

Tube air diffuser ELASTOX®-R

Application

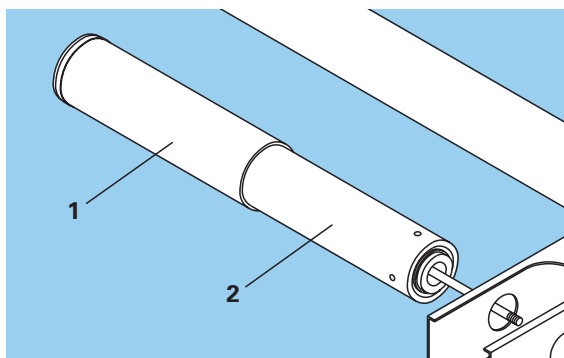
The ELASTOX®-R tube air diffuser was developed by GVA as a membrane compressed-air system especially for water and sewage technology in 1983. The design advantages as well as the low-buoyancy behaviour by floodable support tubes triggered the development of numerous similar systems based on this design principle. Up to now, the high quality and constantly good performance in permanent operation have gained great reputation worldwide.

In the course of time, design-related features and materials have steadily been optimised and advanced; however, the floodable support tube principle has stood the test of time. Typical applications are as follows:

- Preservation aeration of waste water e.g. in balancing tanks
- Oxygenation in activation basins
- Oxygenation for sludge stabilization
- Aeration of rivers and lakes
- Aeration of fish ponds
- CO₂ admission for neutralization

Operational principle

Today the support body of the ELASTOX®-R tube air diffuser consists of a continuous injection-moulded component with integrated air feed and a stainless-steel threaded bush for fixing purposes. The structural design of the air diffuser has been designed in such a way that, as a rule, the exchangeability of the ceramic tube air diffuser Ø 40/70 is ensured. For special installation conditions, adapters can be provided.



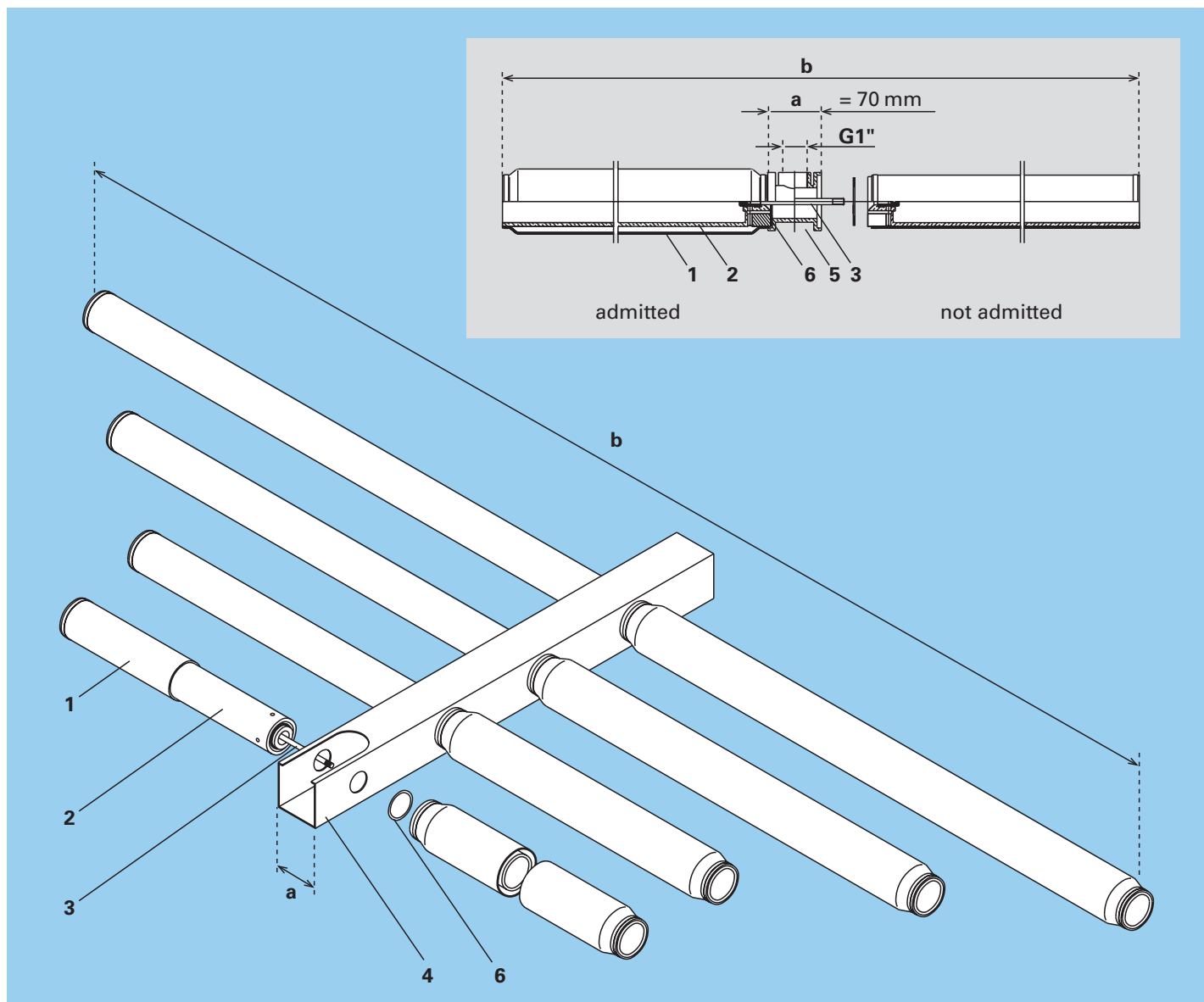
A great many oxygen admission tests on existing facilities have confirmed that ELASTOX®-R tube air diffuser take a leading position as to micro-bubble aeration systems.

