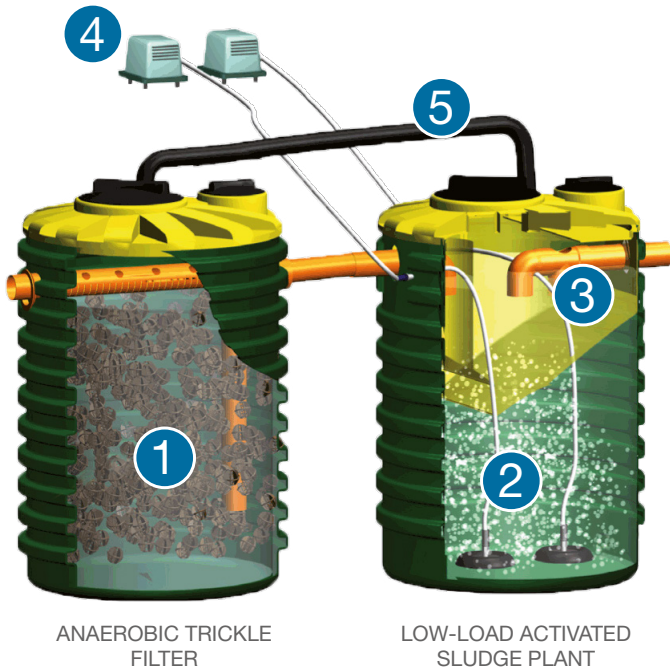
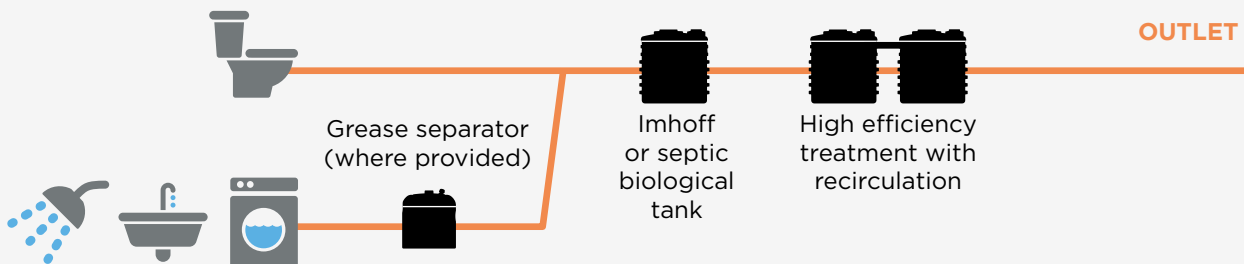


HIGH EFFICIENCY TREATMENT (DEP RF) WITH SLUDGE RETURN



- 1 FILTER MEDIA**
plastic filler elements with a large surface area that act as a support on which the anaerobic bacteria responsible for treating the effluent can develop.
- 2 OXYGENATION AREA**
area in which the effluent is mixed and oxygenated, thanks to micro-bubble air diffuser plates, powered by an external blower/compressor. This develops aerobic bacteria that transform the biodegradable compounds into CO₂, organic nitrogen into ammonia and ammonia into nitrates.
- 3 FINAL SEDIMENTATION AND DISINFECTION AREA**
stilling area in which the residual sludge sediments and returns once again to the oxygenation section. The outlet pipe is fitted with a housing into which a slow release chlorine tablet could be inserted. In this way the effluent is disinfected before being discharged (where provided).
- 4 BLOWERS-COMPRESSORS**
for forced blowing of oxygen into the activated sludge plant and for air-lift recirculation system (included).
- 5 SLUDGE RECIRCULATION PIPE**

