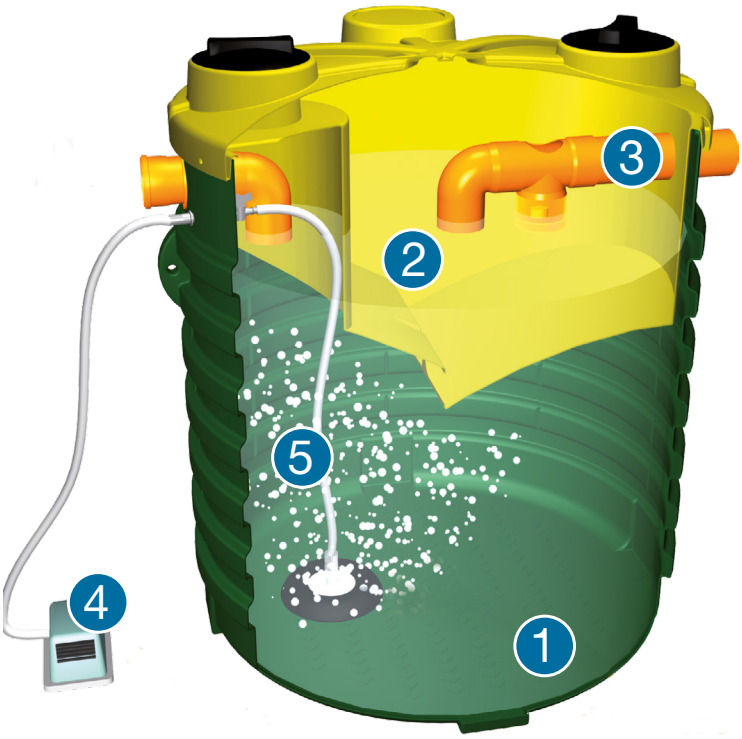
ACTIVATED SLUDGE PLANT

LOW-LOAD



1 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.

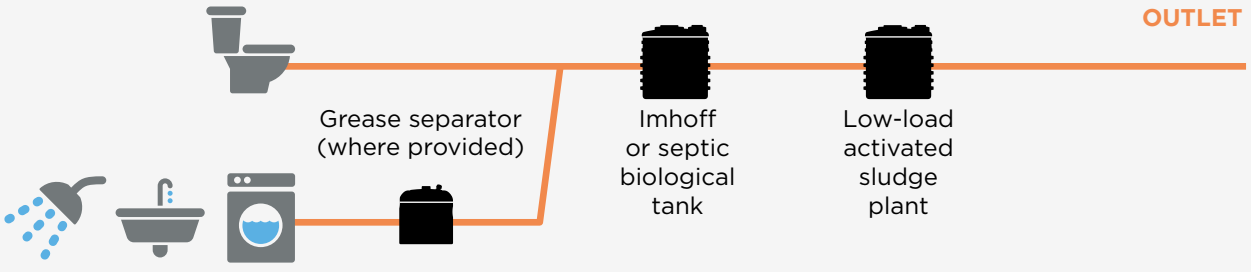
2 SEDIMENTATION AREA
stilling area in which the residual sludge sediments and returns once again to the oxygenation section.

3 OUTLET PIPE
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 BLOWER
(included).

5 DIFFUSER PLATE
(included).

INSTALLATION DIAGRAM



SPECIFICATIONS

TECHNICAL CHARACTERISTICS

Activated sludge plants are secondary treatment systems that make use of the action of the bacterial colonies that, remaining in suspension in the effluent, consume the biodegradable organic material, using it as a nutrient to obtain the necessary energy and the material required for the synthesis of new cells. In this manner, increasingly stable compounds are formed leading to the total degradation of the organic load. Very high concentrations of aerobic type bacteria are developed inside activated sludge plants, sufficient, that is, to absorb the dissolved oxygen in the water in order to consume the biodegradable material. To guarantee the concentration of oxygen necessary for the development of the biological reaction, an aeration system is adopted consisting of submerged diffusers ep the high concentrations of solids present in the tank in suspension.

