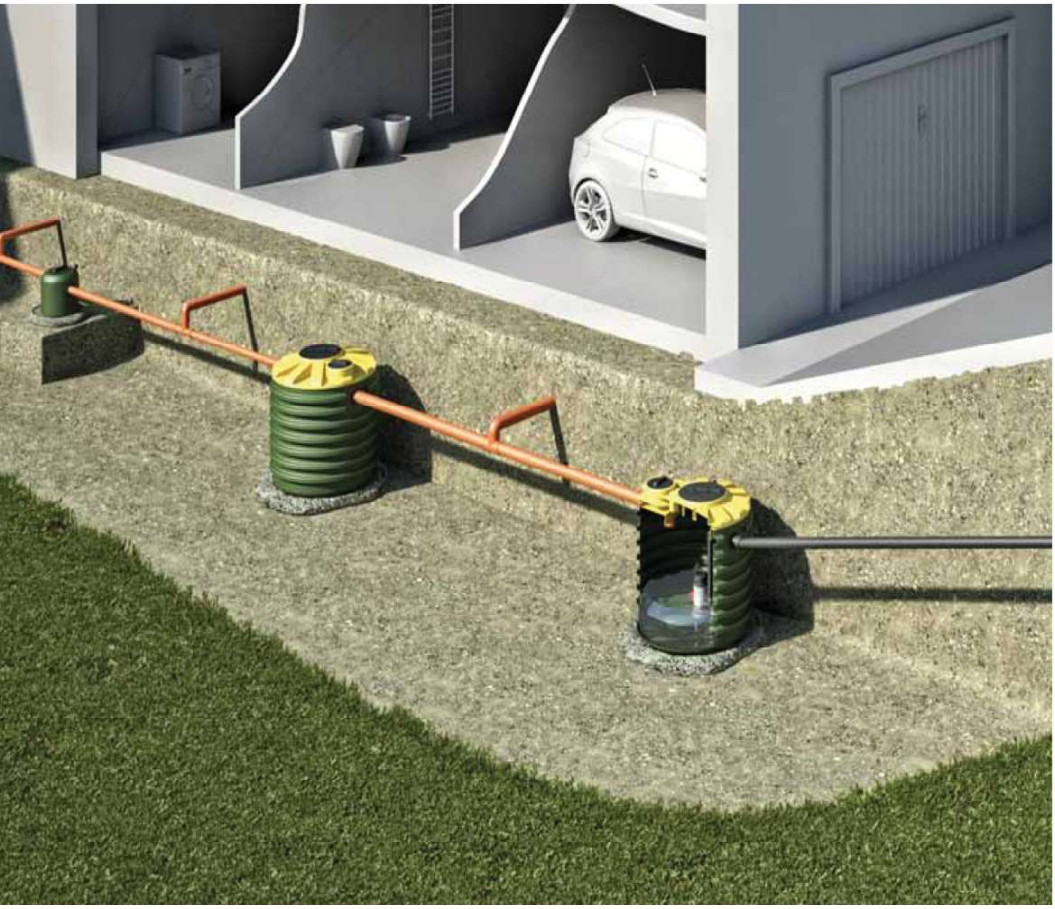


1. SINGLE PUMP LIFT STATIONS
2. DUAL PUMP LIFT STATIONS

LIFT STATIONS

TECHNICAL CHARACTERISTICS

Sewage lift stations are systems that allow effluent to be lifted and transferred to stations located at higher levels (sewerage systems, treatment systems). They become necessary, for example, when the discharge level of a WC is lower than that of the treatment plant or sewerage pipes (cellars, underground premises, etc.) and when the hydraulic profile of the treatment system cannot work by gravity. The station consists of a storage tank in linear high density polyethylene (LLDPE), available in various sizes, in which a submersible pump is installed. The pump is linked to the tank by a chain to enable its removal. In cases where the effluent flow to lift is very high and/or variable and when the presence of a standby pump becomes necessary, models are available with a dual pump system. The pumps are connected to the appropriate electric panels such that control can, depending on needs, either be manual or automatic with start/stop float switches installed in the tank. The dual pump models are provided with an electric panel that allows the two pumps to be run alternately or simultaneously. The electric panel can also be fitted with visual alarms (warning lights) and can be setup for connecting a self-powered audible alarm (mod. QUA) to signal faults, including in the presence of a power cut. The power supply can be single-phase (domestic type: 230 V) or three-phase (industrial type: 400 V). Depending on need, the lift stations can be equipped with various types of pumps with different heads, flow rates and working pressures. For pumps possessing particular characteristics, contact the company technical office.

USE AND MAINTENANCE

In order for a lift station to function efficiently, it is important that the most suitable pump for satisfying the specific requirements is selected during the design phase. To this end, a few important parameters such as the origin and characteristics of the effluent to treat, the function of the lift station, the head and linear distance to the receiver must be evaluated. Under normal operating conditions, a correctly chosen electric pump does not require any particular maintenance operations. It is advisable, however, in the case of a permanent installation, to carry out an inspection once a year. This will include cleaning away any sludge or detritus from the liquid inlet (and any metal filters, where fitted), checking the wear on the impeller and checking the condition of the electric cables, handle and fixing devices. To avoid damage to the pump and/or plant:

- Fit a suitable sized vent on the tank to prevent the formation of a vacuum when the pump is running.
- Only start the electric pump once it has been installed, do not attempt a dry start.
- Do not remove the suction filter for any reason whatsoever.
- Do not transport or handle the pump using the electric power supply cable.
- Avoid operating the pump in the horizontal position. The pump can only function in the vertical position (with the motor at the top and the pump part at the bottom).
- On the three-phase version, the correct direction of rotation is indicated by the arrow stamped on the pump body and on the identification plate.

SPECIFICATION ITEMS

Lift station for civil wastewater or rainwater, manufactured in **ISO 9001/2008 certified company**, for underground installation, consisting of a polyethylene (PE) one-piece structure tank, complete with n°1 or 2 submersible electric pump/s, start/stop float switch/es, outlet pipe/s in PE with cast iron check valve/s; fitted also with inlet pipe with watertight gasket in NBR rubber and 90° elbow in PVC, pump vent and threaded covers in polypropylene (PP) for inspection, emptying and cleaning purposes; optional threaded extensions;
Single pump lift station mod.....with pump.....,storage volume..... lt, dimensions.....x.....x.....cm
Dual pump lift station mod..... with n°2 pumps.....,storage volume..... lt, dimensions.....x.....x.....cm

Pump start-up panel, manual and automatic start-up command for **single pump** mod.....,in plastic material with protection grade IP55, fitted with door lock switch, manual or automatic selector, n°4 indicator light (on - running - thermal trip - alarm), thermal relay and set of fuses for motor protection. fuses on auxiliary circuit, 24 V contactors.

