

ENVICON disc diffusers

EMS 9" (270 mm)

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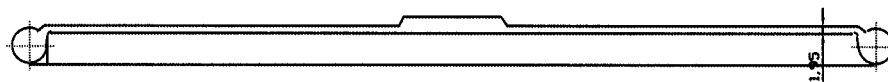
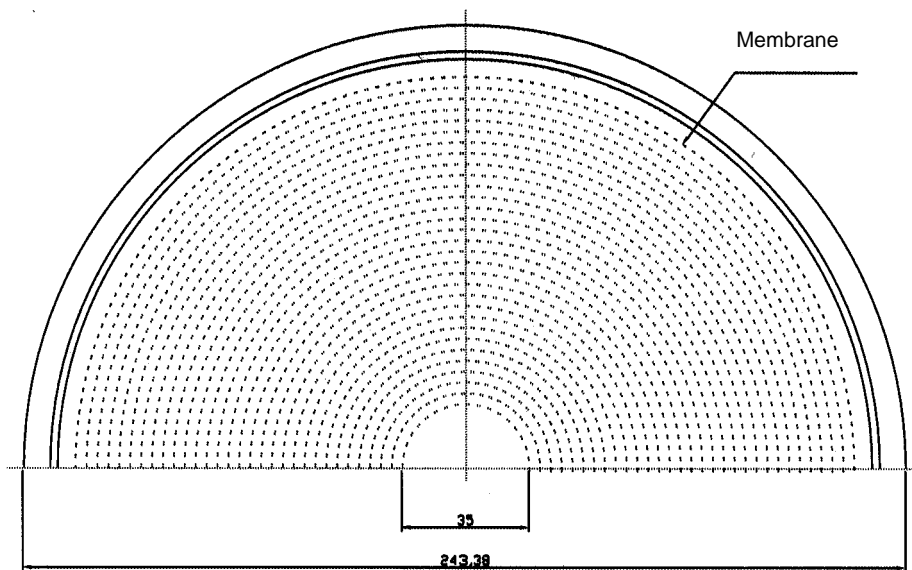
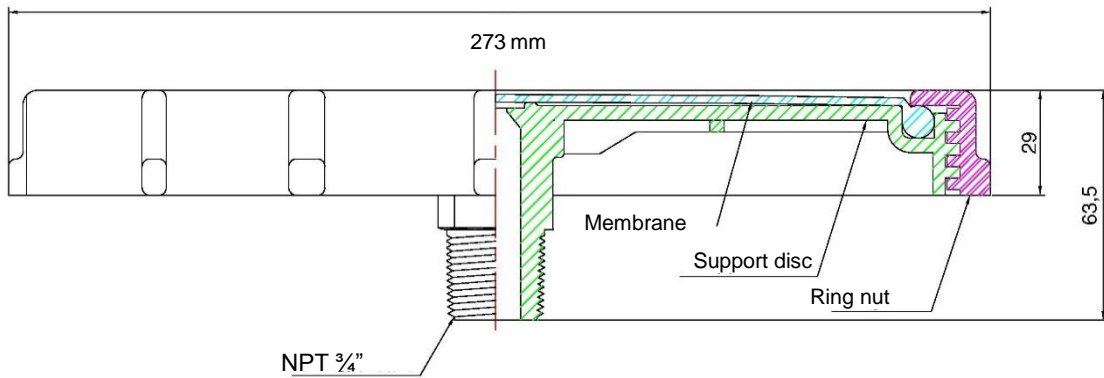
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Description

ENVICON membrane disc or tube diffusers are rugged quality products. 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 270 mm (9"). The polypropylene support disc and ring nut are reusable.

The central air duct under the membrane on disc diffusers ensures the pressure loss is particularly low.



Membrane



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.