USE

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

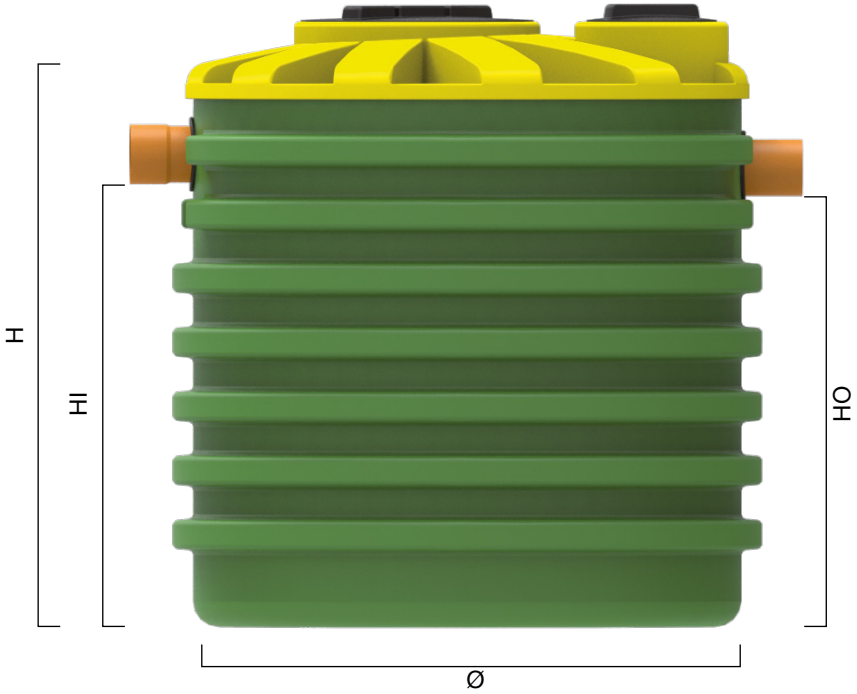
The wastewater treatment system made up of a grease separator, an Imhoff biological tank and an activated sludge plant (installed as shown in the diagram at page 66) ensures that the concentrations of the final effluent are:

