



**ECO**  
**Integrated waste water**  
**Treatment systems**

## CONTENTS

1	INTRODUCTION .....	3
1.1	Why is it necessary to treat waste waters? .....	3
1.2	What are Pipelife's solutions for treating waste waters? .....	3
2	APPLICATIONS .....	3
3	ADVANTAGES OF THE PIPELIFE ECOSYSTEMS .....	3
4	STANDARDS .....	4
4.1	Why are standards necessary? .....	4
4.2	Which standards Pipelife's ecosystems meet: .....	4
4.2.1	ECOBOX meets: .....	4
4.2.2	FATBOX meets: .....	6
4.2.3	OILBOX meets: .....	6
4.2.4	SANDBOX meets: .....	7
5	ECOBOX.....	8
5.1	What is the treatment technology? .....	8
5.2	Why should we choose ECOBOX, instead of "leak-tight" (septic) concrete tank? .....	9
5.3	ECOBOX Product range and technical data for design .....	9
5.3.1	Product range and technical data .....	9
5.3.2	Type of the used tanks for ECOBOX.....	11
5.3.3	Tanks sizes .....	12
5.3.4	Tanks configuration .....	13
5.3.5	Initial data for design .....	14
5.3.6	Exploitation costs .....	16
5.3.7	Technological diagrams for connection .....	16
5.3.8	Filling and emptying of plastic tanks ECOBOX .....	19
5.3.9	Laying plastic tanks ECOBOX .....	20
6	FATBOX .....	21
6.1	What is the treatment technology? .....	21
6.2	Why is FATBOX necessary? .....	21
6.3	FATBOX Product range and technical data for design .....	21
6.4	Type of the used tanks .....	23
6.5	Initial data for design .....	23
6.6	Exploitation costs .....	24
7	OILBOX.....	24
7.1	What is the treatment technology? .....	24
7.2	Why is OILBOX necessary? .....	24
7.3	OILBOX product range and technical data for design .....	25
7.3.1	OILBOX with a coalescent filter with and without by-pass .....	25
7.3.2	OILBOX without a coalescent filter with and without by-pass .....	27
7.4	Type of the used tanks .....	32
7.5	Initial data for design .....	32
7.6	Exploitation costs .....	33
8	SANDBOX .....	33
8.1	What is the treatment technology? .....	33
8.2	Why is SANDBOX necessary? .....	33
8.3	SANDBOX product range and technical data for design .....	33
8.4	Type of the used tanks .....	34
8.5	Initial data for design .....	34
8.6	Exploitation costs .....	34
9	ECOSYSTEMS ASSEMBLY .....	34
9.1	Introduction and general requirements .....	34
9.2	Advantages of ECO laying .....	34
9.2.1	Laying of ECO-TP and ECO-TPV type of tanks.....	35
9.2.2	Laying of ECO-PRO tanks.....	36
9.2.3	Laying of ECO-T and ECO TR type of tanks .....	37
10	ADDITIONAL ELEMENTS PRODUCT RANGE .....	39
11	WARRANTY, MAINTENANCE AND EXPLOITATION.....	40
11.1	Facilities warranty .....	40
11.2	Maintenance .....	40
11.3	Exploitation and cleaning .....	40
11.4	ECOBOX exploitation and cleaning.....	40

# 1 INTRODUCTION

## 1.1 Why is it necessary to treat waste waters?

The necessity of preserving the ecological balance in nature requires reduction of pollutants in the surface and subterranean waters. Such pollutants can be:

- High concentration of petroleum products and oils.
- High concentration of plant and animal fats.
- High concentration of organic and non-organic substances.

## 1.2 What are Pipelife's solutions for treating waste waters?

- Wastewater treatment plants for household-fecal waters - ECOBOX.
- Treatment of waters with high concentration of animal and plant fats - grease separators FATBOX.
- Treatment of waters with high concentration of oils and petroleum products - oil separators OILBOX.
- Treatment of waters with high concentration of big mechanical admixtures - SANDBOX grit separator.

# 2 APPLICATIONS

**ECOBX** - modular wastewater treatment plants for household fecal waters.

Where there is no built sewage system of the place or out of the towns and villages (houses, residential and hotel complexes, small plants and workshops, public and administrative buildings).

**FATBOX** - separator of animal and plant fats

Where the high concentration of fats does not allow their direct discharge in the sewage system of the place or in case of treatment of waste waters through local wastewater treatment plants (meat-processing plants, dairy farms, kitchens, restaurants, confectionery workshops and other plants)

**OILBOX** - separator of oils and petroleum products

Where the high concentration of oils and petroleum products does not allow their direct discharge in the settlement sewage system or in an existing water receiver (garages, auto shops, car washes, gas stations, production workshops, roads and parking lots).

**SANDBOX** - separator of big sludge mechanical admixtures (sand and others inert materials)

Where the high concentration of big admixtures would lead to sludge deposits in the sewage system or in the next treatment facilities (in productions which separate heavier admixtures or insoluble sludge substances, roads, parking lots and others).

# 3 ADVANTAGES OF THE PIPELIFE ECOSYSTEMS

- Guaranteed effect of treatment - above 92%.
- Guaranteed leak-tightness of all the facilities.
- Quick and easy assembly due to the low weight of the facilities.
- Chemical resistance - pH2 - pH12.
- Easy increase the capacity of the wastewater treatment plants by adding of additional modules.
- Long exploitation life.
- An integrated part of the whole system for leading and treating of waters.
- Permanent production control of the raw material and the ready to use product.
- High quality of all facilities. They meet all the requirements of the European standards and the Bulgarian normative organization.

## 4 STANDARDS

### 4.1 Why are standards necessary?

The standards are a combination of rules and norms of practical and theoretical observations and research of the technical parameters which the products should meet. They define minimal requirements for the quality of the specific product. At the same time they guarantee compatibility of products manufactured by different manufacturers.

All this makes the standard extremely important because it guarantees all parties:

Designers, engineers, architects, builders, clients, control authorities and others that the product which they use meets the specific application and possesses all the necessary requirements in order to allow unhindered, flawless and long exploitation.

### 4.2 Which standards Pipelife's ecosystems meet:

#### 4.2.1 ECOBOX meets:

EN 12566-3 from 4 to 52 P.E.<sup>1</sup>, which requires:

- The allowed materials for building the tanks to be concrete, steel, PVC, PE, PP and glass-reinforced plastic.
- Facility leak-tightness tested by vacuum, water and air.
- Resistance to load from soil, hydrostatic load and pedestrian/traffic load.
- Durability of all facility components which are in exploitation.
- Permanent control of: used raw materials and components, manufacture process, ready to use product and its storage.
- Sizing is made on the basis of degree of treatment according to the allowed values of inlet pollution of the treatment facility which are shown in table 1:

BOD <sub>5</sub>	150-500	mgO <sub>2</sub> /l
COD	300-1000	mgO <sub>2</sub> /l
SS	200-700	mg/l
Total nitrogen	22-80	mg/l
Total phosphorus	5-20	mg/l

Table 1

EN 12566-3 does not state specific requirements with regard to the outgoing values of the pollutants (BOD, COD, SS, nitrogen and phosphorus and others). They are determined according to:

- Regulation № 6 from 9.11.2000 "About emission norms for the allowed contents of harmful and dangerous substances in the waste waters, discharged in water sites" and
- Regulation № 7 from 14.11.2000 "About the conditions and order for discharge of production waste waters in the sewage systems of the populated areas" and are coordinated with the European Directive 91/271 EEC.

Regulation № 7 from 14.11.2000 defines the following categories of water receiver:

- **Category I** – waters for drinking needs, bathing, swimming pools and for the food industry
- **Category II** – waters for water sports, fish-breeding, watering-place and bathing of animals
- **Category III** – waters for irrigation and industrial needs

Discharge of waste waters after their treatment is possible only in the second or the third category water receiver or in soil which meets the requirements for the second category, (see Table 2)

<sup>1</sup> Person Equivalent – reflects the pollution with industrial (waste) waters. This is the number of fictitious residents who would pollute with the same mass which the production would make.

Norms/Parameters	91/271EEC mg/l I k.	91/271EEC mg/l II k.	91/271EEC mg/l III k.	Pipelife mg/l
BOD <sub>5</sub>	<=5	<=15	<=25	<=10
COD	25	70	100	<=60
SS	<=30	<=50	<=100	<=50
N	6	17	36	17
O <sub>2</sub>	>=6	>=4	>=2	>=4
P	1	2	4	Additional treatment facility

Table 2

The German standard ATV-122 from 50 to 500 P.E., which requires:

- The allowed materials for building of the tanks must be concrete, steel, PVC, PE, PP and glass-reinforced plastic.
- Facility leak-tightness tested by vacuum, water and air.
- Resistance to static and dynamic loads from the soil and the traffic.
- The elements which are sensitive to pollution must be protected.
- Durability of all facility components which are in exploitation conditions.
- Permanent control of: used raw materials and components, manufacture process, ready to use product and its storage.
- Sizing is based on the following values:
  - drain capacity = 150 l/ r.d.
  - BOD<sub>5</sub> 60 g/resident/day
  - SS 40 g/resident/day
- To be capable of extending and adding to the facility.
- To be easy-accessed for inspection, maintenance and cleaning.
- To be fitted with a device for measuring the working hours.
- To have signals in case of crash.

According to Table 3 can be calculated the capacity of the treatment facility as equivalent of residents.

Calculation of modular WWTP in relation to P.E. capacity, according to ATV A 122		
Types of buildings and activities	Unit of measurement for users	Equivalent of (P.E.):
Hotels and boarding houses	1 bed	1-3 P.E.
Camping site (tent or large flat vessel)	2 visitors	1 P.E.
A place of eating (without cooking, packed food)	3 places	1 P.E.
restaurants (with a kitchen and using of one place max. three times per twenty-four-hour period). - any additional usage of place is three times per twenty-four-hour period	1 place  extra	1 P.E.  1 P.E.
A drinking place (beer-house, discotheque, bar) without kitchen	10 places	1 P.E.
Café without kitchen	30 places	1 P.E.
Sports grounds without restaurant and café	5 visitors	1 P.E.
Plants and workshops without kitchen	2 employees	1 P.E.
Study-hall without kitchen	3 children or educator	1 P.E.
Study-hall and schools with kitchen	2 children or educator	1 P.E.
Kindergartens and nursery during the weekend	2 children or educator	1 P.E.
Everyday manger and kindergartens	1 child or educator	1 P.E.
One-family houses and apartments according to their area	< 50 m <sup>2</sup>	min. 2 P.E. per apartment
	from 50 m <sup>2</sup> to 75 m <sup>2</sup>	min. 3 P.E. per apartment
	> 75 m <sup>2</sup>	min. 4 P.E. per apartment
In case that the apartment or the house has a bigger number of residents, the users are taken into account (8 residing-8 P.E.)		

Table 3

## 4.2.2 FATBOX meets:

EN 1825-1,2, which requires:

- Nominal size of the grease separators - NS: 1, 2, 4, 7, 10, 15, 20 and 25.
- Construction resistance to tension above 15 MPa, not to be deformed more than 25% and to preserve its integrity (against cracks or breaking)
- To be made of homogeneous materials without visible defects on the body or inside.
- The inlets and outlets of the inspection holes must be fitted with sealings which lead to full leak-tightness of the facility.
- Facility leak-tightness.
  - for the tanks there must be no leak for 20 minutes when filling the facility with water of 100 mm above the exploitation level
  - for the assembled manholes there must be no leak for 2 hours, at water pressure of 0,5 ba
- Minimal inlets and outlets diameters according to Table 4:

Nominal size (NS)	Minimal diameter (DNmin)
≤ NS 4	100
>NS4 до NS7	125
>NS7 до NS10	150
>NS10 до NS25	200

Table 4

- Minimal facility covering 650 mm and maximum 2000 mm.
- Defining the facility construction according to:
  - hydrocarbon concentration must not be more than 25 mg/l
  - the facility construction must be in accordance with the parameters in Table 5

Nominal size NS	Grease separator minimal surface of the (m <sup>2</sup> )	Grease separator minimal volume (m <sup>3</sup> )	Minimal volume of the layer for grease separation (m <sup>3</sup> )
<b>NS</b>	<b>0,25 x NS</b>	<b>0,24 x NS</b>	<b>0,04 x NS</b>

Table 5

- The minimal difference in the elevations between the bottom of the inlet pipe and the maximal fluid level in the separator must be 70 mm.
- The volume in the facility for separation of mechanical admixtures and insoluble substances must be at least 100 x NS in liters.
- Defining the nominal size according to the formulas and tables in EN 1825-2. The calculations are equalized to grease separator with a bigger nominal size of the received one.
- Easy facility access, for cleaning, maintenance and wreck repair.
- The covers must meet the corresponding class, according to EN 124.

## 4.2.3 OILBOX meets:

EN 858-1,2, which requires:

- two classes of the facility, according to the separation technology and the quantity of the remaining oil at the facility outlet (see Table 6):

class	Maximal remaining oil at the facility outlet, mg/l	Separation technology
I	5	By a coalescent filter
II	100	By gravity

Table 6

- Nominal size of the grease separators NS: 1.5, 3, 6, 10, 15, 20, 30, 40, 50, 65, 80, 100, 125, 150, 200, 300, 400 and 500.
- Construction resistance to tension above 15 MPa, it must not be deformed more than 25% and to preserve its integrity (against cracks or breaking).

- To be made of a homogeneous material without visible defects on the body or on the inside.
- The inlets and the outlet of the manholes must be equipped with sealings which lead to full leak-tightness of the facility.
- Facility leak-tightness:
  - for tanks there must be no leak for 20 minutes when filling the facility with water of 40 mm above the exploitation level
  - for the assembled manholes there must be no leak for 2 hours, at water pressure of 0,5 ba
- Minimal diameters of the inlets and the outlets according to Table 7:

Nominal size (NS)	Minimal diameter DNmin
≤ NS 3	100
>NS3 до NS6	125
>NS6 до NS10	150
>NS10 до NS20	200
>NS20 до NS30	250
>NS30 до NS100	300
>NS100	400

Table 7

- The use of mechanism for automatic facility inlet closing (according to the norms at our country it is not necessary and can not be applied)
- Defining the facility construction according to its functionality e.g. to be possible during the stay of the fluid to be achieved the necessary outlet values for the corresponding class.
- The facility volume for separation of oils and petroleum products must be at least 15 x NS in liters.
- Possibility for taking out the coalescent filters for cleaning.
- Defining the nominal size, according to the formulas and tables in EN 858-2. The calculations are equalized to the grease separator with a bigger nominal size from the received one.
- Easy facility access, for cleaning, maintenance and wreck repair.
- The covers must meet the corresponding class, according to EN 124.

**The standard allows the usage of by-pass connection which is in accordance with the corresponding nominal size of the facility for treatment of waters from parking lots, roads, storage grounds and others.**

#### 4.2.4 SANDBOX meets:

DIN 4040 and DIN4041, which require:

- Construction resistance to tension above 15 MPa, not to be deformed more than 25% and to preserve its integrity (against cracks or breaking)
- To be made of homogeneous materials without visible defects on the body or inside.
- The inlets and outlets of the manholes must be fitted with sealings which lead to full leak-tightness of the facility.
- Facility leak-tightness.
  - for the tanks there must be no leak for 20 minutes when filling the facility with water of 100 mm above the exploitation level
  - for the assembled manholes there must be no leak for 2 hours, at water pressure of 0,5 ba
- Defining the facility construction according to Table 8:

Incoming water quantity l/s	Minimal sludge surface 0,25 m <sup>2</sup> per liter/ second, m <sup>2</sup>	Minimal stay 3 min, defining the useful volume in liters	Sludge effectiveness
<b>Q</b>	<b>0,25 x Q</b>	<b>3 x Q x 60</b>	<b>92%</b>

Table 8

## 5 ECOBOX

### 5.1 What is the treatment technology?

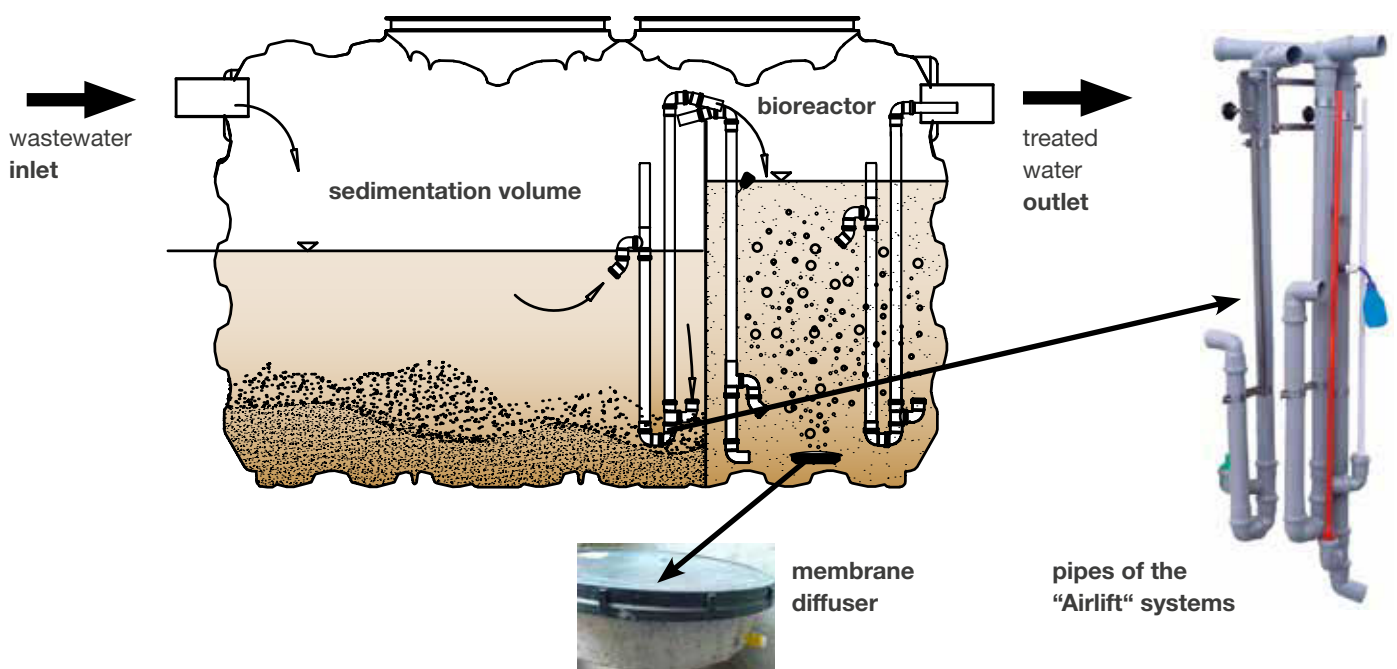
- Mechanical stage – sludge part.
- Biological stage – bio-pool with a cyclic action –SBR (cyclic, non-protracted, reactor).
- Duration of one cycle 8 hours or three cycles per twenty-four-hour period.
  - Precipitation of rough insoluble admixtures under the influence of gravity forces – 1,5 hours.
  - Nitrification for turning the nitrogen compounds into nitrites and nitrates in aerobic environment – 5, 8 hours.
  - Denitrification for turning the nitrates into free nitrogen and oxygen in an anaerobic environment – 0,6 hours.
- Going back to the mechanical stage for additional purification of SAS<sup>2</sup>.
- Purification effect 98%.

Wastewater treatment starts after about three to five weeks. Complete 100% treatment efficiency is achieved by three to six months after the start-up. This is the time necessary for the development of active biomass of bacteria and micro-organisms known as activated sludge, by means of which biochemical treatment of wastewater is done. The most appropriate time to test the treated water is after six months of continuous operation of the treatment module. For seasonal use of the system the maximum time for which the sludge can not be fed with wastewater is no longer than two months. In this period the aeration of the activated sludge must not stop. After this time the bacteria die and need to be created again so that the biochemical processes to continue. The period in which the facility can not be used (to be in "sleep" mode) is 3 to 6 months.

ECOBOX works with an air lift system which transports the wastewater and the sludge between the tanks and discharges the treated water. This air lift system eliminates the need to use mechanical elements mounted inside the tanks. Aeration in the bioreactor tank is carried out by membrane diffusers installed on the bottom of the tank.

The air is supplied to the air lift system and membrane diffusers by compressors and is controlled by magnetic valves. Control panel, compressors and magnetic valves are installed in the cabinet outside of the facility.

ECOBOX wastewater treatment plants are available in two versions, ECOBOX/Air from 4 to 500 P.E. and ECOBOX/AirLight from 4 to 12 P.E. Wastewater treatment plants of type ECOBOX/AirLight have simpler technological equipment, but they have less flexible automation and operation. As a result, they have lower initial capital costs, but with potential for higher future operating costs, compared to ECOBOX/Air, for the same number of equivalent inhabitants.



