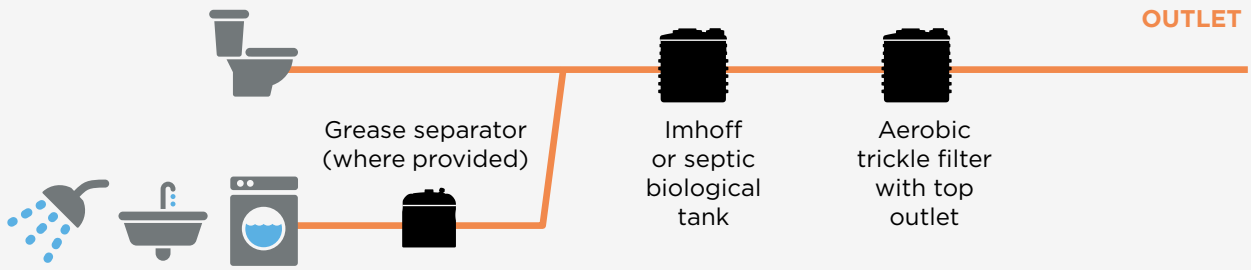
AEROBIC TRICKLE FILTER
TOP OUTLET WITH BLOWER (MBBR)

1. **DISTRIBUTION PIPE**
   bored pipe for even distribution of the effluent on the surface of the filter.
2. **FILTER MEDIA**
   plastic filler elements with a large surface area that act as a support on which the aerobic bacterial responsible for treating the effluent can develop.
3. **COLLECTION PIPE**
   pipe to draw off the treated effluent from the bottom and send it to the outlet.
4. **COMPRESSOR BLOWER (MBBR)**
   to pump the air inside the tank (included).
5. **DIFFUSER PLATES**
   for distribution of the air micro-bubbles (included).

INSTALLATION DIAGRAM



SPECIFICATIONS

TECHNICAL CHARACTERISTICS

A trickle filter is a biological reactor, inside which the micro-organisms that purify the effluent develop on the surface of special bulk fill material (filter media). The uniform distribution of the effluent through the filter guarantees maximum contact between the organic material to purify and the biological film covering the spheres making up the fill material. More specifically, the bacteria that grows and develops inside the aerobic trickle filter with top outlet (MBBR) consumes the organic load in the effluent in the presence of oxygen, continually entering the tank through the external compressor and distributed by the diffuser plates.

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

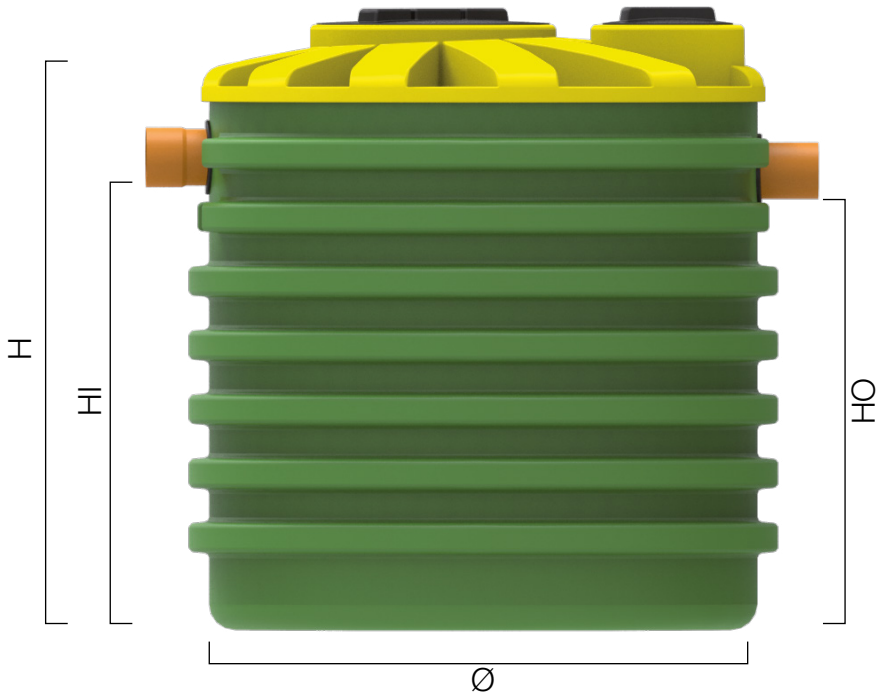
The wastewater treatment system made up of a grease separator, an Imhoff biological tank and an aerobic trickle filter with top outlet MBBR (installed as shown in the diagram at page 84) ensures that the concentrations of the final effluent are:

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

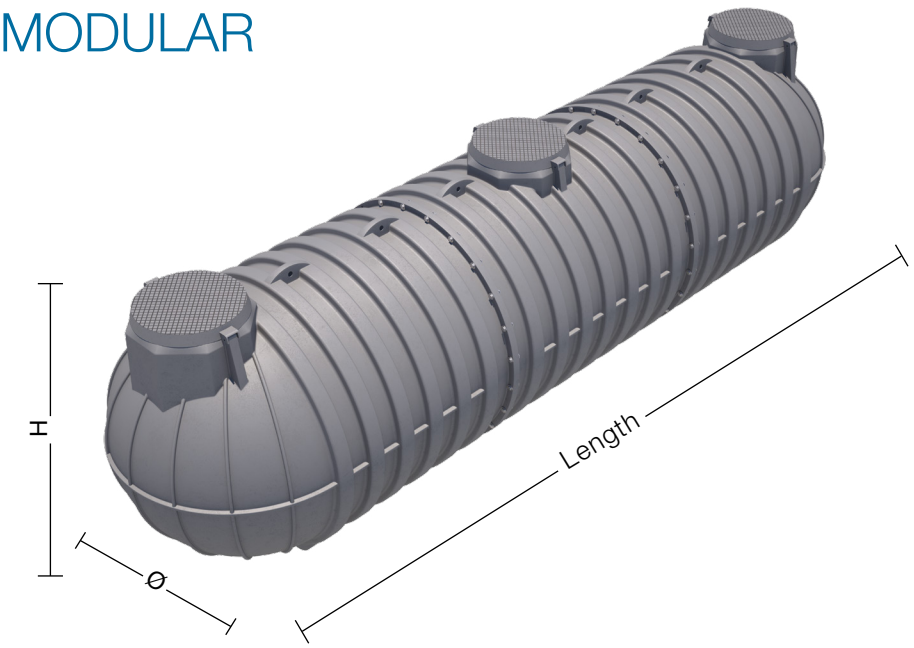
These parameters are respected if the inlet wastewater have the following characteristics (typical concentrations of domestic sewage):

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

AEROBIC TRICKLE FILTER
TOP OUTLET WITH BLOWER (MBBR)



TRICKLE FILTER
AEROBIC WITH TOP OUTLET
MODULAR



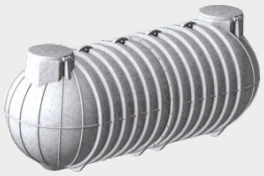
MODEL

CORRUGATED

UNDERGROUND TANK

ELIPSE

MODULAR



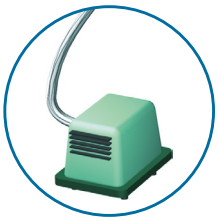
AEROBIC TRICKLE FILTER WITH TOP OUTLET AND BLOWER (MBBR)

Item	Mod.	Length mm	Width mm	Ø mm	H mm	HI mm	HO mm	Ø I/O mm	Covers 1	Covers 2	Extension 1 (optional)	Extension 2 (optional)	Blowers	Filter surface m^2	Filter volume m^3	PE.
NARA1000		-	-	1150	1220	880	860	110	CC400	CC200	PP45	PP30	HP40	1,04	0,85	**6**
NARA1200		1900	708	-	1630	1250	1230	110	CC300	CC300	PP35	PP35	HP40	1,35	1,20	**7**
NARA1500		-	-	1150	1720	1360	1340	110	CC400	CC200	PP45	PP30	HP40	1,04	1,26	**10**
NARA1700		1900	708	-	2140	1760	1740	110	CC300	CC300	PP35	PP35	HP40	1,35	1,77	**10**
NARA2100		-	-	1350	1975	1540	1520	110	CC400	CC300	PP45	PP35	HP40	1,39	1,80	**15**
NARA2600		-	-	1710	1450	1000	980	125	CC400	CC300	PP45	PP35	HP60	2,30	2,06	**16**
NARA3200		-	-	1710	1725	1240	1220	125	CC400	CC300	PP45	PP35	HP60	2,30	2,52	**20**
NARA3800		-	-	1710	1955	1490	1470	125	CC400	CC300	PP45	PP35	HP60	2,30	3,10	**23**
NARA4600		-	-	1710	2225	1710	1690	125	CC400	CC300	PP45	PP35	HP60	2,30	3,80	**28**
NARA5400		-	-	1950	2250	1660	1640	125	CC400	CC400	PP45	PP45	HP60	2,90	4,75	**32**
NARA6400		-	-	1950	2530	1970	1950	125	CC400	CC400	PP45	PP45	HP60	2,90	5,07	**38**
NARA5700		2420	1920	-	2100	1690	1670	125	TAP800	-	PP77	-	HP80	3,78	5,60	**42**
NARA7000		-	-	2250	2367	1850	1830	125	CC400	CC400	PP45	PP45	HP80	3,98	6,93	**50**
NARA9000		-	-	2250	2625	2070	2050	125	CC400	CC400	PP45	PP45	HP80	3,98	7,82	**56**
NARA10700		2780	2430	-	2660	2170	2130	160	TAP800	-	PP77	-	HP80	6,75	10,00	**80**
ITARA15000		5620	-	2100	2200	1830	1800	160	TAP800	-	PP77	-	HP402SF	10,20	14,15	**110**
ITARA22000		7880	-	2100	2200	1830	1800	160	TAP800	-	PP77	-	HP402SF	14,90	20,07	**150**
ITARA30000		10140	-	2100	2200	1810	1780	200	TAP800	-	PP77	-	HP502SF	19,16	27,25	**210**
ITARA36000		12400	-	2100	2200	1810	1780	200	TAP800	-	PP77	-	HP502SF	23,67	33,08	**250**

