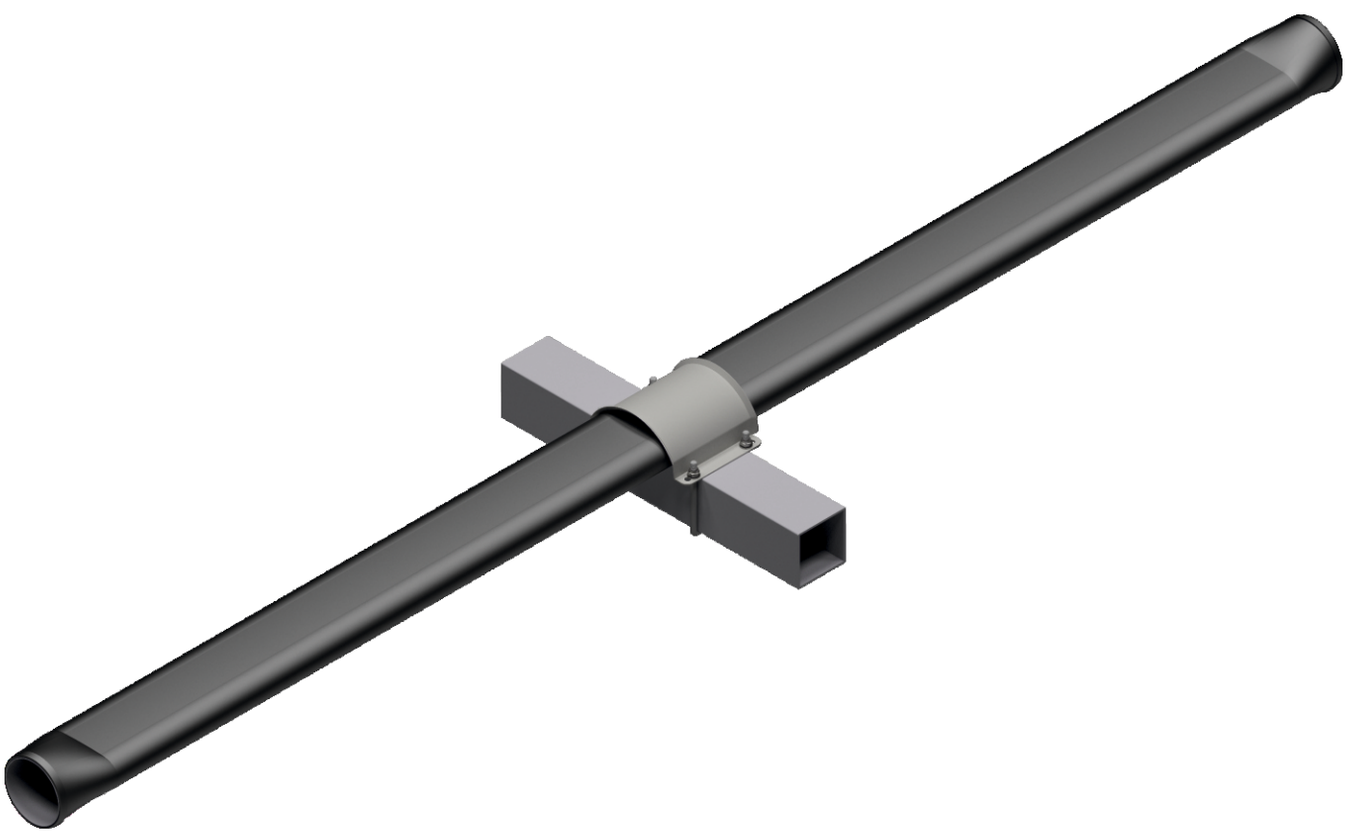
Supratec
Gesellschaft für Umwelt-
und Verfahrenstechnik mbH

PERMOX® OM120

Oval Membrane Tube Diffuser

with stainless steel body

for fine bubble or coarse bubble diffusion of liquids



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PERMOX® OM120
Oval membrane tube diffuser

The PERMOX® OM120 oval membrane tube diffuser is an improvement of old PERMOX® OM with new width of 120 mm, instead of former width of only 90 mm.