The outstanding advantages of the ELASTOX®-R tube air diffuser are the following:

- Micro-bubbling condition and thus optimum oxygen utilisation
- Defined distance between pores prevents coalescence of air bubbles during the generation process. The elastic membrane ensures a high degree of non-clogging operating condition in a difficult application environment.
- Due to an intermittent mode of operation, the application of modern process techniques (e.g. nitrification/ de-nitrification) also in existing facilities is possible.
- Additional energy saving based on the adaptability of oxygen admission to all load conditions, not taking into account a minimum admission of diffusers.
- Floodable support tubes reduce buoyancy effects by air diffusers

- 1 Membrane
- 2 Support body

Design



- 1 Membrane
- 2 Supporting tube
- 3 Tie rod
- 4 Aeration grid
- 5 Tee
- 6 Seal ring

Various air diffuser lengths for each application

Tube air diffusers are normally installed with aeration lengths of 750 or 1.000 mm in newly built aeration tanks. In conjunction with the retrofit of existing sewage treatment plants, old tank structures with an unfavourable geometry (e.g. gutter) are refitted and converted to aeration tanks. In this case, it is helpful to be able to choose from among various air diffuser lengths in order to achieve optimum distribution at the bottom especially with area-type aeration.

Dimensions characteristic values			
ELASTOX®-R types	Ø Support tube	Total length b	Tie rod length
ER 400	65 mm	a + 890 mm	a + 42 mm
ER 500	65 mm	a + 1,170 mm	a + 42 mm
ER 750	65 mm	a + 1,660 mm	a + 42 mm
ER 1000	65 mm	a + 2,160 mm	a + 42 mm

Perforation

The distance between the pores is clearly determined in order to avoid coalescence of air bubbles as far as possible already during the generation process.

Buoyancy forces

The design and dimensions of the tube support and fixing parts are to be based on the buoyancy forces indicated below. The buoyancy forces are to be taken into account especially in case of removable systems.

Perforation / weight / buoyancy characteristic values

ELASTOX®-R types	Perforation length of membrane	Perforation area of membrane	Weight per air diffuser unit	Buoyancy forces per pair
ER 400	400 mm	760 cm ²	0.64 kg	15 N
ER 500	500 mm	950 cm ²	0.81 kg	15 N
ER 750	750 mm	1,425 cm ²	1.06 kg	20 N
ER 1000	1,000 mm	1,900 cm ²	1.33 kg	25 N

Materials characteristic values

Supporting tube	Polypropylene
Membrane	Standard: EPDM Optional: SILICONE
Seal ring	NBR
Tie rod	1.4404
Fixing clamp	1.4571
Aeration grid	1.4301 / 1.4571
Tee	PP

Materials

All materials have been selected to achieve excellent resistance to chemical and biochemical influences to be expected in biological sewage treatment processes. If required, the membranes can easily be replaced.

The membrane material is of special importance for resistance to ageing.

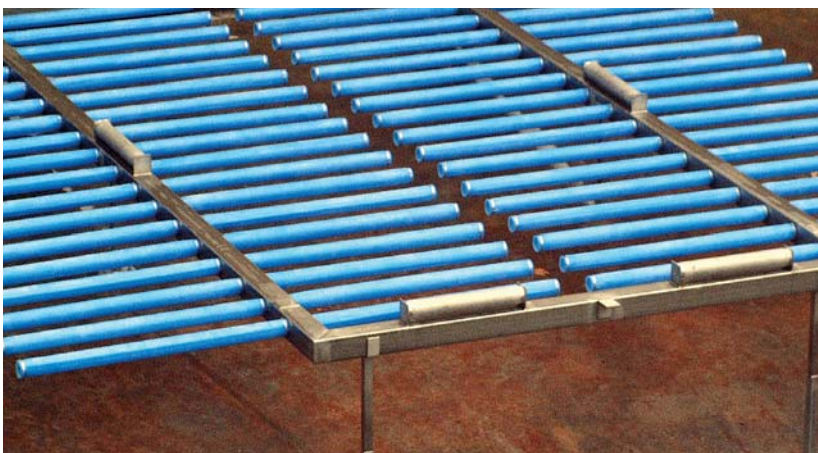
EPDM EPDM membrane with extremely low plasticizer content.

