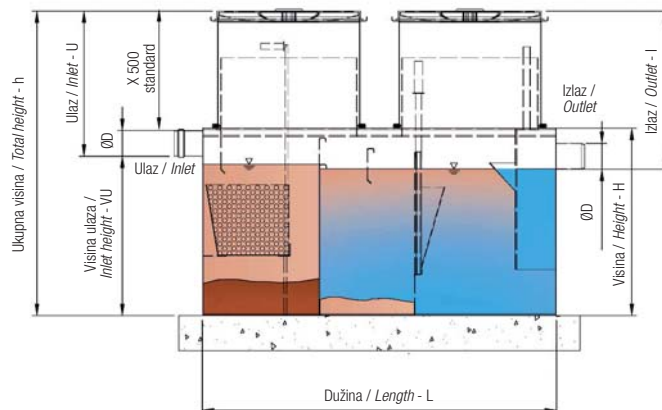
Optimalna rješenje za ugradnju u zemlju, ugradnju u objekt kao samostojeći mastolov. Učinkovit i ekonomičan mastolov prilagođen je zahtjevima i potrebama korisnika.

Grease traps are produced according to HRN EN 1825. Greasy waste waters from kitchens, meat and food industry should be purified by grease trap to prevent clogging of sewage system. It is optimal solution for underground installation and installation within a facility as a free standing grease trap. Efficient and cost-effective grease trap is adapted to requirements and needs of the user.

Prikaz ugradnje mastolova
Installation of a grease trap



Dijagram protoka mastolova u ovisnosti o broju obroka
Graphic outline for determination of grease trap size



Tip separatora Tip separatora Volumen [l]	Dužina Length L [mm]	Širina Width B [mm]	Visina Height H [mm]	Ukupna visina Total height h [mm]	Ulaz Inlet U [mm]	Izlaz Outlet I [mm]	Visina ulaza Inlet height VU [mm]	Cijevi Pipes ØD [mm]	Protok Flow rate Q [l/s]
800	1500	750	800	1300	620	675	680	Ø 110	1,6
1200	1500	850	1000	1500	620	675	880	Ø 110	2,2
2000	2000	1000	1100	1600	620	675	980	Ø 110	3,0
2500	2500	1000	1200	1700	635	700	1065	Ø 125	6,0
3500	2750	1100	1200	1950	920	1000	1030	Ø 160	10,0
5000	3000	1250	1300	2050	950	1050	1100	Ø 200	20,0

BIOJAME kapaciteta do 50 ES

BIO CESSPITS capacity of 50 PE



Biojama tip TEHNIX je uređaj za biološko pročišćavanje sanitarnih otpadnih voda, kapacitet je od 5 do 50 ES-a. Uređaj se prilagođava različitim kapacitetima i specifičnim uvjetima rada, amortizira dnevno hidraulično opterećenje te ispunjava zahtjeve za veće ugradbene situacije. Uređaj je moguće ugraditi u zelene površine ili kolničku konstrukciju, bez utjecaja na promjenu vizualnog izgleda okoliša. Kvaliteta pročišćene vode na izlazu iz tijela uređaja zadovoljava određenu kategorizaciju prijemnika II i III kategorije.

