

# **OXYFLEX® - MF650**

## **Membrane Plate Diffuser**

for fine bubble and coarse bubble diffusion of liquids

### **INSTALLATION, OPERATING and MAINTENANCE INSTRUCTIONS**

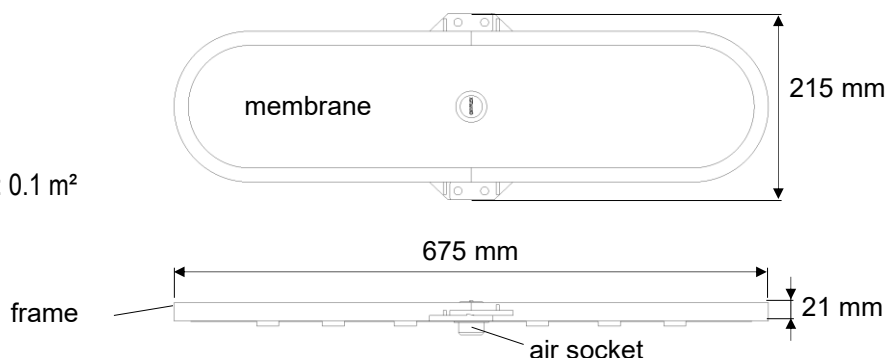


The OXYFLEX® - MF650 membrane plate diffuser consists of a flat, heavily ribbed base plate with air-sockets. A two-piece frame secures the membrane to the base plate. The base plate and the frame are made from fibre glass-reinforced polypropylene, and the membrane is available in EPDM or TPU.

# **INSTALLATION INSTRUCTIONS**

## Dimensions

Free membrane area: 0.1 m<sup>2</sup>

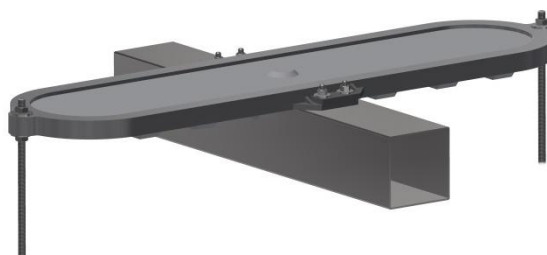


## Materials:

|             |                                        |
|-------------|----------------------------------------|
| Membrane:   | EPDM (ethylene propylene diene rubber) |
|             | TPU (thermoplastic polyurethane)       |
| Base plate: | Polypropylene (PP-GF)                  |
| Frame:      | Polypropylene (PP-GF)                  |
| Gaskets:    | EPDM                                   |

The distance between the diffusers on the distribution pipe (connection hole axis) should be at least 230 mm and must not exceed 1,000 mm (differences possible on request).

In the vicinity of the mixer, optional side brackets provide additional stability and make area-wide coverage possible in this case as well (independently of the type of installation on round or square distribution pipes).



## Storage

Store the diffusers in their packaging in a dry and ventilated room.  
DIN 7716 provisions must be observed.

## Preparation

Prior to installing the OXYFLEX® - MF650 membrane plate diffuser it must be ensured that the pipelines are clean. All drilling chippings, dirt, etc. must be removed, otherwise they will be carried into the diffuser when the fan is started up and could cause significant impairment or damage.

## Levelling

The OXYFLEX® - MF650 membrane plate diffuser is mounted onto distribution pipes (round or square pipe depending on version). The distribution pipes must be levelled to a maximum of  $\pm 10$  mm.

For installation on round pipes with Supratec supporters, the pipe clamps must be tightened with torque of 10 Nm (M10); 20 Nm (M12). The surface pressure that this produces ensures that installation is distortion-free. Threads have to be lubricated before screwing the nuts to avoid seizing.