≤160 mg/l	≤40 mg/l	≤80 mg/l
COD	**BOD_5**	**SS**

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

≤600 mg/l	≤300 mg/l	≤400 mg/l
COD	**BOD_5**	**SS**

ACTIVATED SLUDGE PLANT

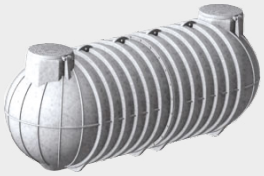


MODEL

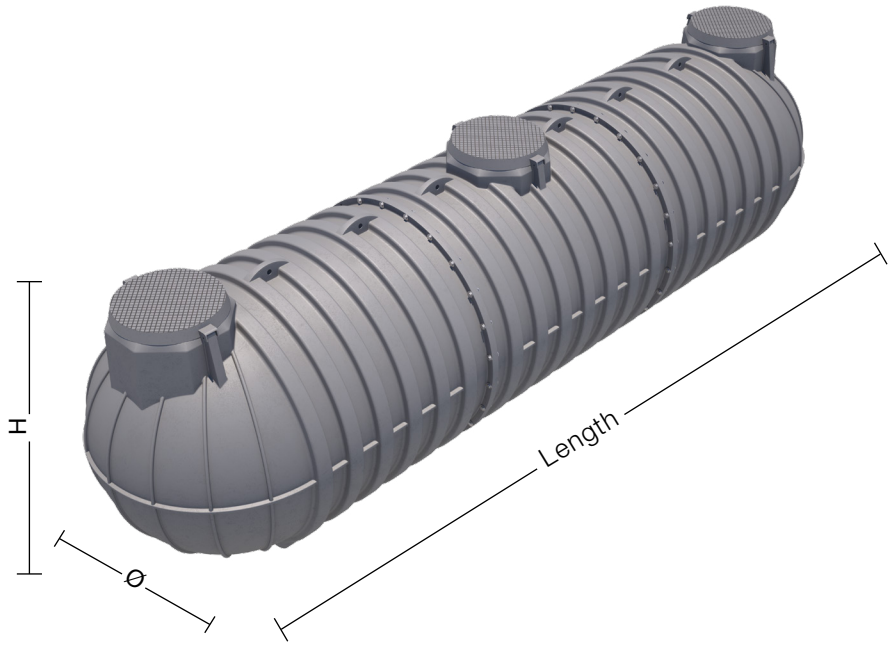
CORRUGATED

ELIPSE

MODULAR



ACTIVATED SLUDGE PLANT MODULAR



ACTIVATED SLUDGE PLANT - LOW-LOAD

Item	Mod.	Length mm	Width mm	Ø mm	H mm	HI mm	HO mm	Ø I/O mm	Covers 1	Covers 2	Extens. 1 (optional)	Extens. 2 (optional)	Sedimentation Volume l	Aerated Volume l	Blower Volume l	Diffuser Plates No.	PE.
NIFA1000		-	-	1150	1220	880	860	110	CC400	CC200	PP45	PP30	243	607	HP40	1	**6**
NIFA1200		1900	708	-	1630	1250	1230	110	CC300	CC300	PP35	PP35	290	910	HP40	1	**7**
NIFA1500		-	-	1150	1720	1360	1340	110	CC400	CC200	PP45	PP30	362	906	HP40	1	**9**
NIFA1700		1900	708	-	2140	1760	1740	110	CC300	CC300	PP35	PP35	412	1363	HP40	1	**9**
NIFA2100		-	-	1350	1975	1540	1520	110	CC400	CC300	PP45	PP35	480	1470	HP60	2	**12**
NIFA2600		-	-	1710	1450	1000	980	125	CC400	CC300	PP45	PP35	629	1432	HP80	2	**14**
NIFA3200		-	-	1710	1725	1240	1220	125	CC400	CC300	PP45	PP35	760	1765	HP80	2	**17**
NIFA3800		-	-	1710	1955	1490	1470	125	CC400	CC300	PP45	PP35	965	2139	HP80	2	**20**
NIFA4600		-	-	1710	2225	1710	1690	160	CC400	CC300	PP45	PP35	1085	2713	HP80	2	**25**
NIFA5400		-	-	1950	2250	1660	1640	160	CC400	CC400	PP45	PP45	1210	3137	HP80	2	**30**
NIFA6400		-	-	1950	2530	1970	1950	160	CC400	CC400	PP45	PP45	1322	3778	HP80	2	**35**
NIFA7000		-	-	2250	2367	1850	1830	160	CC400	CC400	PP45	PP45	1460	5474	HP150	2	**45**
NIFA9000		-	-	2250	2625	2070	2050	160	CC400	CC400	PP45	PP45	2020	5803	HP150	2	**52**
ITIFA15000		5620	-	2100	2200	1870	1850	160	TAP800	-	PP77	-	402	14150	HP402SF	12	**80**
ITIFA22000		7880	-	2100	2200	1870	1850	160	TAP800	-	PP77	-	402	20700	HP402SF	18	**120**
ITIFA30000		10140	-	2100	2200	1870	1850	160	TAP800	-	PP77	-	402	27250	HP502SF	24	**150**
ITIFA36000		12400	-	2100	2200	1870	1850	160	TAP800	-	PP77	-	402	33800	HP502SF	30	**180**

