Technical information

Disk air diffuser ELASTOX®-T

Application

The ELASTOX®-T disk air diffuser was developed in 1984 to be applied especially to water and waste water treatment for fine-bubbling compressed-air aeration. Typical applications are the following:

- Preservation aeration of waste water e.g. in balancing tanks
- Oxygenation in activation basins for concentrated nitrification
- Oxygenation for sludge stabilization
- Aeration of rivers and lakes
- CO_2 admission for neutralization

Operational principle

A G1" socket fitting is used for attachment to one of the distributing pipes and to the air feeding component. In idle state, the membrane is flatly lying on the plain supporting disk. Only after the internal air pressure rises above the static pressure of the surrounding water, the membrane will be lifted slightly from the supporting body, thus giving way for the air to expand into the resulting space. The air flows through the perforation of the membrane and enters the liquid in a very fine-bubbling state.

In idle state

Operating condition

Intermittent mode of operation

The structural design has been arranged in such a way that there are even two systems preventing the liquid from flowing back into the air diffuser in case of dropping pressure:

- Due to restoration elasticity, the perforation holes in the membrane will close, while the latter lies flatly on the supporting disk.
- The patented lift limitation device arranged in the central position functions just like a check valve by closing the air feeding openings.

The ELASTOX®-T Spezial air diffuser excels by the unique safety properties of its additionally integrated spring-loaded check valve, not only in intermittent operation mode, but also in case of damage. If the membrane e.g. is defective, the quantity of leaking air is reduced so that, even in case of damaged individual air diffusers, there is no immediate corrective measure necessary in terms of the overall system.

Design

The ELASTOX®-T disk air diffuser features a gas outlet surface exclusively arranged in upward direction and comes in two basic design models:

- ELASTOX®-T Standard
- ELASTOX®-T Spezial

The patented central lift limitation feature is a particular component common to both models. It prevents the membrane from balloon-like swelling and thus ensures uniform aeration across the entire air diffuser surface. The pertinent reduced coalescence enables efficient oxygen utilization.

The differing design of the central lift limitation feature is the main distinctive property between the ELASTOX®-T Spezial and Standard model versions.

ELASTOX®-T Standard

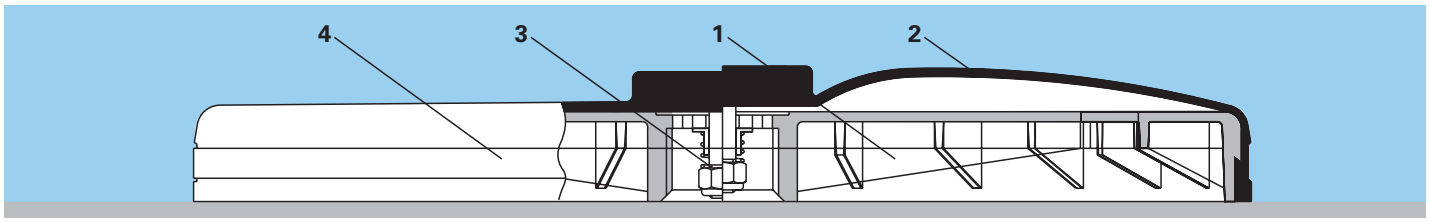
Patented central lift limitation as an integral part of the membrane, at the same time having a non-reverse flow function.

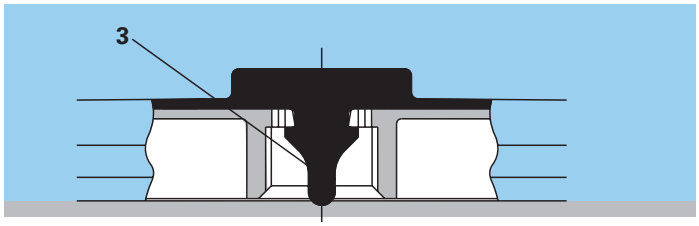
ELASTOX®-T Spezial

Patented central lift limitation integrated into the membrane by vulcanizing and simultaneously designed as a spring-loaded check valve.

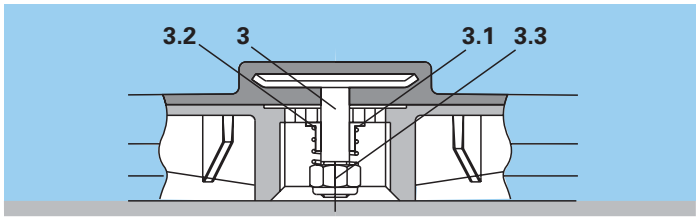
Technical data		gross	net/effective
Diameter	[mm]	320	300 / 70
Gasing area	[cm²]	~ 800	~ 650
Minimum distance	[mm]	~ 200	~ 200
Weight	[Kg]	~ 0.80	~ 0.80

Materials





ELASTOX®-T Standard



ELASTOX®-T Spezial

All materials were selected in such a way that excellent durability properties are achieved as compared with the chemical and biochemical effects to be expected in biological waste water treatment.

As far as resistance to ageing is concerned, the membrane material is of particular importance.