UPRAVLJAČKI ELEKTRO ORMARI

KLIZNO PRILAGODLJIVO GRLO
SA PLINOTJESNIM POKLOPCEM

PRIKLJUČAK ZA UZEMLJENJE

IZLAZ

POPLIPROPILENSKI
BIO AKUMULATORI

PRIKLJUČAK ZA
ZRAK DN75

ULAZ

VISOKO KVALITETNI
SILIKONSKI DIFUZORI ZRAKA

MEMBRANSKA /
MEMBRANE



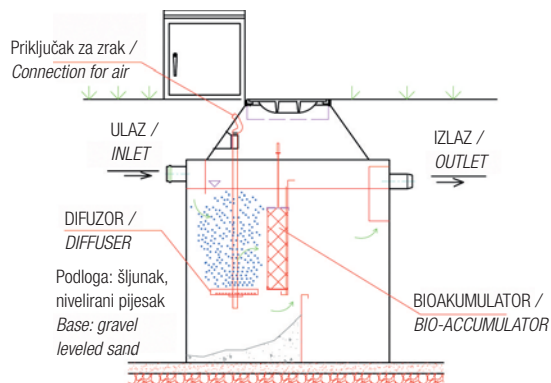
CENTRIFUGALNA /
CENTRIFUGAL



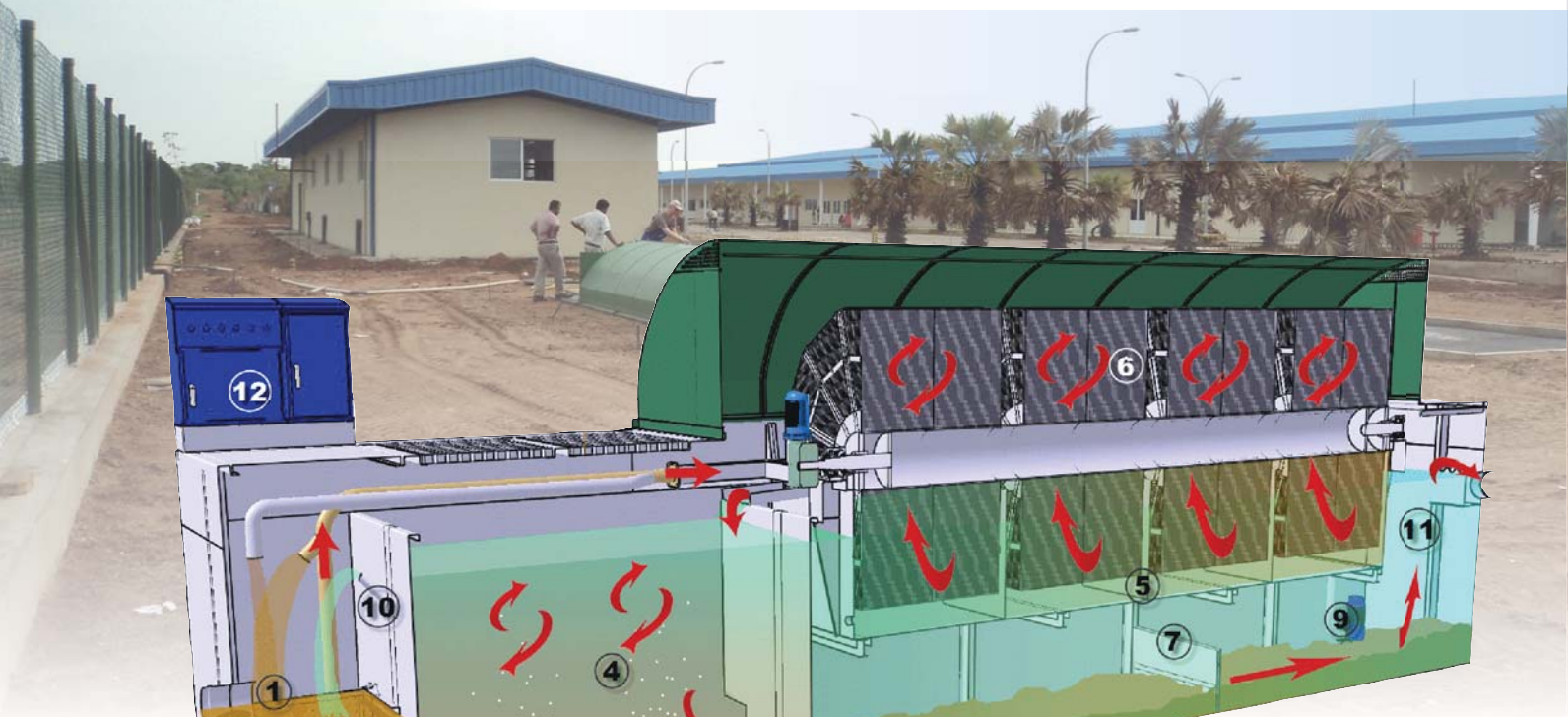
PUHALO ZRAKA
AIR BLOWER



PUHALA U RADU / BLOWERS IN OPERATION

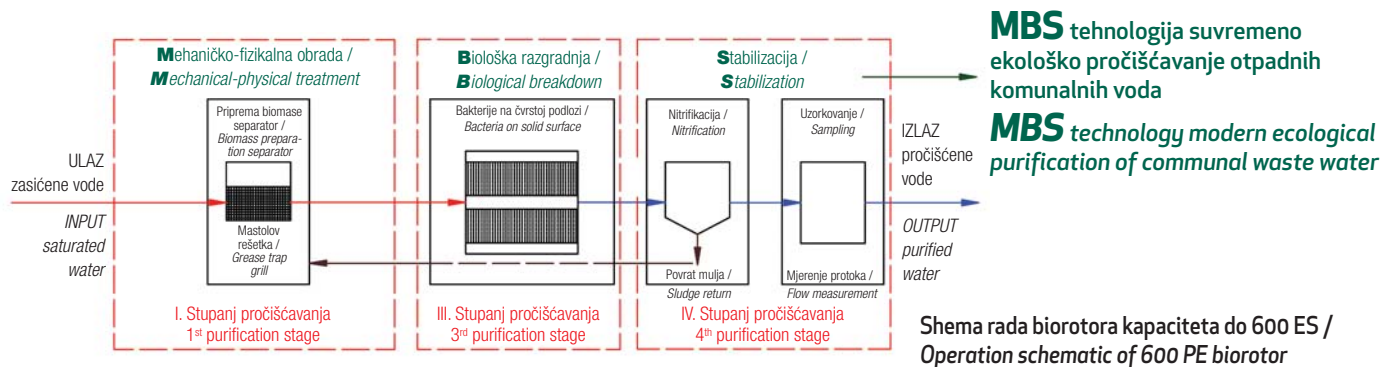


Oznaka uređaja Device type	Broj osoba po danu No. of persons per day	Dnevni dotok Daily inflow [lit/dan]	Organski teret Organic load [g BPK5/dan]	Dimenzije jame Cesspit dimensions [L x B x H]	Priključne cijevi Connecting pipes [mm]
BJT-5	do 5	500	300	1500 x 1500 x 2000	Ø 110
BJT-10	5 - 10	1000	600	3000 x 1500 x 2000	Ø 125
BJT-20	10 - 20	2000	1200	3000 x 2000 x 2500	Ø 160
BJT-30	20 - 30	3000	1800	4000 x 2000 x 2500	Ø 160
BJT-50	30 - 50	5000	2500	6000 x 2500 x 3000	Ø 200



Sanitarne otpadne vode ili komunalne otpadne vode potrebno je pročititi na biološkom uređaju za pročišćavanje otpadnih voda. Kvaliteta pročišćenih otpadnih voda na biorotoru zadovoljava propisane vrijednosti prema Pravilnik o granicnim vrijednostima emisije otpadnih voda (NN 80/13).

Sanitary waste water or communal waste water needs to be cleaned by biological device for waste water purification. The quality of waste water purified by biorotor complies with prescribed values according to Ordinance on emission limit values for waste water discharges (NN 80/13).



BIOROTORI U FUNKCIJI PROČIŠĆAVANJA OTPADNIH VODA / BIOROTORS WORK FOR WASTE WATER TREATMENT

BIOROTORI kapaciteta 100 do 1250 ES

BIOROTORS capacity 100 to 1250 PE

Rješenja urbanog gospodarenja otpadom prema direktivi EU:

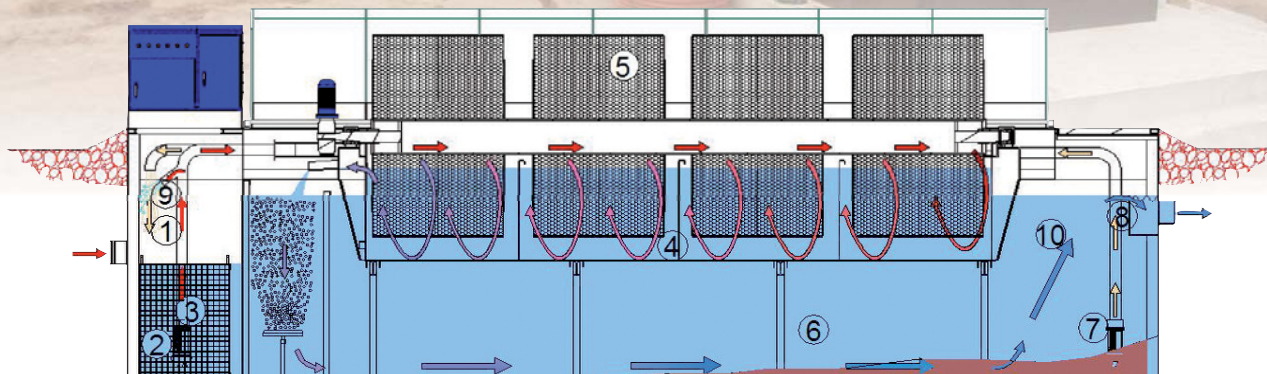
Rješenje "iz istog kalupa" i "iz jednog izvora"

Okvirna EU direktiva o otpadu iz 2008. godine (Direktiva 2008/98/EC Vijeća od 19. studenoga 2008. o otpadu) je trenutni pravni temelj u svim državama članicama Europske unije kojim se uređuje sastav modernog sustava gospodarenja komunalnim otpadom. Čak i izvan EU-a postavlja standarde koji predstavljaju neophodne norme za društveno odgovorno gospodarenje otpadom.

Urban Waste Management Solutions as per EU Directive:

Solution "from the same mould" and "from a single source"

The EU Waste Framework Directive 2008 (Directive 2008/98/EC of the council from 19 November 2008 concerning waste) is the current legal basis in all EU member states governing the composition of a modern municipal waste management system. Even beyond the EU, it sets standards that represent the norm for environmentally friendly waste management and are therefore indispensable.



OPIS TEHNOLOŠKIH PROCESA AEROBNO-BIOLOŠKE OBRADE SANITARNIH OTPADNIH VODA

DESCRIPTION OF TECHNOLOGICAL PROCESSES OF AEROBIC BIOLOGICAL WASTE WATER TREATMENT

- | | |
|---|--|
| 1. Prihvatna komora s košarom za prihvat krutih tvari, krpa, drva i ostalog | 1. Intake chamber with a grill for loading of solid matter, rags, wood and other |
| 2. Pjeskolov-komora za prihvat pijeska, šljunka, pepela i ostalog | 2. Sand trap for collection of sand, gravel, ashes and other |
| 3. Prepumpna podizna stanica s ugrađenim duplim mljnim pumpama tip Tehnix | 3. Pre-pump lifting station with installed double sludge pumps type Tehnix |
| 4. Primarni bazen-dozator bio mase rotirajućeg polipropilenskog rotora | 4. Primary pool bio-mass dosing device of a rotating polypropylene rotor |
| 5. Rotor ispunjen polipropilenskim protočnim sačastim blokovima za održavanje biomase | 5. Rotor filled with polypropylene flow honeycomb blocks for biomass maintaining |
| 6. Sekundarno taložni bazen aerobno-biološki pročišćene otpadne vode | 6. Secondary sedimentation pool of aerobic biological purified waste water |
| 7. Prepumpni sustav za povremeni povrat aktivnog mulja za potrebe nitrifikacije | 7. Pre-pump system for occasional return of active sludge for nitrification purposes |
| 8. Separatna rešetka ugrađena prije izlaza vode iz BIOROTORA | 8. Separation grill installed before water exit from BIOROTOR |
| 9. Ventil za recirkulaciju i balansiranje kružnog procesa aerobne obrade vode | 9. Recirculation and balancing valve of circular process of aerobic water processing |
| 10. Izlazna komora za uzorkovanje uzoraka i pristup za izvlačenje nakupljenog mulja | 10. Output chamber for collection of waste water samples and access for extraction of collected sludge |