Pump start-up panel, automatic, alternate, simultaneuos and manual start-up command for **dual pump** mod....., in steel plate with protection grade IP55, fitted with door lock switch, operating mode selectors (manual - off - automatic), n°5 indicator lights (on - pump 1 - pump 2 - thermal trip), thermal relays and set of fuses for motor protection, fuses on auxiliary circuit, electronic module for alternate or simultaneous pump operation, 24 V contactors.

Self-powered audible alarm mod.....,for fault signalling, including in the presence of a power cut, setup for connecting to the electric start-up panels of sewage pumps in lift stations to supplement the visual alarms (warning lights), fitted with operating mode selectors (ON - OFF - TEST), 230 V battery charger complete with 6 V nickel-cadmium battery, alarm indicator light, audible alarm.

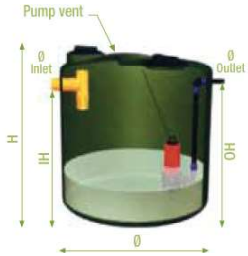
Three-phase electric pumps and control panels available on request.

N.B.: Underground installation instructions on page 107

1. Single pump lift stations

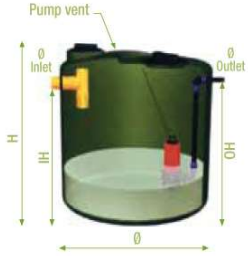
Material Tank in linear high density polyethylene (LLDPE), one-piece structure, complete with inlet pipe in PVC with gasket, PE outlet pipe with ball check-valve, electric submersible pump and start/stop float switch.

Use Sewage lift stations are systems that allow effluent to be lifted and transferred to stations located at higher levels (sewerage systems, treatment systems). They become necessary, for example, when the discharge level of a WC is lower than that of the treatment plant or sewerage pipes (cellars, underground premises, etc.) and when the hydraulic profile of the treatment system cannot work by gravity.



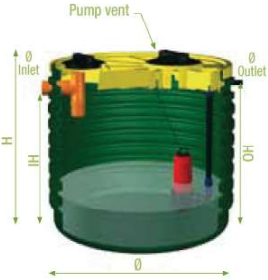
Lift stations 300

Item	Volume lt	Ø mm	H mm	IH mm	OH mm	ØI mm	ØO mm	Ø cover mm	Pump
SOL 326	230	630	979	750	750	110 (in PVC)	50 (in PE)	400	SM 265 L
SOL 345	230	630	979	750	750	110 (in PVC)	63 (in PE)	400	SM 450 L



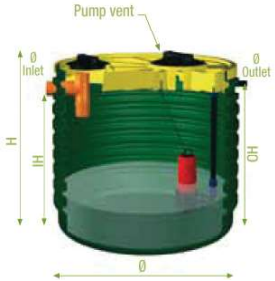
Lift stations 500

Item	Volume lt	Ø mm	H mm	IH mm	OH mm	ØI mm	ØO mm	Ø cover mm	Pump
SOL 526	305	790	790	625	625	110 (in PVC)	50 (in PE)	400	SM 265 L
SOL 545	305	790	790	625	625	110 (in PVC)	63 (in PE)	400	SM 450 L
SOL 563	305	790	790	625	625	110 (in PVC)	63 (in PE)	400	SM 635 SL



Lift stations 1000

Item	Volume lt	Ø mm	H mm	IH mm	OH mm	ØI mm	ØO mm	Ø cover mm	Pump
NSOL 1026	903	1150	1220	870	870	110 (in PVC)	50 (in PE)	400-210	SM 265 L
NSOL 1045	903	1150	1220	870	870	110 (in PVC)	63 (in PE)	400-210	SM 450 L
NSOL 1063	903	1150	1220	870	870	110 (in PVC)	63 (in PE)	400-210	SM 635 SL



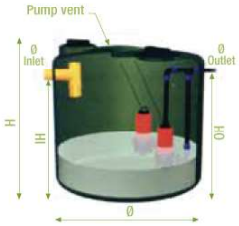
Lift stations 2000

Item	Volume lt	Ø mm	H mm	IH mm	OH mm	ØI mm	ØO mm	Ø cover mm	Pump
NSOL 2026	2000	1150	2280	1990	1950	110 (in PVC)	50 (in PE)	400-210	SM 265 L
NSOL 2045	2000	1150	2280	1990	1950	110 (in PVC)	63 (in PE)	400-210	SM 450 L
NSOL 2063	2000	1150	2280	1990	1950	110 (in PVC)	63 (in PE)	400-210	SM 635 SL

2. Dual pump lift stations

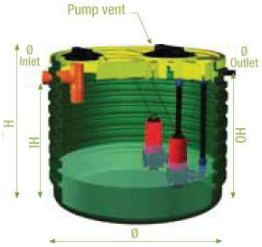
Material Tank in linear high density polyethylene (LLDPE), one-piece structure, complete with inlet pipe in PVC with gasket, PE outlet pipe with ball check-valve, electric submersible pump with start/stop float switch and, on request, direct starter and self-powered audible warning device.

Use sewage lift stations are systems that allow effluent to be lifted and transferred to stations located at higher levels (sewerage systems, treatment systems). They become necessary, for example, when the discharge level of a WC is lower than that of the treatment plant or sewerage pipes (cellars, underground premises, etc.) and when the hydraulic profile of the treatment system cannot work by gravity. The dual pump system allows much higher and variable flows to be managed and guarantees the presence of a standby pump.