INSTALLATION DIAGRAM



SPECIFICATIONS

TECHNICAL CHARACTERISTICS

Secondary treatments consisting of an anaerobic trickle filter and an activated sludge plant with sludge recirculation allow almost 100% removal of the organic load and suspended solids with a very high reduction in the nitrogen load and phosphorous load found in domestic sewage. In this way, the waste water discharged respects the limits indicated in table 4 of attachment 5 to Legislative Decree 152/2006 for discharge to land. The trickle filter is a biological reactor in which the micro-organisms, under anaerobic conditions, make use of the biodegradable substance contained in the effluent. These micro-organisms develop on the surface of special bulk fill material in polypropylene, specifically designed to maximise the contact surface area between the micro-organisms and the effluent. Activated sludge plants are systems in which the bacterial flora develops in colonies that remain in suspension in the effluent and consume the remaining biodegradable material. The process is fully aerobic and the oxygen necessary for the development of the bacteria is supplied by submersed diffusers that emit a flow of fine bubbles of air from the bottom of the tank. This also guarantees continuous effluent mixing. The sludge recirculation system is used to create optimum conditions to develop and maintain the bacteria responsible for removal of the various pollutants present in the effluent.

USE

High level secondary treatment of domestic sewage.

DAILY HYDRAULIC LOAD: 200 l/PE

Please note: it is possible to size the treatment plant according to different daily hydraulic loads



SEWAGE TREATMENT EFFICIENCY

The wastewater treatment systems made up of a grease separator, an Imhoff biological tank and a high efficiency secondary treatment (installed as shown in the diagram at page 94) ensures that the concentrations of the final effluent are:

≤100 mg/l
COD

≤20 mg/l
BOD₅

≤25 mg/l
SS

These parameters are respected if the inlet wastewater have the following characteristics (typical concentrations of domestic sewage):

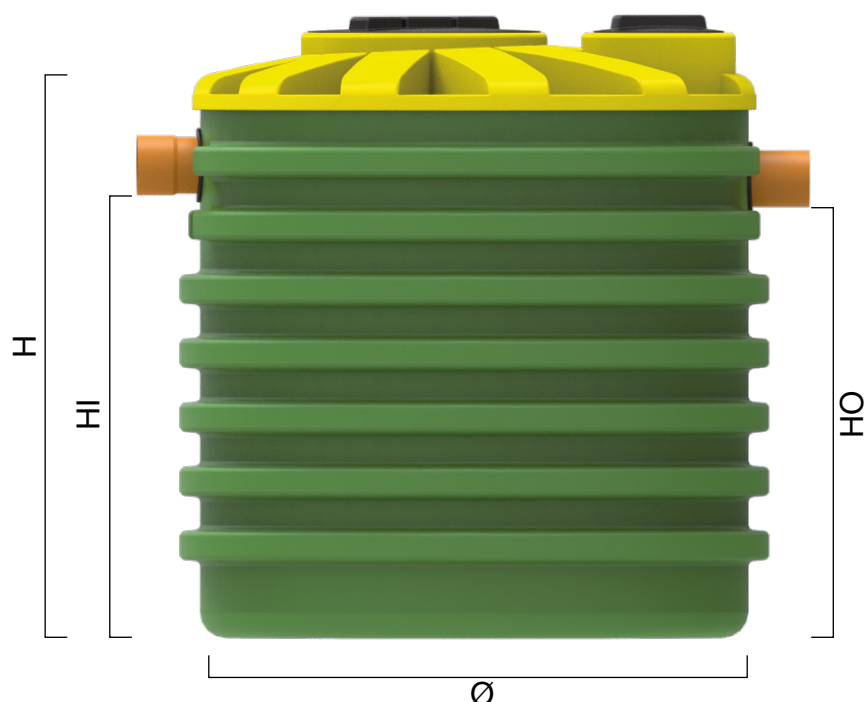
≤600 mg/l
COD

≤300 mg/l
BOD₅

≤400 mg/l
SS

HIGH EFFICIENCY TREATMENT

MODEL



CORRUGATED



HIGH EFFICIENCY TREATMENT WITH SLUDGE RECIRCULATION (DEP RF)