<sup>2</sup> SAS - Surplus Active Sludge





control cabinet



control panel

compressor for airlift system and membrane diffusers

magnet valves for control of the air supplied to the airlift system and the membrane diffusers

## 5.2 Why should we choose ECOBOX, instead of “leak-tight” (septic) concrete tank?

The leak-tight tank requires low initial investment but depending on the site situation and its proximity to urbanized places, the costs for periodical (between 20 and 30 times a year) cleaning of the pits vary greatly.

The ECOBOX systems require one initial investment but the costs for cleaning are many times lower due to the fact that smaller volume is cleaned and at intervals from 1 to maximum 3 times a year.

Example, see. Table 9 :

One-family house 4 ER = 600l/day	Leak-tight tank 8 m <sup>3</sup>	ECOBX 4 ER	DIFFERENCE
Initial investment in levs VAT incl.	1500	8048	6548
Cleaning intensity per year	26	2	
Cleaning costs in levs VAT incl.	240	240	
Cleaning costs per year in levs VAT incl.	6240	480	5760
Period of time for covering the initial investment in months			14

Table 9

The example shows that after 14 months you would get back the bigger initial investment

## 5.3 ECOBOX Product range and technical data for design

### 5.3.1 Product range and technical data

Product Code	PE	Sedimentation Volume	Buffer Volume	Bioreactor	Total Length	Total Width	Required Area	Standard Depth of the Facility from Ground Level to Tank Bottom Level (with one riser)	Number of Man-holes	Voltage	Power	Weight
-	-	tank	tank	tank	m	m	m <sup>2</sup>	m	pcs.	V	W	kg
ECOBX/AIRLIGHT-EW4	4	ECO-PRO1400	ECO-PRO1000	ECO-PRO1000	3,72	2,11	7,85	2,79	2	230	64	272,57
ECOBX/AIRLIGHT-EW4/2Y	4	ECO-PRO1000	ECO-PRO1000	ECO-PRO1000	3,72	2,11	7,85	2,29	2	230	64	257,1
ECOBX/AIRLIGHT-EW4/3Y	4	ECO-PRO605	ECO-PRO1000	ECO-PRO1000	3,72	2,11	7,85	2,29	2	230	64	241,63
ECOBX/AIRLIGHT-EW6	6	ECO-TR5000			2,98	2,8	8,34	2,46	1	230	64	194
ECOBX/AIRLIGHT-EW6/3Y	6	ECO-T3000			3,16	2,36	7,46	2,13	1	230	64	178,4
ECOBX/AIRLIGHT-EW8	8	ECO-TR5000			3,48	2,8	9,74	2,46	1	230	86	266
ECOBX/AIRLIGHT-EW8/2Y	8	ECO-TR5000			2,98	2,8	8,34	2,46	1	230	86	194
ECOBX/AIRLIGHT-EW10	10	ECO-TR6000			3,88	2,8	10,86	2,46	1	230	100	291
ECOBX/AIRLIGHT-EW10/2Y	10	ECO-TR5000			3,48	2,8	9,74	2,46	1	230	100	266
ECOBX/AIRLIGHT-EW10/3Y	10	ECO-TR5000			2,98	2,8	8,34	2,46	1	230	100	194
ECOBX/AIRLIGHT-EW12	12	ECO-TR8000			3,68	3,31	12,18	2,87	1	230	130	419
ECOBX/AIRLIGHT-EW12/2Y	12	ECO-TR6000			3,88	2,8	10,86	2,46	1	230	130	291
ECOBX/AIRLIGHT-EW12/3Y	12	ECO-TR5000			3,48	2,8	9,74	2,46	1	230	130	266

Product Code	PE	Sedimentation Volume	Buffer Volume	Bioreactor	Total Length	Total Width	Re-quired Area	Standard Depth of the Facility from Ground Level to Tank Bottom Level (with one riser)	Number of Man-holes	Voltage	Power	Weight
-	-	tank	tank	tank	m	m	m <sup>2</sup>	m	pcs.	V	W	kg
ECOBX/AIR-EW4	4	ECO-PRO1400		ECO-PRO1000	3,72	2,11	7,85	2,79	2	230	64	272,57
ECOBX/AIR-EW4/2Y	4	ECO-PRO1000		ECO-PRO1000	3,72	2,11	7,85	2,29	2	230	64	257,1
ECOBX/AIR-EW4/3Y	4	ECO-PRO605		ECO-PRO1000	3,72	2,11	7,85	2,29	2	230	64	241,63
ECOBX/AIR-EW6	6	ECO-TR5000			2,98	2,8	8,34	2,46	1	230	64	194
ECOBX/AIR-EW6/3Y	6	ECO-T3000			3,16	2,36	7,46	2,13	1	230	64	178,4
ECOBX/AIR-EW8	8	ECO-TR5000			3,48	2,8	9,74	2,46	1	230	86	266
ECOBX/AIR-EW8/2Y	8	ECO-TR5000			2,98	2,8	8,34	2,46	1	230	86	194
ECOBX/AIR-EW10	10	ECO-TR6000			3,88	2,8	10,86	2,46	1	230	100	291
ECOBX/AIR-EW10/2Y	10	ECO-TR5000			3,48	2,8	9,74	2,46	1	230	100	266
ECOBX/AIR-EW10/3Y	10	ECO-TR5000			2,98	2,8	8,34	2,46	1	230	100	194
ECOBX/AIR-EW12	12	ECO-TR8000			3,68	3,31	12,18	2,87	1	230	130	419
ECOBX/AIR-EW12/2Y	12	ECO-TR6000			3,88	2,8	10,86	2,46	1	230	130	291
ECOBX/AIR-EW12/3Y	12	ECO-TR5000			3,48	2,8	9,74	2,46	1	230	130	266
ECOBX/AIR-EW16	16	ECO-TR12000			4,76	3,31	15,76	2,87	1	230	130	449
ECOBX/AIR-EW16/2Y	16	ECO-TR8000			3,68	3,31	12,18	2,87	1	230	130	419
ECOBX/AIR-EW16/3Y	16	ECO-TR6000			3,88	2,8	10,86	2,46	1	230	130	291
ECOBX/AIR-EW20	20	ECO-TR12000			4,76	3,31	15,76	2,87	1	230	130	449
ECOBX/AIR-EW20/3Y	20	ECO-TR8000			3,68	3,31	12,18	2,87	1	230	130	419
ECOBX/AIR-EW24	24	ECO-TR12000			4,76	3,31	15,76	2,87	1	230	215	449
ECOBX/AIR-EW28	28	ECO-TR8000		ECO-TR8000	6,86	3,31	22,71	2,87	2	230	215	704
ECOBX/AIR-EW28/2Y	28	ECO-TR5000		ECO-TR8000	6,66	3,31	22,04	2,87	2	230	215	564
ECOBX/AIR-EW28/3Y	28	ECO-TR12000			4,76	3,31	15,76	2,87	1	230	215	449
ECOBX/AIR-EW32	32	ECO-TR12000		ECO-TR8000	7,94	3,31	26,28	2,87	2	230	215	734
ECOBX/AIR-EW32/2Y	32	ECO-TR6000		ECO-TR8000	7,06	3,31	23,37	2,87	2	230	215	589
ECOBX/AIR-EW32/3Y	32	ECO-TR5000		ECO-TR8000	6,66	3,31	22,04	2,87	2	230	215	564
ECOBX/AIR-EW36	36	ECO-TR12000		ECO-TR12000	9,02	3,31	29,86	2,87	2	230	215	764
ECOBX/AIR-EW36/2Y	36	ECO-TR8000		ECO-TR12000	7,94	3,31	26,28	2,87	2	230	215	734
ECOBX/AIR-EW36/3Y	36	ECO-TR6000		ECO-TR12000	8,14	3,31	26,94	2,87	2	230	215	619
ECOBX/AIR-EW40	40	ECO-TR12000		ECO-TR12000	9,02	3,31	29,86	2,87	2	230	750	764
ECOBX/AIR-EW40/2Y	40	ECO-TR8000		ECO-TR12000	7,94	3,31	26,28	2,87	2	230	750	734
ECOBX/AIR-EW40/3Y	40	ECO-TR6000		ECO-TR12000	8,14	3,31	26,94	2,87	2	230	750	619
ECOBX/AIR-EW44	44	ECO-TR12000		ECO-TR12000	9,02	3,31	29,86	2,87	2	230	750	764
ECOBX/AIR-EW44/2Y	44	ECO-TR8000		ECO-TR12000	7,94	3,31	26,28	2,87	2	230	750	734
ECOBX/AIR-EW48	48	ECO-TR20000		ECO-TR12000	11,54	3,31	38,2	2,87	3	230	750	1096
ECOBX/AIR-EW48/2Y	48	ECO-TR12000		ECO-TR12000	9,02	3,31	29,86	2,87	2	230	750	764
ECOBX/AIR-EW48/3Y	48	ECO-TR8000		ECO-TR12000	7,94	3,31	26,28	2,87	2	230	750	734
ECOBX/AIR-EW50	50	ECO-TR20000		ECO-TR12000	11,54	3,31	38,2	2,87	3	230	750	1096
ECOBX/AIR-EW50/2Y	50	ECO-TR12000		ECO-TR12000	9,02	3,31	29,86	2,87	2	230	750	764
ECOBX/AIR-EW50/3Y	50	ECO-TR8000		ECO-TR12000	7,94	3,31	26,28	2,87	2	230	750	734
ECOBX/AIR-EW60	60	ECO-TR12000			7,94	3,31	26,28	2,87	2	230	750	734
ECOBX/AIR-EW60/2Y	60	ECO-TR8000			6,86	3,31	22,71	2,87	2	230	750	704
ECOBX/AIR-EW75	75	ECO-TR8000	ECO-TR8000	ECO-TR12000	11,12	3,31	36,81	2,87	3	230	750	1086
ECOBX/AIR-EW75/2Y	75	ECO-TR12000			9,02	3,31	29,86	2,87	2	230	750	764
ECOBX/AIR-EW75/3Y	75	ECO-TR8000			7,94	3,31	26,28	2,87	2	230	750	734
ECOBX/AIR-EW100	100	ECO-TR12000	ECO-TR8000	ECO-TR12000	12,2	3,31	40,38	2,87	3	230	1500	1146
ECOBX/AIR-EW100/2Y	100	ECO-TR5000	ECO-TR8000	ECO-TR12000	10,92	3,31	36,15	2,87	3	230	1500	806
ECOBX/AIR-EW100/3Y	100	ECO-TR3500	ECO-TR8000	ECO-TR12000	10,42	3,31	34,49	2,87	3	230	1500	726
ECOBX/AIR-EW125	125	ECO-TR20000			11,54	3,31	38,2	2,87	3	230	1500	1096
ECOBX/AIR-EW125/2Y	125	ECO-TR8000	ECO-TR8000	ECO-TR12000	11,12	3,31	36,81	2,87	3	230	1500	1086
ECOBX/AIR-EW125/3Y	125	ECO-TR6000	ECO-TR8000	ECO-TR12000	11,32	3,31	37,47	2,87	3	230	1500	856

Product Code	PE	Sedimentation Volume	Buffer Volume	Bioreactor	Total Length	Total Width	Re-quired Area	Standard Depth of the Facility from Ground Level to Tank Bottom Level (with one riser)	Number of Man-holes	Voltage	Power	Weight
-	-	tank	tank	tank	m	m	m <sup>2</sup>	m	pcs.	V	W	kg
ECOBX/AIR-EW150	150	ECO-TR20000	ECO-TR12000	ECO-TR20000	18,32	3,31	60,64	2,87	5	230	1500	2142
ECOBX/AIR-EW150/2Y	150	ECO-TR20000		ECO-TR20000	14,06	3,31	46,54	2,87	4	230	1500	1428
ECOBX/AIR-EW150/3Y	150	ECO-TR8000	ECO-TR12000	ECO-TR20000	14,72	3,31	48,72	2,87	4	230	1500	1418
ECOBX/AIR-EW175	175	ECO-TR30000		ECO-TR20000	16,58	3,31	54,88	2,87	4	230	1500	1708
ECOBX/AIR-EW175/2Y	175	ECO-TR12000	ECO-TR12000	ECO-TR20000	15,8	3,31	52,3	2,87	4	230	1500	1478
ECOBX/AIR-EW175/3Y	175	ECO-TR8000	ECO-TR12000	ECO-TR20000	14,72	3,31	48,72	2,87	4	230	1500	1418
ECOBX/AIR-EW200	200	ECO-TR40000		ECO-TR20000	19,1	3,31	63,22	2,87	4	400	3000	1978
ECOBX/AIR-EW200/2Y	200	ECO-TR20000	ECO-TR12000	ECO-TR20000	18,32	3,31	60,64	2,87	5	400	3000	2142
ECOBX/AIR-EW200/3Y	200	ECO-TR12000	ECO-TR12000	ECO-TR20000	15,8	3,31	52,3	2,87	4	400	3000	1478
ECOBX/AIR-EW225	225	ECO-TR20000	ECO-TR40000		19,1	3,31	63,22	2,87	4	400	3000	2013
ECOBX/AIR-EW225/2Y	225	ECO-TR12000	ECO-TR40000		16,58	3,31	54,88	2,87	3	400	3000	1681
ECOBX/AIR-EW225/3Y	225	ECO-TR8000	ECO-TR40000		15,5	3,31	51,31	2,87	3	400	3000	1651
ECOBX/AIR-EW250	250	ECO-TR20000	ECO-TR20000	ECO-TR30000	23,36	3,31	77,32	2,87	6	400	3000	2422
ECOBX/AIR-EW250/2Y	250	ECO-TR12000	ECO-TR20000	ECO-TR30000	20,84	3,31	68,98	2,87	5	400	3000	1758
ECOBX/AIR-EW250/3Y	250	ECO-TR8000	ECO-TR20000	ECO-TR30000	19,76	3,31	65,41	2,87	5	400	3000	1698
ECOBX/AIR-EW300	300	ECO-TR30000	ECO-TR30000	ECO-TR30000	28,4	3,31	94	2,87	6	400	3000	2982
ECOBX/AIR-EW300/2Y	300	ECO-TR40000		ECO-TR30000	21,62	3,31	71,56	2,87	4	400	3000	2258
ECOBX/AIR-EW300/3Y	300	ECO-TR12000	ECO-TR20000	ECO-TR30000	20,84	3,31	68,98	2,87	5	400	3000	1758
ECOBX/AIR-EW350	350	ECO-TR30000	ECO-TR30000	ECO-TR40000	30,92	3,31	102,35	2,87	6	400	3000	3252
ECOBX/AIR-EW350/2Y	350	ECO-TR30000	ECO-TR50000		24,14	3,31	79,9	2,97	4	400	3000	2553
ECOBX/AIR-EW350/3Y	350	ECO-TR20000	ECO-TR20000	ECO-TR40000	25,88	3,31	85,66	2,87	6	400	3000	2692
ECOBX/AIR-EW400	400	ECO-TR20000	ECO-TR50000	ECO-TR40000	33,44	3,31	110,69	2,97	6	400	3000	2692
ECOBX/AIR-EW400/2Y	400	ECO-TR20000	ECO-TR30000	ECO-TR40000	28,4	3,31	94	2,87	6	400	3000	2692
ECOBX/AIR-EW450	450	ECO-TR30000	ECO-TR50000	ECO-TR50000	38,48	3,31	127,37	2,97	6	400	3000	3512
ECOBX/AIR-EW450/2Y	450	ECO-TR20000	ECO-TR40000	ECO-TR50000	33,44	3,31	110,69	2,97	6	400	3000	2952
ECOBX/AIR-EW450/3Y	450	ECO-TR20000	ECO-TR30000	ECO-TR50000	30,92	3,31	102,35	2,97	6	400	3000	2952
ECOBX/AIR-EW500	500	ECO-TR40000	ECO-TR50000	ECO-TR50000	41	3,31	135,71	2,97	6	400	3000	4052
ECOBX/AIR-EW500/2Y	500	ECO-TR20000	ECO-TR50000	ECO-TR50000	35,96	3,31	119,03	2,97	6	400	3000	2952
ECOBX/AIR-EW500/3Y	500	ECO-TR20000	ECO-TR40000	ECO-TR50000	33,44	3,31	110,69	2,97	6	400	3000	2952

Table 10

On inquiry can be offered bigger wastewater treatment plants above 500 P.E., designed according to ATV-122

### 5.3.2 Type of tanks used for ECOBOX

ECO-PRO: PRO Pipelife manholes are used for vertical assembly. They allow free-standing assembly as well as underground assembly. Reinforced construction of the coating load carrying capacity up to 40 tons.

ECO-TPV: used for vertical assembly in case of high underground waters. Allow free-standing assembly as well as underground assembly. Reinforced construction of the coating load carrying capacity up to 40 tons.

ECO-T and ECO-TR: are produced from polyethylene (PE) with a rotation technology e.g. seamless corrugated and with a wall thickness  $\geq 12$  mm.

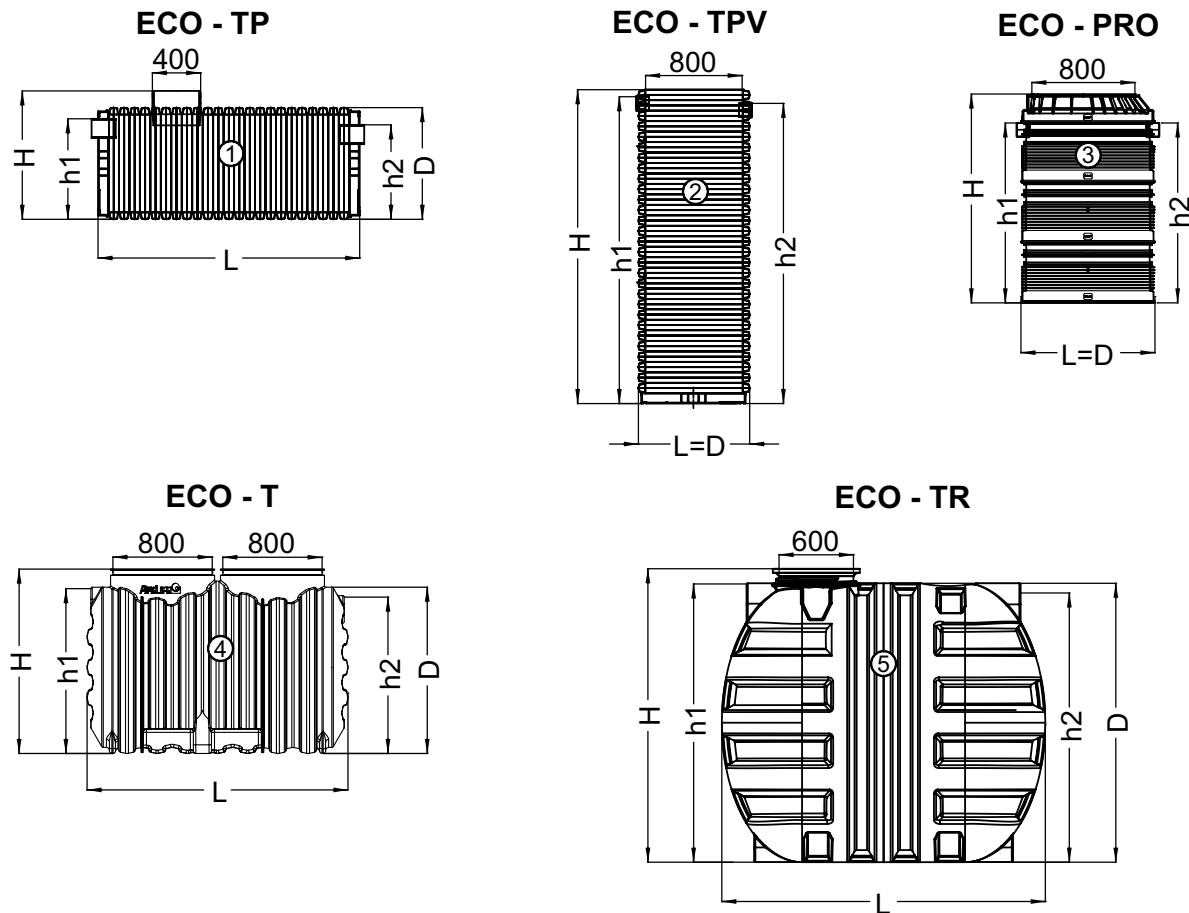
All tanks are equipped with manholes with a diameter DN600. According to the design conditions and the client's wishes they can be made with a diameter DN800. The number of the manholes can be found in Table 10.

If necessary are possible additional manholes with a diameter DN600 or DN800.

ECO-T and ECO-TR tanks are designed for load class A15 but depending on the conditions they can be reinforced with an armoured concrete frames or plate and thus assemblies in traffic zones. The covers which are assembled in this case meet the design load (see Figure 29).

ECOBX are equipped with covers for load A15 (EN124), which can be from polyethylene, cast iron or from polymer concrete and do not allow the occurrence of smells out of the facility.