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

AEROBIC TRICKLE FILTER WITH TOP OUTLET AND BLOWER (MBBR) 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;

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

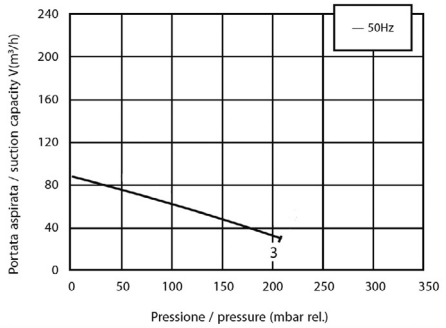
the blower does not have any moving parts in contact, and as such does not require lubrication, its operation is long-term and does not require any other maintenance. It should, however, be installed in a suitable cabinet by qualified personnel.

BLOWER TIMING

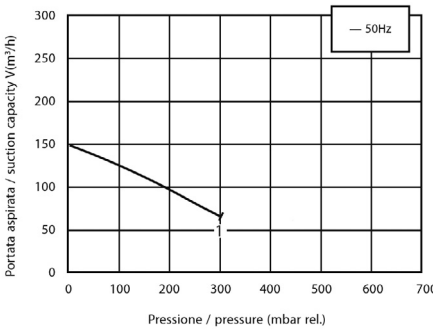
- the blower must remain switched on **24h a day for the first 2-3 months** in order to activate the purification processes;
- after the activation period, blower operation can be timed as follows: **2 hours ON-30 minutes OFF** (repeated for all 24 hour periods)

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

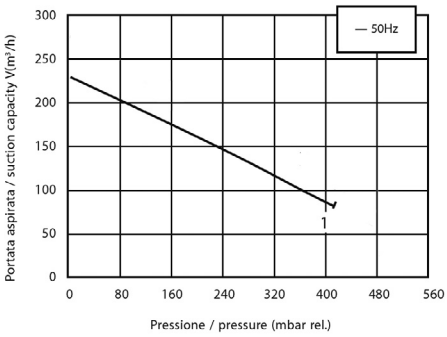
HP302SF



HP402SF



HP502SF



AEROBIC TRICKLE FILTER WITH TOP OUTLET AND BLOWER (MBBR) 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

TECHNICAL SECTION – TRICKLE FILTERS

TECHNICAL CHARACTERISTICS

A trickle filter is a biological reactor, inside which the micro-organisms that purify the effluent develop on the surface of **special bulk fill material (filter media)**. The uniform distribution of the effluent through the filter guarantees maximum contact between the organic material to purify and the biological film covering the spheres making up the fill material.
The spheres making up the filter media are manufactured in polypropylene and are designed to provide a large surface area available for bacterial micro-organisms to take root. In particular, the spheres used provide a **surface area per unit volume of filter media of 140 m^2/m^3**, much higher than the traditional stone fill material, with **voids accounting for over 90%**. This solution minimises the risk of clogging the bed and also guarantees an improved circulation of air through the bed of the aerobic filter. Trickle filters allow good purification performance **without any energy overheads**, with management costs limited to the occasional cleaning of the plant.
The sizing of percolating filters for an average domestic effluent refers to the organic load factor kgBOD/m^3d with which the filter is fed. This parameter is the ratio between the organic load at the inlet kg BOD_5d and the volume of the filter bed. Rototec trickle filters are designed to operate with medium-low organic load factors kg BOD_5 / m^3d. This guarantees a good margin of safety, with respect to fluctuations in inlet flow, and a limited production of excess sludge.

USE AND MAINTENANCE

The filter is designed to ensure **minimum clogging risk**. However, the development of the films on the filter media can over time excessively dirty the filter, with the resulting risk of solids being discharged with the treated effluent.
Cleaning operations are normally carried out as part of the Imhoff tank inspection and emptying operations. It should be remembered that in order for the trickle filter to function correctly, the effluent must first be subjected to sedimentation treatment in an Imhoff tank or similar installed upstream of the filter. The use of Rototec Bio-Activators is recommended for rendering the starting of the biological processes more rapid.

MANAGEMENT

WHAT TO DO	WHEN	HOW
Inspect the trickle filter	Every 12 months	Unscrew the covers on the inspection holes and check the level of sediments
Extract the bottom sludge, clean the interior and the inlet and outlet pipes and backwash the filter media	Every 12 / 15 months	Contact a licensed waste disposal company

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** 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 to a surface watercourse**, install a septic tank (Imhoff or other septic tank) downstream of the trickle filter as the final effluent sedimentation and clarification phase;
- 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.