EPDM EPDM membrane with extremely low plasticizer content.

EPDM-MB EPDM membrane of microbes resistant design; reduced affinity as to biological sedimentation due to a special cross-linked additive.

SILICONE Plasticizer-free membrane made of silicone of very good chemical persistence and with excellent anti-adhesive surface properties.

		ELASTOX®-T Standard	ELASTOX®-T Spezial
1	Supporting body	Polypropylene	Polypropylene
2	Membrane	EPDM EPDM – MB resistant to microbes	EPDM EPDM – MB resistant to microbes SILICONE
3	Lift limitation	Analogously to membrane	Steel/stainless steel – integrated by vulcanizing
3.1	Hull		Polypropylen
3.2	Pull-back spring		Stainless steel
3.3	Self-locking nut		Stainless steel
4	Clamping band	Polypropylene Option: Stainless steel	Stainless steel Option: Polypropylene

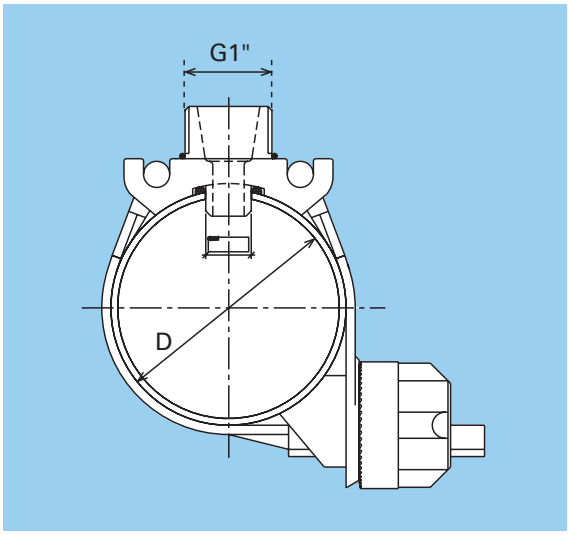
Perforation

The membranes can be punched as three different perforation types, enabling the corresponding adaptation to the required air throughput or oxygen content. The distance of pores from each other has accurately been defined and prevents coalescence of air bubbles already during the generation process.

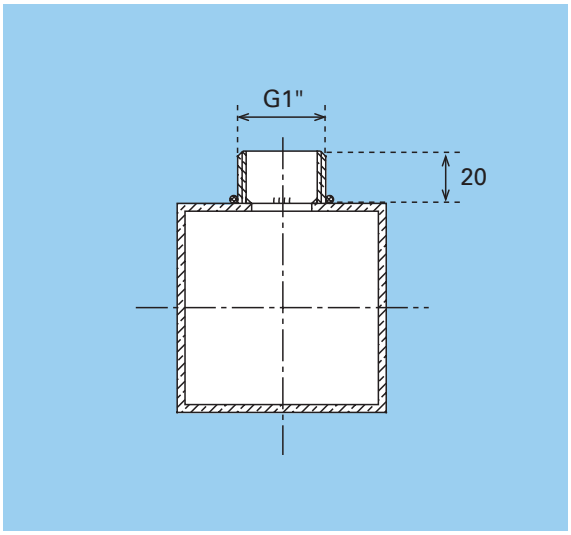
Characteristics perforation		Type A	Type B	Type C
Air throughput nominal value/max. (rinsing)	[Nm^3/h]	8 / 10 (12)	6 / 8 (10)	10 / 12 (14)
Density of slits	[per cm^2]	10	12	12
Slits size	–	fine	extrafine	fine

Attachment/installation

The ELASTOX®-T disk-type air diffusers are attached by using a G1" threaded connection, including sealing by means of an associated O-ring of Ø 32 mm on a corresponding flat area. The bottom distribution systems (aeration grids) can be designed as square, rectangular or round tube structures made of stainless steel or plastic material. The air diffuser can very easily and quickly be mounted on the aeration grids; mounting can be carried out by one person without using special tools.



Round tube



Square/rectangular tube

The GVA saddle clamp consists of glass-fiber-reinforced PP polypropylene and is equally suitable for mounting on stainless steel or plastic round tubes with nominal sizes of DN 65, 80 and 100.

As suitable threaded connections welding nipples G1" x 20 ISO 228 are be planned. Edge length of the tube must be 50 mm at least.

Nominal size	Round tube (outer diameter = D)	
	Plastic	Stainless steel
DN 65	75 mm	76.1 mm
DN 80	90 mm	88.9 mm
DN 100	110 mm	114.3 mm

Oxygen admission capacity

The specific oxygen utilization SOTE [$gO_2/Nm^3 \cdot m$] or the oxygen admission OC [kgO_2/h] are also very much dependent on the energy density in the aeration basin concerned, apart from the general aeration concept of