## 5.3.3 Tanks sizes



N	Tank	Nominal Volume [L]	L(m)	D(m)	H(m)	h1(m)	h2(m)	Net Volume [L]	Weight [kg]
1	ECO-TP1000	1000 L	2,00	0,93	1,06	0,83	0,78	750 L	88,00
	ECO-TP1500	1500 L	3,00	0,93	1,06	0,83	0,78	1130 L	125,00
	ECO-TP2000	2000 L	4,00	0,93	1,06	0,83	0,78	1500 L	162,00
2	ECO-TPV1250	1250 L	0,93	0,93	1,73	2,55	2,49	1150 L	107,00
3	ECO-PRO605	605 L	1,11	1,11	1,79	0,97	0,87	605 L	113,08
	ECO-PRO1000	1000 L	1,11	1,11	2,29	1,47	1,37	997 L	128,55
	ECO-PRO1400	1400 L	1,11	1,11	2,79	1,97	1,87	1390 L	144,02
4	ECO-T3000	3000 L	2,16	1,43	1,52	1,52	1,52	2370 L	138,20
	ECO-T5000	5000 L	2,83	1,72	1,81	1,81	1,81	4980 L	208,20
5	ECO-TR3500	3500 L	1,98	1,80	2,46	1,60	1,55	3500 L	172,00
	ECO-TR5000	5000 L	2,48	1,80	2,46	1,60	1,55	4638 L	212,00
	ECO-TR6000	6000 L	2,88	1,80	2,46	1,60	1,55	5435 L	237,00
	ECO-TR8000	8 000 L	2,68	2,31	2,43	2,43	2,43	7182 L	352,00
	ECO-TR12000	12 000 L	3,76	2,31	2,43	2,43	2,43	10662 L	382,00
	ECO-TR20000	20 000 L	6,28	2,31	2,43	2,43	2,43	18782 L	714,00
	ECO-TR30000	30 000 L	8,80	2,31	2,43	2,43	2,43	26902 L	994,00
	ECO-TR40000	40 000 L	11,32	2,31	2,43	2,43	2,43	35022 L	1264,00
ECO-TR50000	50 000 L	13,84	2,31	2,43	2,43	2,43	43142 L	1524,00	

Table 11

All tanks from the product range described in Table 11 can be applied as tanks for retaining of conditionally clean waters.

### 5.3.4 Tanks configuration.

The tanks can be placed in different configurations for the purpose of most effective area usage. It is important to obey the requirement for minimal distance (D) between the tanks and the trench walls.

Figure 1: Tanks configuration.

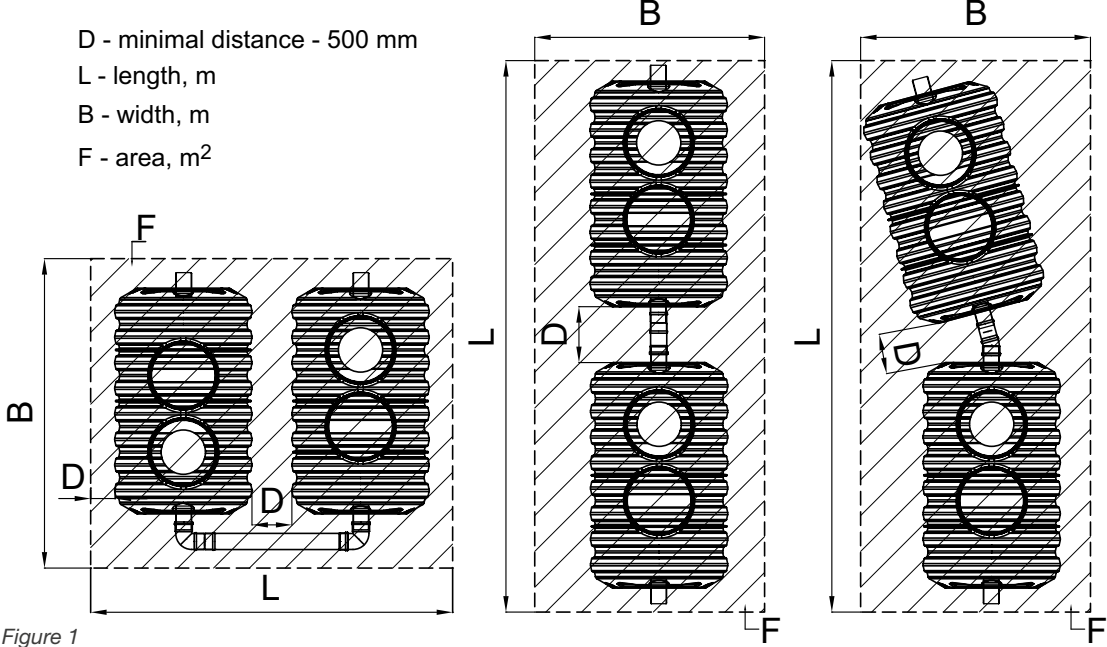


Figure 1

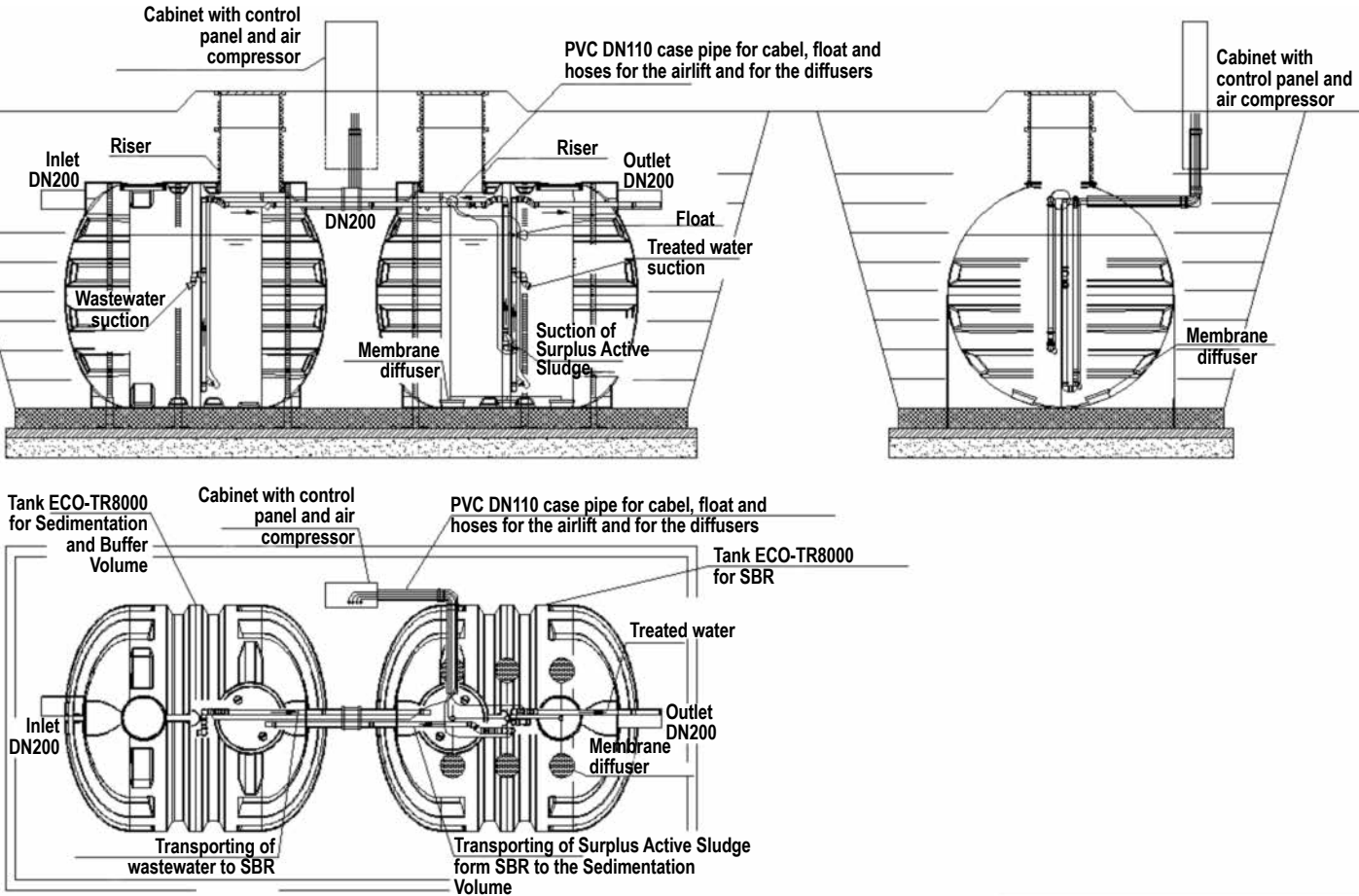


Figure 2

When the depth of the sewage system is big or when the terrain conditions are unfavorable, it is recommended to use modular sewage pump station Pipelife's PROFOS type for pumping the waters, (see Figure 3).

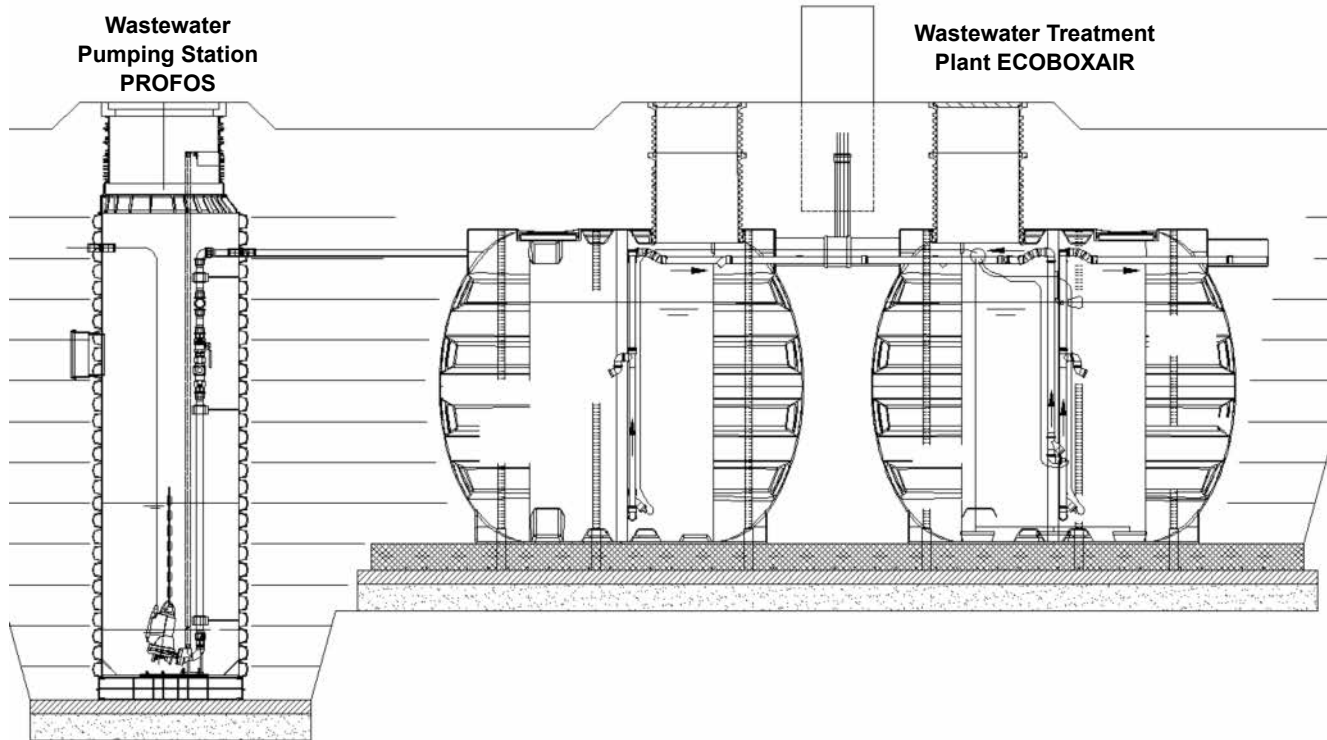


Figure 3

In case that the discharge level is higher than the level of the outlet pipe of the wastewater treatment plant, a sewer pumping station type PROFOS is recommended to be installed after the outlet pipe (see Figure 3 a).

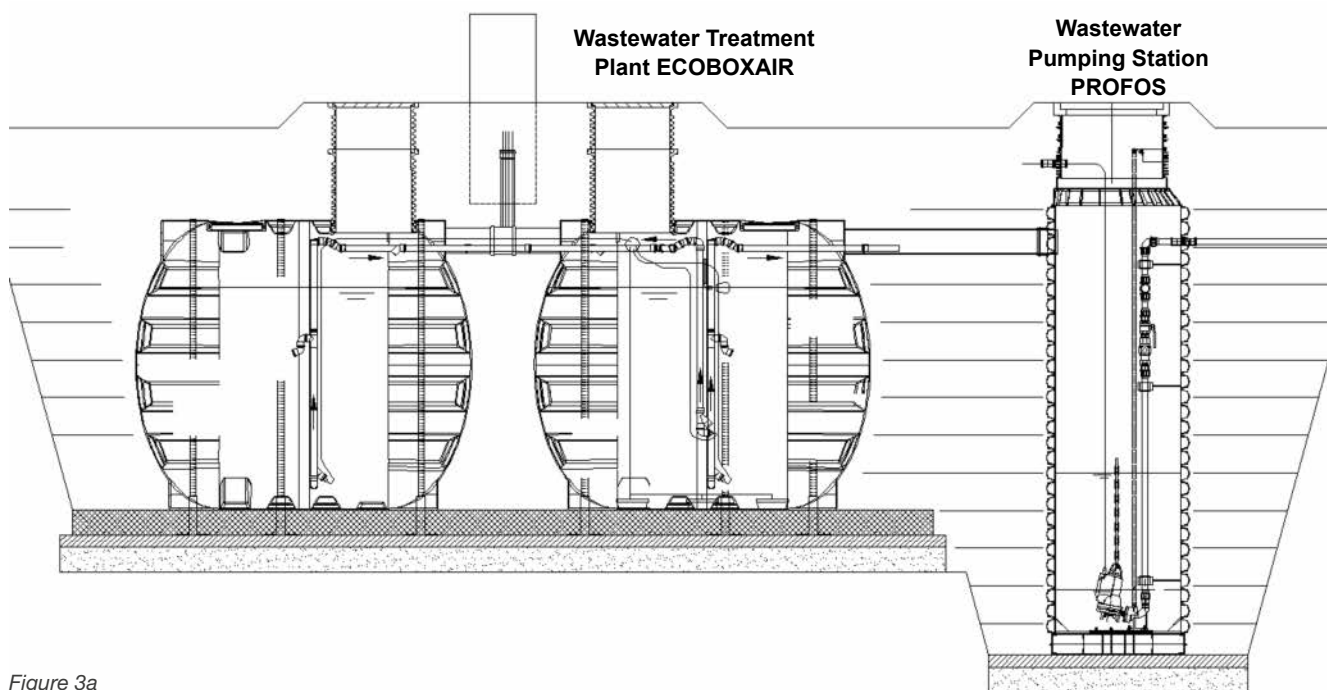


Figure 3a

### 5.3.5 Initial data for design

The assembly plan of the specific ECOBOX model is prepared by Pipelife in accordance with the concrete design conditions. For the preparation of the assembly plan the following data is necessary (see Table 12).

Input Data	Parameter	Data	Comment
Wastewater Flow m <sup>3</sup> /d	Q		
Infiltration Water (%)	Q%		
Installation Area, Length (L) and Width (B), m	L x B		
Distance from Control Panel, m	L1		
Traffic Load A15, B125, C250 or D400 (BDS EN 124)			
Inlet Pipe Depth, m	H1		
Inlet Pipe Diameter, m	D1		
Discharge Level, m	H2		
Pump Shaft after WWTP, when the treated water could not reach the discharge point by gravity	yes/no		
Underground Water Level, m	Z		

Table 12

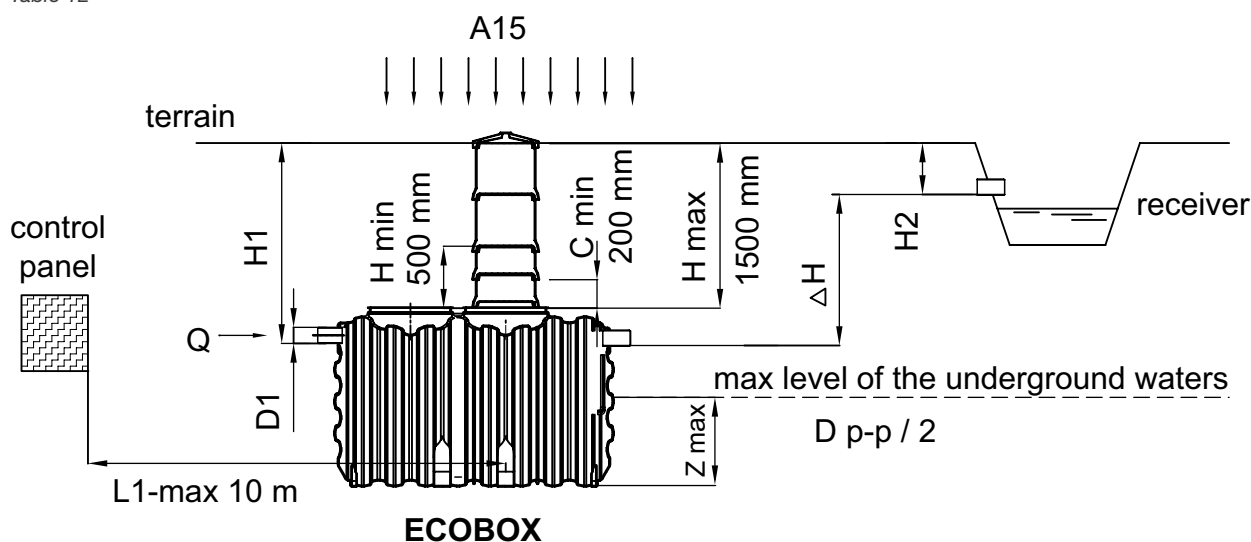


Figure 4: Initial data

The maximum level of the underground waters must not surpass Z max. When the underground waters are high it is necessary a reinforcement with wet concrete with a protective layer thickness of 10 cm around the tank. The maximal and minimal covering of the tanks from crown tank to elevation terrain must be in accordance with H min and H max. C min can be 200 mm when the tanks' load is up to 250 kg (see Figure 5).

When the underground waters are high or the concrete terrain conditions (rocks), the tanks can be semi-dug or in an embankment provided that they have minimal covering of 200 mm and are not subjected to direct sunlight (see Figure 6).

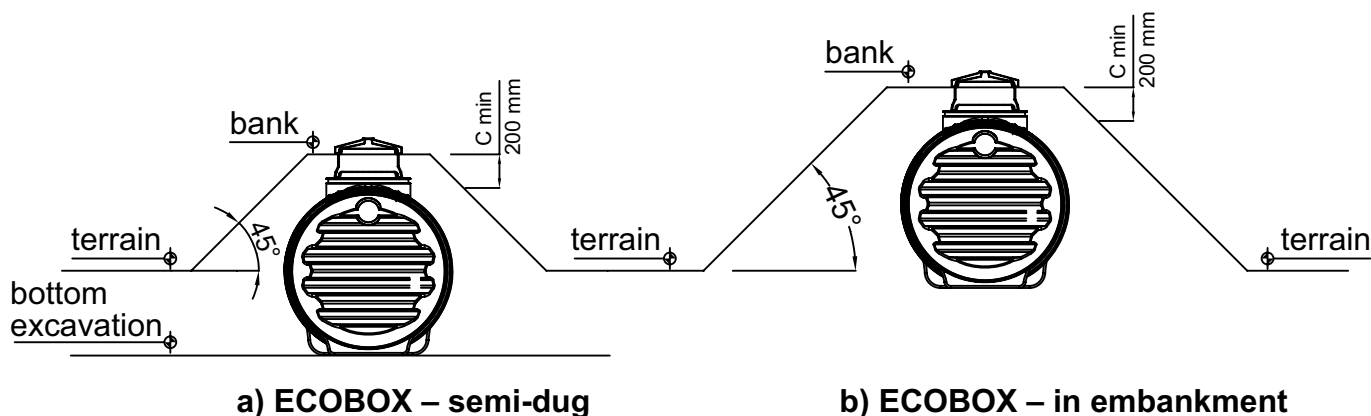


Figure 5: ECOBOX assembly semi-dug and embankment

**Discharge of the atmospheric waters in ECOBOX is inadmissible due to fact that this would burden the facility.**

If infiltration of underground water is expected in existing or newly sewerage system, this has to be indicated in Table 12 as a percentage of dry flow.

The biological treatment is an exothermic process during which big amount of heat is separated. Due to this reason the low temperatures of the environment do not have a negative effect on the purification. This make the ECOBOX assembly allowed in embankment as well as shallow settled.