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

TECHNICAL SECTION - ACTIVATED SLUDGE PLANTS

TECHNICAL CHARACTERISTICS

Activated sludge plants are secondary treatment systems that make use of the action of the bacterial colonies that, remaining in suspension in the effluent, consume the biodegradable organic material, using it as a nutrient to obtain the necessary energy and the material required for the synthesis of new cells. In this manner, increasingly stable compounds are formed leading to the total degradation of the organic load. Very high concentrations of aerobic type bacteria are developed inside activated sludge plants, sufficient, that is, to absorb the dissolved oxygen in the water in order to consume the biodegradable material. To guarantee the concentration of oxygen necessary for the development of the biological reaction, an aeration system is adopted consisting of submerged diffusers which, from the bottom of the tank, disperse a flow of fine air bubbles. This also guarantees sufficient mixing to keep the high concentrations of solids present in the tank in suspension.
In the oxygen rich environment of the aeration tank, a number of different processes are set in motion:
- **Chemical**, i.e. the oxidation of malodorous compounds (hydrogen sulphide, sulphites…)
- **Physical**, i.e. the removal of effluent solids trapped by the dispersion of bacteria
- **Biological**, i.e. direct assimilation of the organic substances dissolved in the sewage.

The sizing of the activated sludge plants is performed on the basis of the **sludge load** (or organic load factor) expressed as the ratio between the organic load BOD_5 and the micro-organisms; the lower this ratio, the more intensely the organic load is consumed, at the same time reducing the production of excess sludge. Rototec activated sludge plants are sized to have sludge loads of less than 0.08 KgBOD / KgSSD with retention times of more than 24 hours at mean flows and volumetric loads of less than 0.25 KgBOD / m^3d in the prolonged aeration (or total oxidation) configuration and sludge loads of less than 0.15 KgBOD/KgSSD and volumetric loads less than 0.5 KgBOD / m^3d in the low-load configuration.

USE AND MAINTENANCE

The small user activated sludge plant is designed with the sedimentation compartment inside the oxidation tank in order to provide sewage settlement as well as sludge recirculation. This however leads to a build-up of solids in the oxidation chamber. It should be remembered that in order to ensure the correct operation of an activated sludge plant, a grease separator should be installed upstream of the reactor itself, and that the aeration should be kept on during the periods of use of the plant. The plant needs 10-15 days in order to reach normal operation. This time can be reduced however by adding biomass activators (Rototec bio activator) directly to the sewage.

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
Check operation of the blower	Every month	Unfasten the inlet inspection hole cover and check that air is being blown in
Extract the bottom sludge, clean the interior, the inlet and outlet pipes and the diffuser plate	Every 6 / 12 months	Contact a licensed waste disposal company
Change the chlorine tablet	Every 2 months	Unfasten the outlet inspection hole cover and insert the tablet in the housing provided

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

PROHIBITIONS

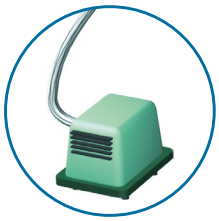
- **do not use toxic and/or poisonous substances** (bleach, solvents, insecticides, disinfectant substances, aggressive detergents), always use biodegradable products;
- **NEVER** put the chlorine tablet into the plant, but insert it in the proper housing;
- **NEVER** drain rainwater into the system.

WARNINGS

- make sure that drains have a siphon;
- check that the pipes slope sufficiently (approximately 1% - 2%);
- connect the biogas vent pipe (**see installation method**);
- when discharging into the subsoil using a soil absorption system, provide a dosing siphon chamber downstream of the system, for better distribution of the effluent into the dispersion pipes;
- after pump-out, fill the tank 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.

ACTIVATED SLUDGE PLANT ACCESSORIES (INCLUDED IN THE SUPPLY)

BLOWER/COMPRESSOR



Rototec fits its Activated Sludge plants with diaphragm type air compressors which make use of the **electromagnetic vibration** of an actuator rod supported by rubber diaphragms.
This system reduces **energy consumption to a minimum**, by supplying constant air flows without any variations in working pressure. The blower does not have any moving parts in contact, and as such does **not require any lubrication**. Special attention is paid to the acoustic insulation and to the design of the vibrating section of the compressor in order to make it **as silent as possible**.

