ENVICON disc diffusers
EMS 12” (330 mm)

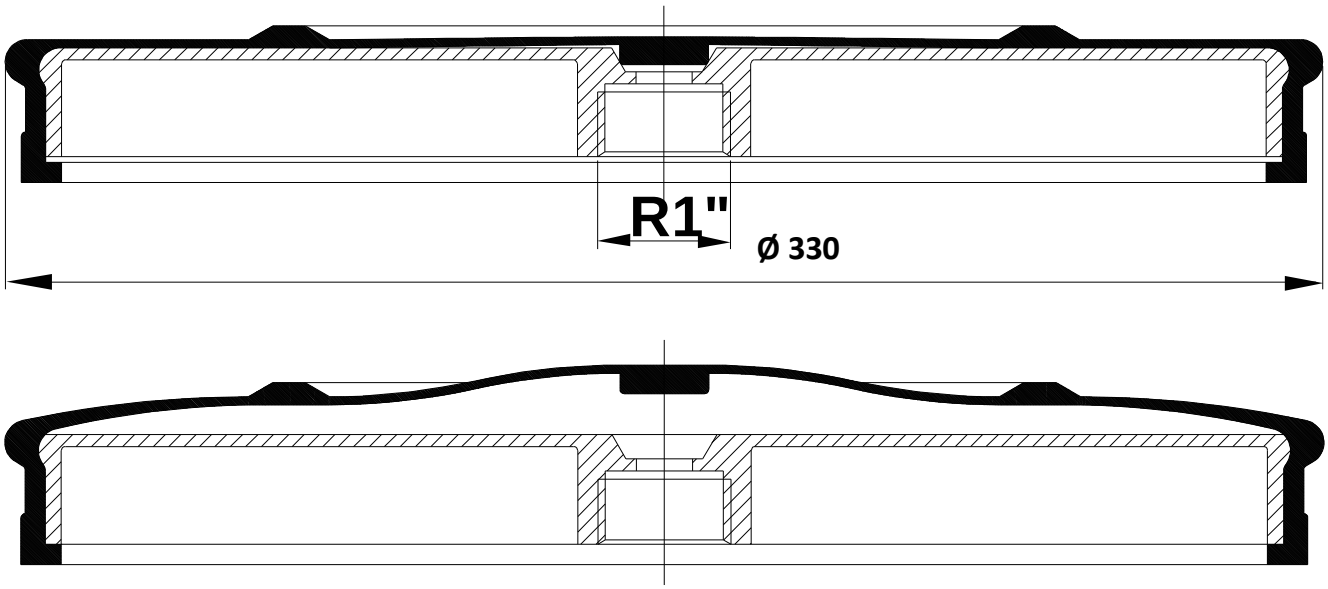
Contents

Description

ENVICON membrane disc diffusers are quality products from Germany. Sophisticated membrane mixtures, modern production processes as well as optimised fine-bubble perforation guarantee a high-quality product throughout its service life and durable, cost-effective operation of aeration systems.

The external diameter is 330 mm (12“). The support disc and clamping ring are made of highly chemically and thermally resistant glass-fibre reinforced polyamide and can be reused.

The central air duct under the membrane on disc diffusers ensures the pressure loss is particularly low. The pull ring reinforcement integrated into the membrane keeps the membrane flat and therefore contributes to an even bubble pattern over the entire perforated area. The membrane also has a sealing plug that acts as a non-return value due to the water pressure when not in use.



Available membrane materials

The substances in wastewater and the cleaning process are the main factors determining the choice of membrane material. If you have any questions, please contact us: Based on our many years of experience we would be pleased to offer non-binding advice.

The specific oxygenation depends largely on the installation situation and the selected method of operation. To help you achieve the best possible results, we would also be pleased to advise you on this.

EPDM AeroTop (sulphur crosslinked, low plasticiser content)

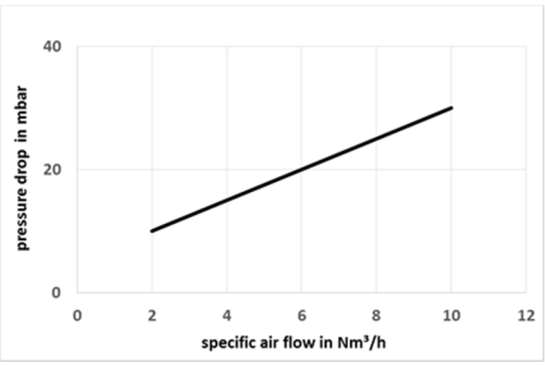
A proven, strong membrane made of sulphur crosslinked EPDM. Durable, efficient product with low plasticiser content for high demands and municipal wastewater according to DWA-M 115 with up to 10% industrial and commercial content. Made and perforated in Germany. The optimised, fine-bubble aeration ensures excellent oxygenation.