Oznaka uređaja Device type	Ekvivalent osoba [po danu] No. of persons per day	Dnevni dotok [m³/dan] Daily flow rate [m³/day]	Organski teret Organic load [kg BPK5/dan]	Dimenzije uređaja Device dimensions AxBxH [m]	Temeljna ploča Base plate AxBxH [m]	Priključne cijevi Connecting pipes Ø [mm]	Instalirana snaga Installed power [kW]
BRT-100	100	10	6	6,00 x 2,25 x 2,25	7,0 x 2,25 x 0,20	160	3,5
BRT-200	200	20	12	7,00 x 2,25 x 2,25	8,0 x 2,25 x 0,20	200	4,5
BRT-300	300	30	18	8,00 x 2,25 x 2,25	9,0 x 2,25 x 0,20	200	4,5
BRT-400	400	40	24	10,00 x 2,25 x 2,25	11,0 x 2,25 x 0,20	200	4,5
BRT-600	600	60	36	10,00 x 2,50 x 2,50	11,0 x 3,00 x 0,20	250	6,0
BRT-800	800	80	48	11,00 x 2,50 x 2,50	12,0 x 3,00 x 0,20	250	7,0
BRT-1000	1000	100	60	12,00 x 2,50 x 2,50	13,0 x 3,00 x 0,20	315	7,5
BRT-1250	1250	125	75	13,50 x 2,50 x 2,50	14,5 x 3,00 x 0,20	400	8,5



Primjer ugradnje u radničkom kampu u Yemenu
Example of installation in workers camp in Yemen



Pročišćavanje vode iz zabavnih parkova
Water purification from amusement parks



Ugradnja / Installation



Reciklaža vode / Water recycling



Montaža i ugradnja biorotora u ekstremno teškim i zahtjevnim prostornim uvjetima za naselja i gospodarsko stambene objekte
Assembly and installation of biorotor in extremely difficult and challenging conditions for settlements and household facilities



Okvirna EU direktiva o otpadu iz 2008. godine (Direktiva 2008/98/EC Vijeća od 19. studenoga 2008. o otpadu) je trenutni pravni temelj u svim državama članicama Europske unije kojim se uređuje sastav modernog sustava upravljanja komunalnim otpadom. Čak i izvan EU-a, postavlja standarde koji predstavljaju neophodne norme za društveno odgovorno gospodarenje otpadom.

The EU Waste Framework Directive 2008 (Directive 2008/98/EC of the council from 19 November 2008 concerning waste) is the current legal basis in all EU member states governing the composition of a modern municipal waste management system. Even beyond the EU, it sets standards that represent the norm for environmentally friendly waste management and are therefore indispensable.

PRIMJERI UGRADNJE

Examples of installation



Pročišćavanje otpadnih voda iz farme svinja
Waste water purification from pig farms



U sklopu kompleksa hotela u Sloveniji - sa automatskim izvlačem krutina
Within the hotel complex in Slovenia - with automatic extraction of solids



Montaža kontejnerskog Biorotora u Radničkom kampu u Iraku / Installation of biorotor container type in workers camp in Iraq



Ugradnja Biorotora kontejnerskog tipa u Iraku
Construction of biorotor container type in Iraq



Montaža u zahtjevnim planinskim uvjetima za naselja
Installation in challenging mountainous conditions for settlements



Redovni godišnji servis
Annual planned maintenance



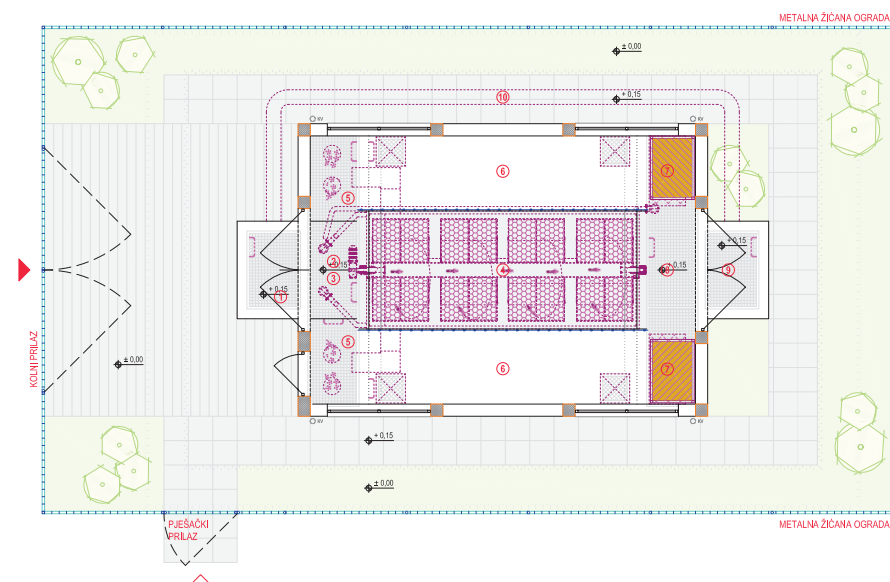
Nadzor i kontrola rada tokom cijele godine
Operation supervision and control year around

Univerzalnost postrojenja je velika prednost u komunalnoj vodnoj infrastrukturi Republike Hrvatske. Bioreaktorska postrojenja su najpovoljnija za manja naselja do 2000 stanovnika, a posebno su pogodna za turističke objekte i manja naselja na otocima. Tehnološke prednosti postrojenja su bitne za ekonomičnost izgradnje postrojenja te njegove trajne funkcionalne namjene. Vijek trajanja je minimalno 30 godina, što je povoljno za amortizaciju. Za kontinuiranu funkcionalnost nije potreban nadzor radnika. Upravljanje postrojenjem i nadzor vrši se informatičkim sustavom. Kvaliteta pročišćavanja zadovoljava kvalitetu pročišćenosti vode propisana. Pravilnikom za pročišćavanje komunalnih voda za kapacitete uređaja do 2000 ES, što je usklađeno sa direktivama EU te zadovoljava tražene standarde. Otpadni mulj može se koristiti u sekundarnoj poljoprivredi. Cijelo postrojenje treba malo prostora te omogućuje tehnološki proces pročišćavanja u svim vremenskim uvjetima i temperaturama, od -30 °C - +50 °C, nema nikakvih negativnih utjecaja na okoliš.

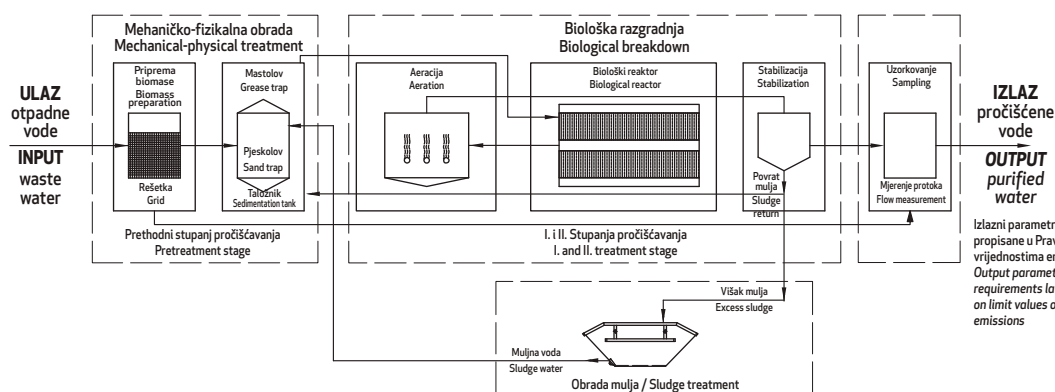


TEHNIX PROJEKTIRANJE - 3D PRILAGODBA TIPSKEG PROJEKTA STVARNOJ SITUACIJ
TEHNIX DESIGN ENGINEERING - 3D ADAPTATION OF STANDARD DESIGN TO ACTUAL SITUATION