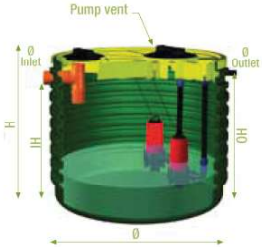
Dual pump lift stations 500

Item	Volume lt	Ø mm	H mm	IH mm	OH mm	ØI mm	ØO mm	Ø cover mm	Pump
SOL 526 P2	305	790	790	625	625	110 (in PVC)	50 (in PE)	400	SM 265 L
SOL 545 P2	305	790	790	625	625	110 (in PVC)	63 (in PE)	400	SM 450 L
SOL 563 P2	305	790	790	625	625	110 (in PVC)	63 (in PE)	400	SM 635 SL



Dual pump lift stations 1000

Item	Volume lt	Ø mm	H mm	IH mm	OH mm	ØI mm	ØO mm	Ø cover mm	Pump
NSOL 1026 P2	903	1150	1220	870	870	110 (in PVC)	50 (in PE)	400-210	SM 265 L
NSOL 1045 P2	903	1150	1220	870	870	110 (in PVC)	63 (in PE)	400-210	SM 450 L
NSOL 1063 P2	903	1150	1220	870	870	110 (in PVC)	63 (in PE)	400-210	SM 635 SL



Dual pump lift stations 2000

Item	Volume lt	Ø mm	H mm	IH mm	OH mm	ØI mm	ØO mm	Ø cover mm	Pump
NSOL 2026 P2	2000	1150	2280	1990	1950	110 (in PVC)	50 (in PE)	400-210	SM 265 L
NSOL 2045 P2	2000	1150	2280	1990	1950	110 (in PVC)	63 (in PE)	400-210	SM 450 L
NSOL 2063 P2	2000	1150	2280	1990	1950	110 (in PVC)	63 (in PE)	400-210	SM 635 SL

Dual pump lift station 3000

Item	Volume lt	Length mm	Width mm	H mm	IH mm	OH mm	ØI mm	ØO mm	Ø cover mm	Pump
NSOL 3065 P2	2900	2090	1500	1720	1320	1330	125 (in PVC)	90 (in PE)	630	SM 650 L

Sewage pumps

Submersible electric pump with vortex or 2-channel impeller

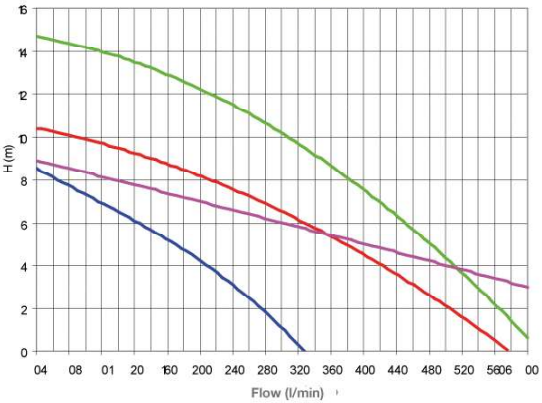
Application Submersible electric pump with vortex or 2-channel impeller (SM635SL) for pumping wastewater, sewage and effluent from septic tanks, stormwater runoff, liquids containing solid and filamentary matter (with vortex impeller).

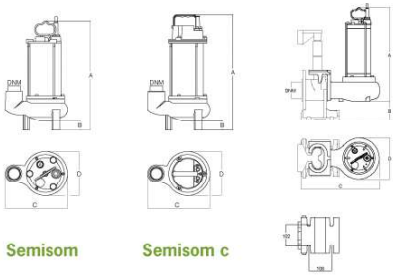
Pump model	Power		A1	µF	Cable length	DNM	Ø solids passage	A	B	C	D	Weight	Flow rate		Head
	HP	Kw	A		m	inches	mm	mm	mm	mm	mm	Kg	l/min	m³/h	m
SM 265 L	0,75	0,55	4,2	16	5	1" 1/2	40	400	50	230	162	13,6	0	0	8,5
													300	18	1
SM 450 L	1,5	1,1	7,3	25	5	2"	50	464	50	260	183	19,4	0	0	10,5
													500	30	2
SM 635 SL	1,5	1,1	7,3	25	5	2"	32	440	60	250	172	19,3	0	0	15
													650	39	0
SM 650 L	2	1,5	12	31,5	5	2"1/2	65	445	89	370	195	22	0	0	9
													600	36	3

Material Stay rods, handle, nuts and bolts, motor and shaft casing in stainless steel; cover, pump body and impeller in engineering cast iron; mechanical seal in graphite and ceramic; asynchronous motor with rotor in short-circuit, immersed liquid cooling, mounted on ball bearings.

Use and maintenance Under normal operating conditions, the electric pump does not require any maintenance operations. It is advisable, however, in the case of a permanent installation, to carry out an inspection once a year. This will include cleaning away any sludge or detritus from the liquid inlet (and any metal filters, where fitted), checking the wear on the impeller and checking the condition of the electric cables, handle and fixing devices. Even when the pump is capable of handling solid matter (vortex impeller) it is nevertheless advisable to install a primary sedimentation system (e.g. septic tank) upstream or a sewage screening system that can separate non-shreddable materials such as rags, plastics, etc. The installation of such a system is essential when pumps with 2-channel impellers are installed.

Technical characteristics of the pumps

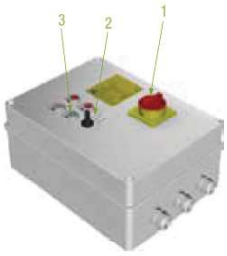




Semisom **Semisom c**

Pump model	Max immersion depth m	Max grit concentration g/m³	Max. num. start-ups n°/h	Max water temp. °C
SM 265 L	20	/	20	35-45
SM 635 SL	20	/	20	35-45
SM 450 L	20	/	20	35-45
SM 650 L	20	/	20	35-45

Electric panels for lift stations



Direct panel for submersible electric pumps

Application Pump start-up panel for sewage lift station. The start-up command can be either manual or automatic by means of start/stop float switches in the tank. The electric panel is fitted with visual alarms (warning lights) and is set-up for connecting a self-powered audible alarm (mod. QUA) to signal faults, including in the presence of a power cut. The power supply can be single-phase (domestic type: 230 V) or three-phase (industrial type: 400 V).

Item *	Height mm	Lenght mm	Width mm	Voltage V	Frequency Hz	Operating temperature	Protection grade
QZP 2 BPA	120	300	220	230-400	50	-5°C/+40°C	IP 55

* In order to be able to size the thermal switches of this control panel for the selected pump, contact our technical office.

Installation In the case where the direct starter is installed outside and not protected against atmospheric agents, it should be housed in an appropriate casing or cabinet with protection grade IP55.