SILICONE Plasticiser-free silicone membrane with very good chemical durability and anti-adhesive service properties.

Attachment/installation

The mounting of the air diffuser to the aeration grids is extremely simple and time-saving. It can be carried out by one person without any special tools.

In addition the standard fixation to square/ rectangular tubes, it is possible to install the aeration components by means of a tee with 1" connection e.g. to round tubes. The tee has been designed as an injection-moulded part made of polypropylene.



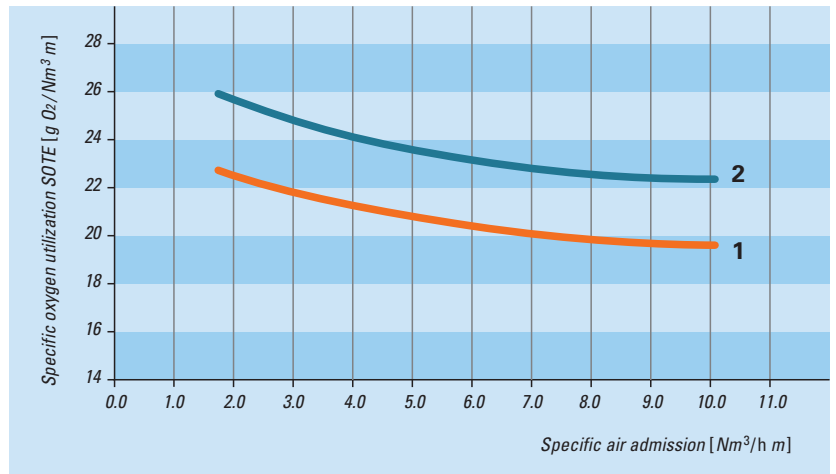
Oxygen admission capacity

The oxygen utilization coefficient of the ELASTOX®-R tube air diffuser has been optimized by numerous pilot-scale tests. The result is an air diffuser featuring excellent fine-bubble gas admission properties.

Apart from a great many other influencing factors, the oxygen utilization coefficient is also highly dependent on the deposit density in the aeration tank under consideration. The presentation of the degree of oxygen utilization relates to an area-type aeration in pure water under normal conditions.

In order to document the influence of the deposit density, we have installed various numbers of air diffusers on the bottom of a test tank.

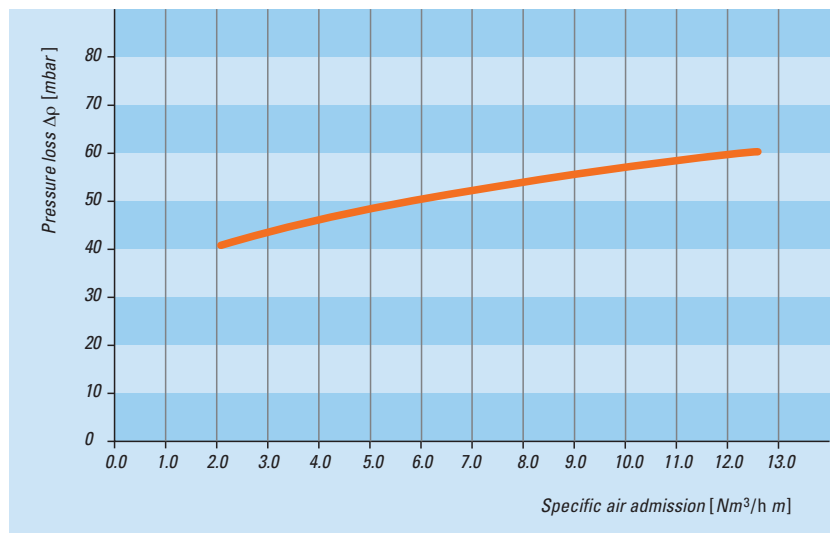
- 1 = 0.85 m air diffuser length/m² of tank bottom
- 2 = 2.40 m air diffuser length/m² of tank bottom



Pressure loss

Unlike the conditions in rigid gas admission bodies, the elasticity of the membrane causes a flatly bent pressure loss characteristic. Due to this, the economics and overall efficiency of these systems is boosted.

The adjacent data relate to all properties of membranes made of EPDM. The pressure loss of the silicone membrane is slightly higher under new condition.



Rating admission value

For the design of aeration systems, a rating admission value of 8 Nm³/running m of an air diffuser is specified. For service test operation purposes for a limited time, admissions up to 12 Nm³/running m of an air diffuser are permitted.