### 5.3.6 Exploitation costs

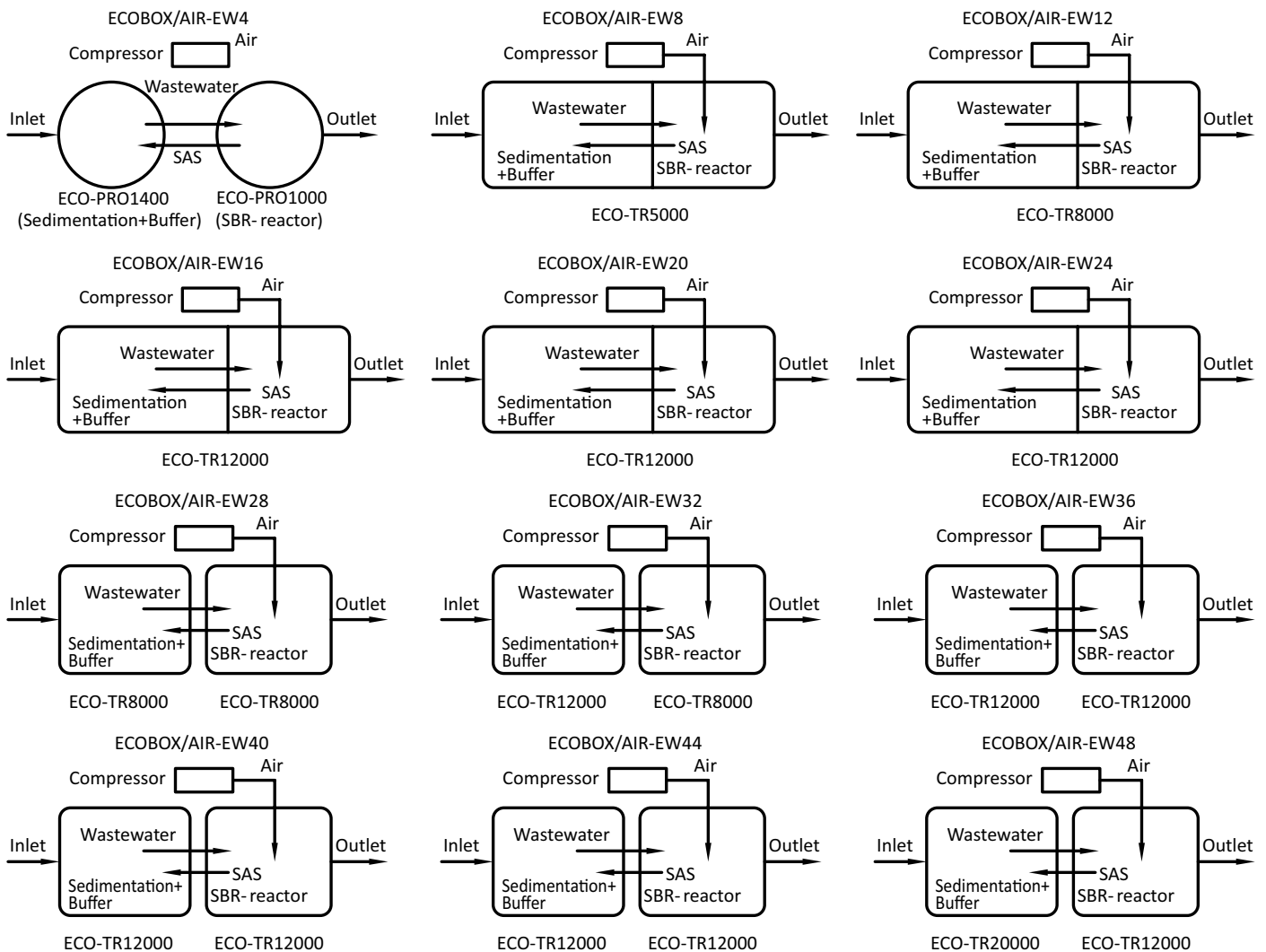
The exploitation costs of ECOBOX wastewater treatment plants are cut to minimum:

- The necessary supply of the station control panel is single phase 230 V or three phase 400 V, 50 Hz.
- The maximal power of the ECOBOX/AIR system compressors is 3000 W.
- Without additional supplies it is not necessary to put biomass in advance.
- Service is brought to minimum – a few types of periodical “checks” of the facility condition:
  - taking of water samples after ECOBOX for the period 3 to 6 months after the start of the facility.
  - cleaning of the sludge tanks, one to three times per year.
  - facility prevention twice a year.

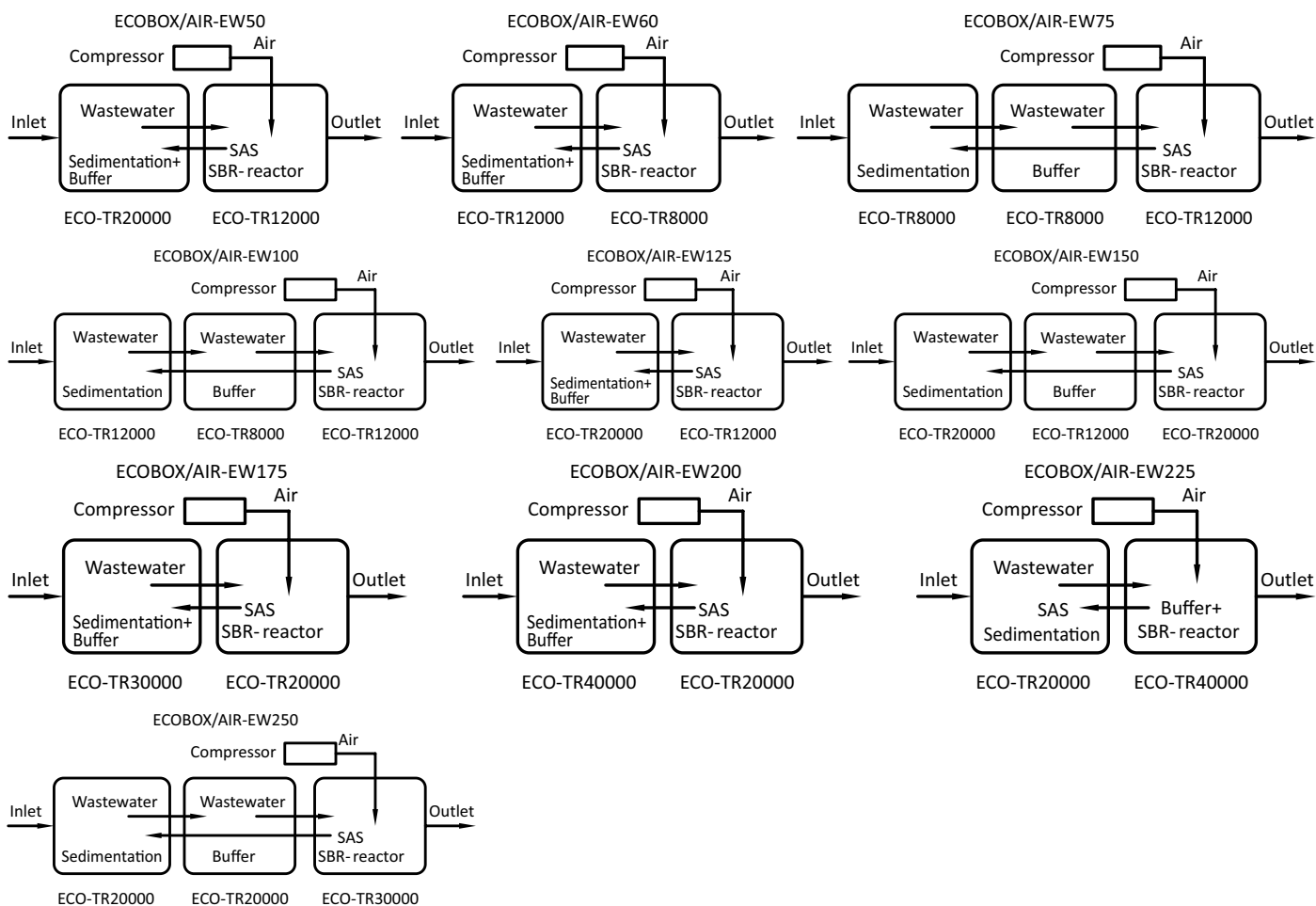
### 5.3.7 Technological diagrams for connection

The sample diagrams below show the technology for connection the ECOBOX. These configurations can be changed, keeping the sequence and the necessary volumes of the different treatment stages.

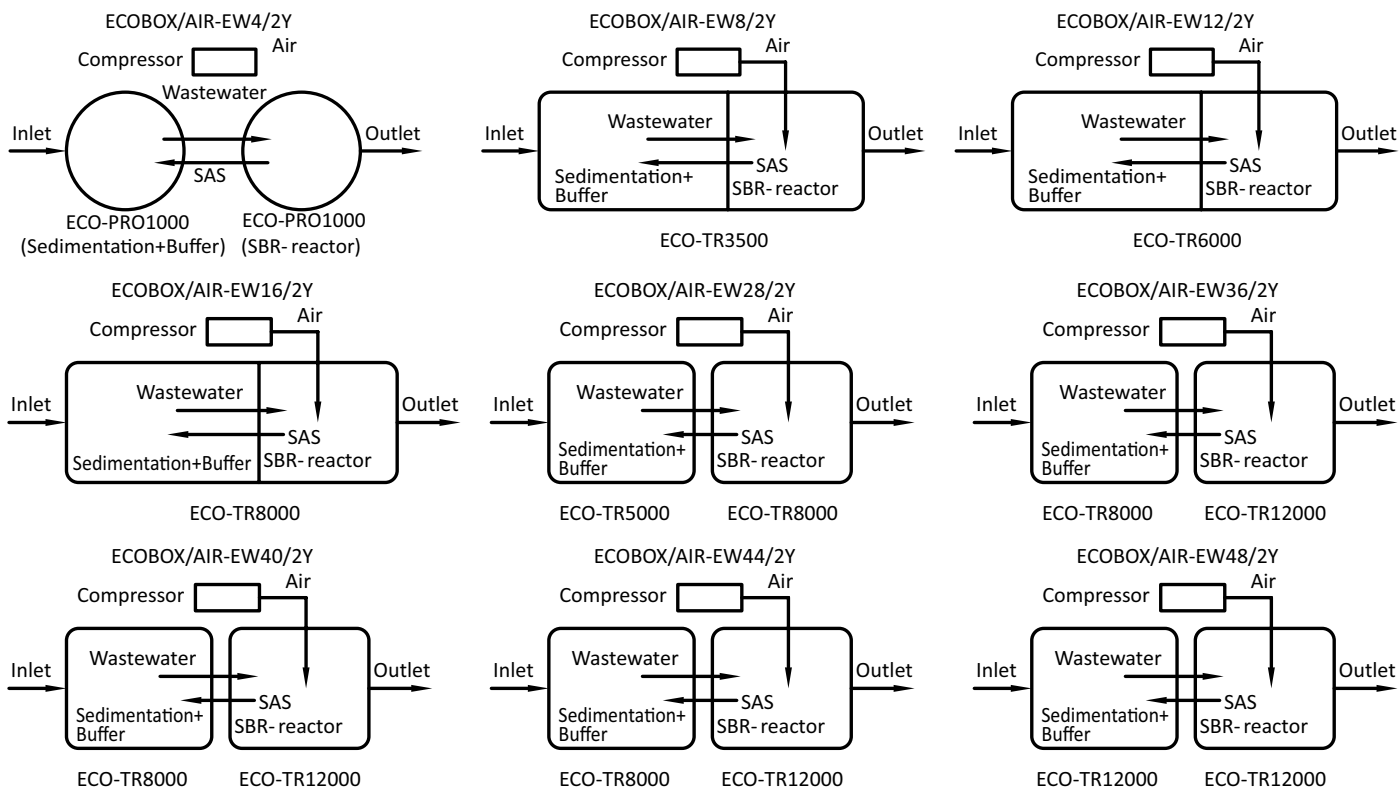
#### ECOBOX for cleaning once an year

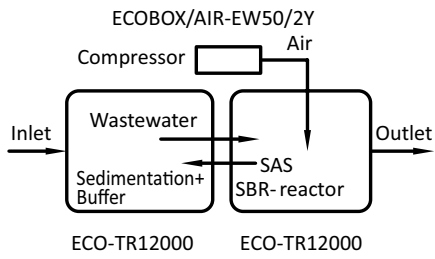




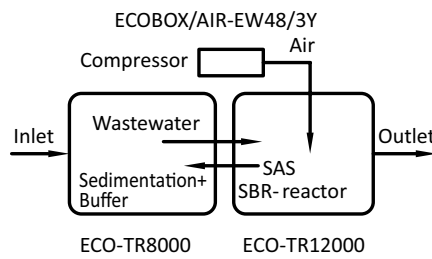
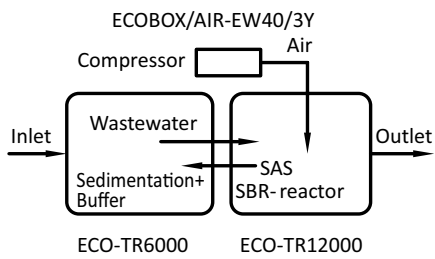
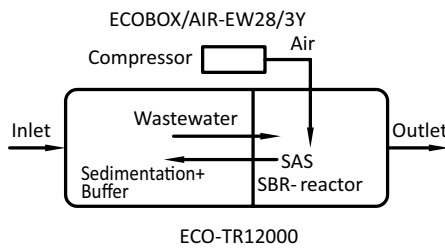
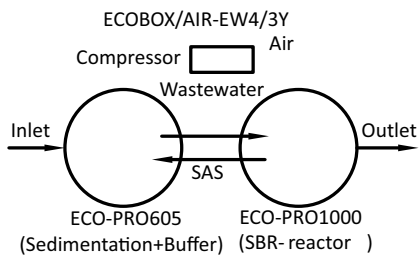


ECOBOX for cleaning twice a year





ECOBOX for cleaning three times a year

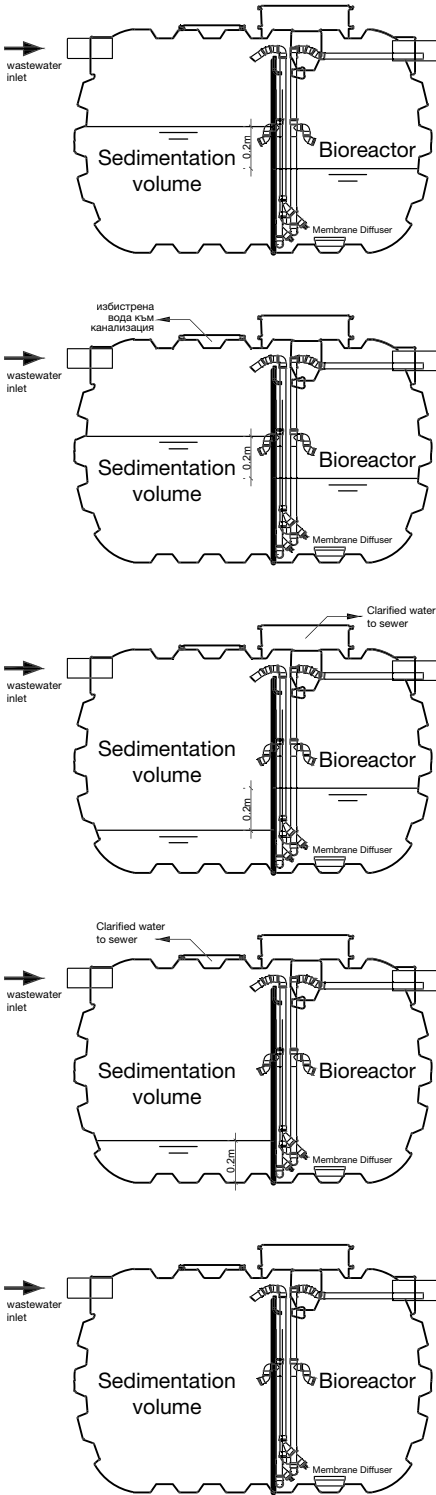
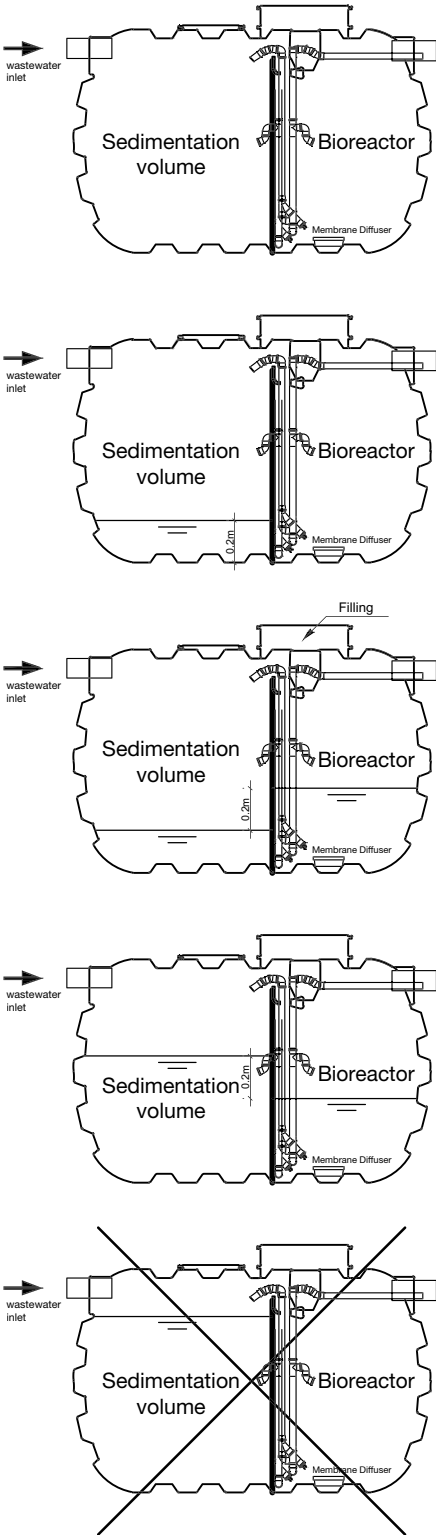


### 5.3.8 Filling and emptying of plastic tanks ECOBOX

#### FILLING

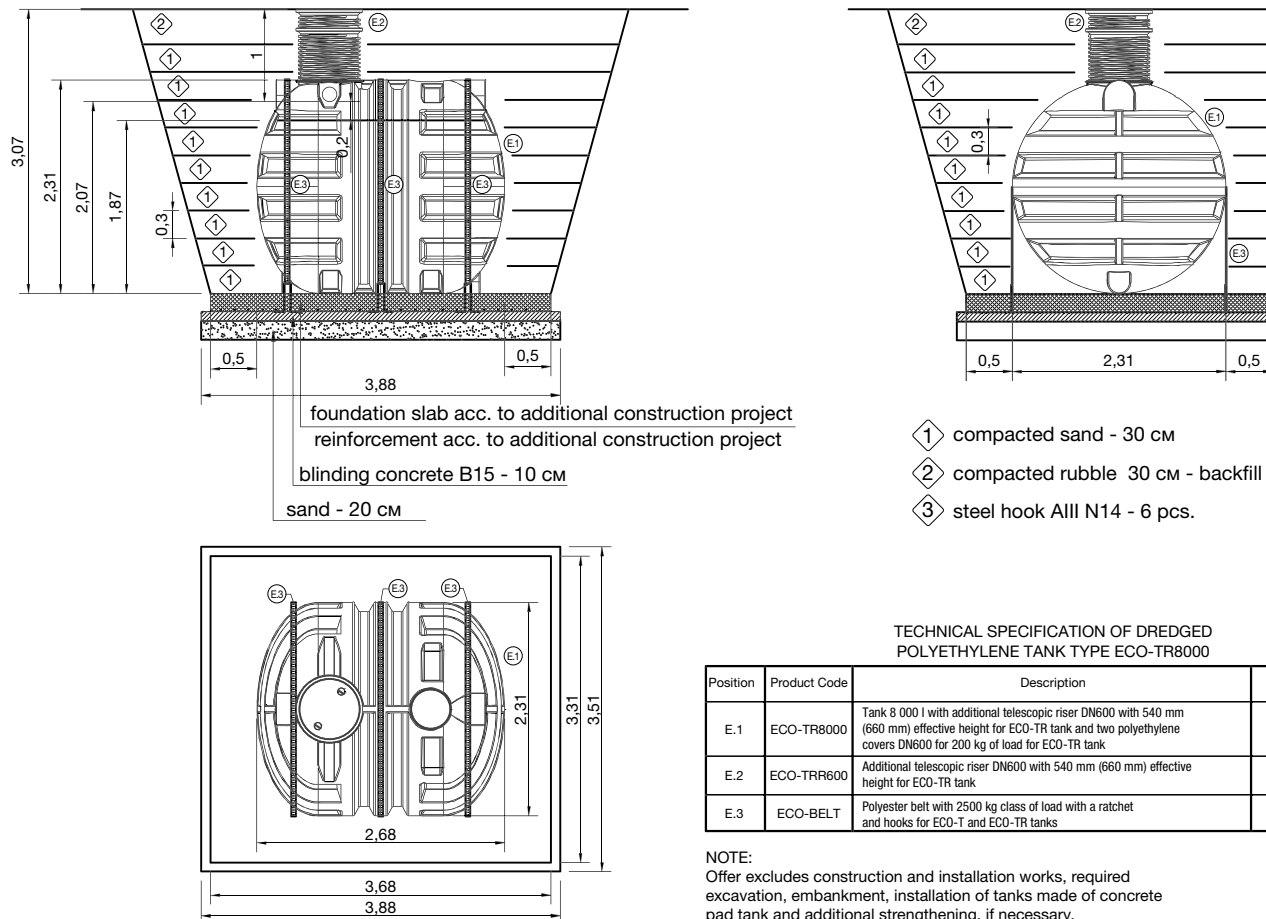
#### EMPTYING

WHEN FILLING THE DIFFERENCE IN WATER LEVEL ON BOTH SIDES OF THE PARTITION SHOULD NOT BE MORE THAN 0.2 METERS



WHEN FILLING THE DIFFERENCE IN WATER LEVEL ON BOTH SIDES OF THE PARTITION SHOULD NOT BE MORE THAN 0.2 METERS

### 5.3.9 Laying plastic tanks ECOBOX



#### Assembly instruction for polyethylene tank type ECO-TR

Trench has to be made, according to the sizes and elevations specified in the drawing. 50 cm are needed between the trench walls and the tanks for easier installation and connection of the pipe system. When the trench is excavated the trench bottom is compacted, 10 cm sand bedding is laid and above it 10 cm bedding of b15 concrete is cast. On the concrete bedding a reinforced concrete slab is cast with a lower reinforcement grid by individual structural design project.