PERMOX® OM120 oval membrane tube diffuser consists of a solid, strong stainless steel body (AISI 316).
This special design of the oval membrane tube diffuser results in a flat membrane area, active only to the top, similar to most efficient plate diffusers. Even for different specific air loads, the entire flat active membrane surface works always evenly. A higher efficiency and significantly longer operation time is resulting by this special shape compared to normal tube diffusers. The oval membrane tube diffuser PERMOX® OM120 provides the advantages similar to a modern plate diffuser with regard to limited pressure increase and increase efficiency.

The diffuser membrane is secured to the body by two stainless steel 1-ear clips. The high-quality membranes are available in EPDM (ethylene propylene diene rubber).

The PERMOX® OM120 is available in two sizes:
- PERMOX® OM120 - 1.5 with an active flat membrane surface of 0.18 m²
- PERMOX® OM120 - 2.0 with an active flat membrane surface of 0.24 m²

The PERMOX® OM120 oval membrane tube diffuser is a fine bubble aeration element for efficient aeration, which is mainly used for the oxygen supply of biological waste water treatment plants.

The PERMOX® OM120 oval membrane tube diffuser is characterized by the following superior features:
- higher efficiency compared to standard tube diffusers
- high operational reliability by limited pressure increase
- significantly extended operation time, also due to stainless-steel-body
- special diffuser design, optimized for liftable grids (no buoyancy)
- available in different lengths
- insusceptible to fouling

The membranes are perforated individually. The PERMOX® OM120 oval membrane tube diffuser is able to cover a very broad operating range of up to 20 m^3_N /h per meter.

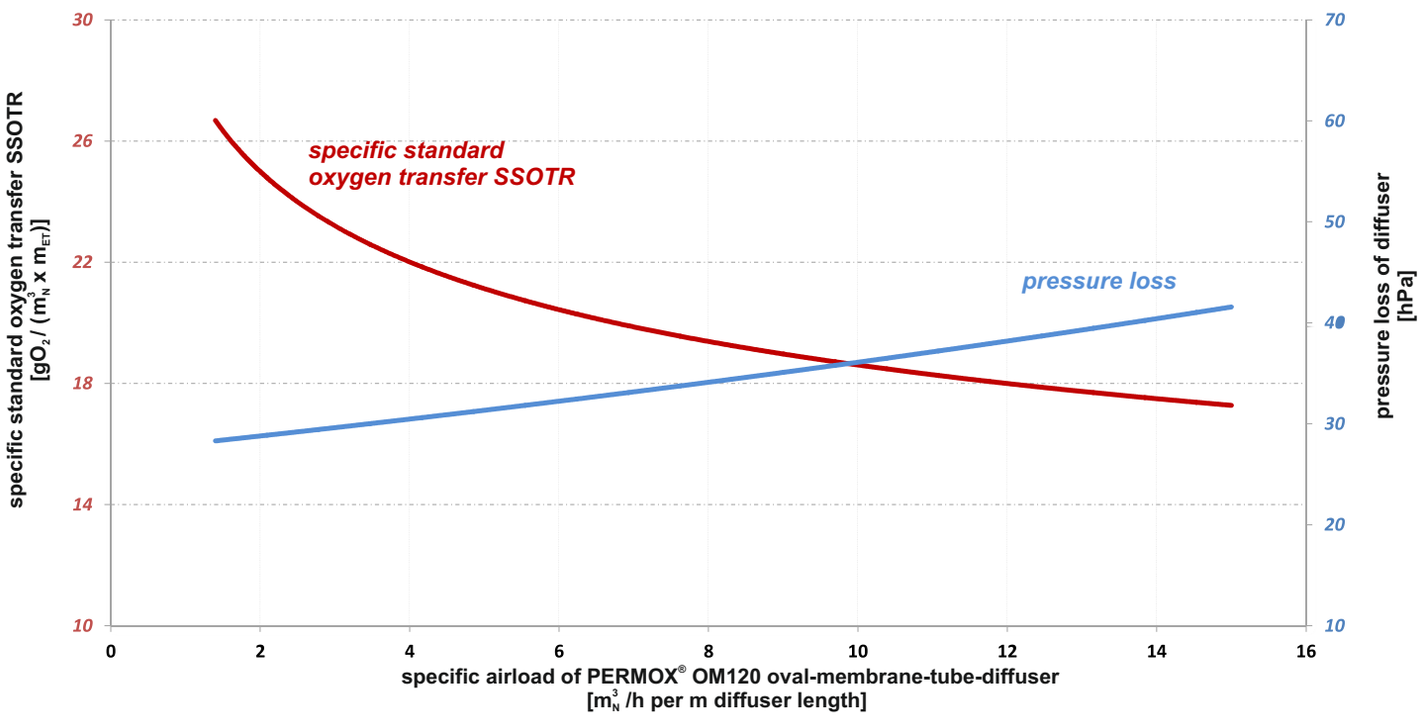
The PERMOX® OM120 oval membrane tube diffuser can be operated in intermittent mode.