COMPRESSOR BLOWER

Model	Voltage V	Frequency Hz	Power W	Capacity (l/min)	Noise level (dBa)	Weight (kg)	Max length (mm)	Max width (mm)	Max height (mm)
HP 40	220	50	38	40	< 37	5.7	250	185	190
HP 60	220	50	56	60	<39	7	250	185	196
HP 80	220	50	78	80	< 41	7	250	185	196
HP 150	220	50	145	160	< 50	9	300	230	230
HP 200	220	50	186	200	< 50	12	300	230	250

INSTALLATION

- install in a special above ground technical room (with an environment free from corrosive gas), protected from the weather but with adequate ventilation to avoid overheating of the blower;
- **maximum distance of 10 m** from the activated sludge plant;
- the blower must rest on a stable, flat surface, not exposed to vibration, at a level higher than that of the plant itself so as to avoid any return of the sludge if the air supply is interrupted;
- if necessary, provide ducting for the air pipe, running from the technical room to the edge of the tank (minimum diameter 80mm), and for the electric cable (minimum diameter 63mm);
- connect one end of the air feed pipe supplied to the outlet of the blower using the appropriate clips;
- connect the other end of the pipe to the coupling on the tank;
- when installation has been completed, connect the blower to the **power socket (220V, 50Hz)**.

BLOWER TIMING

- the blower must remain switched on **24h a day for the first 2-3 months** in order to activate the purification processes;
- after the activation period, blower operation can be timed as follows: **2 hours ON- 30 minutes OFF** (repeated for all 24 hour periods)

MANAGEMENT

WHAT TO DO	WHEN	HOW
Check that the blower is working properly	Every month	Unfasten the cover on the inlet inspection hole and check that air is being blown into the tank
Clean the suction filter	Every 3 months	Remove the filter, eliminate excess dust and if necessary wash with mild detergent

PROHIBITIONS

- never connect the compressor to energy sources other than those indicated. If you have any doubts about how to do so, DO NOT connect up the equipment.

WARNINGS

- the operating temperature must be between –20°C and +40°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;

ACTIVATED SLUDGE PLANT ACCESSORIES (INCLUDED IN THE SUPPLY)

SIDE CHANNEL COMPRESSORS/BLOWERS

construction of the ring blowers fan is based on the lateral ducts principle. The blowers can operate as either exhaust or compression fans and are designed for continuous service. The device is assembled directly on the motor shaft: all rotating parts are dynamically balanced to ensure absolute absence of vibration. Full die-cast aluminium construction for maximum sturdiness and ease of handling.

USE AND MAINTENANCE

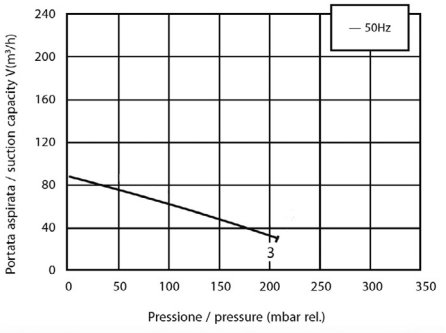
the blower does not have any moving parts in contact, and as such does not require lubrication, its operation is long-term and does not require any other maintenance. It should, however, be installed in a suitable cabinet by qualified personnel.