Before casting the concrete hooks should be embedded. Polyester belts which hold the tanks will be hooked up on these hooks. Places of the hooks are shown in assembly plan depending on the situation and the type of the treatment facility. The hooks are made by st.Aiii n14. Laying of the tank happens after the bedding is ready and reach the necessary strenght. The tank must be checked for factory damages or cracks as result of storage and transportation. After this check, the tank can be placed in the pit.

Dropping of the tank into the pit is being made by crane, lifting facility or via cables. Dropping should be done carefully and slowly, without impacting the tanks. If dropping the tank by crane - consider the center of the load to avoid any possible slipping or flattening of the tank. Minimum coverage above the tank is 50 cm, and the maximum is 150 cm. The tanks are equipped with telescopic riser dn600 for inspection and repair. In case of deeper depth installation it is good to make reinforced concrete structure with a plate which to bare traffic and soil loads.

After laying the tank in the trench, on the finished bedding the tank should be backfilled in its bottom part carefully with compacted sand and rubble with grain sizes from 4 mm to 16 mm. Special care should be given of compacting the sand and the rubble in the area below the middle part of the tank and around the sides, but mostly in the area under the tank. You should check the area near the tank to assure that there are not sharp objects near the tank that could damage it.

During the installation, the tank must be filled partially with water i.E. The water level during the installation should always matches the height of the compacted backfill. This is required for the stabilization and correct positioning of the tank. The tank must be fixed to the ground with polyester unstretched belts with nominal capacity of 2500 kg, attached to pre-set hooks in the reinforced concrete slab or in the concrete bedding.

## 6 FATBOX

### 6.1 What is the treatment technology?

- The fats surface because their density is lower than the water one.
- They separate with the speed of 4 mm/s.
- Time for stay in the facility from 3 to 5 min.

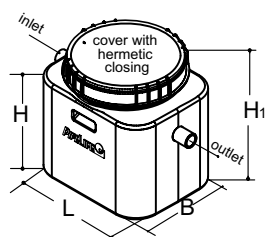
The waters polluted with fats, without the big particles, enter the first phase of the grease separator, where settlement of the insoluble substances take place and gravity separation of fats, after which water is drained into the sewage system. The separated fats surface where they are kept until the moment of their removal from the grease separator.

### 6.2 Why is FATBOX necessary?

- waste waters, for example:
  - restaurants, kitchens
  - shops with processing of dairy, meat or fish products
  - meat-processing workshops, food industry plants and others
- The grease separators protect the sewage pipes from:
  - choking, blocking with fats
  - formation of corrosive fat acids
  - unpleasant smells.
- During the dissolving of the fats which have fallen in the biological wastewater treatment plant the water acidity would increase and the treatment effect would be decreased or entirely eliminated.

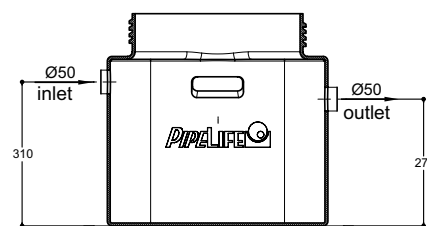
### 6.3 FATBOX Product range and technical data for design

#### FATBOX-GNS0,5-NEO



H<sub>1</sub> = 457 mm  
 H = 365 mm  
 L = 475 mm  
 B = 380 mm

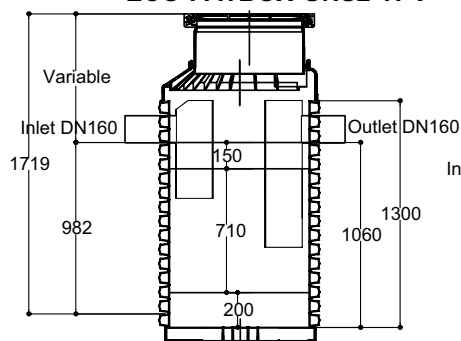
LDPE Material  
 Calculated weight 8 kg  
 Wall thickness min. 6,0 mm  
 Without sharp edges



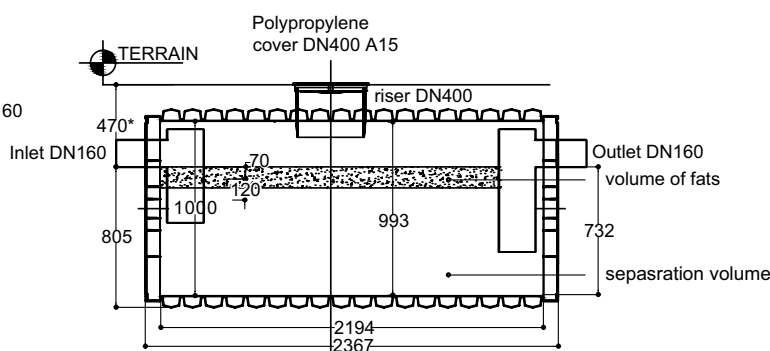
PRODUCT CODE	CAPACITY [l/s]	NOMINAL VOLUME [l.]	WORK VOLUME [l.]	MAX. VOLUME OF FATS [l.]	WORKING SURFACE [sq.m.]	SEPARATION VOLUME [l.]	INLET/OUTLET [Ø]	WEIGHT [kg.]
FATBOX-GNS0,5-NEO	0,5	65	39	11	0,16	28	50	8

Figure 6: FATBOX-GNS0,5-NEO

#### ECO-FATBOX-GNS2-TPV



#### ECO-FATBOX-GNS4-TPH

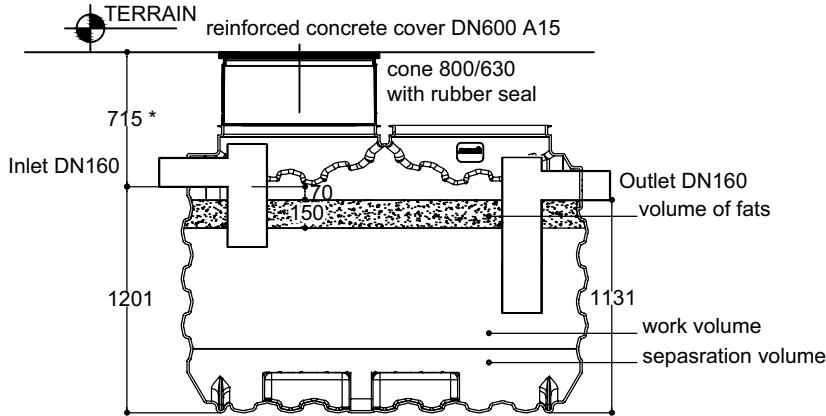


\*the standard height may vary in accordance with the design height  
 all sizes in millimeters

PRODUCT CODE	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF FATS [L]	WORKING SURFACE [m²]	SEPARATION VOLUME [L]	INLET/OUTLET [Ø]	WEIGHT [kg]
ECO-FATBOX-GNS2-TPV	2	560	360	100	0.50	100	160	95
ECO-FATBOX-GNS4-TPH	4	1600	1430	160	1,83	400	160	120

Figure 7: ECO-FATBOX-GNS2-TPV and ECO-FATBOX-GNS4-TPH

**ECO-FATBOX-GNS7-T**

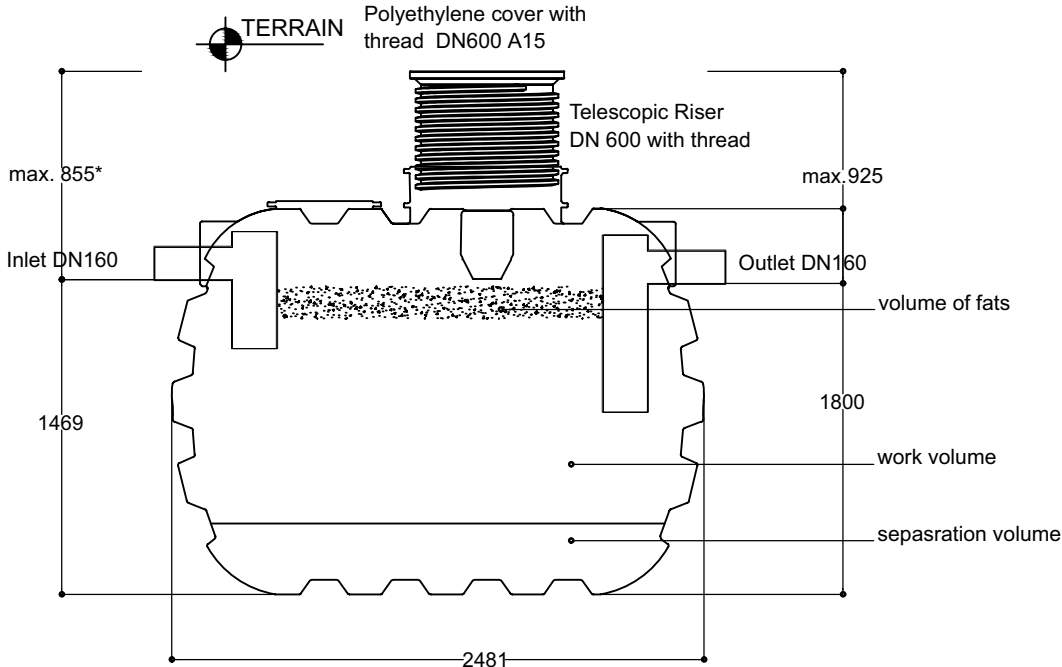


\*the standard height may vary in accordance with the design height  
 all sizes in millimeters

PRODUCT CODE	CAPACITY [L/sec]	NOMINAL VOLUME [L]	H water [m]	WORK VOLUME [L]	MAX. VOLUME OF FATS [L]	WORKING SURFACE [m <sup>2</sup> ]	SEPARATION VOLUME [L]	INLET/OUTLET [Ø]
ECO-FATBOX-GNS7-T	7	3000	1.10	2660	280	1.83	700	160

Figure 8: ECO-FATBOX-GNS7-T

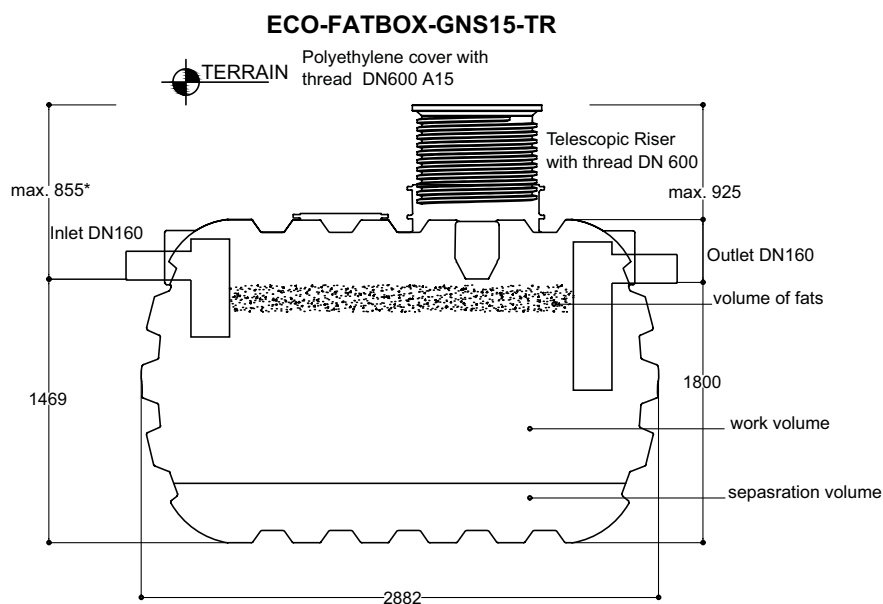
**ECO-FATBOX-GNS10-TR**



\*the standard height may vary in accordance with the design height  
 all sizes in millimeters

PRODUCT CODE	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF FATS [L]	WORKING SURFACE [m <sup>2</sup> ]	SEPARATION VOLUME [L]	INLET/OUTLET [Ø]
ECO-FATBOX-GNS10-TR	10	5000	2400	280	1.83	700	160

Figure 9: ECO-FATBOX-GNS10-TR



\*the standard height may vary in accordance with the design height  
all sizes in millimeters

PRODUCT CODE	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF FATS [L]	WORKING SURFACE [m²]	SEPARATION VOLUME [L]	INLET/OUTLET [Ø]
ECO-FATBOX-GNS15-TR	15	6000	3600	600	3.75	1500	160

Figure 10: ECO-FATBOX-GNS15-TR

## 6.4. Type of the used tanks

The tanks, used for grease separators of the FATBOX system are the following type:

ECO-PRO: PRO Pipelife shafts are used for vertical assembly. They allow free-standing assembly as well as underground assembly. Reinforced construction of the coating – load-carrying capacity up to 40 tons. In case of assembly above the surface (basements, storehouses) they can be fitted with devices for measuring the quantity of fats and with a discharge device for periodical measurement of the fats.

ECO-T и ECO-TR: used for horizontal assembly, in case of high underground waters. They allow free standing assembly as well as underground assembly. Reinforced construction of the coating – load carrying capacity up to 40 tons.

ECO-T and ECO-TR: used for horizontal and underground assembly. The tanks are designed for A15 class of load but depending on the conditions they can reinforced with an armoured concrete frame and thus assembled in traffic zones. The covers which are mounted in these cases meet the designed load (see Figure 24).

All tanks are equipped with manholes with a diameter DN600. According to the design conditions and the client’s wishes they can be made with a diameter DN800 (with the exception of ECO-TP). If necessary additional manholes are possible with a diameter DN600 or DN800 (with the exception of ECO-TP and ECO-PRO).

## 6.5 Initial data for design

Initial data	index	data	comment
Waste waters capacity l/s	Q		
Assembly type – free standing/buried			
Waste water max. temperature, °C	ft		
Fats density gr/cm <sup>2</sup>	fd		
Used preparation for cleaning and what are they	fr		
Elevation of the leading canal in relation to the terrain, m	H1		
Leading canal diameter, m	D1		
Traffic load A15, B125, C250 or D400 (EN 124)			
Underground waters height, m	Z		

Table 13: Initial data

To the grease separators are brought only waters polluted with oils and fats of plant or animal origin. It is unacceptable to be brought fecal or atmospheric waters. This determines the design of separation sewage network for technological and production waste waters separated by the fecal and the rain network.

In front of the grease separator must not be installed a device for grinding the kitchen waste. Its usage is not allowed in order not to receive grease separator overloading with organic substances.

The grease separators installing is most appropriate when they are as close as possible to the waste water source and when there is and easy access for cleaning. The treated water can be discharged in the sewage system or in the next step of treatment, for example biological wastewater treatment plant.

## 6.6 Exploitation costs

FATBOX exploitation costs are brought to minimum:

- Without additional supplies.
- Service is brought to minimum – a few regular “checks” of the facility condition are necessary:
  - taking of samples of water after the FATBOX for the period of 3 to 6 months after the facility is started
  - tanks cleaning
  - facility prevention

## 7 OILBOX

### 7.1 What is the treatment technology?

- The oils surface because their density is lower than water.
- They separate with the speed of 4 mm/s.
- Calculated time for water stay is accepted 3 min.
  - Two types of petroleum products separation:
    - **Gravity type** – under the force of gravity the admixtures lighter than the water (oils, fats and petroleum products) under the lifting force separate on the surface.
    - **Coalescent type** – small drops of the petroleum products aggregate which facilitates their separation. Besides that, petroleum products precipitation is achieved on the filter material (adsorption).
  - Petroleum products retaining depends on the speed of their surfacing which in turn is defined by the drops size, their density, viscosity and the temperature of the environment where they have fallen – waste water. According to the requirements of EN 858 these separators must provide 97% treatment of the waste water from those products.

The lower the speed of passing, the less oil quantity will remain in the water.

### 7.2 Why is OILBOX necessary?

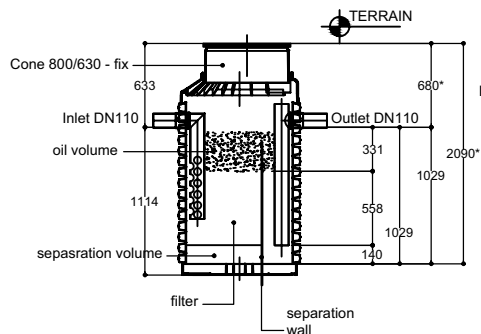
- The separation of the petroleum products (petrol, naphtha, oils, kerosene and others), contained in the waste waters is made in separators for separation of liquids with density lower than the water or dissolved in it, called grease separators. They find application in:
  - garages, car-repair shops, car-washes
  - gas stations
  - production warehouses
  - roads and parking lots
- The oil separators prevent:
  - waste water pollution
  - blockage of soil pores and improper air exchange
  - harming the self-cleaning processes in the water receiver
- They allow secondary usage of waters-recirculation (car-washes)



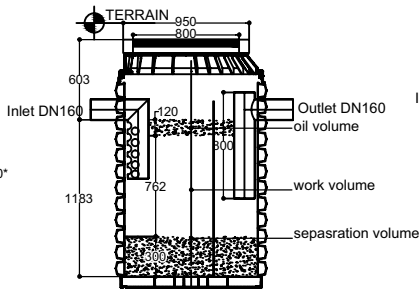
### 7.3 OILBOX product range and technical data for design

#### 7.3.1.OILBOX with a coalescent filter without a by-pass

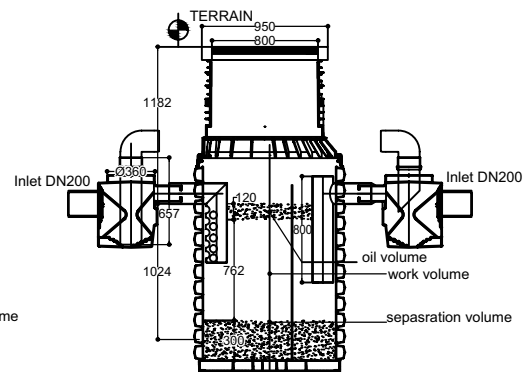
**ECO-OILBOX-CNS1,5-TPV**



**ECO-OILBOX-CNS3-TPV**



**ECO-OILBOX-CNS3/30-TPV**

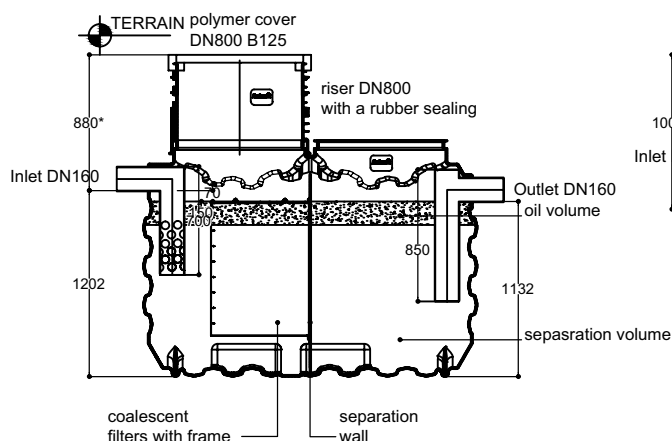


\*the standard height may vary in accordance with the design height  
all sizes in millimeters