As an alternative to fine-bubble aeration diffuser, the membrane can also be manufactured for a coarse-bubble version.

The oval membrane tube diffuser type PERMOX® OM has been used successfully in Germany and worldwide in communal and industrial waste water treatment plants for many years. It is also suitable for aerating liquids of all kinds were stainless steel bodies are suitable. We will be pleased to send you our current list of references on request.

With the fine-bubble design of PERMOX® OM120 oval membrane tube diffuser, specific oxygen transfer rates in pure water of more than 25 g $O_2/(m^3_N \times m_{ET})$ can be achieved with an extensive layout and correct water depth.
The following diagram shows the example of a result of an oxygen transfer test. The values were measured in a rectangular tank with a water depth of 4.0 m, a diffuser blow-in depth of 3.8 m and coverage of 20%.

specific standard oxygen transfer SSOTR and pressure loss of PERMOX® OM120 oval-membrane-tube-diffuser [1]



[1]The diagram cannot be used in order to derive warranty claims of any kind.

The values cannot be transferred to other plants. The results that are shown here depend on several influencing factors, such as the tank shape, blow-in depth, coverage or a separate recirculation due to additional mixers.

Supratec will be pleased to prepare a technical data sheet for each individual application for you on request.

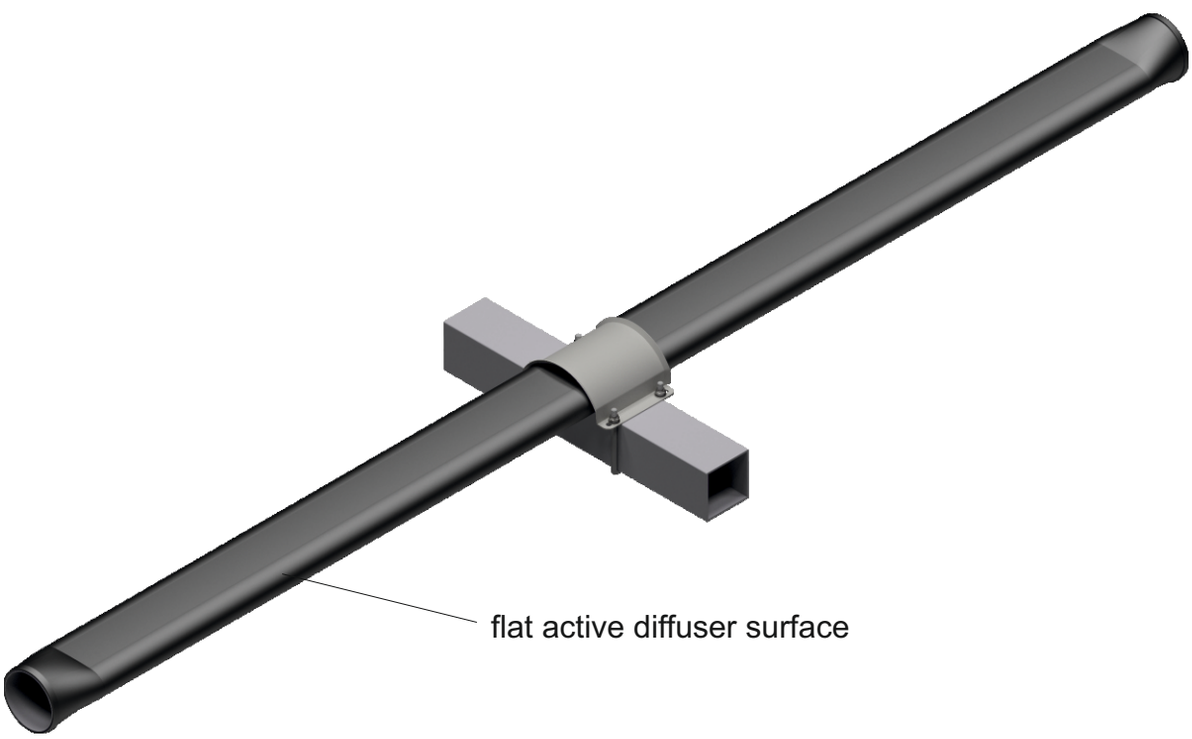
AIR-PULSING: mixing without a mixer