Construction characteristics

- door lock switch (1)
- manual or automatic selector (2)
- n°4 indicator lights (green, yellow, red): on - running - thermal trip - alarm (3)
- thermal relay and set of fuses for motor protection
- fuses on auxiliary circuit
- 24 V contactors
- box in plastic material

Direct panel for dual submersible pumps

Application Pump start-up panel enabling activation of alternate or simultaneous operation mode of n. 2 pumps for sewage lift station. The start-up command can be either manual or automatic by means of a series of start/stop float switches positioned at different levels in the tank. The electric panel is fitted with visual alarms (warning lights) and is setup for connecting a self-powered audible alarm (mod. QUA) to signal faults, including in the presence of a power cut. The power supply can be single-phase (domestic type: 230 V) or three-phase (industrial type: 400 V).

Item *	Height mm	Lenght mm	Width mm	Voltage V	Frequency Hz	Operating temperature	Protection grade
QZP 2 BPA 2	150	400	300	230-400	50	-5°C/+40°C	IP 55

* In order to be able to size the thermal switches of this control panel for the selected pump, contact our technical office.

Installation In the case where the direct starter is installed outside and not protected against atmospheric agents, it should be housed in an appropriate casing or cabinet with protection grade IP55.

Construction characteristics

- door lock switch (1)
- operating mode selectors: manual - off - automatic (2)
- n°5 indicator lights (green, yellow, red): on - pump 1 - pump 2 - thermal trip (3)
- thermal relay and set of fuses for motor protection
- fuses on auxiliary circuit
- electronic module for alternate or simultaneous pump operation
- 24 V contactors
- box in steel plate

Electric panels for lift stations

Self-powered audible alarm

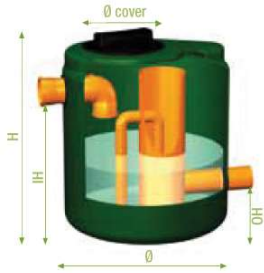
Application Self-powered audible alarm for fault signalling, including in the presence of a power cut. The unit is set-up for connecting to the electric start-up panels of sewage pumps in lift stations to supplement the visual alarms (warning lights).

Item	Height mm	Lenght mm	Width mm	Voltage V	Frequency Hz	Power DB/M	Operating temperature	Protection grade
QUA	70	190	140	230	50	120/1	-5°C/+40°C	IP 40

Construction characteristics

- operating mode selectors: ON - OFF - TEST (1)
- 230 V battery charger, complete with 6 V nickel-cadmium battery
- alarm indicator light (2)
- audible alarm
- box in plastic material

CHAMBERS



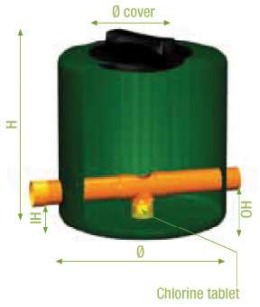
Dosing siphon chamber

Material Smooth tank in one-piece linear high density polyethylene (LLDPE) complete with inlet and outlet pipes in PVC and fitted with threaded cover in polypropylene (PP). Dosing system with PVC siphon.

Use When clarified effluents from biological tanks or treatment plants are discharged to land, in general they create blockages in the initial part of the drainage pipe. This is due to the low flow rate of the effluent and the possible presence of suspended solids. The dosing siphon is designed to allow optimum dispersion of the effluent through the ground. The effluent is conveyed to a chamber housing a special siphon capable of discharging a considerable amount of liquid in a short period of time and distribute it uniformly throughout the entire length of the dispersion pipe.

Use and maintenance The effluent from the treatment plant may contain suspended solids that could gradually accumulate in the chamber, thus blocking the siphon. For this reason, it is advisable to inspect the chamber periodically and check the operation of the siphon itself. If the presence of sludge is discovered, it must be removed by cleaning the tank and siphon using a pressurised lance. Installation: For the device to function correctly, once the tank has been positioned, the siphon must be filled with water up to the level of the outlet pipe.

Item	Ø mm	H mm	IH mm	OH mm	ØI/O mm	Ø cover mm	Extensions	Dosing siphon volume lt
PDC 500	790	790	640	100	110	400	PP45	~ 250
PDC 1200	1240	1250	1080	130	125 / 110	400	PP45	~ 1000



Chlorinator chamber

Material Smooth tank in one-piece linear high density polyethylene (LLDPE) complete with inlet and outlet pipes in PVC, T piece in PVC for housing a chlorine tablet, fitted with threaded cover in polypropylene (PP) (extension available on request).

Use The chamber has a housing for a chlorine tablet. Consequently, when installed downstream of a treatment plant, it disinfects the final effluent prior to discharging to the receptor.

Item	Ø mm	H mm	IH mm	OH mm	ØI/O mm	Ø cover mm	Extensions
PCL 50	430	430	100	90	110	300	PP35
PCL 150	580	660	100	90	110	300	PP35

Chambers

Soakaway chamber

Material Corrugated tank in one-piece linear high density polyethylene (LLDPE) complete with inlet pipe in PVC and fitted with threaded cover in polypropylene (PP).

Use The holes present at the base of the tank allow previously treated effluent to soak away through the surface layers of soil.

Use and maintenance Periodically inspect the tank to make sure that the holes are not blocked. If there is an excessive accumulation of sludge that prevents the effluent from soaking away, it must be removed.

Item	Ø mm	H mm	IH mm	ØI mm	Ø cover mm	Extensions
NPD 1000	1150	1220	890	110	400 - 210	PP45 / PP30
NPD 1500	1150	1720	1370	110	400 - 210	PP45 / PP30
NPD 2000	1150	2280	1990	110	400 - 210	PP45 / PP30

Sampling chamber

Material Smooth tank in one-piece linear high density polyethylene (LLDPE) complete with inlet and outlet pipes in PVC and fitted with threaded cover in polypropylene (PP). Extension available on request.

Use Installated downstream of a sewage treatment plant, allows effluent samples to be taken for analysis purposes.

Item	Ø mm	H mm	IH mm	OH mm	ØI/O mm	Ø cover mm	Extensions
PPF 50	430	465	260	37	110*	300	PP35
PPF 500	790	790	618	50	125**	400	PP45

* I/O 125 mm on request
** I/O 160 mm on request

Diversion chambers

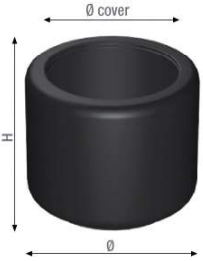
Material Smooth tank in one-piece linear high density polyethylene (LLDPE) complete with inlet and outlet pipes in PVC and fitted with threaded cover (extension available on request).