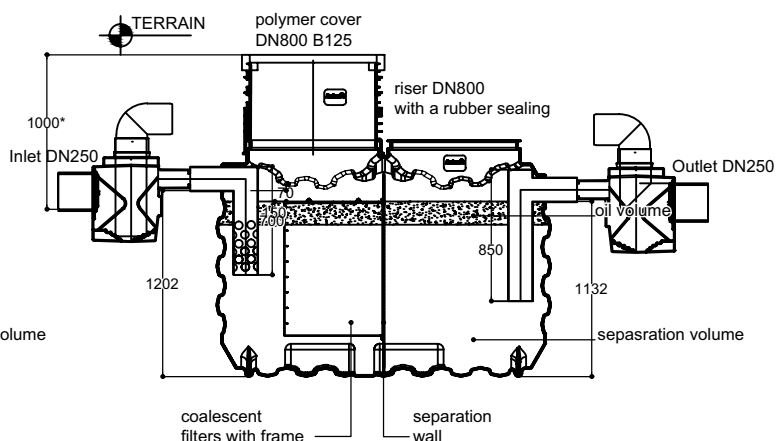
PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [L]	INLET/OUTLET [Ø]
ECO-OILBOX-CNS1.5-TPV	I	1.5	470	270	50	150	110
ECO-OILBOX-CNS3-TPV	I	3.0	840	540	100	200	160
ECO-OILBOX-CNS3/30-TPV	I	3.0	840	540	100	200	160

Figure 11: ECO-OILBOX-CNS1.5-TPV and ECO-OILBOX-GNS3-TPV and ECO-OILBOX-CNS3/30-TPV

**ECO-OILBOX-CNS6-T**



**ECO-OILBOX-CNS6/60-T**



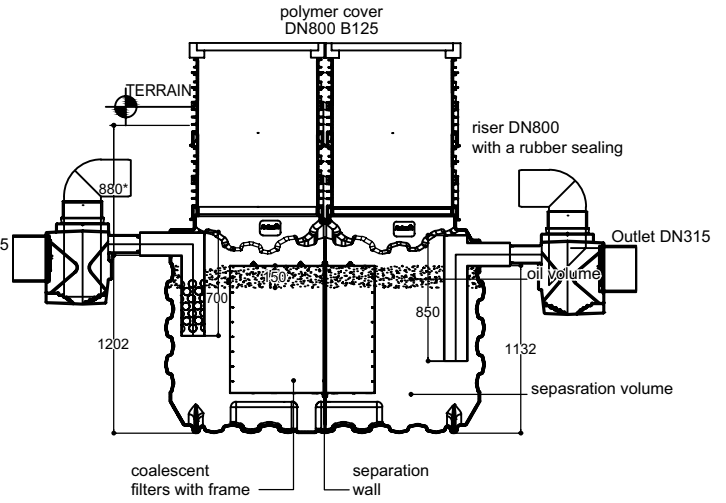
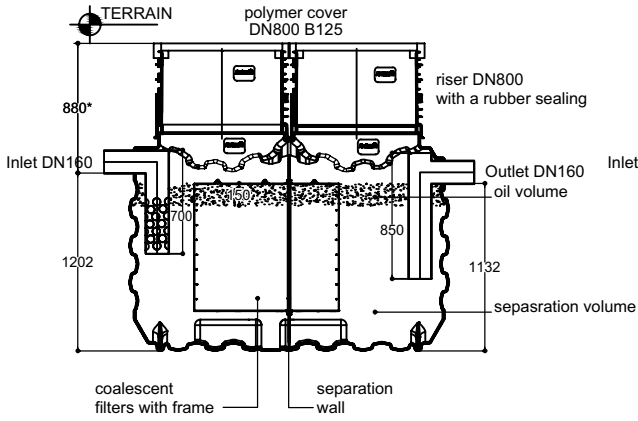
\*the standard height may vary in accordance with the design height  
all sizes in millimeters

PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [L]	FILTERS [pcs.]	INLET/OUTLET [Ø]
ECO-OILBOX-CNS6-T	I	6	3000	1800	300	400	4	160
ECO-OILBOX-CNS6/60-T	I	6	3000	1800	300	400	4	160

Figure 12: ECO-OILBOX-CNS6-T and ECO-OILBOX-CNS6/60-T

**ECO-OILBOX-CNS10/100-T**

**ECO-OILBOX-CNS10-T**

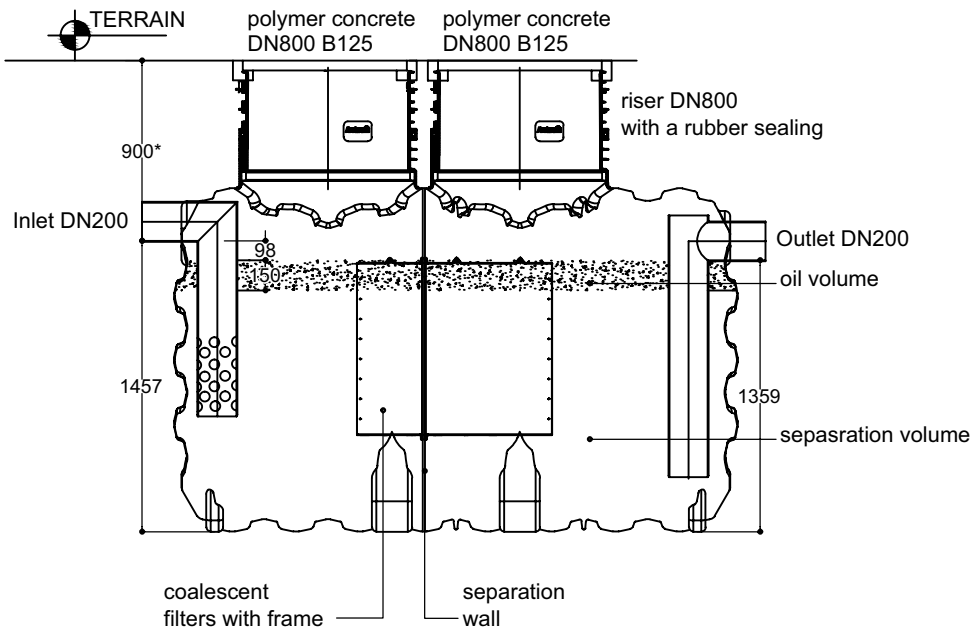


\*the standard height may vary in accordance with the design height  
all sizes in millimeters

PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [L]	FILTERS [pcs.]	INLET/OUTLET [Ø]
ECO-OILBOX-CNS10-T	I	10	3000	1800	300	400	6	160
ECO-OILBOX-CNS10/100-T	I	10	3000	1800	300	400	6	160

Figure 13: ECO-OILBOX-CNS10-T and ECO-OILBOX-CNS10/100-T

**ECO-OILBOX-CNS15-T**



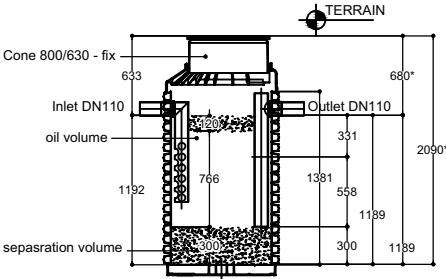
\*the standard height may vary in accordance with the design height  
all sizes in millimeters

PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [L]	FILTERS [pcs.]	INLET/OUTLET [Ø]
ECO-OILBOX-CNS15-T	I	15	5000	2700	400	600	9	200

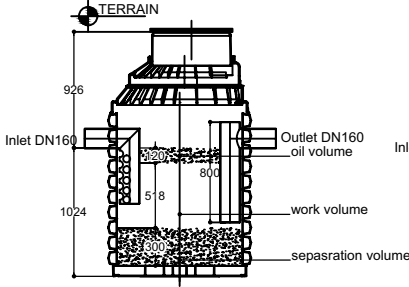
Figure 14: ECO-OILBOX-CNS15-T

7.3.2.OILBOX without a coalescent filter with and without by-pass

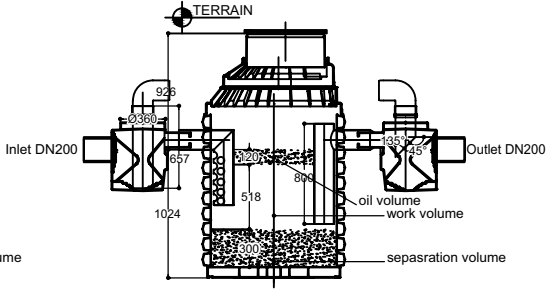
ECO-OILBOX-NS1.5-TPV



ECO-OILBOX-NS3-TPV



ECO-OILBOX-NS3/30-TPV

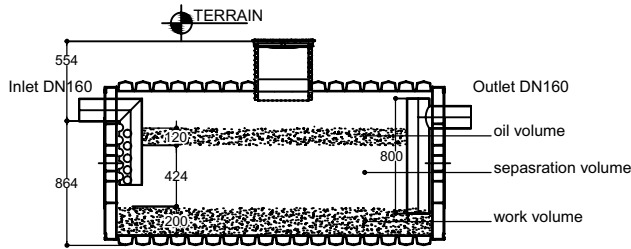


\*the standard height may vary in accordance with the design height  
all sizes in millimeters

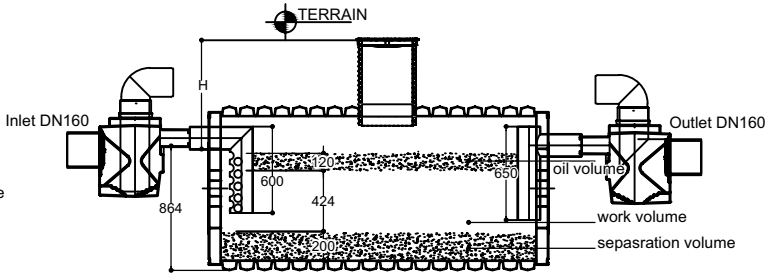
PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [L]	INLET/OUTLET [Ø]
ECO-OILBOX-NS1.5-TPV	II	1.5	370	270	50	50	110
ECO-OILBOX-NS3-TPV	II	3.0	840	540	100	200	160
ECO-OILBOX-NS3/30-TPV	II	3/30	840	540	100	200	200

Figure 15: ECO-OILBOX-NS1.5-TPV and ECO-OILBOX-NS3-TPV and ECO-OILBOX-NS3/30-TPV

ECO-OILBOX-NS6-TPH



ECO-OILBOX-NS6/60-TPH



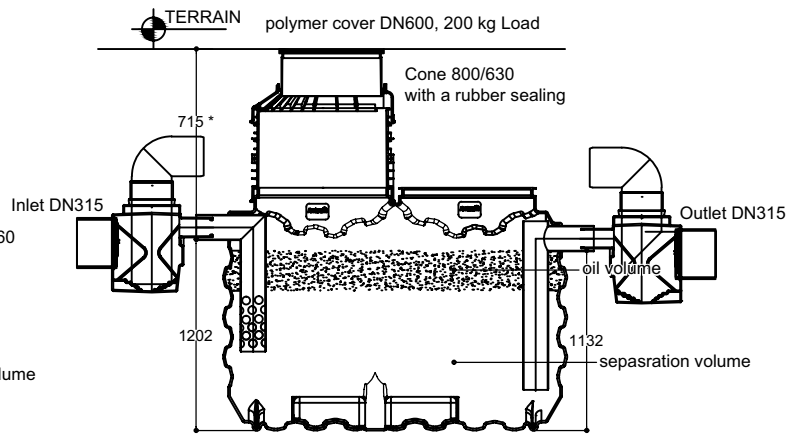
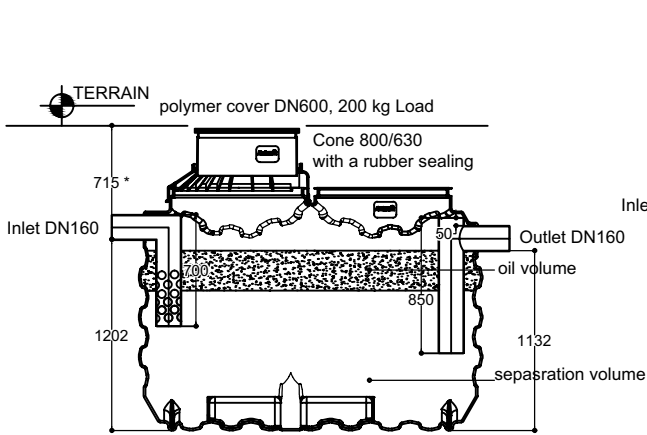
\*the standard height may vary in accordance with the design height  
all sizes in millimeters

PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [L]	INLET/OUTLET [Ø]
ECO-OILBOX-NS6-TPH	II	6.0	1580	1080	200	300	160
ECO-OILBOX-NS6/60-TPH	II	6/60	1580	1080	200	300	250

Figure 16: ECO-OILBOX-NS6-T and ECO-OILBOX-NS6/60-T

**ECO-OILBOX-NS10-T**

**ECO-OILBOX-NS10/100-T**



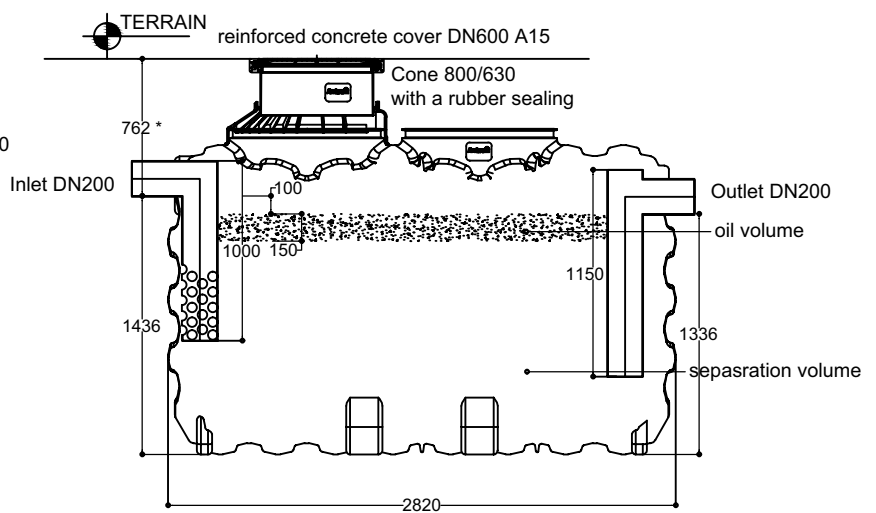
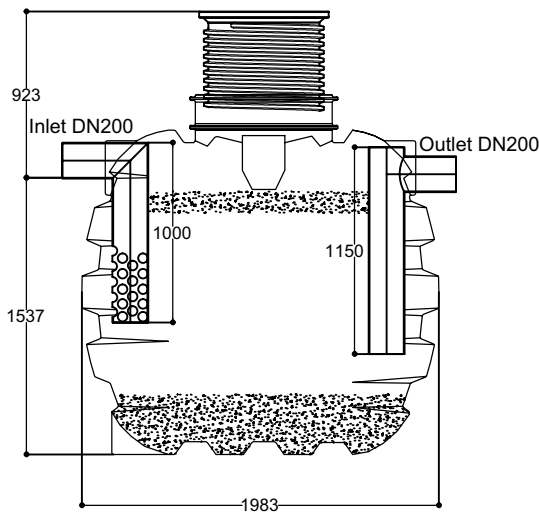
\*the standard height may vary in accordance with the design height  
all sizes in millimeters

PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [L]	INLET/ OUTLET [Ø]
ECO-OILBOX-NS10-T	II	10	3000	1800	300	400	160
ECO-OILBOX-NS10/100-T	II	10/100	3000	1800	300	400	315

Figure 17: ECO-OILBOX-NS10-T and ECO-OILBOX-NS10/100-T

**ECO-OILBOX-NS15-TR**

**ECO-OILBOX-NS20-T**



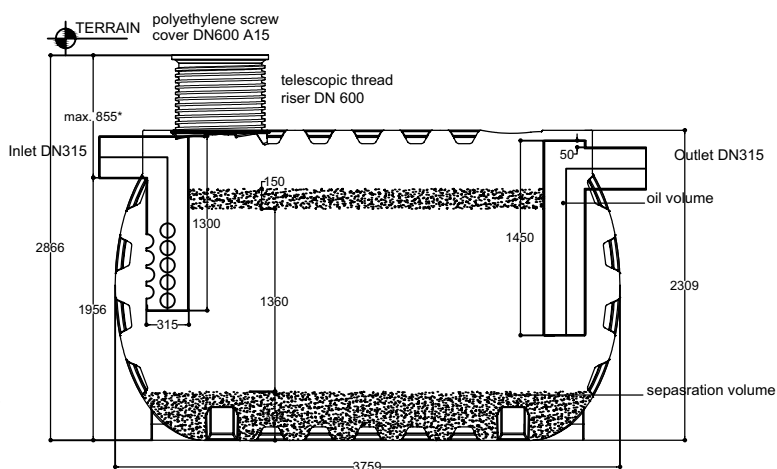
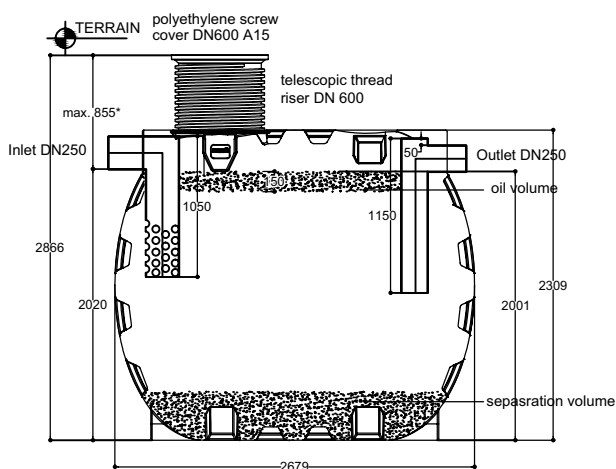
\*the standard height may vary in accordance with the design height  
all sizes in millimeters

PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [L]	INLET/ OUTLET [Ø]
ECO-OILBOX-NS15-TR	II	15	3700	2700	400	600	200
ECO-OILBOX-NS20-T	II	20	5000	3600	400	1000	200

Figure 18: ECO-OILBOX-NS15-TR and ECO-OILBOX-NS20-T

**ECO-OILBOX-NS30-TR**

**ECO-OILBOX-NS50-TR**

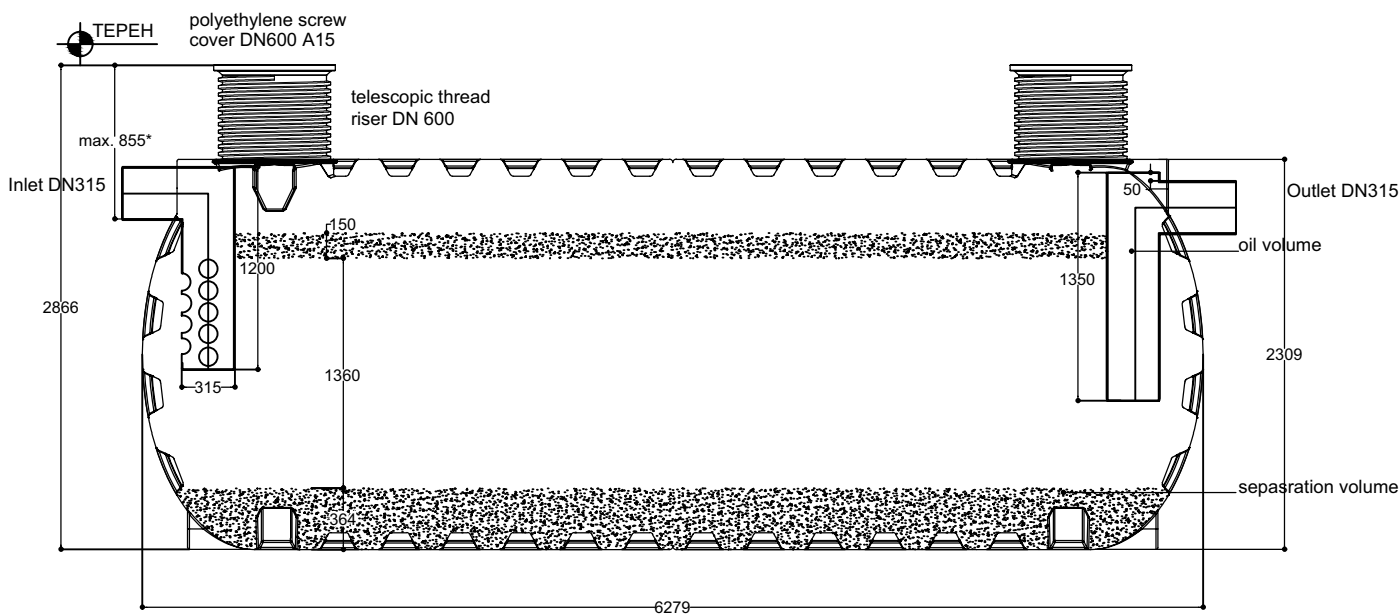


\*the standard height may vary in accordance with the design height  
all sizes in millimeters

PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [L]	INLET/OUTLET [Ø]
ECO-OILBOX-NS30-TR	II	30	8000	5400	500	2000	250
ECO-OILBOX-NS50-TR	II	50	12000	9000	750	2000	315

Figure 19: ECO-OILBOX-NS30-TR and ECO-OILBOX-NS50-TR

**ECO-OILBOX-NS80-TR**

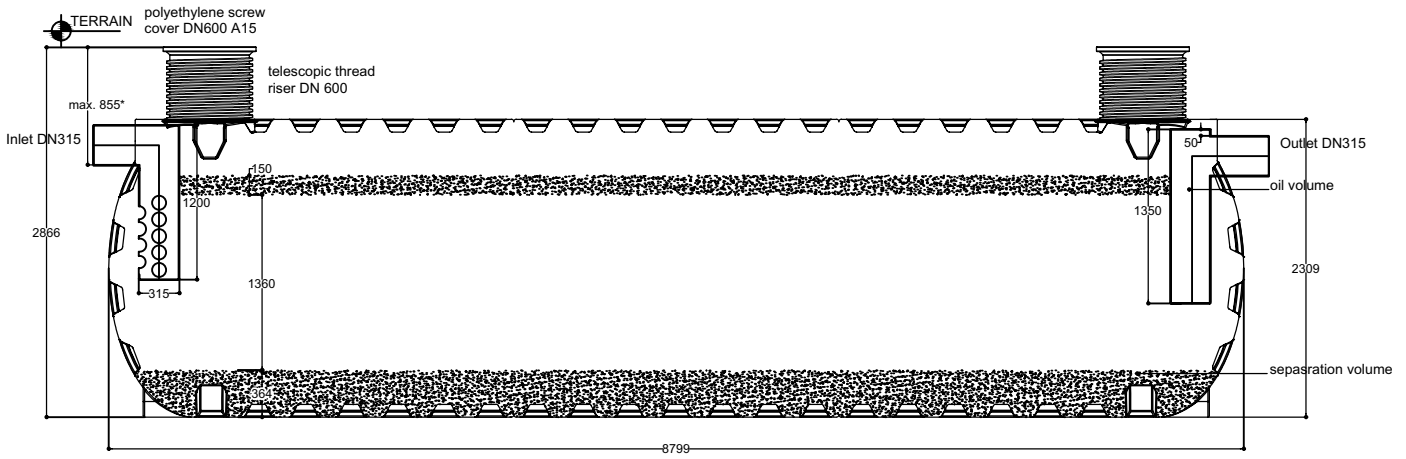


\*the standard height may vary in accordance with the design height  
all sizes in millimeters

PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [L]	INLET/OUTLET [Ø]
ECO-OILBOX-NS80-TR	II	80	20000	14400	2000	3500	315

Figure 20: ECO-OILBOX-NS80-TR

### ECO-OILBOX-NS100-TR

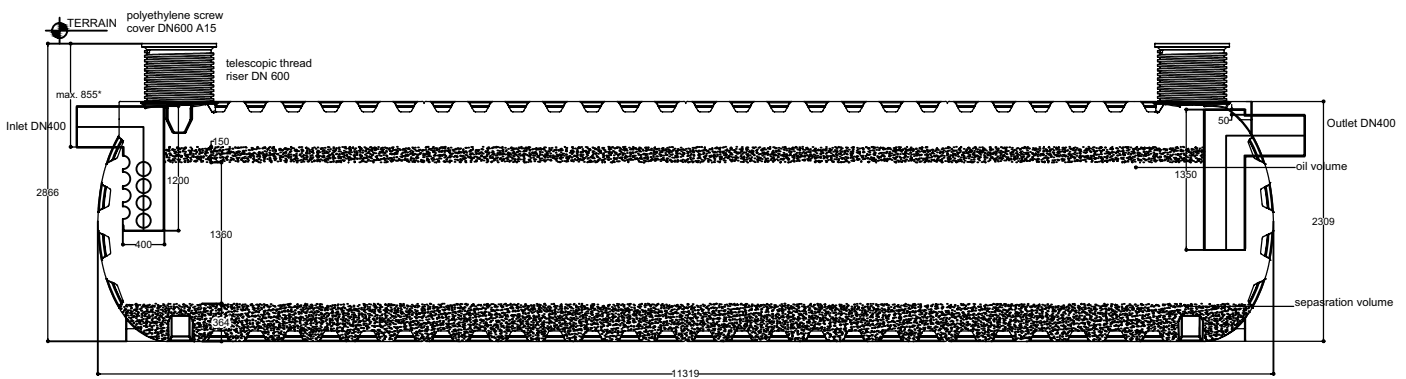


\*the standard height may vary in accordance with the design height  
all sizes in millimeters

PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [m³]	INLET/ OUTLET [Ø]
ECO-OILBOX-NS100-TR	II	100	30000	18000	3000	7000	315

Figure 21: ECO-OILBOX-NS100-TR

### ECO-OILBOX-NS150-TR

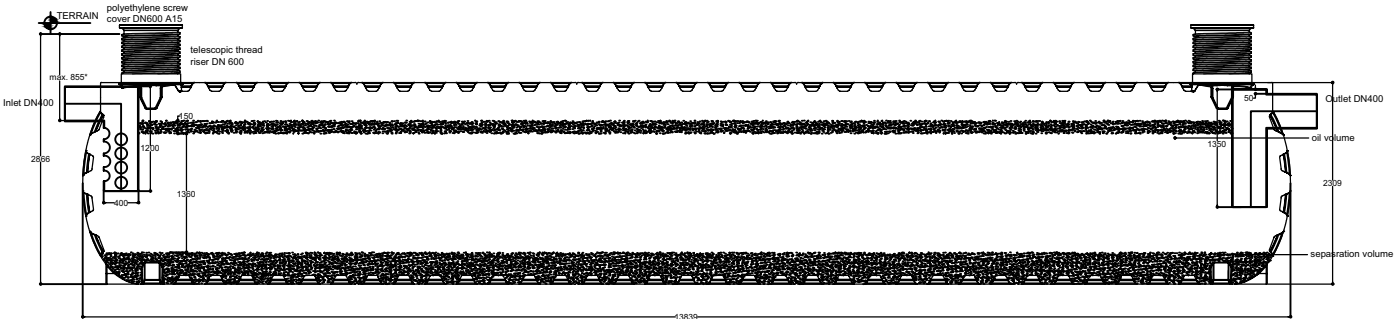


\*the standard height may vary in accordance with the design height  
all sizes in millimeters

PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [m³]	INLET/ OUTLET [Ø]
ECO-OILBOX-NS150-TR	II	150	40000	27000	3500	8000	400

Figure 22: OILBOX-NS150-TR

**ECO-OILBOX-NS200-TR**

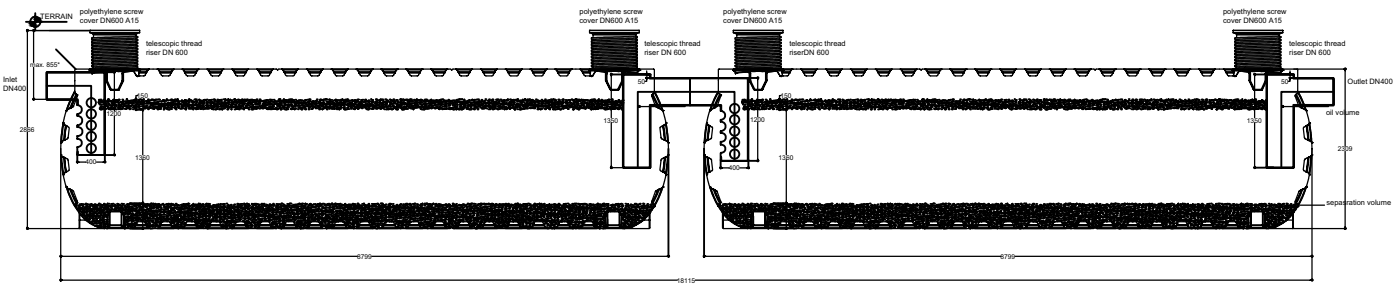


\*the standard height may vary in accordance with the design height  
all sizes in millimeters

PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [m <sup>3</sup> ]	INLET/ OUTLET [Ø]
ECO-OILBOX-NS200-TR	II	200	50000	36000	4000	9000	400

Figure 23: OILBOX-NS200-TR

**ECO-OILBOX-NS250-TR**



\*the standard height may vary in accordance with the design height  
all sizes in millimeters

PRODUCT CODE	CLASS	CAPACITY [L/sec]	NOMINAL VOLUME [L]	WORK VOLUME [L]	MAX. VOLUME OF OIL [L]	SEPARATION VOLUME [m <sup>3</sup> ]	INLET/ OUTLET [Ø]
ECO-OILBOX-NS250-TR	II	250	60000	45000	4000	10000	400

Figure 24: OILBOX-NS250-TR

## 7.4 Type of the used tanks

The tanks, used for grease separators of the OILBOX system are the following type:

- ECO-PRO: PRO Pipelife manholes are used for vertical assembly. They allow free standing assembly as well as underground assembly. Reinforced construction of the coating – load carrying capacity up to 40 tons. In case of assembly above the surface (basements, storehouses) they can be fitted with devices for measuring the quantity of fats and with a discharge device for periodical measurement of the fats.
- ECO-T: used for horizontal underground assembly. The tanks are designed for load class A15 but according to the conditions they can be reinforced with a armor concrete frames or a plate and to be assembled in traffic zones. The covers which are mounted in these cases meet the design load.  
All tanks must ne equipped with manholes with a diameter DN600. Depending on the design conditions and the client's wishes they can be made with a diameter DN800. If necessary, are possible additional manholes with a diameter DN600 or DN800 (with the exception of ECO-PRO)

## 7.5 Initial data for design

Initial data	index	data	comment
Waste waters capacity l/s	Q		
Rain waters capacity l/s	Qr		
Pollution origin			
Assembly type – free-standing/buried			
Treatment degree as class I or class II			
Oil density gr/cm <sup>2</sup>	fd		
Availability of substances which can hamper The separation (for example detergent preparations)	fx		
Elevation of the leading canal in relation to the terrain, m	H1		
Diameter of the leading canal, m	D1		
Traffic load A15, B125, C250 or D400 (EN 124)			
Underground waters height, m	Z		

Table 14: Initial data

The grease separators are designed right next to the origin of the waste waters if possible out of buildings and streets. They must be with an easy access for maintenance and cleaning.

All products from the OILBOX product range are equipped with a grit separator volume.

**For drainage of rain waters from parking lots, street surfaces and others open surfaces Pipelife offers OILBOX with a by-pass.**

During rain the initial flow is with highest degree of pollution and gradually increasing capacity. It is accepted by the grease separator. According to the duration and the rain intensity, the capacity increases and this quantity go through the facility by-pass and increase its effectiveness.



## 7.6 Exploitation costs

The OILBOX exploitation costs are brought to minimum:

- Without additional supplies.
- Service is brought to minimum – a few types of periodical “checks” of the facility condition are necessary:
  - taking of samples from the water after OILBOX
  - cleaning of filter for class I
  - facility prevention

**All OILBOX class I (with filters) is equipped with manholes DN800 which allow the filters to be taken out for cleaning and change. This not only facilitates the facility maintenance but also extends its exploitation life and guarantees facility effectiveness.**

## 8 SANDBOX

### 8.1 What is the treatment technology?

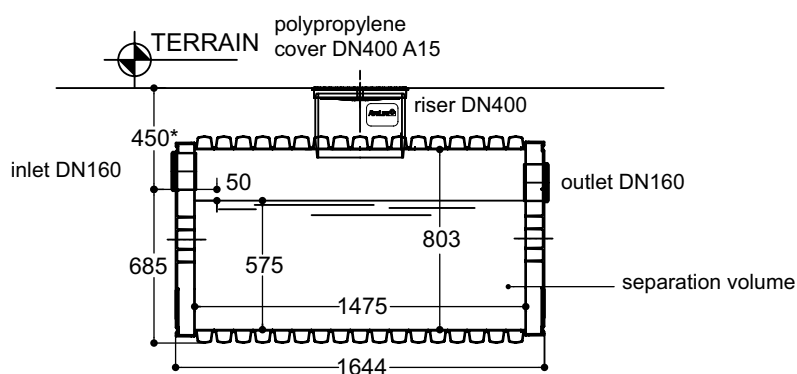
- Retains sand and mineral substances.
- Precipitation principle – particles heavier than the water settle down on the bottom.
- They separate with the speed of minimum 0,15-0,20 m/s.
- Sizing time for stay in the water is accepted 3 min.
- The necessary fluid surface for precipitation 0.25 m<sup>2</sup> per liter/second.
- Separation effectiveness is more than 92%.

### 8.2 Why is SANDBOX necessary?

- For normal work of the sewage system.
- For normal work of the wastewater treatment plants.
- It is designed before grease and oil separators.

### 8.3 SANDBOX product range and technical data for design

#### SANDBOX-GT3-TP



\*the standard height may vary in accordance with the design height

All sizes in millimeters

PRODUCT CODE	CAPACITY [l/s]	NOMINAL VOLUME [l.]	WORK VOLUME [l.]	MAX SLUDGE VOLUME [l.]	WORKING SURFACE [sq.m.]	SEPARATION VOLUME [L]	INLET/ OUTLET [Ø]	WEIGHT [kg.]
SANDBOX-GT3-TP	up to 3.0 l/s	740	575	105	1,08	470	up to 160	72

Figure 25: SANDBOX-GT3-TP

## 8.4 Type of the used tanks

The tanks, used for grit separators of the SANDBOX system are the following type:

ECO-TP - used for horizontal assembly, in case of high underground waters. They allow free-standing assembly as well as underground assembly. Reinforced construction of the coating load carrying capacity up to 40 tons.

## 8.5 Initial data for design

Initial data	index	data	comment
Waste waters capacity – l/s	Q		
Assembly type – free standing / buried			
Necessity of grating before SANDBOX			
Elevation of the leading canal in relation to the terrain, m	H1		
Leading canal diameter, m	D1		
Traffic load A15, B125, C250 or D400 (EN 124)			
Underground waters height, m	Z		

Table 15: Initial data

They are calculated on the basis of precipitation surface, stay and treatment effect of the separated heavy admixtures and insoluble settled substances with a density bigger than the water one.

## 8.6 Exploitation costs

SANDBOX exploitation costs are brought to minimum:

- Without additional supplies.
- Periodical facility prevention is necessary when taking out the accumulated pollutants.

# 9 ECOSYSTEM ASSEMBLY

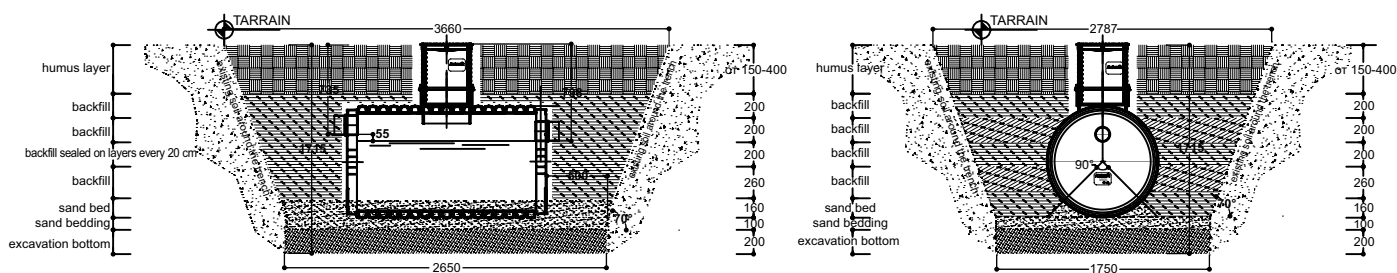
## 9.1 Introduction and general requirements

Facilities assembly must be in accordance with the design and the terrain conditions. Their proper assembly guarantees long and flawless exploitation life. When submitting the necessary design data see Tables 12, 13, 14, 15. Pipelife prepares free assembly plans.

## 9.2 Advantages of ECO laying

- Quick and easy assembly.
- Different variants of laying.
- Final product ready for laying.
- Variant for consolidation against high underground waters.
- Modularity – an opportunity for increasing the facility capacity.
- An opportunity for extending the inspection holes to the necessary elevation.
- There is no need of specialized mechanization for laying the vessels.
- There is no need of shuttering works.

### 9.2.1 Laying of ECO-TP and ECO-TPV type of tanks



Note: The humus layer is provided in case of assembly in green areas. The backfill includes most types and classes of natural granulated materials with a maximal size of the particles not more than 10% of the pipe's nominal diameter or size of up to 60 mm. maximum. The material for the backfill should not contain foreign materials (admixtures) like: snow, ice or frozen masses of earth.

Note: The excavation width depends on the normal diameter DN, the depth of laying and its reinforcement. When it is not reinforced the excavation width depends on the wall angle of response.

Characteristics of the material for fill:

material	particles diameter [mm]	notes
gravel crushed stones	8-22, 4-16 8-12, 4-8	The most appropriate soil material, maximum 5 to 20% particles with the size of 2 mm
gravel	2-20	Appropriate soil material, maximum from 5 to 20% particles with the size of 0,2 mm
sand, moraine gravel	0.2-20	Relatively appropriate soil material, maximum up to 5% particles with the size of 0.02 mm

- humus layer ..... m<sup>3</sup>
- backfill ..... m<sup>3</sup>
- sand bed ..... m<sup>3</sup>
- sand cushion ..... m<sup>3</sup>
- bedding ..... m<sup>3</sup>

The sand bed must be made with an angle of laying min. 90 degrees. The sand cushion must be sealed well up to 95% according to Proctor. Excavation bottom – well sealed soil or concrete bedding. In the zones around the inlet and the outlet to be sealed manually. The sealing should be 95% according to Proctor.

Figure 26: An assembly plan for laying of tanks ECO -TP type (see PRAGMA® infrastructure polypropylene system)

What is necessary for proper assembly of the tanks:

- An assembly plan in accordance with the concrete design and terrain data and conditions.
- An trench and bedding in accordance with the assembly plan.
- The tanks must be checked for body cracks and defects in case they appear during transportation and storage. The inlet and outlet connections of the corresponding manhole must be checked.
- The tanks must be laid and leveled in accordance with the specific assembly – vertical or horizontal.
- The assembly plan concerning the angle of laying must be followed – in case of horizontal assembly e.g. for ECO-TP.
- During the filling and sealing of the different layers must be followed the instructions, described in the assembly plan.
- Before the complete tank's covering and sealing it must be connected with the corresponding sewage system. Manual sealing must be done around the connections and the inspection hole.
- In the zone around the cover a manual sealing must be done and additional support with bricks or with a concrete belt, on which the ring and the cover of the tank will lay.