TEHNOLOŠKI POSTUPAK PRETHODNOG I. I II. STUPNJA PROČIŠĆAVANJA TECHNOLOGICAL PROCESS OF I. AND II. STAGE OF TREATMENT

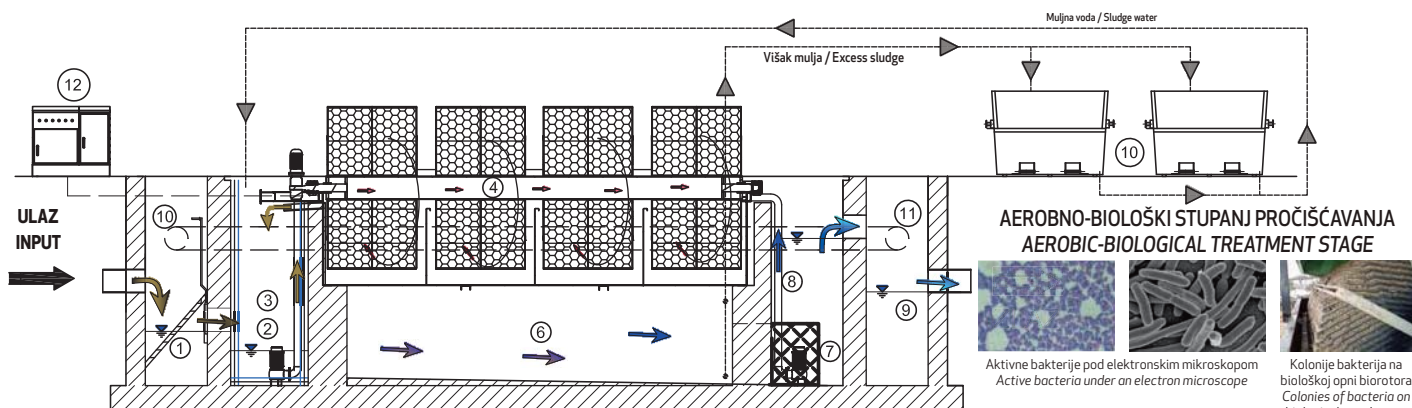


Universality of the plant is a major advantage in municipal water infrastructure of Republic of Croatia. Bioreactor plants are optimal for settlements up to 2000 people, especially for touristic places and small villages on islands. Technological advantages of the plant are essential for its economical construction and permanent functionality. Service life is minimum 30 years, which is optimal for depreciation. Continuous operation does not require supervision by operator. The plant is controlled and supervised by computer system. The quality of treatment meets the quality of water purification prescribed by Regulations on municipal water treatment for devices with capacity up to 2000 PE, which is in line with EU directives and meets the required standards. Sludge may be used in secondary agriculture. The entire facility needs little space and allows technological process of purification in all weather conditions and temperatures, from -30 °C to +50 °C, there is no negative impact on the environment.



Oznaka uređaja / Device type	Ekvivalent osoba [po danu] No. of persons per day	Dnevni dotok [m³/dan] Daily flow rate [m³/day]	Organski teret Organic load [kg BPK₅/dan]	Dimenzije uređaja Device dimensions AxB [m]	Priključne cijevi Connecting pipes Ø [mm]	Instalirana snaga Installed power [kW]
BRP 200 - 500	200 - 500	50	30	8,6 x 6,0	315	5,9
BRP 500 - 1000	500 - 1000	100	60	10,5 x 6,0	315	5,9
BRP 1000 - 1500	1000 - 1500	150	90	8,6 x 9,0	400	9,2
BRP 1500 - 2000	1500 - 2000	200	120	10,5 x 9,0	400	9,2

BIOREAKTORSKO POSTROJENJE kapaciteta 200 do 2000 ES BIOREACTOR PLANT capacity 200 to 2000 PE



TEHNOLOŠKI POSTUPAK BIOREAKTORSKOG POSTROJENJA ZA PROČIŠĆAVANJE OTPADNIH VODA

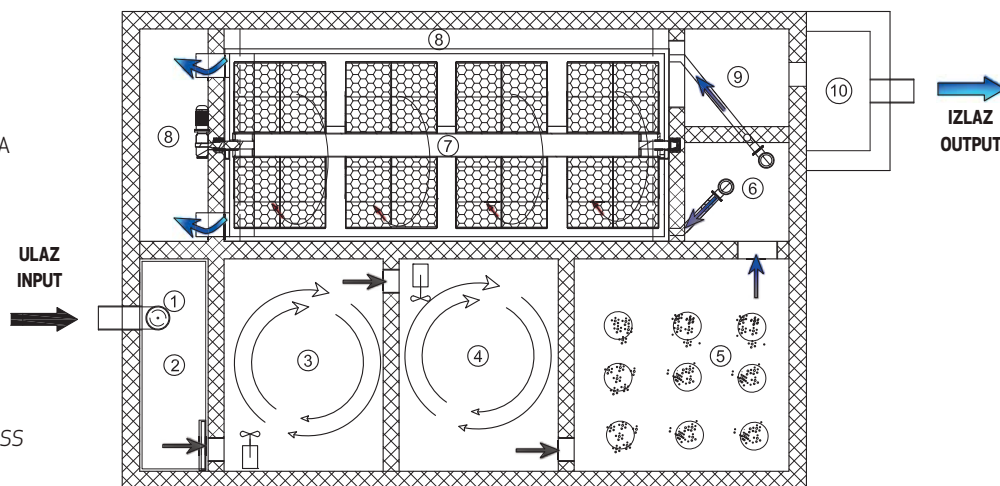
1. Ulazno okno sa rešetkom – odvajanje krutina
2. Prihvatna komora – homogenizacija otpadne vode i pumpe za pripremu biomase
3. Taložnik, pjeskolov i mastolov
4. Primarni bioreaktor – rotirajući PP bubanj
5. Aeracijska komora – oksidacija amonijaka – nitrifikacija
6. Sekundarna taložna komora – taloženje suspendiranih čestica
7. Labirintni filter biobox – stabilizacija i smirivanje toka
8. Recirkulacija toka – povrat mulja
9. Izlazno okno
10. Mimovod i sustav zapornica

TECHNOLOGICAL PROCESS OF BIOREACTOR PLANT FOR WASTEWATER TREATMENT

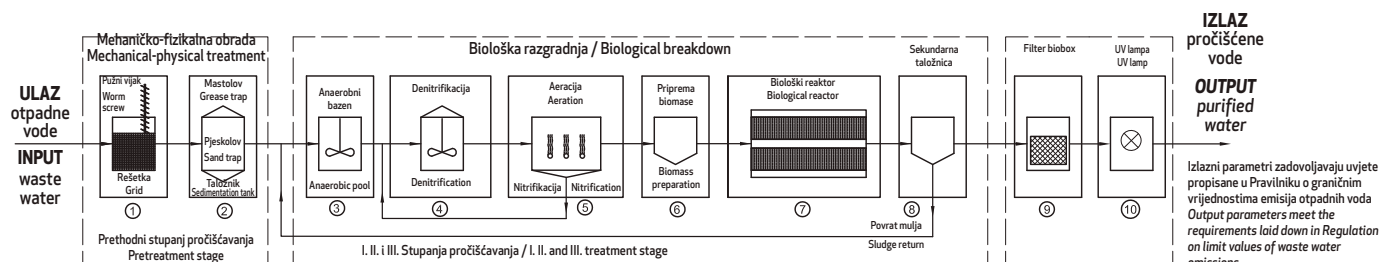
1. Input window with a grid – separation of solids
2. Intake chamber - waste water homogenization and biomass preparation pump
3. Sedimentation tank, sand trap and grease trap
4. Primary bioreactor - rotating PP drum
5. Aeration chamber - ammonium oxidation - nitrification
6. Secondary sedimentary chamber - settlement of suspended particles
7. Labyrinth filter biobox - stabilization and quieting of flow
8. Recirculation of flow - sludge return
9. Output window
10. Bypass and stoppers system

TEHNOLOŠKI POSTUPAK III STUPANJ PROČIŠĆAVANJE OTPADNIH VODA TECHNOLOGICAL PROCESS OF II STAGE OF WASTE WATER TREATMENT

1. REŠETKA I PUŽNI VIJAK
2. PJEŠKOLOV I MASTOLOV
3. ANAEROBNI SPREMNIK
4. DENITRIFIKACIJA
5. AERACIJSKI BAZEN - NITRIFIKACIJA
6. STABILIZACIJA - PREPUMPNA - BIOMASA
7. BIOROTOR, PRIMARNI BAZEN
8. SEKUNDARNA TALOŽNICA
9. STABILIZACIJA - FILTER BIOBOX
10. IZLAZNA KOMORA - UV DEZINFEKCIJA



1. GRID AND WORM SCREW
2. SAND TRAP AND GREASE TRAP
3. ANAEROBIC TANK
4. ENITRIFICATION
5. AERATION POOL - NITRIFICATION
6. STABILIZATION - PREPUMPING - BIOMASS
7. BIOROTOR, PRIMARY POOL
8. SECONDARY SEDIMENTATION TANK
9. STABILIZATION - FILTER BIOBOX
10. OUTPUT CHAMBER - UV DESINFECTION