The option of the intermittent operating mode means that in a combined tank with alternating nitrification and denitrification phases and for a sufficient coverage by PERMOX® OM120 oval membrane tube diffusers, the use of a mixer will not be necessary ("Air-Pulsing" process).
Any sedimentation of the activated sludge during the denitrification phase is prevented by short-term aeration intervals. The required aeration intervals are individually adapted to the respective plant with regard to its specific conditions such as the sludge index of the waste water. The aeration time is limited to some minutes and the process is repeated approximately every 10 to 20 minutes depending on the plant type.

Installation

The PERMOX® OM120 oval membrane tube diffuser is suitable for installation on rectangular stainless steel pipes by using U-bolts (M8). U-bolts are available for rectangular pipe dimension 100 mm x 100 mm or 80 mm x 80 mm as standard (other sizes on request).

Membrane:	EPDM
Oval tube body:	stainless steel (AISI316)
Clamp saddle:	stainless steel (AISI316)
U-bolts:	stainless steel (AISI316)
Seals:	EPDM



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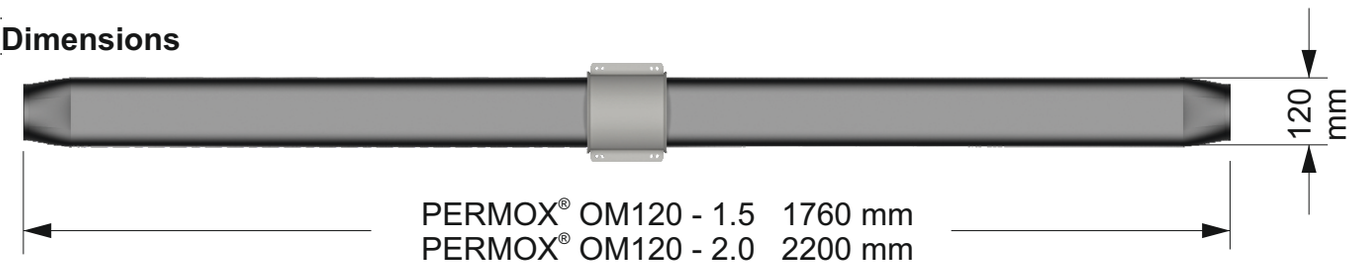
INSTALLATION INSTRUCTIONS

Dimensions



Storage

The diffusers shall be stored in their packing inside a dry and aerated building. DIN 7716 has to be considered.

Preparation

Before installation of the oval membrane tube diffusers PERMOX® OM120, it has to be checked that the piping system is clean inside. Cuttings, sludge or other dirt have to be removed, as those will be transported into the diffusers as soon as blowers are set into operation and causing serious damage to the diffuser membranes.