## 9.2.2 Laying of ECO-TPV type tank

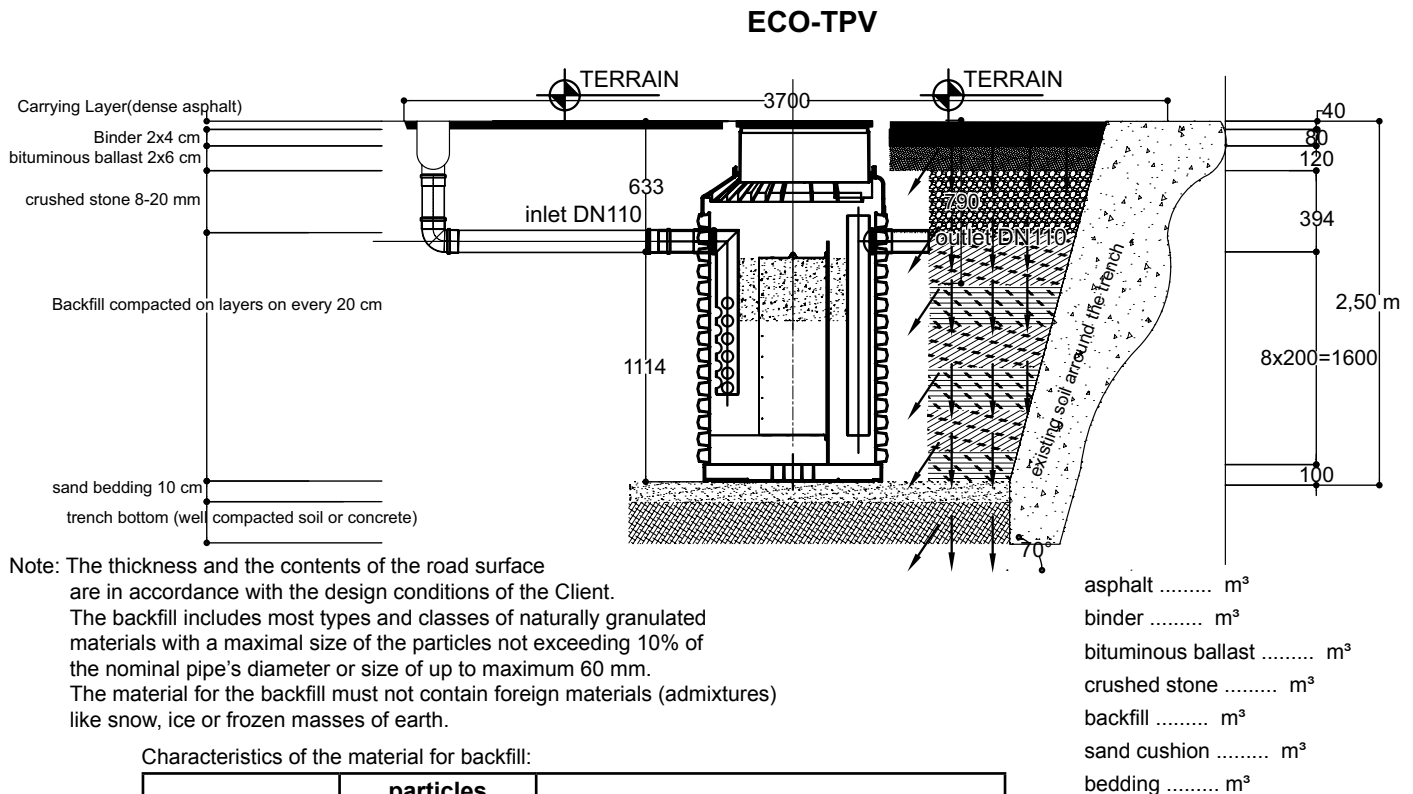


Figure 27: An assembly plan for laying of ECO-PRO type of tank (see PRO Manholes DN630, 800, 1000)

### What is necessary for the appropriate tanks assembly:

- An assembly plan, prepared according to specific design and terrain data and conditions.
- An trench and leveled bedding, in accordance with the assembly plan.
- The tanks to be checked for cracks and defects of the body in case they have appeared during transportation and storage. Inlet and outlet connections have to be made.
- To lay and level the tanks by a lifting device or by ropes. When dropping in the trench they have to be grabbed at the designated spots.
- The instructions described in the assembly plan must be followed when covering and sealing the different layers.
- Before final covering and sealing the tank must be connected with the corresponding sewage network. Manual sealing must be done around the connections.
- In the zone around the cover a manual sealing must be done and additional support with bricks or with a concrete belt, on which the ring and the cover of the tank will lay.

### 9.2.3 Laying of ECO-T and ECO TR type of tanks

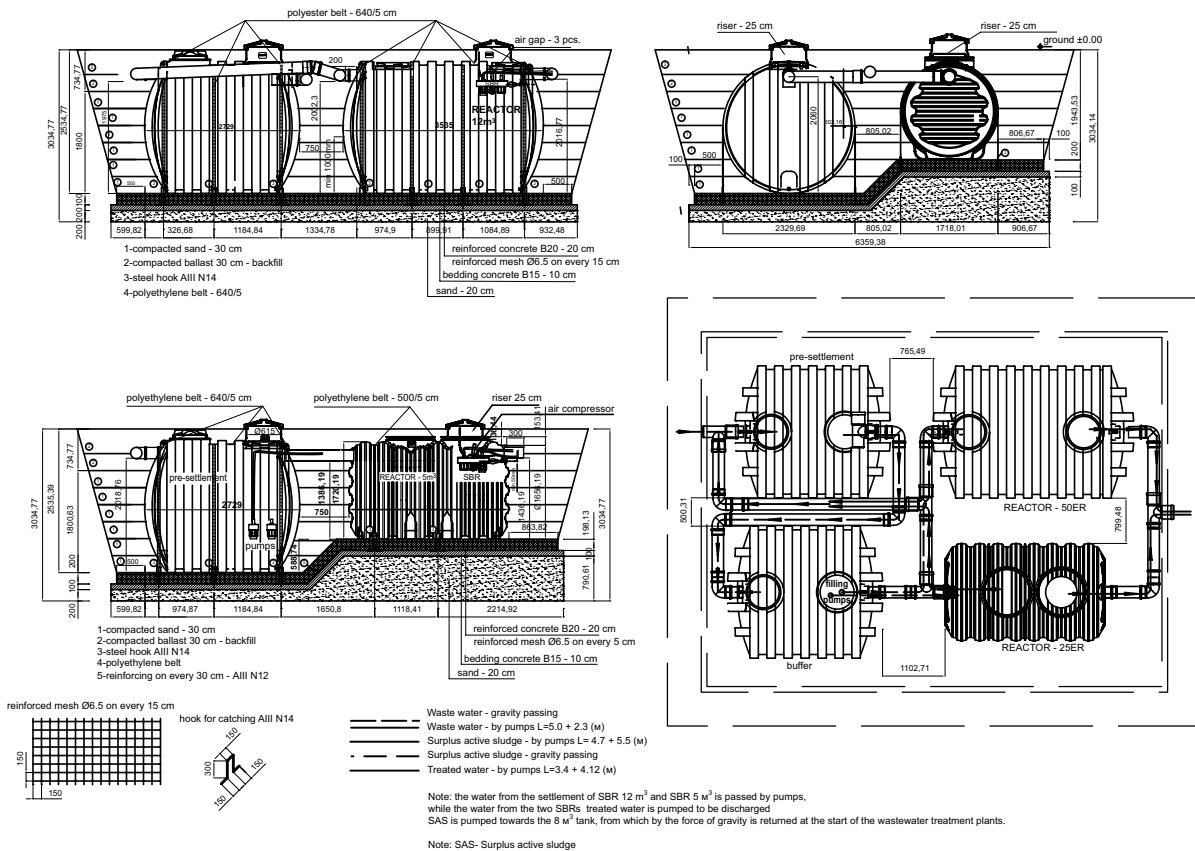


Figure 28: An assembly plan for laying of ECO-T and ECO-TR type of tanks in green areas

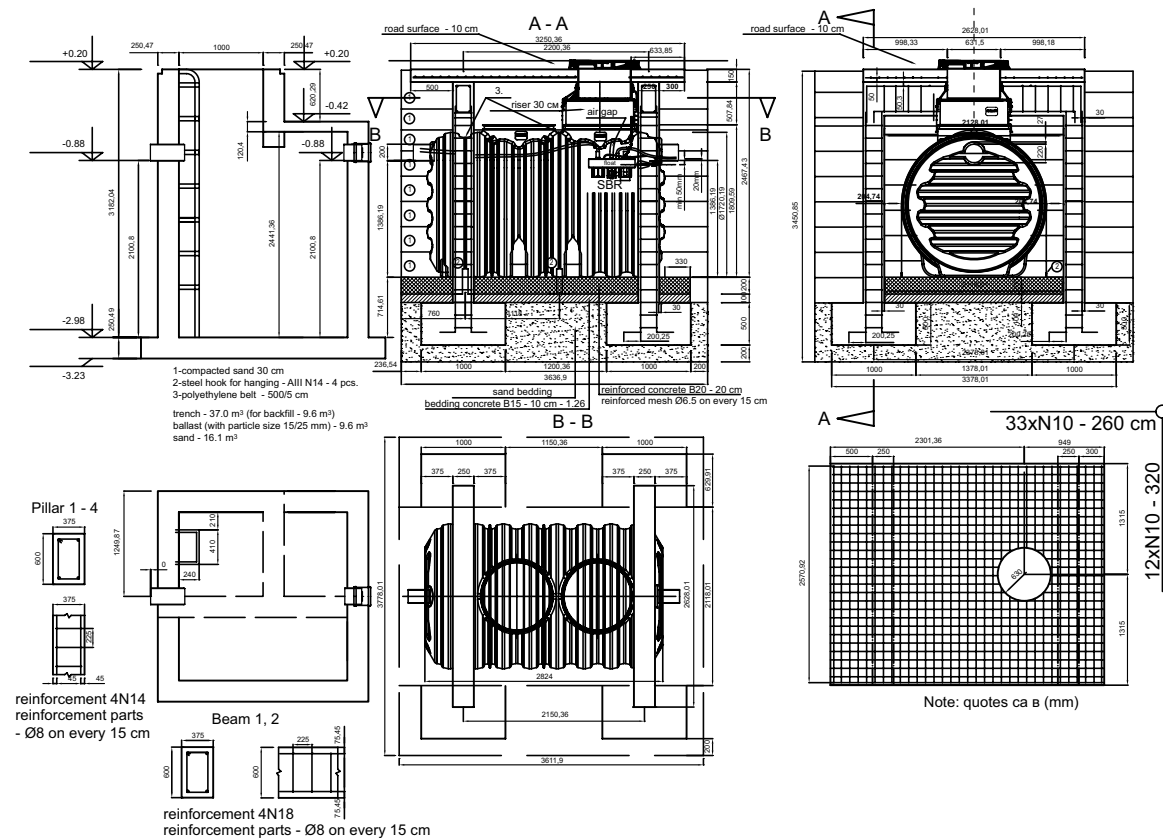


Figure 29: An assembly plan for laying of ECO-T and ECO-TR type of tanks in traffic zones

What is necessary for proper assembly of the tanks:

- An assembly plan in accordance with the concrete design and terrain data and conditions.
- An trench and leveled bedding which has acquire the corresponding strength qualities in accordance with the assembly plan.
- The tanks must be checked for body cracks and defects in case they appear during transportation and storage.
- The inlet and outlet connections of the corresponding manhole must be checked.
- To lay and level the tanks by a crane, lifting device or by ropes according to the used tanks type. When dropping in the trench they have to be grabbed at the designated spots.
- The tank must be fixed to the ground with the help of non-stretchable polyester belts with a nominal capacity of 2500 kg. Depending on the tank's size the number of the polyester belts is described in Table 16:

Tank Model	Polyester Belts <sup>3</sup>
ECO-T3000	1
ECO-T5000	2
ECO-TR3500	2
ECO-TR5000	2
ECO-TR6000	2
ECO-TR8000	3
ECO-TR12000	4
ECO-TR20000	7
ECO-TR30000	10
ECO-TR40000	13
ECO-TR50000	17

Table 16

- When covering and sealing the different layers, the following requirement must be met:
  - The tanks must be sealed carefully in their lower part with sand.
  - The tank must be filled with water to the level of the height of the layer for the next backfill.
 Filling of tanks with water is recommended before their exploitation during the assembly works is necessary and recommended in order to:
  - Protect the tank from the ground pressure when covering and sealing the trench around the tank.
  - Avoid surfacing of the tank as a result of the underground waters rising during assembly.
  - Every time after filling with water and before sealing the next layer of backfill, the covers of the revision hatches must be installed.
  - You must be sure that there are no sharp objects close to the tank which can harm it.
  - Before covering and sealing the tank it must be connected with the corresponding sewage network. Manual sealing must be done around the connections.

<sup>3</sup> Polyester belts for reinforcing the tanks for load carrying capacity of 2.5 tons with a tightening device. (a ratchet with two hooks at the ends).

## 10 ADDITIONAL ELEMENTS PRODUCT RANGE






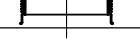






diagram/drawing	product code	description	way of application
	PRO-TS-400	Additional riser DN400-smooth end with 200 mm effective height for ECO-TP tanks	It can end with a plastic cover KGDOV400-A15 or to be extended with a socket KGU400 and KGEM 400 pipe
	PRO-TSO-400	Additional riser DN400-with a socket with 200 mm effective height for ECO-TP tank	It is used in combination with PPDWRISER400/1 and a PRK400 sealing ring and ends with a KGDOV400-A15 cover
	PRO-TS-200	Additional inlet/outlet DN160 and DN200 for smooth pipe for ECO-TP tank	
	PPDWRISER400/1	Extension pipe, Pragma DN/OD 400, without a socket	
	PRK400	Sealing ring for DN/OD 400 used for ECO-TP tanks	
	KGDOV400-A15	Polypropylene cover DN400 for 1500 kg of load for ECO-TP tank	
	ECO-TS200/315	Additional inlet/outlet DN200, DN250 and DN 315-smooth pipe, for ECO-T tank	
	ECO-T600x500	Additional riser DN600 with 500 mm effective height for ECO-T tank	The element end with a thread which allows additional riser with ECO-T 600x250 or a direct assembly of ECO-TDOV600 threaded cover
	ECO-T600x250	Additional riser DN600 with 250 mm effective height for ECO-T tanks	The element end with a thread which allows additional riser with ECO-T 600x500 or a direct assembly of ECO-TDOV600 threaded cover
	ECO-TDOV600	Polyethylene cover DN600 for 600 kg of load threaded for ECO-T tanks	
	PRO-RISER800-WO-L	Additional riser DN800 without steps with 500 mm effective height for ECO-T tank	It is assembled with a PRO-SEAL800 sealing ring and ends with a PRO-COVER800-A15 cover
	PRO-SEAL800	Sealing ring DN 800 used for ECO-TP tanks	
	PRO-COVER630-A15	Concrete cover DN600 for 1500 kg of load for ECO-T tank	
	PRO-CON800/630-Fix	Cone 800/630 with TFE element for fixed inlet for ECO-T tank	It is assembled with a PRO-SEAL800 sealing ring and ends with a PRO-COVER630-A15 cover
	PRO-COVER800-A15	Polymer concrete cover DN8600 for 1500 kg of load for ECO-T tanks	
	ECO-TSEP	Separation wall for ECO-T tanks	They are installed in the tanks according to the design conditions
	ECO-TRSEP	Separation wall for ECO-TR tanks	They are installed in the tanks according to the design conditions
	ECO-TRS200/315	Additional inlet/outlet DN200, DN250 and DN 315 - smooth pipe for ECO-TR tanks	
	ECO-TRR600	Additional telescopic riser DN600 with 540 mm (660 mm) effective height for ECO-TR tank	End with a ECO-TRDOV600-200 cover or ECO-TRDOV600-600
	ECO-TRDOV600-200	Polyethylene cover DN600 for 200 kg of load for ECO-TR tank	
	ECO-TRDOV600-600	Polyethylene cover DN600 for 600 kg of load for ECO-TR tank	
	ECO-BELT	Polyester belt with 2500 kg class of load with a ratchet and hooks for ECO-T and ECO-TR tanks	They are recommended especially in case of high underground waters for all facilities
	ECO-VENT-DN110	Ventilation cover with a pipe DN110 for ECO-TP, ECO-T and ECO-TR tanks	If ventilation is necessary in the specific facility
	ECO-MESDEVICE	Emptying and measuring device for ECO- PRO grease and oil separators	In case of free standing assembly
	OILBOX-ACD	Automatic closing device for OILBOX for ECO-T tanks	

Table 17: Additional elements product range

## 11 WARRANTY, MAINTENANCE AND EXPLOITATION

### 11.1 Facilities warranty

Facility type	Warranty	Exploitation life
ECOBIX	24 months	10 years
FATBOX	36 months	20 years
OILBOX	36 months	20 years
SANDBOX	36 months	20 years

Table 18: Facilities warranty

### 11.2 Maintenance

The facility maintenance and exploitation are performed by by:

- Specialized companies when a contract is signed for subscription service, or
- The final user after free training from Pipelife Bulgaria employees.

The facility is released to the end user after assembly on site, start and adjustments. When passing the following documents are issued:

- A written statement for entering into exploitation.
- A warranty card.
- A manual for exploitation and maintenance.
- A written statement for passed training.

### 11.3 Exploitation and cleaning

The transportation and taking of surplus sludge from the Pipelife modular and conventional treatment facilities must be made by the authorized for this purpose firms according to the local requirements and orders.

The waste material which is in the tanks must be removed and transported for further treatment to the nearest city wastewater treatment plant.

During the maintenance, the side walls of the tank, the inlets, the waste discharge pipe and the other parts must be cleaned by machines with high pressure. The vertical pipes, the covers and the external parts must be visually checked.

After finishing the facility cleaning fill the tanks with pure water in order to assure the system proper functioning from the moment of its running into exploitation.

### 11.4 ECOBOX exploitation and cleaning

Pipelife – ECOBOX modular wastewater treatment systems require cleaning of sludge only from the sludge tanks. There is where the accumulation and storage of big undissolved pollutants happen.

The frequency of their transportation by specialized firms which deal with this activity depend on tanks' capacity and their filling up. The initial investment in bigger sludge tank leads to rarer system cleaning. Visual notion the client can acquire by the following principles (see Figures 30, 31, 32).



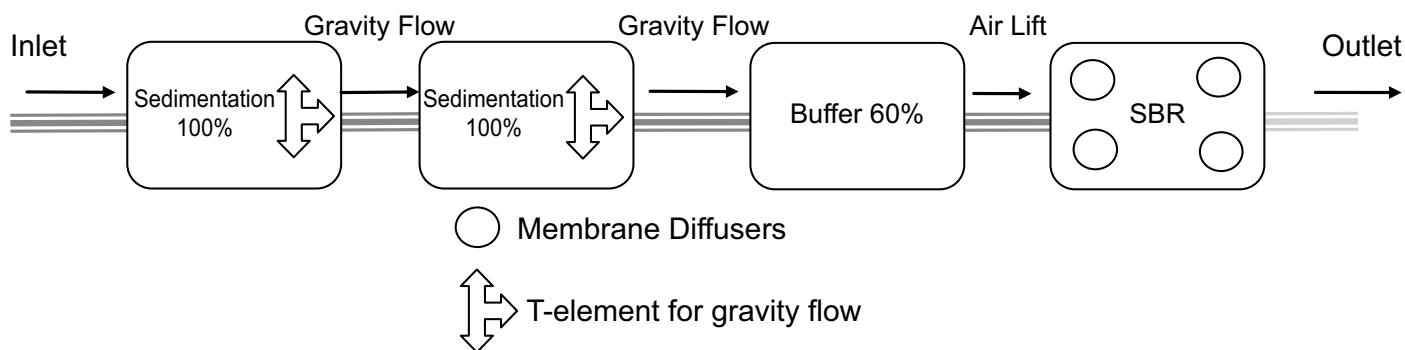


Figure 30

- The settlements from which the reactor is filled must not be filled with more than 50% sludge during pump passing of waste waters.
- The settlements from which the reactor is not filled can be filled with sludge up to 100%.
- The pre-settlements which serve as sludge tank can be filled with sludge to 100%.  
The fluid passes to the next phase by the force of gravity. A T-element is installed which hampers big-size wastes towards next tanks.

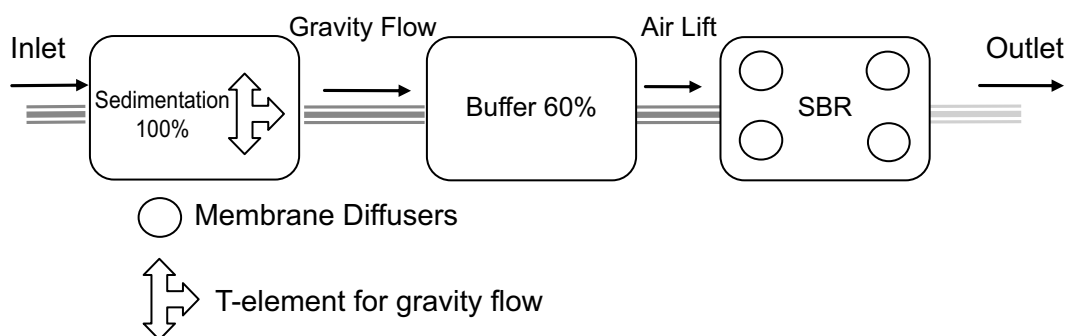


Figure 31

- The settlements from which the reactor is filled must not be filled with more than 50% sludge in case of pump passing of waste waters.
- The initial settlements which serve as a sludge tank can be filled with 100% sludge.  
The fluid passes to the next phase due to the force of gravity. A T-element is installed which hampers big-size wastes towards the next tanks.

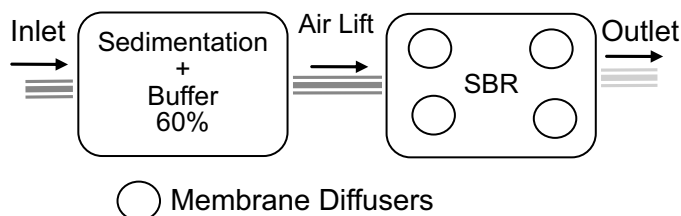


Figure 32

The settlements from which the reactor is filled must not be filled with more than 75% of sludge in case of gravity passing of the waste waters. A T-element is installed which hampers big-size wastes towards the next tanks.

On the basis of our knowledge and our capabilities in the field of the thermoplastic materials, the development, the construction and the different separation methods, we are capable of manufacture besides the serial products, special products which are in accordance with your requirements.