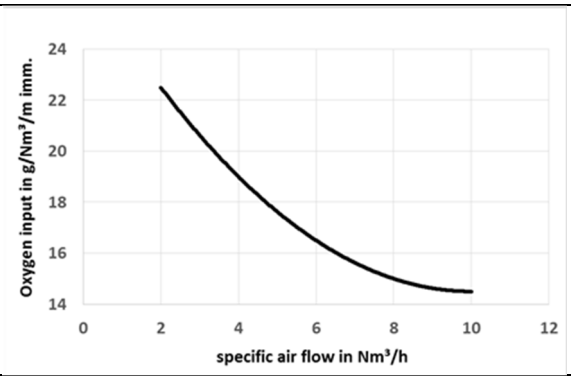
Operating range (Nm^3/h x diffuser):		
Minimum (recommended)	2	Continuous
Standard	4-6	Continuous
Maximum (specified)	12	Continuous
Maximum (specified)	15	Brief; e.g. for flushing cycles

Frequent load changes are recommended to prevent deposits and to keep the membrane supple.

Technical data of the EMS AeroTop:

Measured according to worksheet ATV M209 under standard conditions (pure water, water depth = 4.0 m, density: 1.1 pc. EMS / m^2)





Temperature-resistant up to 80°C

EMS AeroTop	Membrane fastened at centre	Connection	Maximum operating depth	Order no.:
EMS1 12”	**Stainless steel clamp**	1” female thread	7.0 m	30301001
EMS2 12”	**Plastic ring**	1” female thread	7.0 m	30301005

Greater operating depths may be possible. Please contact us.

Special EPDM AeroBest (peroxide crosslinked, low plasticiser content)

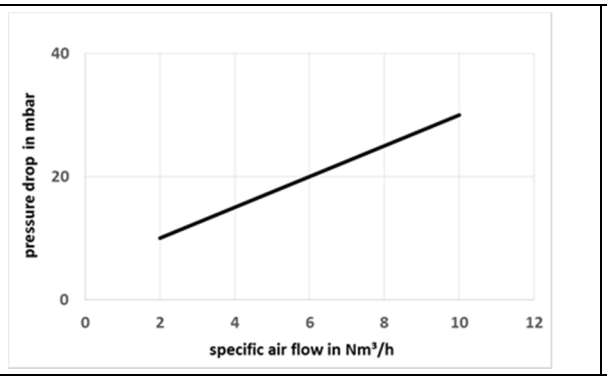
Peroxide crosslinked high-performance EPDM, suitable for supply air temperatures of up to 130 °C and for higher proportions of industrial and commercial wastewater. This proven and especially tough product, made and perforated in Germany, is particularly efficient due to its optimised fine-bubble aeration.

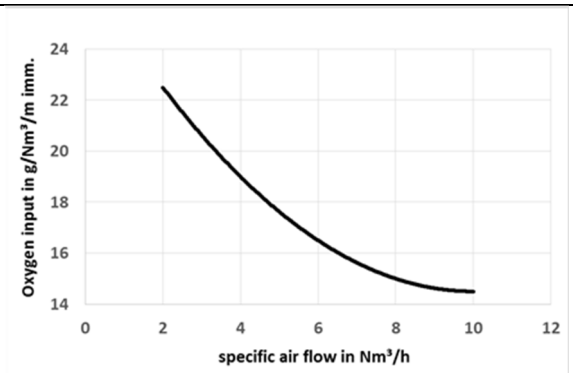
Operating range (Nm^3/h x diffuser):		
Minimum (recommended)	2	Continuous
Standard	4-6	Continuous
Maximum (specified)	12	Continuous
Maximum (specified)	15	Brief; e.g. for flushing cycles

Frequent load changes are recommended to prevent deposits and to keep the membrane supple.