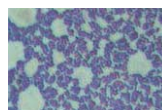
PRI ODABIRU UREĐAJA ZA PROČIŠĆAVANJE OTPADNIH VODA ZA GRAĐOVE I NASELJA OD 2500 DO 10000 STANOVNIKA, PRIORITET TREBA DATI TEHNOLOGIJAMA S NAJBOLJIM KARAKTERISTIKAMA:

1. MINIMALNA (NAJMANJA) POTROŠNJA ENERGIJE PO m^3 PROČIŠĆIVANJA - 1 Kn 11 m^3
2. JEDNOSTAVNOST RADA I ODRŽAVANJA TE AUTOMATSKI NADZOR RADA
3. EFIKASNO PROČIŠĆAVANJE OTPADNIH VODA UZ KONTINUIRANI RAD KOD VELIKIH VODA - BYPASS
4. MALA KOLIČINA OTPADNOG MULJA NASTALOG U PROCESU OBRADJE VODA (MAX. 30%)
5. MALI PROSTOR ZA IZGRADNJU, OSIGURANO TRAJNO ODRŽAVANJE I SERVISIRANJE POSTROJENJA

WHILE CHOOSING WASTE WATER TREATMENT PLANT FOR TOWNS AND SETTLEMENTS FROM 2500 TO 10000 INHABITANTS, PRIORITY SHOULD BE GIVEN TO TECHNOLOGIES WITH THE BEST FEATURES:

1. MINIMAL ENERGY CONSUMPTION BY m^3 OF PURIFICATION - 0,15 € $l m^3$
2. SIMPLICITY OF WORK AND MAINTENANCE WITH AUTOMATIC CONTROL SYSTEM
3. EFFECTIVE TREATMENT OF WASTE WATER WITH CONTINUOUS OPERATION AT INFLOW OF LARGE CAPACITY - BYPASS
4. SMALL AMOUNT OF SLUDGE GENERATED IN WATER TREATMENT PROCESS (max. 30%)
5. SMALL SPACE FOR BUILDING, SECURED PERMANENT MAINTENANCE AND SERVICE OF FACILITY

Oznaka uređaja Device type	Ekvivalent osoba po danu Number of persons per day	Dnevni dotok [m^3 /dan] Daily flow rate	Organski teret Organic load [kg BPKs/dan]	Dimenzije uređaja Device dimensions [A x B] [m]	Priključne cijevi Connecting pipes [Ø]	Instalirana snaga Installed power [kW]
BRT-1000	1000	100	60	25,0 x 20,0	315	10
BRT-1500	1500	150	100	30,0 x 20,0	315	15
BRT-2000	2000	200	120	35,0 x 25,0	315	20
BRT-2500	2500	250	150	35,0 x 25,0	400	25
BRT-3000	3000	300	180	40,0 x 30,0	400	30
BRT-4000	4000	400	240	40,0 x 30,0	600	40
BRT-5000	5000	500	300	45,0 x 30,0	600	50
BRT-10000	10000	1000	600	50,0 x 50,0	800	80



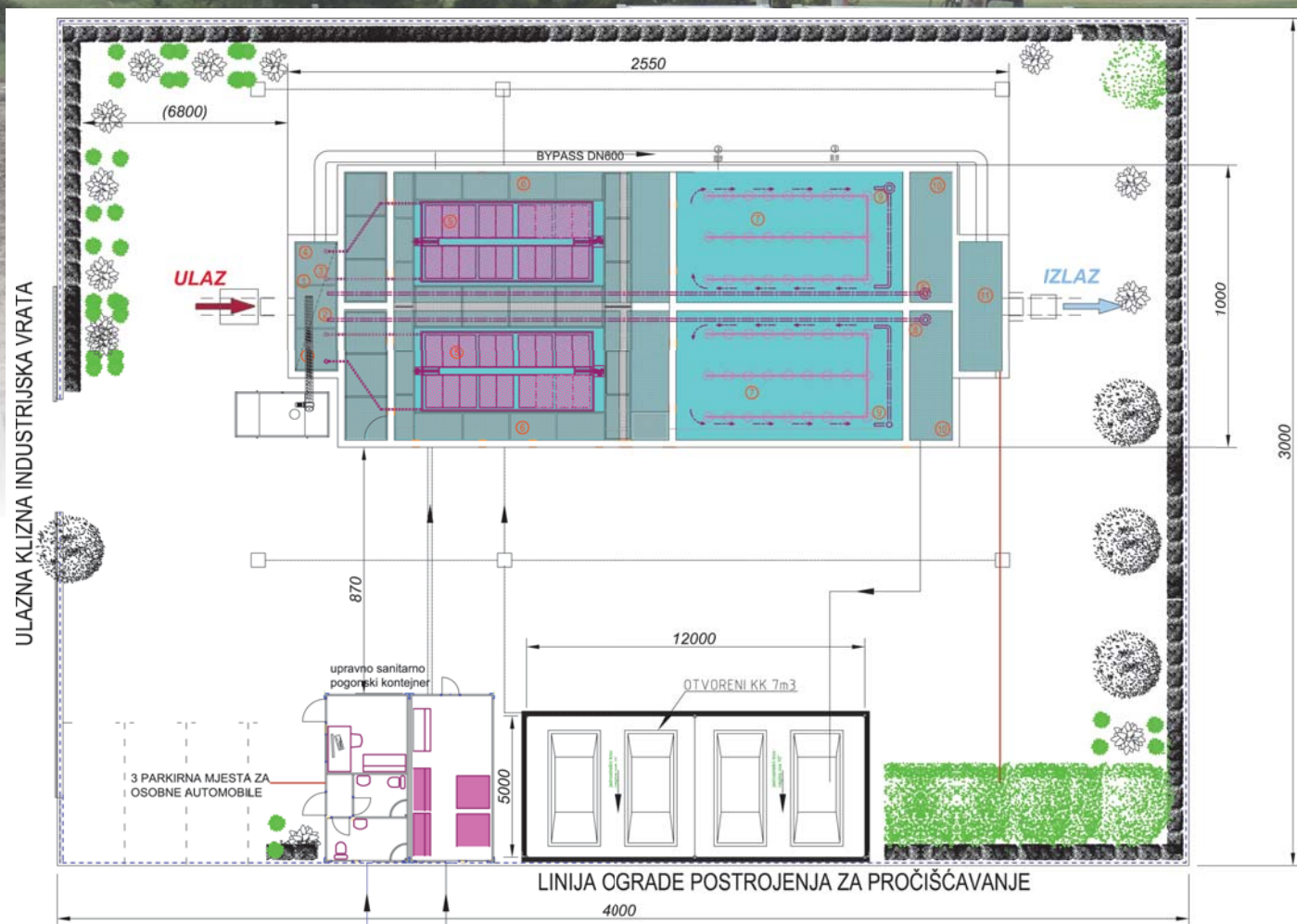
Aktivne bakterije pod elektronskim mikroskopom



Kolonije bakterija na
biološkoj opni biorotora

BIOREAKTORSKA POSTROJENJA

BIOREACTOR PLANTS



OPIS TEHNOLOŠKOG PROCESA

1. PRIHVATNA KOMORA VODE S PUMPAMA
2. GRUBA PODIZNA REŠETKA ZA PRIHVAT TE ISPIRANJE KRUTINA
3. PODIZNA HIDRAULIČNA STANICA 4 x 1,7 kW TE PRIPREMA BIOMASE
4. PJEŠKOLOV MASTOLOV
5. BIOROTORI (ROTACIJSKA BIOLOŠKA OBRADA VODE)
6. PRIMARNO TALOŽNI BAZENI
7. BAZENI ZA AERACIJU S PUNILIMA ZA BIOLOŠKI PREDTRETMAN
8. PREPUMPNI SUSTAV ZA POVRAT AKTIVNOG MULJA
9. ROTACIJSKI SUSTAV MIJEŠANJA VODE U BAZENIMA 2 x 1,1 kW
10. STABILIZACIJSKA KOMORA
11. IZLAZNA KOMORA (OPCIJA MJERAČ PROTOKA)