Use The distribution chambers are installed upstream and downstream of a treatment system laid out in two parallel lines. The upstream chamber divides the effluent into two equal flows, while the downstream chamber combines the two treatment flow lines into one outlet. This latter chamber can also function as a sampling point.

Item	Ø mm	H mm	ØI/O* mm	IH mm	OH mm	Ø cover mm	Extensions
PRE 500	790	790	125	to be defined according to use		400	PP45
PRU 500	790	720	125			400	PP45

* I/O 160 mm and 200 mm on request

ACCESSORIES



THREADED EXTENSION

Material Linear high-density polyethylene (LLDPE).

Application Installing the extensions enables the tops of the tanks to be installed below ground level. More than one extension can be used at the same time (See chapter on Underground installation).

Item	Ø mm	H mm	Ø cover mm
PP30	300	300	210
PP35	435	300	300
PP45	535	300	400
PP65	730	300	600

HINGED TOP EXTENSION

Material Linear high-density polyethylene (LLDPE).

Application Installing the extensions enables the tops of the tanks to be installed below ground level. More than one extension can be used at the same time (See chapter on Underground installation).

Item	Ø mm	H mm	Ø cover mm
PP 75	750	430	630

COVER*

Material Polypropylene (PP).

Application Threaded cover for inspection holes on treatment tanks.

Item	Ø Internal mm	Ø External mm
CC140	120	140
CC255	210	250
CC355	300	355
CC455	400	454
CC600	600	611

* The tanks are fitted with covers at the time of purchase.

BULB TYPE FLOAT SWITCH FOR SEWAGE

Material PVC cable. The interior of the level control is injected with non-hygroscopic closed-cell expanded polyurethane to eliminate all air particles for complete isolation.

Application Level control float for particularly turbulent industrial effluent or liquids containing suspended agglomerate residues or for raw sewage.

Installation To be installed in accordance with that provided for by DPR 547 and subsequent amendments and according to the provisions of standard CEEel-N24 and subsequent.

Technical specifications 10A - 250V - T 55°C - IP68. Fitted with counterweight. Not contain mercury.

Item	Cable length m
GALB 5	5

Accessories

RING

Material Polypropylene (PP).

Application Installed when creating customised inspection holes.

Item	Ø External mm	Ø Internal mm	H ring mm
AF154	155	120	10
AF255	255	210	30
AF355	355	300	30
AF455	455	400	30
AF600	617	600	30

GASKET

Material NBR rubber

Item	Ø External mm	Ø Internal mm	L mm	cutter diameter for gasket hole mm
GG 50	95	50	8	60
GG 63	110	63	8	75
GG 80	125	80	8	89
GG 100	145	100	8	121
GG 110	150	110	8	127
GG 125	160	125	10	140
GG 125 S 15	160	125	13	140
GG 160	200	160	10	170
GG 200	230	200	10	210
GG 250	280	250	10	260

INCREASERS AND REDUCERS

PVC increaser	Item
	RAC 110/125
	RAC 100/110
	RAC 100/125

PVC reducer	Item
	RRC 110/100
	RRC 125/100
	RRC 125/110

DIFFUSER KIT

Material PVC hose, polypropylene (PP) valve.

Application When connected to a diaphragm type blower and to one or more diffuser plates and installed inside a tank, aerates and agitates the content, either continuously or intermittently.

Item	Hose length mm
IFA 1D	according to the depth of the tank
IFA 2D	according to the depth of the tank

Precautions Before starting the blower, make sure that the valve is in the open position.

BIO ACTIVATOR

Composition The bio activator is a cereal based biological formula specially designed for treating septic tanks, Imhoff tanks, cesspits and small treatment plants. It contains a mixture of selected micro-organisms that have the capacity to degrade the principal compounds present in a domestic sewage: protein, carbohydrates and oils. It also helps liquefy solids, break down paper, fibres and break up greases.

Application The bio activator is useful for reducing the activation times of the biological process that naturally develop in a sewage treatment plant. These processes are particularly slow during the initial period of life of a treatment plant and each time chemical compounds, detergents, disinfectants, highly acidic or basic and caustic substances are discharged to the sewer. The reduced effectiveness of a plant is the cause of an overload of solids in the tank and the emission of malodours. The bio activator thus helps to eliminate malodours, helps to reduce the emptying operations of septic tanks by up to 60%, minimises the risk of pipe blockages and optimises the operation of the treatment plant.

Safety The product is a formula based on micro-organisms that are not pathogenic to humans or animals. The microbic strains are produced in single pure cultures, collected, stabilised on a cereal base and mixed for the preparation of the finished product. The micro-organisms contained in the bio activator have been isolated in a natural environment and have not been genetically modified. These microbic strains have been classified as not harmful to humans, animals or plants. The product has been tested to guarantee the total absence of Salmonella and other contaminating agents. It does not contain caustic, chemical or acidic corrosives. It does not damage the sewage plant. The micro-organisms contained in the product are classified according to EU Commission Directive 95/30/EC of 30/6/1995, EU Commission Directive 97/59/EC of 7/10/1997 and EU Commission Directive 97/65/EC of 26/11/1997.

Instructions To re-activate the micro-organisms, pour the mix into an open container, add 2/3 litres of water at room temperature per packet, leave it to stand for a few hours and then pour the mixture directly into the WC.

Item IFABIO		
Tank volume lt	Plant activation	Plant maintenance
Up to 2000	1 packet	1 packet
From 2000 to 6000	2 packets	1 packet
from 6000 to 11000	3 packets	2 packets
over 11000	4 packets	2 packets

UNDERGROUND INSTALLATION INSTRUCTIONS

DO'S AND DON'TS

a) When carrying out any of the operations, comply with Law Decree 81/08 and subsequent amendments governing safety at permanent or temporary construction sites.
b) Thoroughly check the tank on delivery and report any defects encountered.
c) Make sure that the gaskets, pipes and all the various parts other than in polyethylene are suitable for the liquid to be contained.
d) When unloading, avoid impacts and contact with sharp objects that could compromise the integrity of the product.
e) Only handle the tanks when they are completely empty and then using the lifting eyes (where provided). NEVER lift the tanks by the inlet or outlet pipes.
f) For the choice of backfill material and compaction methods, refer to European Standards ENV 1046 and UNI EN 1610.
g) **It is absolutely forbidden to install underground tanks above ground.**

1. EXCAVATION

1.1 Prepare a hole of suitable dimensions with a flat bottom, leaving a space of at least **30/40 cm** around the tank. In the case of heavy ground (e.g.: clayey subsoil) and/or groundwater, the distance must be at least 50 cm. Spread a layer of sand on the bottom of the excavation of **minimum depth 15 cm** to allow the tank to rest on a uniform and level base. The excavation must be a minimum of 1 m from any structures.