Technical data of the EMS AeroBest:

Measured according to worksheet ATV M209 under standard conditions (pure water, water depth = 4.0 m, density: 1.1 pc. EMS / m^2)





Temperature-resistant up to 130°C

EMS AeroBest	Membrane fastened at centre	Connection	Maximum operating depth	Order no.:
EMS1 12”	**Stainless steel clamp**	1” female thread	10.0 m	30302001
EMS2 12”	**Plastic ring**	1” female thread	10.0 m	30302005

Greater operating depths may be possible. Please contact us.

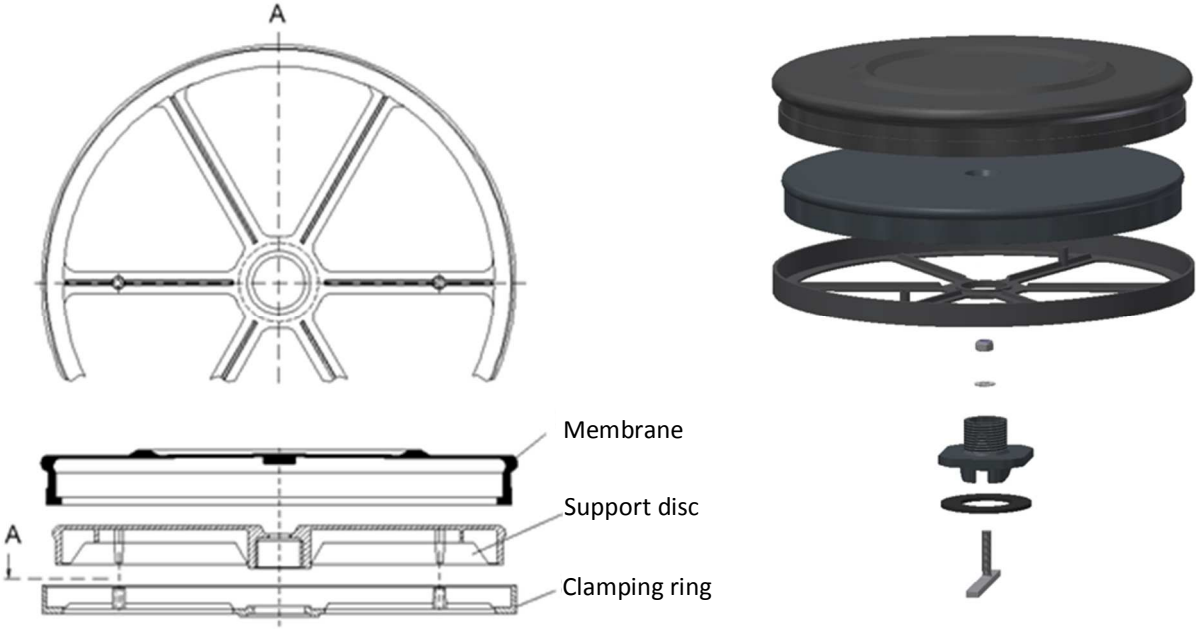
Membrane fastening with plastic clamping ring (EMS2)

Like the support disc, the clamping ring is also made of glass-fibre reinforced, heat-stabilized polyamide (Durethan). This material has a high mechanical strength and resistance.

The clamping ring can be easily removed and refitted for replacing the membrane.

The star-shaped clamping ring used to fasten the membrane can be reused several times and makes it possible to replace the membrane particularly quickly without tools and without any special effort.

One-ear clamps are not reusable and must be disposed of, making the clamping ring much more environment-friendly.



Connection variants:

	
1 Inch female	1 Inch male
	
¾ Inch male	½ Inch male

Other connection variants including saddle clamps are available upon request.

Alternative membrane fastening with non-reusable stainless steel clamp (EMS1)

The disc diffuser EMS1 with stainless steel clamp is designed for universal use, both with and without ENVICON adapter EBA1. The standard connection is a 1” female thread. Other connection options are available (see also above).

When changing the membrane, a small number of clamps can be fitted using a hand tool you can also order from us. For larger quantities, we recommend the use of a pneumatic tool such that all the clamps can be fitted with the same application pressure without the need for muscle power.

As standard, we use one-ear clamps (stainless steel clamps) of 1.4301. This is sufficient for most applications. If your wastewater contains or if you suspect that it may contain higher concentrations of chloride or other corrosive chemicals, possibly in combination with higher wastewater temperatures, the material of the one-ear clamps might have to be adapted. Please contact us.