DESCRIPTION OF TECHNOLOGICAL PROCESS

1. RECEPTION WATER CHAMBER WITH PUMPS
2. COARSE REAR GRID FOR RECEPTION AND WASHING OF SOLIDS
3. REAR HYDRAULIC STATION 4 x 1,7 kW AND BIOMASS PREPARATION
4. GREASE TRAP CAPACITY
5. BIOROTORS (BIOLOGICAL ROTARY WATER TREATMENT)
6. PRIMARY SEDIMENT POOLS
7. POOLS FOR AERATION WITH FILLERS FOR BIOLOGICAL PRE-TREATMENT
8. PREPUMPING SYSTEM FOR RETURN OF ACTIVATED SLUDGE
9. ROTARY WATER MIXING SYSTEM IN POOLS 2 x 1,1 kW
10. STABILIZATION CHAMBER
11. OUTPUT CHAMBER (OPTION WITH FLOW METER)

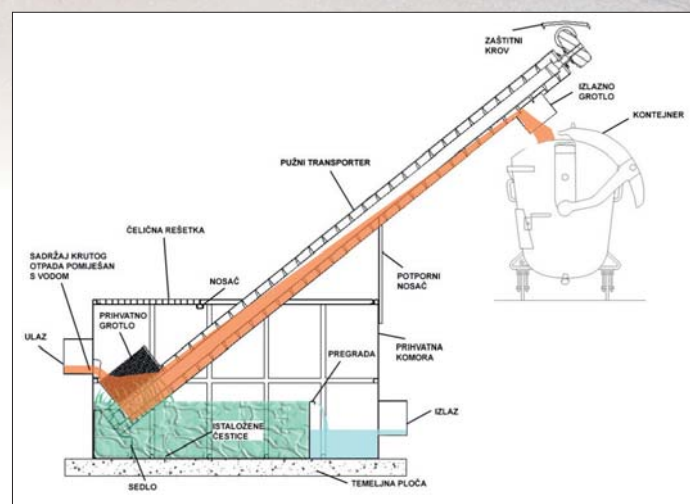


TEHNOLOŠKO PROČIŠĆAVANJE TECHNOLOGICAL PURIFICATION



Pužni separator namijenjen je izvlačenju krutog sadržaja promjera max. 2 mm iz tehnoloških otpadnih voda. Ugrađuje se u funkciji predtretmana u procesu obrade otpadnih voda i prethodi aerobno biološkoj fazi pročišćavanja. Izdvajanje krutina iz otpadnih voda rasterećuje daljnje faze pročišćavanja što direktno utječe na kvalitetu pročišćavanja.

Screw separator is intended to extract solid content of maximal diameter 2 mm from industrial waste water. It is installed in pre-treatment function in waste water treatment process and precedes aerobic biological treatment stage. Separation of solids from waste water reduces the load of further purification stages with immediate effect on the quality of treatment.



NEUTRALIZATOR - ređaj za korekciju ph faktora u otpadnim vodama

Kisele ili lužnate vode nepovoljno utječu na biološku fazu pročišćavanja i na trajnost pojedinih komponenti uređaja za pročišćavanje, stoga je vrlo važno dovesti vodu u neutralno stanje.

karakteristike uređaja NEUTRO tip Tehnix

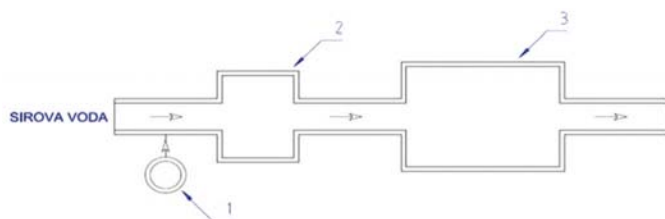
- potpuno automatski režim rada
- mogućnost pohrane mjerenih podataka na memorijskoj kartici
- mogućnost praćenja stanja sustava preko GSM modula.

NEUTRALIZER - device for correct of ph factor in waste water

Acidic or alkaline water adversely affects biological purification stage and durability of each component of purification device, so it is very important to bring the water to its neutral state.

Characteristics of NEUTRO device tip Tehnix

- completely automatic operation mode
- possibility to store measured data on a memory card
- possibility to monitor the state of the system via GSM module



1. otapanje i doziranje kogulanata, 2. miješanje, 3. pahuljičenje - flokulacija
1. coagulant dissolving and dosing, 2. mixing, 3. flaking

Shema dijela uređaja za kondicioniranje vode
Operation schematic of water conditioning device



TEHNOLOŠKO PROČIŠČAVANJE TECHNOLOGICAL PURIFICATION

OPREMA UREĐAJA ZA PROČIŠČAVANJE VODA EQUIPMENT OF WATER PURIFICATION DEVICE



Difozor / Diffuser



UV dezinfekcija / UV disinfection



Upojni biobox / Absorption biobox



Ugradnja upojnih bioboxeva / Installation of absorption biobox

BIOAKTIVENTI / BIOACTIVATORS



UREĐAJI ZA NADZOR I DOJAVU OPTEREĆENJA,
KONTROLA NEPROPUSNOSTI

DEVICE FOR CONTROL AND ALARM IN CASE OF
OVERLOAD, LEAKAGE CONTROL



enviro
BIOENHANCERS FOR THE ENVIRONMENT



Bioenhancer technology is
easy to use and apply;
in some cases, the results
can be improved even
further, through continuous
and accurate application.

ZAPORNICE / STOPPERS



POSTROJENJE ZA AUTOMATSKO PRANJE PODVOZJA PLANT FOR AUTOMATIC WASHING OF UNDERCARRIAGES



POSTROJENJE ZA AUTOMATSKO I EKOLOŠKO PRANJE PODVOZJA GOSPODARSKIH VOZILA

Postrojenje APV je namijenjeno za prolazno automatsko pranje podvozja gospodarskih vozila koja izlaze iz deponija, kamenoloma, ..., a u svrhu sprečavanja iznošenja smeća, blata, kamenja, prašine idr. sa područja deponije na otvorenu cestu.

TIP TEHNIX APV 4/20 m³ KAPACITET PRANJA 20 VOZILA/SAT

TIP TEHNIX APV 6/30 m³ KAPACITET PRANJA 30 VOZILA/SAT

PLANT FOR AUTOMATIC AND ECOLOGICAL WASHING OF MUNICIPAL VEHICLES UNDERCARRIAGES

Plant APV is intended for drive-through automatic washing of municipal vehicles undercarriages coming from landfills, quarries, ... with the purpose to prevent transfer of garbage, mud, rocks, dust, etc. from landfill area to open road.

TYPE TEHNIX APV 4/20 m³ WASHING CAPACITY 20 VEHICLES/HOUR

TYPE TEHNIX APV 6/30 m³ WASHING CAPACITY 30 VEHICLES/HOUR

Tip / Type	Kapacitet Capacity [vozila / vehicle/h]	Protok pumpe Pump flow rate [L/min]	Instalirana snaga Installed power [kW]	Broj mlaznica Number of nozzles	Dimenzije postrojenja Plant dimensions [mm]	Dimenzije temelja Foundation dimensions [mm]	SEPARATOR [L]
APV 4/20 m ³	do 20	max 1800	5,5	114	5000 x 3600 x 2150	6000 x 4000 x 200	20000
APV 6/30 m ³	do 30	max 3750	7,5	174	7000 x 3600 x 2150	8000 x 4000 x 200	30000

PREPUMPNE STANICE - SUSTAVI ZA PREPUMPAVANJE VODE PREPUMPING STATIONS – SYSTEMS FOR WATER PREPUMPING



PREPUMPNE STANICE tip TEHNIX:

- sustavi za prepumpavanje vode sa nižeg na viši nivo
- jednostavno i ekonomično održavanje
- potpuno automatiziran sustav upravljanja
- prepumpavanje fekalnih komunalnih voda
- prepumpavanje oborinskih voda
- dobra pokrivenost servisne službe

PREPUMPING STATIONS type TEHNIX:

- systems for water pumping from a lower to a higher level
- simple and economical maintenance
- fully automated control system
- pumping of sewage municipal water
- pumping of rainwater
- good coverage with customer service