Item	Mod.	Anaerobic trickle filter							Impianto a fanghi attivi									PE.		
		Item	Ø mm	H mm	Cov. 1	Cov. 2	Extens. 1 (optional)	Extens. 2 (optional)	Filter Vol. m³	Item	Ø mm	H mm	Cov. 1	Cov. 2	Extens. 1 (optional)	Extens. 2 (optional)	Aerated vol. l		Sed. vol. l	Blowers
DEP07RF		NAN 1000R	1150	1220	CC400	CC200	PP45	PP30	0,85	NIFA 1000R	1150	1220	CC400	CC200	PP45	PP30	607	243	HP40-HP40	7
DEP09RF		NAN 1000R	1150	1220	CC400	CC200	PP45	PP30	0,85	NIFA 1500R	1150	1720	CC400	CC200	PP45	PP30	906	362	HP40-HP40	9
DEP11RF		NAN 1500R	1150	1720	CC400	CC200	PP45	PP30	1,26	NIFA 1500R	1150	1720	CC400	CC200	PP45	PP30	906	362	HP40-HP40	11
DEP13RF		NAN 1500R	1150	1720	CC400	CC200	PP45	PP30	1,26	NIFA 2600R	1710	1450	CC400	CC300	PP45	PP35	1432	629	HP80-HP60	13
DEP15RF		NAN 2600R	1710	1450	CC400	CC300	PP45	PP35	2,06	NIFA 2600R	1710	1450	CC400	CC300	PP45	PP35	1432	629	HP80-HP60	15
DEP17RF		NAN 2600R	1710	1450	CC400	CC300	PP45	PP35	2,06	NIFA 3200R	1710	1725	CC400	CC300	PP45	PP35	1765	760	HP80-HP60	17
DEP20RF		NAN 3200R	1710	1725	CC400	CC300	PP45	PP35	2,52	NIFA 3200R	1710	1725	CC400	CC300	PP45	PP35	1765	760	HP80-HP60	20
DEP23RF		NAN 3200R	1710	1725	CC400	CC300	PP45	PP35	2,52	NIFA 3800R	1710	1955	CC400	CC300	PP45	PP35	2139	965	HP80-HP60	23
DEP26RF		NAN 3800R	1710	1955	CC400	CC300	PP45	PP35	3,10	NIFA 3800R	1710	1955	CC400	CC300	PP45	PP35	2139	965	HP80-HP60	26
DEP30RF		NAN 3800R	1710	1955	CC400	CC300	PP45	PP35	3,10	NIFA 4600R	1710	2225	CC400	CC300	PP45	PP35	2713	1085	HP80-HP80	30
DEP35RF		NAN 4600R	1710	2225	CC400	CC300	PP45	PP35	3,80	NIFA 4600R	1710	2225	CC400	CC300	PP45	PP35	2713	1085	HP80-HP80	35
DEP40RF		NAN 4600R	1710	2225	CC400	CC300	PP45	PP35	3,80	NIFA 7000R	2250	2367	CC400	CC400	PP45	PP45	5474	1460	HP150-HP150	40
DEP47RF		NAN 7000R	2250	2367	CC400	CC400	PP45	PP45	6,93	NIFA 7000R	2250	2367	CC400	CC400	PP45	PP45	5474	1460	HP150-HP150	47
DEP52RF		NAN 7000R	2250	2367	CC400	CC400	PP45	PP45	6,93	NIFA 9000R	2250	2625	CC400	CC400	PP45	PP45	5803	2020	HP150-HP150	52
DEP60RF		NAN 9000R	2250	2625	CC400	CC400	PP45	PP45	7,82	NIFA 9000R	2250	2625	CC400	CC400	PP45	PP45	5803	2020	HP150-HP150	60

PE. = population equivalent: Ø = diameter; H = height; HI = inlet pipe height; HO = outlet pipe height; ØI/O = inlet/outlet pipe diameter.

TECHNICAL SECTION HIGH EFFICIENCY TREATMENT WITH SLUDGE RECIRCULATION

TECHNICAL CHARACTERISTICS

Secondary treatments consisting of an anaerobic trickle filter and an activated sludge plant with recirculation allow almost 100% removal of the organic load and suspended solids with a very high reduction in the nitrogen load and phosphorous load found in domestic sewage. The trickle filter is a biological reactor in which the micro-organisms, under anaerobic conditions, make use of the biodegradable substance contained in the effluent. These micro-organisms develop on the surface of special bulk fill material in polypropylene, specifically designed to maximise the contact surface area between the micro-organisms and the effluent.