ENVICON single adapter EBA1

Fastening for disc diffusers with a connection 1” female is preferably by screwing onto an ENVICON fastening adapter of type **EBA1** with 1” male thread:

ENVICON supplies adapters EBA1 for the following tubes:

Square tube: From 80 x 40 mm
Round tube: DN50, DN65, DN80, DN100, DN150,
oD63, oD75, oD84, oD90, oD103, oD110, oD154
Hole sizes: for round tube up to 40 mm, for square tube up to 45 mm

For other existing tubes, please contact us – we would be pleased to provide a quotation.

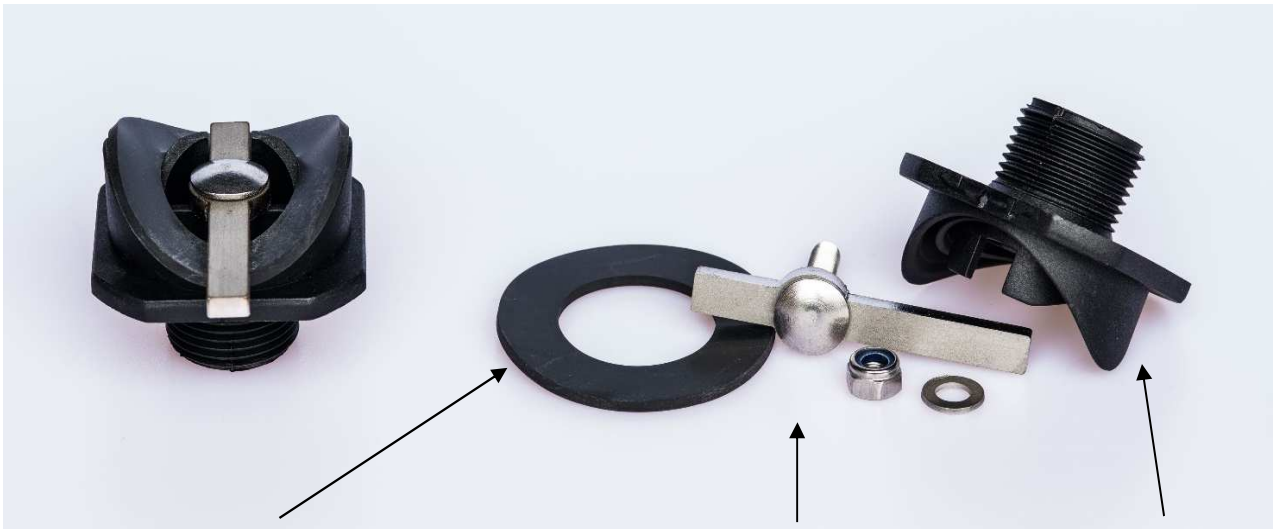
Storage

ENVICON diffusers must be stored at the buyer's premises according to DIN 7716, ideally in the packaging supplied by ENVICON. It should be unpacked only shortly before installation. Protect the diffusers from direct sunlight.

Preparation of the air supply ducts

The air distribution ducts and the ducts on the bottom of the basin are to be checked for good condition and cleanliness before the installation of the diffusers (blow out the complete pipe system, remove any moisture, dirt or rust).

Installing fastening adapter EBA1



Flat seal 70x40x3, to be fitted between adapter and air duct	Arm with threaded stud, washer and self-locking nut	Threaded nipple (here for a round tube)

The fastening adapters EBA1 are supplied as separate parts and are assembled on site.

The seal (70x40x3) is fitted between the tube and the adapter. Pick up this seal and place it on the threaded nipple. Grasp the arm with threaded stud (tie rod) at the arm and insert the thread through the hole in the threaded nipple.

The arm is now in the chamfered mounting, the end of the thread appears on the other side of the threaded nipple. We recommend the application of an anti-seize compound (e.g. LOCTITE LB 8009 or LB 8023) to the thread to prevent possible seizing. Fit the washer to the end of the thread and screw on the nut until it holds, but not so far that the arm is pressed into the chamfered mounting on the other side.

The adapter is now complete and can be fitted in the hole by pressing one finger against the as yet untightened nut and in this way pressing the arm with threaded stud out of its guide to the maximum extent. The play is sufficient to "thread" the adapter into the hole. Once the adapter is correctly positioned, please tighten the nut to a torque of 8 Nm using a torque wrench. This action tightens the arm with threaded stud and the adapter EBA1 seals. On the right you can see a correctly mounted EBA1 adapter (here an example installation on a round tube)

Installing the disc diffuser EMS with 1” female thread on the EBA1

The diffuser EMS can now be screwed onto the firmly seated adapter EBA1 (here as an example on a round tube PP). Additional sealing, e.g., using Teflon tape between the threads, is not necessary, because the high-quality PAGV used is slightly hygroscopic: The material swells slightly in contact with water and seals perfectly.