RAZDJELNI SUSTAV ODVODNJE DRAINAGE DISTRIBUTION SYSTEM

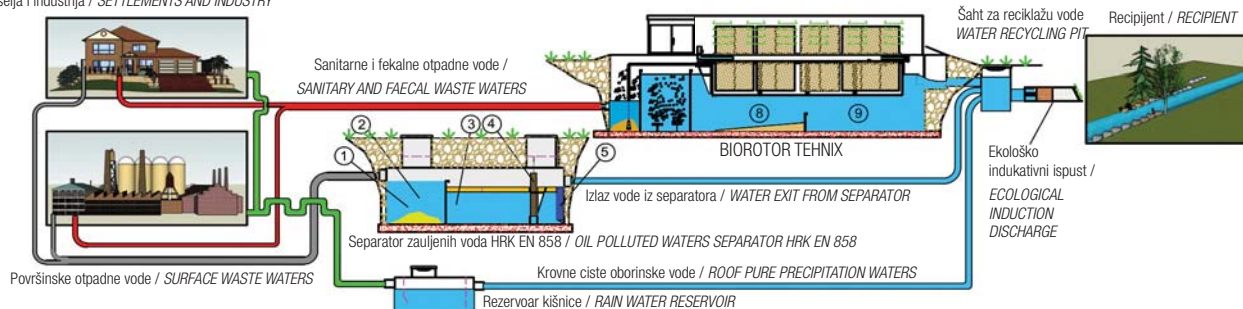
- Sanitarne i fekalne vode / **SANITARY AND FAECAL WATERS**
- Zaujlene i površinske vode / **OIL POLLUTED SURFACE WATERS**
- Krovne oborinske vode / **ROOF PRECIPITATION WATERS**

EKONOMIČNO I FUNKCIONALNO PROČIŠĆAVANJE VODA ECONOMICAL AND FUNCTIONAL WATER PURIFICATION

Pročišćavanje sanitarnih i fekalnih otpadnih voda HRN EN 12255

PURIFICATION OF SANITARY FAECAL WASTE WATER HRN EN 12255

Naselja i industrija / **SETTLEMENTS AND INDUSTRY**



SUPERIOR RESULTS OF PURIFIED WATER ANALYSIS

Tehnix®

INPUT
ULAZ

OUTPUT
IZLAZ

**VRHUNSKI REZULTATI PROČIŠĆAVANJA
LEADER IN WASTE WATER PURIFICATION**

TEHNOLOGIJA BIOREAKTORSKIH POSTROJENJA ZA PROČIŠĆAVANJE KOMUNALNO SANITARNIH VODA

BIOREAKTORSKA POSTROJENJA:

UREĐAJI ZA BIOLOŠKO PROČIŠĆAVANJE SANITARNIH OTPADNIH VODA

Bioreaktorska postrojenja su uređaji za biološko pročišćavanje sanitarnih otpadnih voda kojima se osigurava učinkovitost "drugog (II) stupnja pročišćavanja" i postiže se karakteristika efluenta prema važećim zakonskim odrednicama.

Drugi (II.) stupanj pročišćavanja zadovoljava propisanu zakonsku regulativu *Pravilnik o graničnim vrijednostima pokazatelja, opasnih i drugih tvari u otpadnim vodama* (NN br.: 80/13, 43/14, 27/15, 3/16), pokazatelje (suspendirana tvar, BPK₅ i KPK), uz postizanje uvjetovanih izlaznih vrijednosti pokazatelja zagađenja:

POKAZATELJI	GRANIČNA VRIJEDNOST	NAJMANJI POSTOTAK SMANJENJA OPTEREĆENJA
BPK ₅ (20°C)	25 mg O ₂ /l	70 - 90 %
KPK _{Cr}	125 mg O ₂ /l	75 %
Suspendirane tvari	25 mg/l	70 %

Cilj i zadatak bioreaktorskog postrojenja za biološko pročišćavanje sanitarnih otpadnih voda je visoka kakvoća efluenta, a koncepcija uređaja je takva da bude što manje ovisna o ljudskom faktoru. Sukladno razvoju aglomeracije do punog kapaciteta, uređaj se prilagođava traženom kapacitetu procesom samoregulacije. Cilj je ujednačiti dotok otpadne vode u uređaj za pročišćavanje prema količini i koncentraciji zagađenja koja je u otpadnoj vodi promjenjiva, a kako bi se sačuvala konstantna unutrašnja ravnoteža biološkog pročišćavanja otpadnih voda.

Prednost uređaja prema drugim tehnologijama je:

- jednostavnost pogona,
- prilagodljivost promjenama hidrauličkog i biološkog opterećenja
- troškovi izgradnje,
- mala potrošnja energije,
- nepotreban stalni nadzor,
- mali godišnji troškovi održavanja.

Konačno rješenje uređaja, svih njegovih dijelova, položaja, uređenja kruga i priključaka na prometnice i instalacije utvrdit će se prilagodnim projektom za svaku konkretnu lokaciju.

TEHNOLOŠKI POSTUPAK BIOREAKTORSKOG POSTROJENJA ZA PROČIŠĆAVANJE OTPADNIH VODA

Bioreaktorsko postrojenje je uređaj za biološko pročišćavanje otpadnih voda, sa aerobno biološkom razgradnjom komunalnih voda.

OPIS TEHNOLOŠKOG PROCESA PROČIŠĆAVANJA OTPADNIH VODA: MEHANIČKO PROČIŠĆAVANJE OTPADNIH VODA:

Otpadna voda prije dotoka u prihvatnu komoru prolazi kroz zaštitnu grubu rešetku i / ili finu rešetku. Rešetke su fiksne sa slobodnim otvorom oka od 10 do 25 mm. Na rešetki se izdvaja krupni odnosno sitni otpad. Za mehanički predtretman može se ugraditi rešetka i automatski pužni izvlačak krutina. Rešetka i puž se postavlja kompatibilno prema dotoku vode, rad puža nije pod utjecajem varijacije dotoka. Uklonjeni otpad odbacuje se i odlaže u komunalni kontejner. Unutar okna predviđa se montaža servisne zapornice koja bi omogućila da se na UPOV izvrši potreban servis. Za potrebe servisa ili kišnoga velikog opterećenja ugrađen je kanal mimovod – bypass, koji se koristiti za

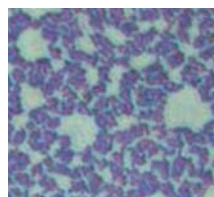
zaobilaznje UPOV. Otpadna voda nakon rešetke uljeva se u prihvatnu komoru gdje su instalirane dvije pumpe. Pumpe usitnjavaju organske tvari u otpadnoj vodi i pripremaju tvari u biomasu za biološko pročišćavanje otpadnih voda. Prihvatna komora ima svrhu ujednačavanje dotoka te uklanjanja pijeska i masnoće. Izdvojena mast i pijesak se prijenosnom muljnom pumpom crpi te skladišti u predviđene spremnike.

BIOLOŠKO PROČIŠĆAVANJE OTPADNIH VODA:

Biološko pročišćavanje otpadnih voda odvija se u biorotoru. Osnovna karakteristika biorotora je postupak pročišćavanje mikroorganizmima koji se vežu na orebrenu polipropilensku foliju, na koju se veže fekalna pripremljena biomasa za razgradnju. Biorotori su zaokružene tehničko-tehnološke jedinice u kojima se odvija aerobno biološka obrada otpadnih voda. Biorotor ima visoku površinu obrade organskog opterećenja, gdje se na 5 m² biorotorske površine obrađuje biološko opterećenje za 1 ekvivalent stanovnika. Na površini PP bubnja stvara se biološka reakcija između formirane biološke kolonije i organskih čestica u otpadnoj vodi, i na taj način se vrši redukcija organskog opterećenja u otpadnoj vodi. Kako se bubanj lagano okreće (1 – 1,5 ok./min.) biološka opna se prozračuje tako da je polovica u vodi. Uz rotaciju i aeraciju vrši se intenzivna aerobno-biološka obrada.

Otpadna voda protječe od jednog prema drugom kraju spremnika, u smjeru osovine biološkog nosača. Rotacijom mikroorganizmi pričvršeni na orebrenu polipropilensku foliju povremeno bivaju potopljeni u otpadnoj vodi iz kojih uzimaju hranu a potom bivaju u zraku iz kojeg dobivaju kisik. Procijenjena potreba za čišćenjem, izvlačenjem istaloženog mulja iz sekundarne taložnice, jedanput do dva puta u 12 mjeseci. Prednosti postupka su visoki efekti čišćenja, veliki raspon mogućih opterećenja, visoka pogonska sigurnost, za kontinuiranu funkcionalnost nije potreban nadzor radnika, manje proizvedenog mulja, nema pojave neugodnih mirisa, tehnološki proces pročišćavanja odvija se u svim vremenskim uvjetima od -30 °C do +50 °C, nema negativnih utjecaja na okoliš. Nakon faze biološke obrade voda se ulijeva u aeracijsku komoru gdje se odvija oksidacija amonijaka čime on prelazi u nitrat i završnu razgradnju preostalog organskog tereta, te aerobnu stabilizaciju mulja. Nakon završetka biološke faze pročišćavanja, odvija se taloženje aktivnog mulja gdje se mulj taloži iz pročišćene otpadne vode. U sekundarnoj taložnici preko stabilizacijske komore i filter boxa otpadna voda se bistri te kao pročišćena gravitacijski se odvodi u prijemnik.