BLOWER TIMING

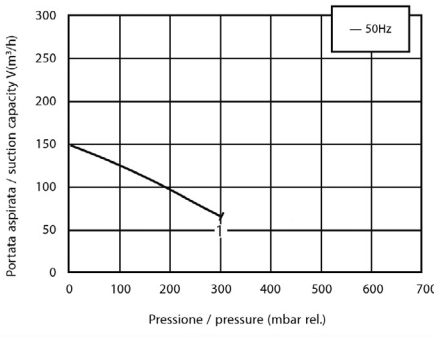
- the blower must remain switched on **24h a day for the first 2-3 months** in order to activate the purification processes;
- after the activation period, blower operation can be timed as follows: **2 hours ON-30 minutes OFF** (repeated for all 24 hour periods)

Item	Voltage V	Frequency Hz	Power W	Absorption (A)	Noise level (dBa)	Weight (kg)	Length (mm)	Width (mm)	Height (mm)
HP302SF	220	50	0.7	4.5	< 55	15	458	316	270
HP302SF	380	50	1.6	5.6	< 66	24	485	401	315
HP302SF	380	50	3	10	< 72	38	597	465	371

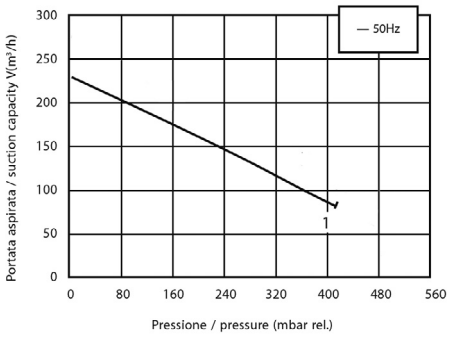
HP302SF



HP402SF



HP502SF



ACTIVATED SLUDGE PLANT ACCESSORIES (INCLUDED IN THE SUPPLY)

PLATE DIFFUSERS

In its activated sludge plants, Rototec uses diaphragm type diffusers in microbored rubber, constructed to provide a uniform distribution of air with bubbles of microscopic diameter designed to optimise the oxygenation of the effluent. The particular structure of the plates reduces the risk of blockages even during intermittent operation to a minimum and eliminates the possibility of its separation during the inspection phase, thus guaranteeing a high air flow with minimum head loss. The rubber lining of the rigid air distributor provides protection against accidental damage to the system, which will maintain its original characteristics over time. The innovative composition of the plate also ensures absolute impermeability of the connection between the diaphragm, the support plate and the support coupling.

Item	Diameter mm	Weight kg	Maximum air flow rate m^3/h	Diameter of bubbles mm	Oxygenation capacity gO^2 / Nm^3 per metre head
IFADN	211	2.1	5	1-3	18-20

INSTALLATION

- already fitted inside the tank and connected to the set-up provided;
- stays on the bottom of the tank thanks to its special micro-pore rubber structure.

MANAGEMENT

WHAT TO DO	WHEN	HOW
Clean the diffuser plate	During pump-out of the plant (every 6/12 months)	Contact a licensed waste disposal company (water jet pump-out)

WARNINGS

- during cleaning operations, lift the plate using the transparent pipe provided, paying attention to the set-up in the tank.

MEMBRANE AIR DIFFUSERS

rubber surface with microholes that act like one valve, dilating themselves in order to let out the air but closing up once the flow is interrupted preventing to the water to enter

APPLICATIONS

- Wastewater treatment
- Intermittent operation capability
- Clean water treatment
- Sludge stabilization
- Aeration of fish pond, streams and lakes

USE AND MAINTENANCE

the particular structure of the plates reduces the risk of blockages even during intermittent operation to a minimum and eliminates the possibility of its separation during the inspection phase, thus guaranteeing a high air flow with minimum head loss. The rubber lining of the rigid air distributor provides protection against accidental damage to the system, which will maintain its original characteristics over time. During the cleaning operations of the oxidation plant, clean the membrane air diffusers with water to avoid any clogging of the bored surface.

Item	Material	Diameter mm	Size and quantity of the bubbles	Connection	Air flow	Operation temperature	Diffusion area
IFADN250	High grade EPDM hardness 60° ±5	250	1-3 mm 8300 holes	R ¾" NPT	1,5-8,5 m^3/h	0 – 100 °C	1,67 m