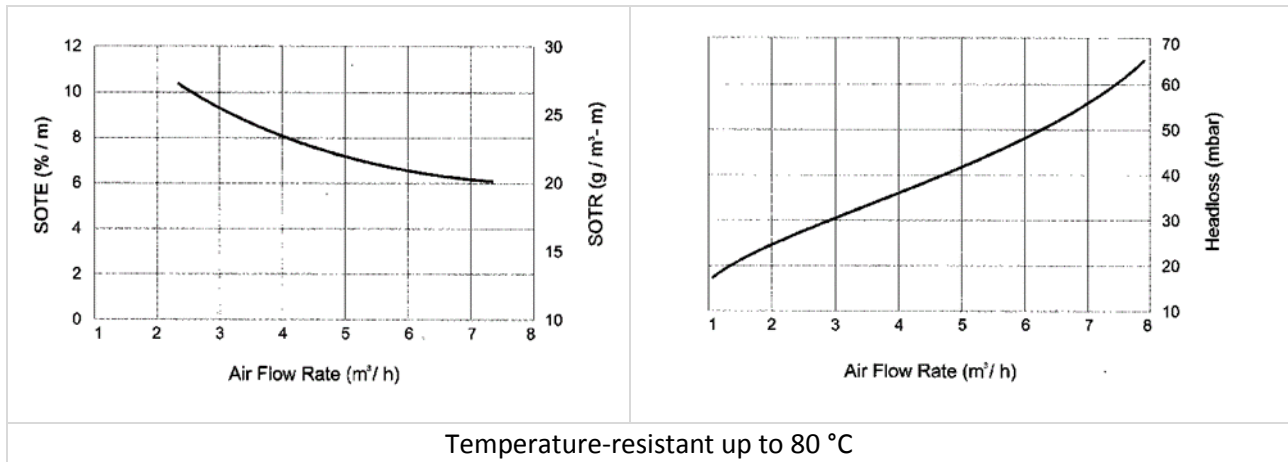
EPDM AeroTop (sulphur crosslinked, low plasticiser content)

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. The optimised, fine-bubble aeration ensures excellent oxygenation.

Operating range (Nm³/h x diffuser):		
Minimum (recommended)	1.5	Continuous
Standard	4-6	Continuous
Maximum (specified)	8	Continuous
Maximum (specified)	10	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:



Temperature-resistant up to 80 °C

Test conditions: Air pressure 983 Pa, air temperature (inlet) 23 °C, humidity 52.3%, water temperature 13.2 °C (test tank with 18.3 m³, aeration depth 3.5 m).

Silicone AeroSil (plasticiser-free)

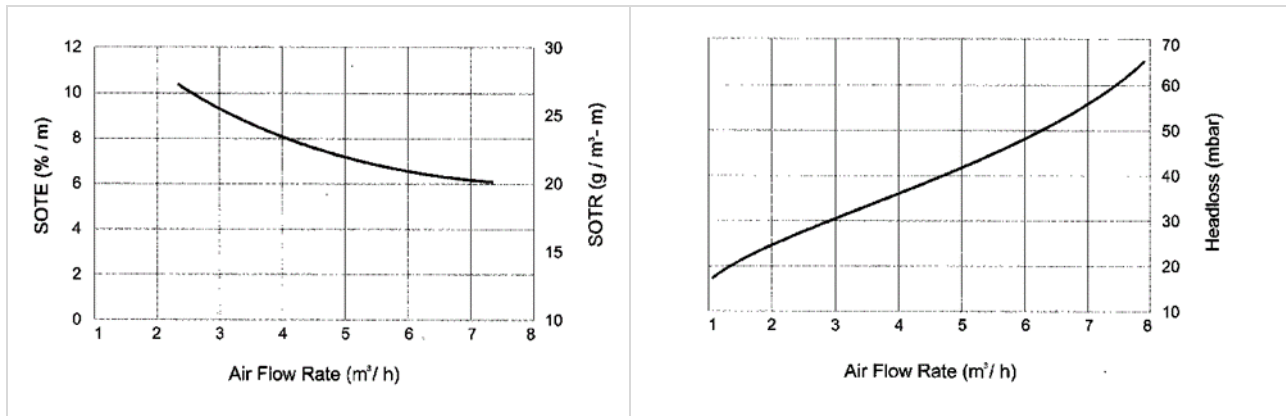
This outstanding, plasticiser-free silicone product is exceptionally resistant to tear propagation. It is also resistant to many oils and greases and can be used at high wastewater and air temperatures. Its highly smooth surface makes it resistant to micro-biological growth and its metabolic products. The optimised, fine-bubble aeration ensures excellent oxygenation.