Levelling

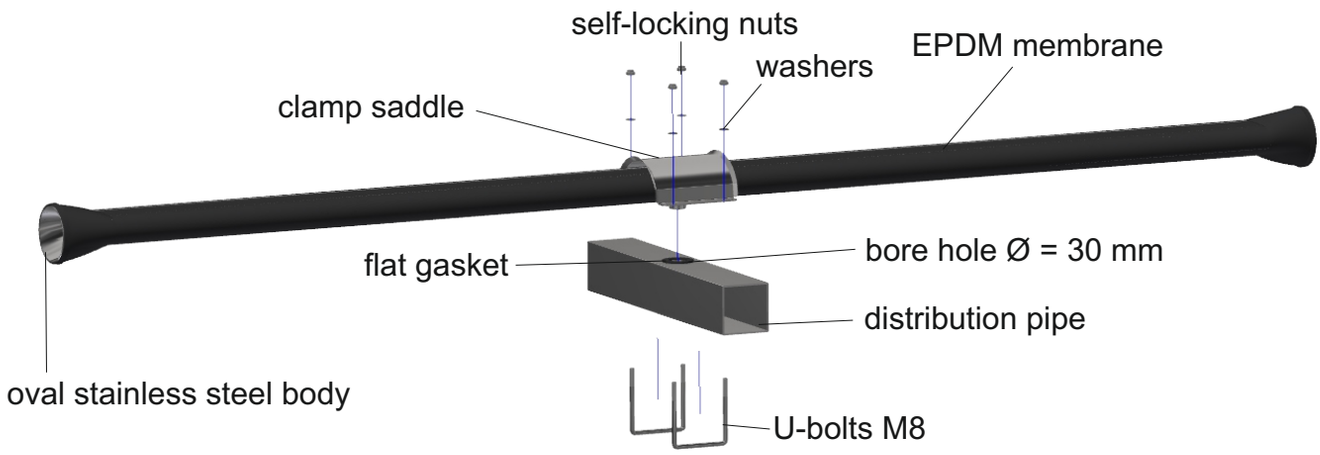
Oval membrane tube diffusers PERMOX® OM120 can be installed on square pipes with dimensions 80 mm x 80 mm or 100 mm x 100 mm (different sizes on request). The piping system has to be levelled to maximum ± 10 mm.

Installation on rectangular pipe

Oval membrane tube diffusers PERMOX® OM120 must be mounted horizontally and rightangled on rectangular stainless steel distribution pipes with bore holes Ø 30 mm at the top. The distance between the oval membrane tube diffusers PERMOX® OM120 on the distribution pipe (connection bore hole axis) should be at least 200 mm, recommended 250 mm – 500 mm and must not exceed 1,000 mm (differences possible on request). A self-sticking round EPDM flat gasket (50/30 mm x 3 mm) is positioned around the bore hole of the distribution pipe. The surfaces of the rectangular pipe must be clean, dry and straight.
The air socket outer-Ø = 28 mm at the bottom side of oval membrane tube diffuser PERMOX® OM120 is inserted from above into the bore hole Ø = 30 mm of the rectangular distribution pipe. The gasket must sit clean and undamaged between the diffuser and the pipe.

The fixing clamp saddle will be put from the top to the oval-membrane-tube-diffuser PERMOX® Om120. By using 2 pieces of U-bolts M8 around the rectangular pipe, the clamp-saddle, resp. the diffuser will be fixed.

The fixing has to be done by symmetrically tightening with self-locking nuts M8 to ensure a firmly, horizontally and right-angled mounting. The threads of the U-bolts must be lubricated beforehand to avoid seizing. Starting torque is 4 Nm and has to be increased until clamp saddle is drawn down to the rectangular distribution pipe and the diffuser is safely tightened.



OPERATING INSTRUCTIONS

Functional check and leak test

After the oval membrane tube diffusers PERMOX® OM120 have been installed, a function check and leak test must be performed. In order to do this, the tank has to be filled up to a level of approx. 10 cm above the top edge of the diffuser with clean water.
To check the function visually, the diffusers should be loaded with the specified amount of air (see load table on last page).
After ensuring that all diffusers are working well, the air flow can be reduced (min. specific load in table on last page) in order to make it easier to perform the leak test. Rising large bubbles indicate leaks (e.g. due to gaskets that have been dislodged). Those must be remedied.
The successfully performed functional check and leak test must be documented.
The water level has to be raised to at least 100 cm above the top edge of the diffuser as quickly as possible.
Important: the air flow shall not be stopped between these afore noted tests and following diffuser run-in!

Diffuser run-in

The compressed air must not be turned off between the functional check, resp. leak test and the run-in of the diffusers. Oval membrane tube diffusers PERMOX® OM120 with EPDM membrane must be operated continuously for at least 60 hours with the specified specific load (see run-in of diffusers on last page) before performing a conclusive oxygen transfer test.