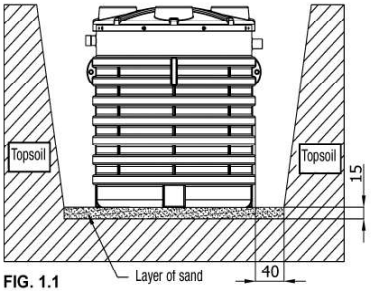


FIG. 1.1

2. BACKFILL AND FILLING

2.1 Place the **totally empty tank** on the bed of sand at the bottom of the hole, gradually fill the tank with water and at the same time support it by backfilling with sand: proceed with successive layers of **15/20 cm**, first filling the tank and then backfilling with compacted sand. **NEVER** use material with sharp edges.
N.B. For installation in more severe conditions (groundwater, clay soils or in sloping ground), refer to paragraphs 2.6, 2.7 and 2.8.

2.2 After the tank had been filled and the hole suitably backfilled, gradually cover with topsoil to a depth of 20/30 cm, leaving the inspection covers exposed. In this way, the area concerned is suitable for **pedestrian traffic**, while the transit of motor vehicles **within 2 m of the excavation** is prohibited.
N.B. To render the site trafficable by motor vehicles, refer to chapter 3.

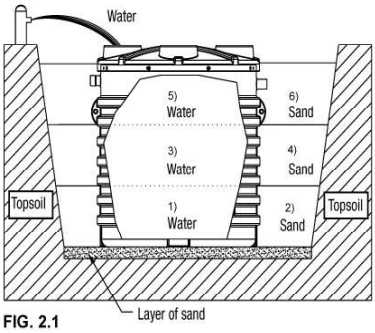


FIG. 2.1

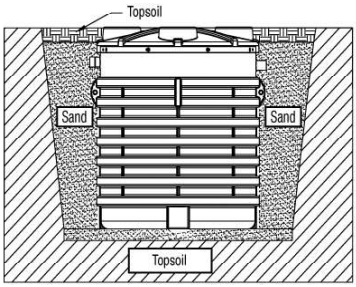


FIG. 2.2

Underground installation instructions

2.3 EXTENSION INSTALLATION

If the tank is installed **at a depth of 30 cm** and the site is to remain open to pedestrian traffic, it is advisable to install the **Rototec polyethylene extensions** directly on the inlet and outlet inspection holes. In the case where the tank is installed deeper than that previously indicated, which constitutes an unfavourable condition and not recommended by Rototec, adhere scrupulously to the instructions reported in **chapter 3 "Trafficability"**. The technician responsible for the installation will follow the instructions reported in the two paragraphs according to the installation depth.

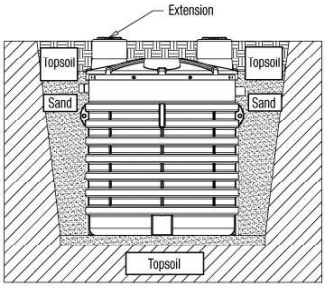


FIG. 2.3

2.4 BIOGAS VENT CONNECTION

In order to prevent the formation of malodours and, consequently, enable the company treatment plant to function efficiently, **ALWAYS** connect a PVC or PE pipe (the diameter will vary according to the tank model) to the connection point provided for the biogas vent on the tank cover. Run the pipe to the **highest point of the building** along the downpipes and away from the dwelling.

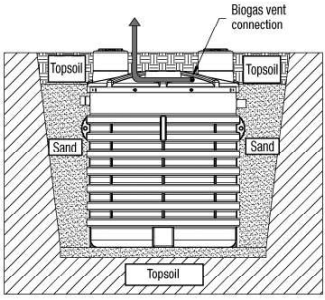


FIG. 2.4

2.5 MANHOLES INSTALLATION

The installation of manholes or covers of **weight exceeding 50 kg** must always be solid with the **concrete slab** designed to allow a uniformly distributed load on the tank. Avoid constructions in brickwork which would compromise maintenance and/or eventual replacement of the tank itself.

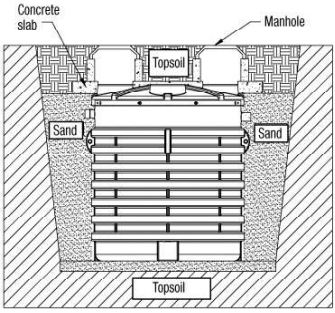


FIG. 2.5

2.6 INSTALLATION IN ZONES WITH GROUNDWATER

Installation in the presence of **groundwater** represents one of the riskiest conditions for a storage tank. In this case, it is advisable to obtain a **geotechnical report** from a specialist. From the report, the installation technician will be able to define the expected pressure from the groundwater and design the backfill material and slab accordingly. In particular, he will design the backfill to have the necessary capacity for resisting the high lateral forces. The resistance capacity can be further increased by inserting an electro-welded wire mesh. After having constructed the **concrete slab** at the bottom of the excavation, a 10 cm thick layer of sand must be spread over the top to fill in the voids between the corrugations in the base of the tank. The tank filling and backfilling operations must always be carried out **progressively**. It is advisable, therefore, to half fill the tank and at the same time backfill with **reinforced concrete** and allow it to stand for **24/36 hours** [Fig. 2.6 points 1 and 2]. After which, complete the tank filling and the backfill [Fig. 2.6 points 3 and 4].

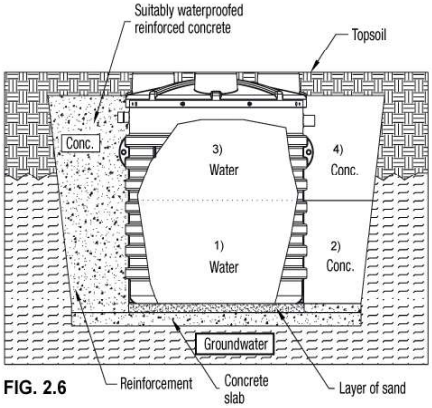


FIG. 2.6

2.7 INSTALLATION IN ZONES WITH CLAYEY SOIL

Installing an underground storage tank in areas with **clay subsoil** represents another unfavourable condition for the tank. A **geotechnical report** prepared by a specialist is advisable in this case also. From the report, the installation technician will be able to define the expected **ground pressure** (high in the case of clayey soil) and design the backfill accordingly. In particular, the bottom of the excavation must be covered by a bed of finely crushed stone or fine gravel (diameter **5/8 mm**) and the sides of the tank backfilled with gravel (diameter **20/30 mm**). The tank filling and backfilling operations must always be carried out progressively as previously specified (See para. 2.1). It is also advisable to install a **drainage system** at the bottom of the excavation.