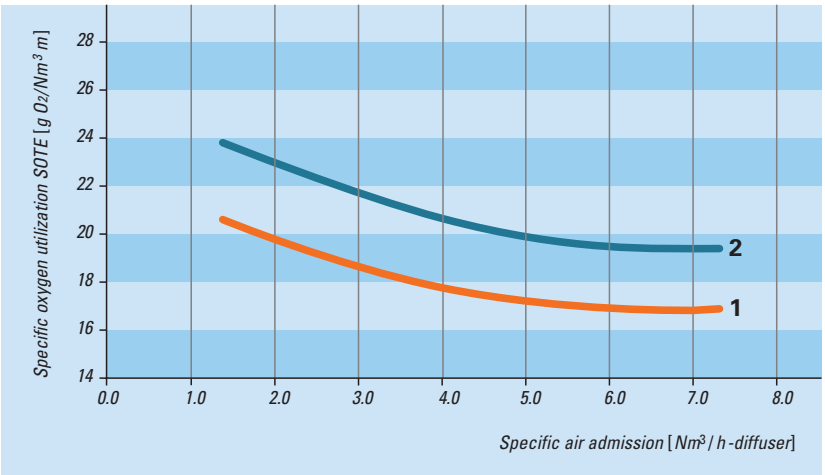
- Full-floor aeration ①
- Aeration with separate circulation e.g. inclined flow aeration
- Partial area aeration, linear aeration (spiral flow)

as well as a great number of further influencing factors.

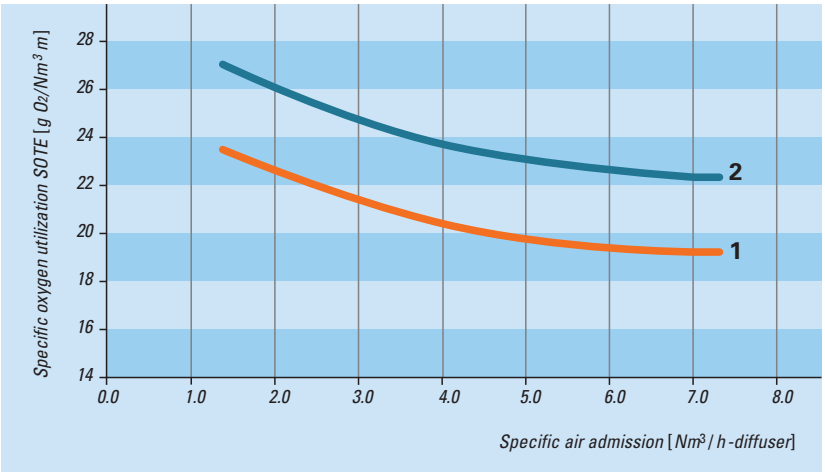
The following description of oxygen utilization is based on an full-floor aeration in clean water under standard conditions and a blow-in depth of 3.75 m. In order to determine the degree of influence of the density of disk arrangement, in each case the number of disk air diffusers has been varied:

1 = Axis distance 1.0 m (~ 6,5 %)
2 = Axis distance 0.5 m (~ 13,0 %)

① *Uniform arrangement on the basin bottom; the relationship of ~ 4:1 between the air admission depth and the air diffuser distance should not be essentially less in order to prevent the creation of cylindrical water flows caused by rising air bubbles.*



*Oxygen utilization in clean water, ELASTOX®-T **type A and type C***

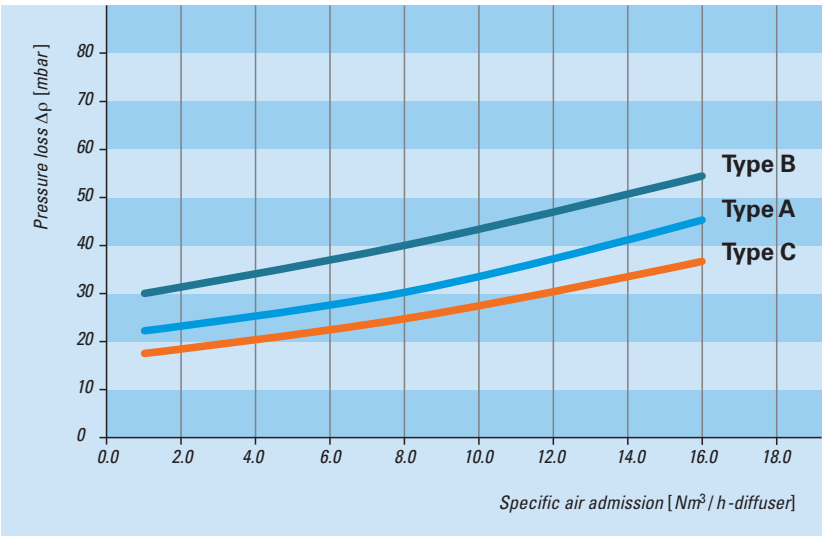


*Oxygen utilization in clean water, ELASTOX®-T **type B***

Pressure loss

The ELASTOX®-T disk air diffusers excel by their elasticity due to very low basic pressure losses and a slightly bent pressure loss curve, unlike excessively rigid aeration bodies. Thanks to this, the economic effectiveness and general efficiency of this system are enhanced.

The mentioned data refer to all membrane qualities out of EPDM. The pressure loss of the silicone membrane lies in the new condition slightly more highly.



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