Bubble pattern test

The bubble pattern shall be assessed first after the above-described run-in of the diffusers has been completed. For this purpose the diffusers have to be operated from the maximum down to the minimum specific load (see load table at last page).
The evenness of the aeration (bubble pattern test) has to be checked when the tank is filled to a level of at least. 100 cm of water above the diffuser top edge.
Checking the evenness of the aeration is only possible at a water temperature of above 10°C.

Oxygen transfer test

Prior to carrying out an oxygen transfer test as a proof of the efficiency of the oval-membrane-tube-diffusers PERMOX® OM120, afore mentioned steps must have been completed.
The oxygen transfer test can be carried out in accordance with the accepted regulations (e.g. DIN EN 12255-15 2003 or DWA-M 209) using the fresh water or waste water method. Specified warranty values must be rigorously adhered to. A calibrated and exact measurement of the air volume is required.

Commissioning

If commissioning is delayed it must be ensured that the diffusers are sufficiently covered by water (at least 100 cm) so that oval-membrane-tube-diffusers PERMOX® OM120 are protected against strong sun, frost and mechanical damage caused by falling objects, for example.

MAINTENANCE INSTRUCTIONS

The oval-membrane-tube-diffuser PERMOX® OM120 is a low-maintenance system and is partially self-cleaning due to the different specific air loads during the normal operating cycle. Especially with an intermittent operation mode, the normal operation cycle can be used for parallel maintenance as described below. Depending on the operating conditions an additional appropriate maintenance cycle has to be executed. This maintenance cycle is also used for removing deposits after longer periods of inactivity and long-term operation with low specific loads

Maintenance cycle

Any deposits are removed by short-term load-dependent changes of the membrane extension. This also prevents any accumulation of biological growth.
For PERMOX OM120 we recommend a daily and no less than weekly maintenance loading (see load table on last page) of approx. 15-30 minutes. Using intermittent operation, the first 10-15 minutes of each aeration cycle are used with the higher maintenance air flow in advance of standard operation

Monitoring

The bubble pattern and the pressure loss should be checked and documented at regular intervals under similar operating conditions (such as water level and air quantity). The pressure loss development in the load-dependent, seasonal comparison makes it possible to evaluate the condition of the container objectively.
In the event of significant changes of the bubble pattern (e.g. partial massive large bubbles instead of homogenous fine bubble pattern) and/or increase of pressure loss of the system (for more than 40 hPa compared to commissioning), Supratec should be consulted immediately. Particularly in the case of systems that are operated intermittently, there is a risk that damaged diffusers can allow the ingress of live sludge into the entire pipework system. This will adversely affect the function and service life of all diffusers.

Cleaning

The condition of the diffusers must be checked whenever the tank is empty. Particular attention must be paid to soiling (deposits, sludge, etc.), which can usually be easily removed from the membranes. Depending on the type and composition of the soiling, one of the following methods or a combination of several methods might be required. Testing for compatibility and successful results must always be carried out first on individual membranes (particularly with alkalis and acids). We recommend:

- **Manually:** Cleaning with water and a soft brush is often sufficient for removal of existing deposits
- **Alkaline solutions:** Soapy water can usually be used to support manual cleaning.
- **Acids:** In some cases (e.g. limescale) the membranes must be cleaned by adding acids to the compressed air (see below).

Acid dosing

In systems in which limescale deposits are expected, we recommend to clean those systems with diluted acid (85% formic acid for EPDM) at regular intervals. If necessary, diluted acid is dosed into the compressed air in order to minimise the pressure loss of the membrane and increase the service life of the diffuser. For this purpose, we offer a mobile acid dosing station. Please contact Supratec for further information.

Load table

Oval-membrane-tube-diffuser PERMOX® OM120	**EPDM [m^3_N /h per meter]**
Functional check	8
Diffuser run-in prior to the oxygen transfer test (at least 60 hrs)	12
Bubble pattern (starting with higher specific load)	3 - 12
Minimum specific load (0 m^3_N /h/m or ...)	1
Nominal operating range	4 - 12
Maximum continous load	15
Maximum short-term specific load / maintenance load	20

For current version please check our website www.oxyflex.de

We reserve the right to make technical changes.

Our QMS is certified in compliance with DIN EN Norm ISO 9001