Operating range (Nm³/h x diffuser):		
Minimum (recommended)	1.5	Continuous
Standard	3-4	Continuous
Maximum (specified)	6	Continuous

Maximum (specified)	8	Brief; e.g. for flushing cycles
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Frequent load changes are recommended to prevent deposits and to keep the membrane supple.

Technical data of the EMS AeroSil:





Temperature-resistant up to 120 °C

Test conditions: Air pressure 983 Pa, air temperature (inlet) 23 °C, humidity 52.3%, water temperature 13.2 °C (test tank with 18.3 m³, aeration depth 3.5 m).

General information and accessories

EMS 9 membrane material	∅ total / effective	Connection	Maximum operating depth	Order no.:
EPDM AeroTop	273 / 230 mm	NPT 3/4'' male thread	7.0 m	30401001
Silicone AeroSil	273 / 230 mm	NPT 3/4'' male thread	7.0 m	30401002

Greater operating depths may be possible. Please contact us.

<p>Standard connector: ENVGH</p> <p>Universal connector for 9-inch diffuser EMS 9 for connection to, e.g. PVC pipes.</p> <p>Available for plastic pipes with an external diameter of 90 and 110 mm.</p>											
<p>Connectors for high loads ENVS (saddle clamp)</p> <p>Available for round tubes with the following external diameters:</p> <table data-bbox="165 913 533 1120"> <tr> <td>50 mm</td> <td>ENVS oD50</td> </tr> <tr> <td>63 mm</td> <td>ENVS oD63</td> </tr> <tr> <td>75 mm</td> <td>ENVS oD75</td> </tr> <tr> <td>90 mm</td> <td>ENVS oD90</td> </tr> <tr> <td>110 mm</td> <td>ENVS oD110</td> </tr> </table>	50 mm	ENVS oD50	63 mm	ENVS oD63	75 mm	ENVS oD75	90 mm	ENVS oD90	110 mm	ENVS oD110	
50 mm	ENVS oD50										
63 mm	ENVS oD63										
75 mm	ENVS oD75										
90 mm	ENVS oD90										
110 mm	ENVS oD110										

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).

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 anti-freeze.

During longer downtimes, switch on the aeration 1-2 times per week for at least 1 hour.

Installation of EPDM-grommets

Necessary equipment Hot water
 Lubricant
 Soft head hammer

Pipework: the installation may take place onto all plastic pipes that are suitable for the use in wastewater and with hot air. The grommets are suitable for outer diameters of pipework from 89 to 141 mm and wall thicknesses from 4 to 8 mm.

Openings: The hole size should be 30 to 32 mm at the maximum. All openings should be exactly aligned.

All inside and outside edges of the openings have to be deburred. The pipework has to be cleaned properly inside and outside before starting the installation.

Preparation of grommets: warm them up until the moment of installation in a tank or a bucket with hot water (50 to 90°C) to make the grommets more flexible.

Insertion will be eased by using lubricants, e.g. common household detergents or professional products. Please do not use lubricants containing mineral oils or other hydrocarbons.

The grommet may be pressed into the hole by pressing manually or by using a soft head hammer until the grommet sets onto the plastic pipe.

An insertion without a preparation as described above might harm the grommet.

The grommets can be used with all disc diffusers with a $\frac{3}{4}$ " male NPT nipple. Although the exertion force when properly installed is about 850 N we recommend not to use disc diffusers with an outer diameter of more than 9".

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 $5-6 \text{ Nm}^3 / (\text{h} \times \text{diffuser})$.

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. $6 \text{ Nm}^3/\text{h}$ 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.



smart aeration

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.