Activated sludge plants are systems in which the bacterial flora develops in colonies that remain in suspension in the effluent and consume the remaining biodegradable material. The process is fully aerobic and the oxygen necessary for the development of the bacteria is supplied by submersed diffusers that emit a flow of fine bubbles of air from the bottom of the tank. This also guarantees continuous effluent mixing. Thanks to the recirculation system, a part of the sludge present in the tank is recirculated to the percolator by means of an air lift system. In this way, the removal of the organic load, the nitrogen and the phosphorous is the maximum possible, allowing the effluent to be re-used for irrigation (if the Local Regulations allow the re-use of treated water) or for discharge to highly protected areas.

The outlet from the activated sludge plant is equipped with a housing in which it is possible to insert a chlorine tablet. This allows the effluent leaving the treatment plant to be disinfected before being stored.

USE AND MAINTENANCE

Bacterial organisms develop inside the two tanks forming the treatment system and transform the pollutants into inert sludge which tends to accumulate at the bottom and on the filter media of the trickle filter. Over time, an excessive accumulation of sludge leads to the release of these bacterial organisms with the resulting deterioration in the quality of the final effluent. For this reason, the tanks need to be inspected and subjected to periodic maintenance. These operations are normally carried out as part of the Imhoff tank inspection and emptying operations.

During the tank inspection operations, make sure that there is a continuous supply of air being blown into the activated sludge plant and a recirculation of sludge to the anaerobic trickle filter. It should also be remembered that in order to ensure the correct operation of the plant, a grease separator and Imhoff tank or similar should be installed upstream of the plant itself. Furthermore, particular attention should be paid to the discharge of disinfectants, bleaches, strong acids or bases which could deactivate the biomass. The plant needs 10-15 days in order to reach normal operation. This time can be reduced however by adding biomass activators (Rototec Bioactivator) directly to the sewage.

PROHIBITIONS

- **do not use toxic and/or poisonous substances** (bleach, solvents, insecticides, disinfectant substances, aggressive detergents); always use biodegradable products;
- **NEVER** put the chlorine tablet into the activated sludge plant, but insert it in the proper housing;
- **NEVER** drain rainwater into the system.

WARNINGS

- make sure that drains have a siphon;
- check that the pipes slope sufficiently (approximately 1% - 2%);
- connect the biogas vent pipe in both tanks (**see installation method**);
- after pump-out, fill the tanks again with **clean water**;
- in the event of a maintenance operation of any kind, always comply with the **safety regulations** regarding operations within closed waste water treatment areas, and with the general technical procedures applicable.

WARNINGS (blower)

- the operating temperature must be between -20°C and $+40^{\circ}\text{C}$ with relatively low humidity;
- always carry out all cleaning and/or replacement operations **with the electric power supply disconnected**;
- before carrying out any cleaning and/or replacement operation, make sure that the body of the compressor has **cooled down**, to avoid any risk of burns;
- when carrying out repairs, it is good practice only to use **original materials** in order to guarantee the safety of the equipment;
- maintenance operations that require the presence of electricity, such as detecting faults inside the blower, must only be carried out by **qualified technicians**.
- never connect the compressor to energy sources other than those indicated. If you have any doubts about making the connections, **DO NOT** connect the equipment.

MANAGEMENT

WHAT TO DO	WHEN	HOW
Inspect the activated sludge plant	Every 6 / 12 months	Unscrew the covers on the inspection holes and check the level of sediments
Inspect the trickle filter	Every 6 / 12 months	Unscrew the covers on the inspection holes and check the level of sediments
Check that the blower in the activated sludge plant is working	Every month	Unfasten the cover on the inlet inspection hole and check that air is being blown into the activated sludge plant
Check that the blower in the Air-lift sludge recirculation is working	Every month	Unscrew the cover on the trickle filter inlet manhole and check the sludge recirculation
Clean the blowers suction filter	Every 3 months	Remove the filter, eliminate excess dust and if necessary wash with mild detergent
Extract the bottom sludge, clean the interior and the inlet and outlet pipes	Every 6 / 12 months	Contact a licensed waste disposal company
Clean the plate diffuser in the activated sludge plant	Every 6 / 12 months	Contact a licensed waste disposal company (water jet pump-out)
Backwash the filter media in the trickle filter	Every 6 / 12 months	Contact a licensed waste disposal company (water jet pump-out)

N.B. the frequency of operations will depend on the incoming organic load.