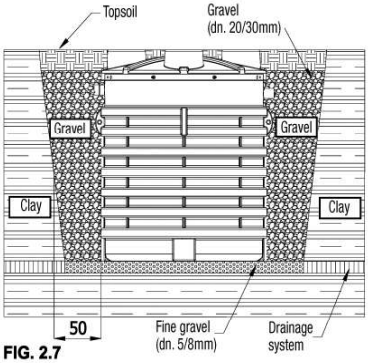


FIG. 2.7

2.8 INSTALLATION NEAR TO SLOPING GROUND

When the tank is to be installed near to a **slope** or on sloping ground, the tank must be protected by a **reinforced concrete retaining wall**, appropriately designed by a specialist, in order to balance the lateral thrust of the ground and to protect the area from possible infiltration. The tank filling and backfilling operations must always be carried out progressively as previously specified (See para. 2.1).

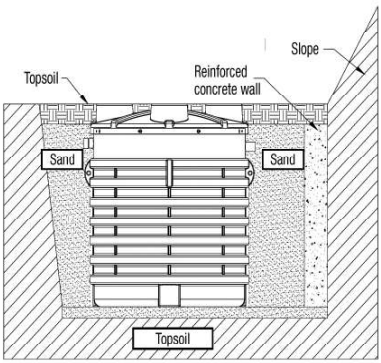


FIG. 2.8

Underground installation instructions

3. TRAFFICABILITY

3.1 LIGHT TRAFFIC - CLASS B125-EN124/95 - MAX 12.5 TONS

To render the site suitable for the **transit of light vehicles**, a **self-supporting reinforced concrete slab,** designed in relation to the load, must be constructed. The perimeter of the slab must be larger than the tank excavation to prevent the weight of the slab from bearing on the tank itself. It is also advisable to construct a 15/20 cm thick **concrete slab** at the bottom of the excavation. A 10 cm thick layer of sand must be spread over the top to fill in the voids between the corrugations in the base of the tank. The self-supporting reinforced concrete top slab and the bottom concrete slab must be designed by a qualified professional. The tank filling and backfilling operations must always be carried out progressively as previously specified (See para. 2.1).

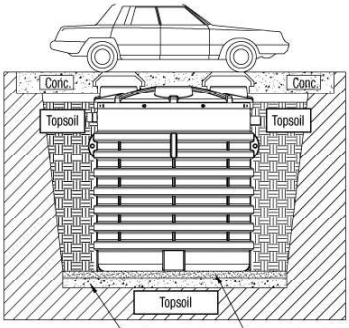


FIG. 3.1

3.2 HEAVY TRAFFIC - CLASS D400-EN124/95 - MAX 40 TONS

To render the site suitable for the **transit of heavy vehicles**, a **reinforced concrete containment structure** cast on-site with a suitable **concrete cover slab** must be provided. The perimeter of the slab must be larger than the tank excavation in order to distribute the load on the containment walls and not on the tank itself. It is advisable to spread a 10 cm thick layer of sand at the bottom of the containment structure to fill in the voids between the corrugations in the base of the tank. The containment structure and top slab must be designed by a qualified professional in relation to the expected loads. The tank filling and backfilling operations must always be carried out progressively as previously specified (See para. 2.1).

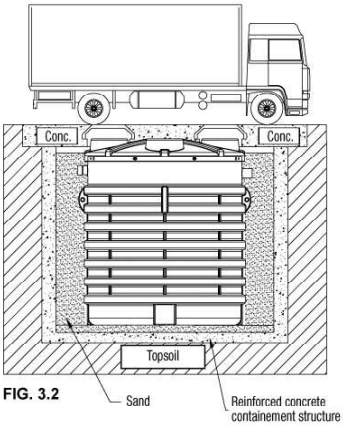


FIG. 3.2

Law Decree 152/2006: "Environmental standards"

ART. 74, "Definitions":

- Population equivalent: the biodegradable organic load having a biochemical oxygen demand (BOD5) of 60 grams of oxygen per day.
- Domestic sewage: waste water from residential type buildings and services and prevalently from the human metabolism and domestic activities.
- Industrial sewage: any waste water from buildings or installations in which commercial or production activities are carried out, qualitatively different from domestic waste water and stormwater runoff, intended as also including that which has come into contact with substances or materials, including pollutants, not linked to the activities performed at the site.
- Urban sewage: the mixture of domestic sewage, industrial sewage and/or stormwater runoff carried by a public sewer, including separated, and originating from built-up areas.
- Discharge: any input of effluent to surface watercourses, soil, subsoil and sewerage system, independent of its polluting nature, including effluent subjected to purification treatment.
- Primary treatment: the treatment of sewage involving sedimentation of suspended solids by physical and/or chemical/physical and/or other processes, following which and prior to discharge, the BOD_5 of the effluent being treated has been reduced by at least 20% and the suspended solids by at least 50%.
- Secondary treatment: the treatment of sewage by means a process which generally involves biological treatment with secondary sedimentation or by any another process in which the requirements of table 1 of Appendix 5 of the third part of this decree are complied with.

Notes on the tables:

(*) the limits for discharging to a sewerage system indicated in table 3 are obligatory in the absence of limits laid down by the sector authority or in the absence of a final treatment plant capable of respecting the discharge limits of the final effluent. Different limits provided for by the managing authority must be made to comply with that indicated in note 2 of table 5 relating to hazardous substances.

(1) for watercourses, the maximum variation between the mean temperature at any cross section of the watercourse upstream and downstream of the discharge point must not exceed 3 °C. On at least half of any cross section downstream, this variation must not exceed 1 °C. For lakes, the temperature of the discharge must not exceed 30 °C and the increase in temperature of the receiving body of water must not in any case exceed 3 °C at more than 50 m distance from the outfall. For artificial channels, the maximum mean value of the water temperature at any cross section must not exceed 35 °C, the above condition is subject to the approval of the authority managing the channel. For sea and estuaries of small watercourses, the temperature of the discharge must not exceed 35 °C and the increase in temperature of the receiving body of water must not in any case exceed 3 °C at more than 1000 m distance from the outfall. Environmental compatibility of the discharge with the receiving body of water must be guaranteed and the formation of thermal barriers at river estuaries must be avoided.