Both the EMS1 with stainless steel clamp and the EMS2 with plastic clamping ring can be fitted to the EBA1:

The diffusers are installed by screwing them onto the male thread using both hands. The diffuser is tightened hand-tight.

Installing the disc diffuser EMS with 1” female thread on a stainless steel nipple

Welded stainless steel nipples are not compatible with the plastic clamping ring on the EMS2. Therefore only ENVICON disc diffusers of type EMS1 with a stainless steel clamp can be installed here:

In this situation the opposite applies to the sealing of the thread: Because the welded stainless steel nipple is not hygroscopic, we recommend the usage of Teflon tape.
The diffusers are installed by screwing them onto the male thread using both hands. The diffuser is tightened hand-tight.

Measures for delayed commissioning and decommissioning

The diffusers fitted must not be subjected to direct sunlight for more than one day. If the system is not commissioned immediately after the run-in or is to be decommissioned, increase the water coverage of the diffusers to 1.0 m. Continually replace any water lost through evaporation.

At temperatures below freezing, the water coverage must be at least 10 % of the frost temperature (in metres). Example: At -20 °C, the water coverage must be 2 m. Do not use antifreeze.

During longer downtimes, switch on the aeration 1-2 times per week for at least 1 hour. This does not apply during ice formation.

Leak test, bubble pattern check and fine tuning

To perform the leak test, fill the basin with drinking water/ground water or clean river water such that all disc diffusers are approx. 5 - 10 cm below the water level. Clarification basin water is not suitable for the bubble test and leak test, because it tends to foam and any leaks may be difficult to detect.

The bubble pattern at the bottom of the basin should be checked from close up and not only from the gantry or the upper edge of the basin.

The bubble pattern check/leak test is undertaken by applying air to the diffuser system; the air flow rate must be at least 6-8 Nm^3 / (h x diffuser).

Check that the air is discharged evenly from the diffusers. Replace any diffusers that do not aerate correctly after a time.

We recommend shutting off the air supply at the end of the test so that any remaining leaks can be detected quickly. It is normal if a few bubbles escape from the diffusers after shutting off the air. After the last small bubbles have left the water, large bubbles must no longer continue to rise at one point. The entire surface of the water must be calm.

If large bubbles continue to rise at one point, the diffuser fittings and fastening adapters are to be checked for correct installation with the aeration in operation (the increased amount of air that is then vented prevents the ingress of water while the leak is fixed) and, if necessary, installed again or sealed.

Oxygenation test

Once installation is complete and the leak test has been undertaken, the diffusers must be in contact with water with the aeration in operation for a minimum of 7 days so that the diffusers adapt to the water. Preferably, the air supply should be intermittent (hourly change) with an air flow rate of approx. 8 Nm^3/h per diffuser.
The tests should be undertaken as per ATV instructions M209. In some circumstance the guaranteed values cannot be achieved if the instructions above are not followed.

Operating and maintenance instructions

Generally ENVICON cannot influence the specific conditions on site and thus the purchaser is responsible for carrying out sufficient testing of the object of purchase for the intended purpose.

Impression at the surface of the basin

No large bubbles should be visible. In particular in basins with stirrers or with large water depths, however, there may be areas of high turbulence with increased quantities of bubbles, this situation is to be considered normal.

Membrane load through deposits

The biological wastewater treatment in the aeration phase with its many processes and reactions can result in various levels of biological (fouling) and mechanical (scaling) deposits depending on the composition of the wastewater, the load and the process control. The substances that can deposit on the membranes include: calcium and carbonates, iron and aluminium salts, biological growth and polymers.

The level of fouling/scaling of the diffusers and membranes depends on the process conditions in the purification plant, its operating principle and the substances in the wastewater. These conditions cannot be influenced by ENVICON.

Deposits on the membrane and, in particular, in the membrane slits, can cause increased pressure loss and a reduced service life of the membranes (in some cases also a failure) and must therefore be prevented at all cost.

Remedy through load changes and flushing

In the early stages, process-related deposits on the membrane can be easily removed. From the point of commissioning, self-cleaning through alternately stretching and relaxing the membrane to peel off mineral-based deposits can help.