Biološki mulj taloži se na dnu sekundarne taložnice. Tako istaloženi biološki mulj, vraća se u primarni bazen. Bitantehnološki segment je održavanje razgradive organske tvari približno konstantnom kako bi se biološki proces pročišćavanja odvijao bez većih poremećaja. Postupku se može naknadno završno dodati dezinfekciju otpadne vode (efluenta), ukoliko izlazne karakteristike otpadne vode i zakonski propisi to budu tražili!



Aktivne bakterije pod elektronskim mikroskopom



Kolonije bakterija na biološkoj opni biorotora

OBRADA MULJA:

Produkt pročišćavanja je pročišćena voda i biološki mulj koji sadrži organsku tvar koju treba stabilizirati i razgraditi u anorganske tvari. Nastali mulj se izvlači prijenosnom muljnom pumpom u spremnik za pohranu i cjeđenje mulja, čiji je kapacitet dostatan za prihvata. Predviđa se postava više komunalnih kontejnera ovisno o tipu uređaja. Kontejneri imaju dvostruko dno gdje je gornja ploča preforirana i propušta vodu od cjeđenja a mulj ostavlja u spremniku. Volumen dva kontejnera dostatan je za zbrinjavanje mulja u periodu od 6 mjeseci do 1 godine. Procjeđena otpadna voda iz mulja odvodi se na bioreaktorsku u prihvatnu komoru. Cjelokupna količina mulja uz prethodno obavljene analize koristi se za proizvodnju komposta, te dalje u poljoprivrednoj proizvodnji. Time se postiže održiv razvitak, zatvar se kružni tok tvari u prirodi.

UPRAVLJANJE:

Upravljanje tehnološkim procesima izvodi se u potpunosti automatski te je potreban samo povremeni nadzor rada od strane obučenog djelatnika.

TECHNOLOGY OF BIOREACTOR PLANT FOR MUNICIPAL SANITARY WASTE WATER TREATMENT

BIOREACTOR PLANT: BIOLOGICAL TREATMENT OF SANITARY WASTEWATER

Bioreactor plants are devices for biological treatment of sanitary waste water that ensure effectiveness of second (II) stage of purification and allow to achieve effluent characteristics according to applicable legal guidelines. Second stage of purification meets prescribed legal Regulation on limit values of parameters, hazardous and other substances in waste water (NN nr.: 80/13, 43/14, 27/15, 3/16), indicators (suspended substances, BOD and COD) while achieving prescribed output value of pollution parameter:

PARAMETER	LIMIT VALUE	MINIMUM PERCENTAGE OF LOAD REDUCTION
BOD ₅ (20°C)	25 mg O ₂ /l	70 - 90 %
COD _{Cr}	125 mg O ₂ /l	75 %
Suspended substances	25 mg/l	70 %

Target and purpose of bioreactor plant for biological treatment of sanitary waste water is high quality of effluent, and its concept is such that it is less dependent on human factor. In line with development of agglomeration to full capacity, the device adjusts to required capacity through self-regulation process. The aim is to equalize waste water inflow into purification device according to the amount and concentration of pollution which is variable in waste water, and in the same time to maintain a constant internal balance of biological waste water treatment.

Advantage of this device with respect to other technologies is:

- simplicity of operation,
- adaptive to changes of hydraulic and biological load
- construction costs,
- low power consumption,
- continuous supervision is not necessary,
- low annual maintenance costs.

Final design solution of device, all its parts, positioning, arrangement of circuits and connection to routes and installations will be determined in respective project for each specific site.

TECHNOLOGICAL PROCESS OF BIOREACTOR PLANT FOR WASTE WATER TREATMENT

Bioreactor plant is a device for biological treatment of waste water, with aerobic biodegradation of municipal water.

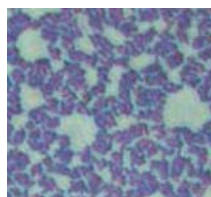
DESCRIPTION OF TECHNOLOGICAL PROCESS OF WASTE WATER TREATMENT: MECHANICAL WASTE WATER TREATMENT:

Before entering into receiving chamber, wastewater passes through protective coarse and/or fine grid. Grids are fixed and have a free opening shaft of 10 to 25 mm. Large and small waste respectively is separated on the grid. Both grid and automatic screw extractor of solids can be installed for mechanical pretreatment. Grid and screw are installed in compatibility with water inflow. Operation of screw is not affected by variations of inflow. Removed waste is discarded and disposed in municipal containers. It is foreseen to install maintenance stopper inside the shaft to allow required maintenance of device. Bypass channel is mounted for the purposes of maintenance or heavy rain load and is used for bypassing of device. After the grid, wastewater flows into receiving chamber, where two pumps are installed. Pumps reduce organic substances in wastewater to a smaller size and prepare substances into biomass for biological treatment of wastewater. Receiving chamber is aimed

to equalize the flow and remove sand and grease. Separated grease and sand is extracted by portable sludge pump and stored in foreseen containers.

BIOLOGICAL WASTEWATER TREATMENT:

Biological wastewater treatment is carried out in biorotor. Main characteristic of biorotor is purification process by means of microorganisms attached to finned polypropylene foil, to which attaches faecal biomass prepared for decomposition. Biorotors are rounded technical and technological units where aerobic biological treatment of wastewater takes place. Biorotor has large surface of organic load processing, as biological load of 1 population equivalent is processed on every 5 m² of biorotor surface. Biological reaction between formed biological colonies and organic particles in wastewater takes place on the surface of PP drum, leading to the reduction of organic load in wastewater. As the drum slowly rotates (1-1.5 rpm) biological membrane is ventilated while its half is in the water. Intensive aerobic biological treatment is carried out with rotation and aeration. Wastewater flows from one to another side of the tank, in the direction of biological carrier shaft. As a result of rotation, microorganisms attached to finned polypropylene film are periodically submerged into wastewater where they take food, and then go up in the air from which they receive oxygen. Estimated need for cleaning and extraction of deposited sludge from secondary sedimentation tank is one or two times in 12 months. Process advantages are highly effective purification, large range of possible loads, high operational safety, continuous operation does not require supervision by employees, less production of sludge, no odors, technological purification process takes place in all weather conditions from -30 °C to +50 °C, there is no negative impact on the environmental. At the end of biological treatment stage, water flows into aeration chamber where ammonium is oxidized and turns into nitrate to proceed with final decomposition of remaining organic load and aerobic sludge stabilization. After completion of biological treatment stage, active sludge sedimentation takes place as sludge precipitates from processed wastewater. In secondary sedimentation tank water is cleared through stabilization chamber and filterbox and then purified water flows into receiver as a result of gravitation. Biological sludge settles on the bottom of secondary sedimentation tank. In this way sedimented biological sludge returns to primary pool. Important technological segment is to maintain degradable organic matter more or less constant so that biological treatment process could go without any major disturbances. Final disinfection of wastewater (effluent) can be included into the process, whenever such is required by output characteristics of waste water and legal guideline!



Active bacteria under an electron microscope



Colonies of bacteria on biological membranes of biorotor

SLUDGE TREATMENT

The product of treatment is purified water and biological sludge containing organic substances that need to be stabilized and decomposed into inorganic substances. Resulting sludge is extracted by portable sludge pump into storage and sifting tank of sufficient capacity. It is foreseen to install several municipal containers depending on the type of device. Containers have double bottom where top plate is perforated and allows sifting water to go through the plate while sludge remains in the tank. Two containers are sufficient to dispose sludge for a period of 6 months up to 1 year. Sifted wastewater is conveyed to bioreactor into receiving chamber. All sludge after analysis is used for the production of compost, and further in agriculture. In this way sustainable development is achieved, and circulation of matter in nature is completed.

OPERATION:

Technological process is carried out fully automatically and requires only occasional supervision by trained staff.



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