(2) As far as urban sewage discharges are concerned, the limits indicated in table 1 apply and, for sensitive areas, those indicated in table 2. For discharges of industrial sewage in sensitive areas, the total phosphorous and total nitrogen concentrations must be 1 and 10 mg/l respectively.

(3) These limits are not applicable to sea outfalls, in this respect, estuary zones regarded as being equivalent to coastal seawater, providing the natural variations in the concentrations of sulphates or chlorides are not disturbed in at least half of any one cross-section downstream of the outfall.

(4) When applying for authorisation to discharge from an urban sewage treatment plant, the competent authority will fix the most appropriate limits to comply with in relation to the environmental and hygiene-sanitary situation of the receiving body of water and its current usage. A limit not exceeding 5000 UFC/100 ml is recommended.

(5) The toxicity test is obligatory. In addition to the Daphnia magna test, acute toxicity tests can also be carried out on Ceriodaphnia dubia, Selenastrum capricornutum, luminescent bacteria or organisms such as Astemia salina, for discharges of salt water, or other organisms indicated in accordance with point 4 of this appendix. In the case of more than one toxicity test, the worst result is considered. A positive result of the toxicity test does not necessarily indicate the direct application of the sanctions provided for under heading V, but also provides for the obligation for ulterior analytical analyses, research into the causes of the toxicity and their elimination.

Parameter	Measure-ment unit	Table 3 Discharge to surface watercourses	Table 3 Discharge to public sewer (*)	Table 4 Discharge to land
pH		5.5 – 9.5	5.5 – 9.5	6 - 8
SAR				10
Temperature	°C	(1)	(1)	
Colour		Not perceptible with dilution 1:20	Not perceptible with dilution 1:40	
Odour		Not to be annoying	Not to be annoying	
Coarse materials		Absent	Absent	Absent
Total suspended solids (2)		≤ 80	≤ 200	≤ 25
BOD5 (come O2) (2)	mg/L	≤ 40	≤ 250	≤ 20
COD (come O2) (2)	mg/L	≤ 160	≤ 500	≤ 100
Alluminium	mg/L	≤ 1	≤ 2	≤ 1
Arsenic	mg/L	≤ 0.5	≤ 0.5	≤ 0.05
Barium	mg/L	≤ 20		≤ 10
Beryllium	mg/L	≤ 0.1		
Boron	mg/L	≤ 2	≤ 4	≤ 0.5
Cadmium	mg/L	≤ 0.02	≤ 0.002	
Total chrome	mg/L	≤ 2	≤ 4	≤ 1
Chromium VI	mg/L	≤ 0.2	≤ 0.2	≤ 0.05
Iron	mg/L	≤ 2	≤ 4	≤ 2
Manganese	mg/L	≤ 2	≤ 4	≤ 0.2
Mercury	mg/L	≤ 0.005	≤ 0.005	
Nickel	mg/L	≤ 2	≤ 4	≤ 0.2
Lead	mg/L	≤ 0.2	≤ 0.3	≤ 0.1
Copper	mg/L	≤ 0.1	≤ 0.4	≤ 0.1
Selenium	mg/L	≤ 0.03	≤ 0.03	≤ 0.002
Tin	mg/L	≤ 10		≤ 3
Vanadium	mg/L	≤ 0.1		
Zinc	mg/L	≤ 0.5	≤ 1.0	≤ 0.5
Total cyanide (such as CN)	mg/L	≤ 0.5	≤ 1.0	
Free active chlorine	mg/L	≤ 0.2	≤ 0.3	≤ 0.2
Sulphides (such as S)	mg/L	≤ 1	≤ 2	≤ 0.5
Sulphites (such as SO2)	mg/L	≤ 1	≤ 2	≤ 0.5
Sulphates (such as SO3) (3)	mg/L	≤ 1000	≤ 1000	≤ 500
Chlorides (3)	mg/L		≤ 1200	≤ 200
Fluorides	mg/L	≤ 1200		
Total phosphorous (such as P) (2)	mg/L	≤ 6	≤ 12	≤ 1
Ammoniacal nitrogen (such as NH4) (2)	mg/L	≤ 10	≤ 10	≤ 2
Nitrous nitrogen (such as N) (2)	mg/L	≤ 15	≤ 30	≤ 5
Nitric nitrogen (such as N) (2)	mg/L	≤ 0.6	≤ 0.6	
Total nitrogen	mg/L	≤ 20	≤ 30	
Greases and animal/vegetable oils	mg/L			≤ 15
Total hydrocarbons	mg/L	≤ 20	≤ 40	
Phenols	mg/L	≤ 0.5	≤ 1	≤ 0.1
Aldehydes	mg/L	≤1	≤ 2	≤ 0.5
Aromatic organic solvents	mg/L	≤ 0.2	≤ 0.4	
Total aromatic organic compounds	mg/L			≤ 0.01
Total nitrogenous organic compounds	mg/L			≤ 0.01
Nitrogenous organic solvents	mg/L	≤ 0.1	≤ 0.2	
Total surfactants	mg/L	≤ 2	≤ 4	≤ 0.5
Phosphorated pesticides	mg/L	≤ 0.10	≤ 0.10	≤ 0.01
Total pesticides	mg/L			
(excluding phosphorated)	mg/L	≤ 0.05	≤ 0.05	≤ 0.05
Including:				
- aldrin	mg/L	≤ 0.01	≤ 0.01	
- dieldrin	mg/L	≤ 0.01	≤ 0.01	
- endrin	mg/L	≤ 0.002	≤ 0.02	
- isodrin	mg/L	≤ 0.002	≤ 0.02	
Chlorinated solvents	mg/L	≤ 1	≤ 2	
Escherichia coli (4)	UFC /			
100 mL	notes			
Acute toxicity test (5)	mg/L	The sample is unacceptable when, after 24 hours, the number of immobile organisms is greater than or equal to 50% of the total.	The sample is unacceptable when, after 24 hours, the number of immobile organisms is greater than or equal to 80 % of the total.	The sample is unacceptable when, after 24 hours, the number of immobile organisms is greater than or equal to 50% of the total.

SEWAGE TREATMENT DIVISION

WATER DIVISION

INFINITANK

GARDEN DIVISION