In addition to this self-cleaning effect, regular flushing cycles should be carried out. To do this, we recommend briefly switching the aeration off at least once or twice a week and then running the diffusers at the maximum permissible air throughput of each diffuser for about 30 minutes. This is the minimum frequency and should be increased depending on local conditions, for example if a higher level of process-related deposits is expected (e.g. for simultaneous precipitation, wastewater from dairies or high water hardness).

In any case, flushing should be carried out both in intermittent operation with longer downtimes (e.g. seasonal operation) and in plants continually operated in the diffuser's lower operating range in order to delay the ageing process of the membranes, which would accelerate if the membranes were not loaded (alternating tension and relaxation).

Remedy through acidulation

We recommend to inject a suitable acid that does not damage the membrane into the compressed air both to remove existing mineral deposits on the membranes as well as in the slits and as a regular preventive measure to reduce pressure loss of the aeration system. This measure also helps to reduce energy consumption and increase the diffusers' reliability. The acid should be added in vaporised form during aeration.

Especially in plants with large volumes of calcareous wastewater, such as from dairies, treatment of this kind is essential.

The success of this measure depends on various factors and must be tested on site. The resistance of all parts that the acid comes in contact with must be checked and the pipes should, if necessary, be flushed after treatment through the injection of tap water.

Acid cannot be used to remove fouling and may even be counter-productive. In this case, mechanical cleaning of the membranes may be the solution.

Remedy through cleaning the membranes in an empty basin

Make sure that neither the diffusers nor their mounts are damaged when walking or working in the basin, as this will result in further operating problems.

As far as possible, rinse the activated sludge off the diffusers with clear water. Note that an excessively strong water jet, e.g. from high-pressure cleaners, will damage the membranes. During and for some time after cleaning, apply the maximum air flow rate to each diffuser to protect the perforation from sludge ingress or to clear sludge out of the perforation.

The membranes can be brushed off as long as this does not cause the perforation to become clogged or damaged. This is best done with a commercial soft car washing brush. During this type of cleaning, also apply the maximum air flow rate to each diffuser to protect the perforation from sludge ingress. You can wipe the membranes, but this increases the risk of rubbing sludge into the perforation.

Use only environment-friendly cleaning agents that do not damage the membranes.

Inspecting the aeration system

These preventive measures alone do not reliably exclude the possibility of clogging due to operation. To ensure operational safety, the system pressure must be continually logged at comparable operating states (air flow rate, water level) and any required measures derived and specified from them.

Operating specifications

Air flow rates in operation and intake air

The drawn-in air must be free from oil, dust, condensate and solvents and must correspond to the TA (technical work instruction) for air. Dust filters for ambient dust **must** be fitted. The air temperature must not exceed the specified limit values for the diffuser and membrane materials.

The specified values for each membrane type must be maintained. Higher flow rates may be possible after consultation with ENVICON depending on the type of perforation used.

Flow accelerator and flow conditions in the basin

If a basin contains both stirrers and diffusers, a sufficient distance must be maintained between the two. This distance depends on the performance of the stirrers, the diffuser shape and mounting, the type of pipes as well as the geometry of and flow conditions in the basin. We recommend that you consult with ENVICON and the stirrer manufacturer in good time.

Draining the pipes

At regular intervals and depending on the specific conditions in the purification plant, the low-point drains in the main lines and the drain lines of the distributor sections should be checked and the condensate blown out of the pipes through the condensate drain line.

Measures in the event of membrane damage during operation

If irregularities occur in the bubble pattern during operation that seem to indicate membrane damage and are likely to cause ingress of wastewater into the aeration system, keep the air supply to the diffusers running at the highest permissible rate and for as long as possible to minimise the risk of wastewater or sludge ingress. This applies also when draining a basin and also for grids that can be lifted. Avoid draining the basin under frost conditions.

Please note that differences in the diffusers used can lead to aeration problems and diffuser failure. Variations of the material used, of the perforation or of the duration of use (pressure loss variations) can result in a higher air flow through individual diffusers and overload them. Please contact us, we will be happy to assist you.

Replacement

Even the best diffusers will come to the end of their service life at some time. If you are uncertain about this issue, we offer the assessment of a diffuser sent to us and the comparison of the membrane values with the condition as delivered. You can then decide with certainty whether a replacement is advisable.

Please contact us.