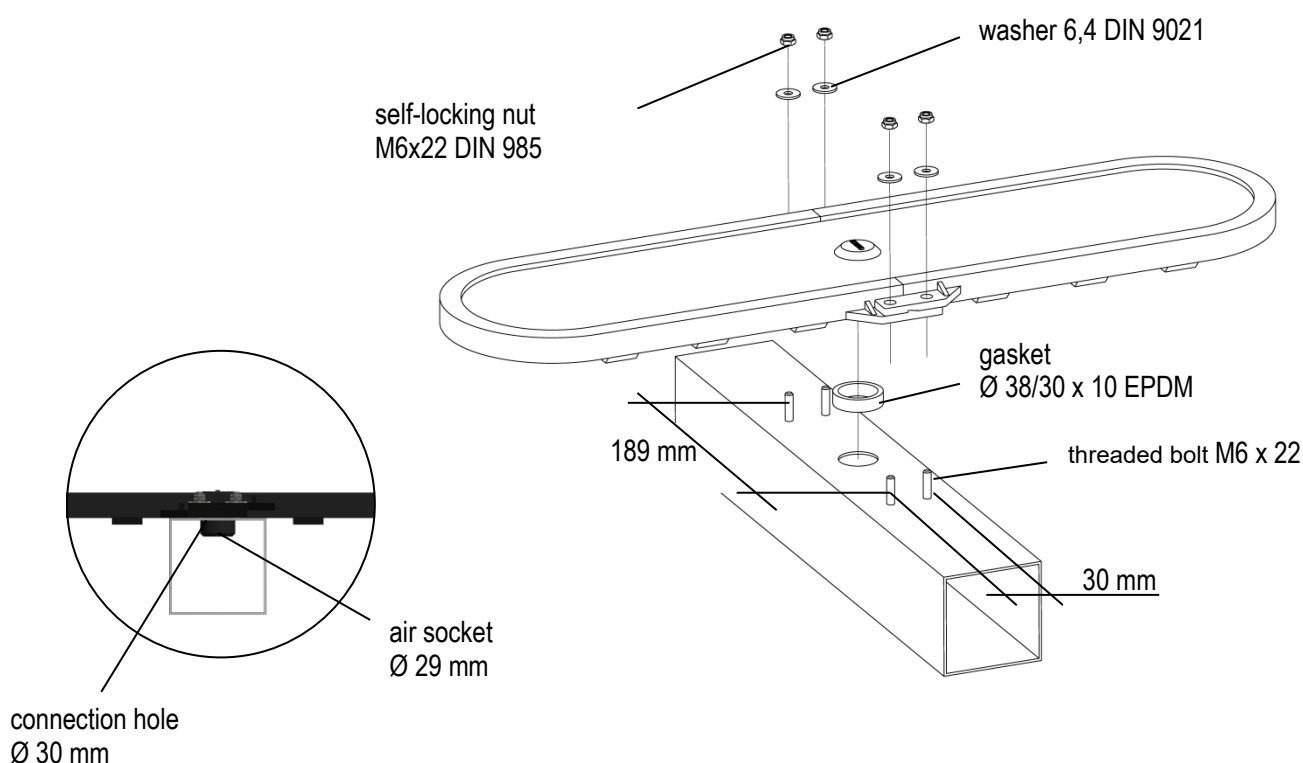
## Type 'B': Installation on square pipe

The OXYFLEX® - MF650 type 'B' membrane plate diffuser is mounted on a square pipe (width at least 60 mm) with 4 threaded bolts M6 x 22 mm.

An EPDM gasket is inserted between the diffuser and the distribution pipe. The surfaces must be clean and straight. Gasket must sit clean and undamaged between the diffuser and the pipe.

The distance between the bolts is 189 x 30 mm (see sketch). We would be pleased to provide you with an appropriate welding template. The air-socket  $\varnothing = 29$  mm is inserted from above into the bore hole  $\varnothing = 30$  mm of the square pipe and bolted in place using the threaded bolt that is now protruding from the side fastening lug of the diffuser frame with washers and self-locking nuts M6 (4 Nm). The threaded bolts must be lubricated beforehand to avoid seizing.

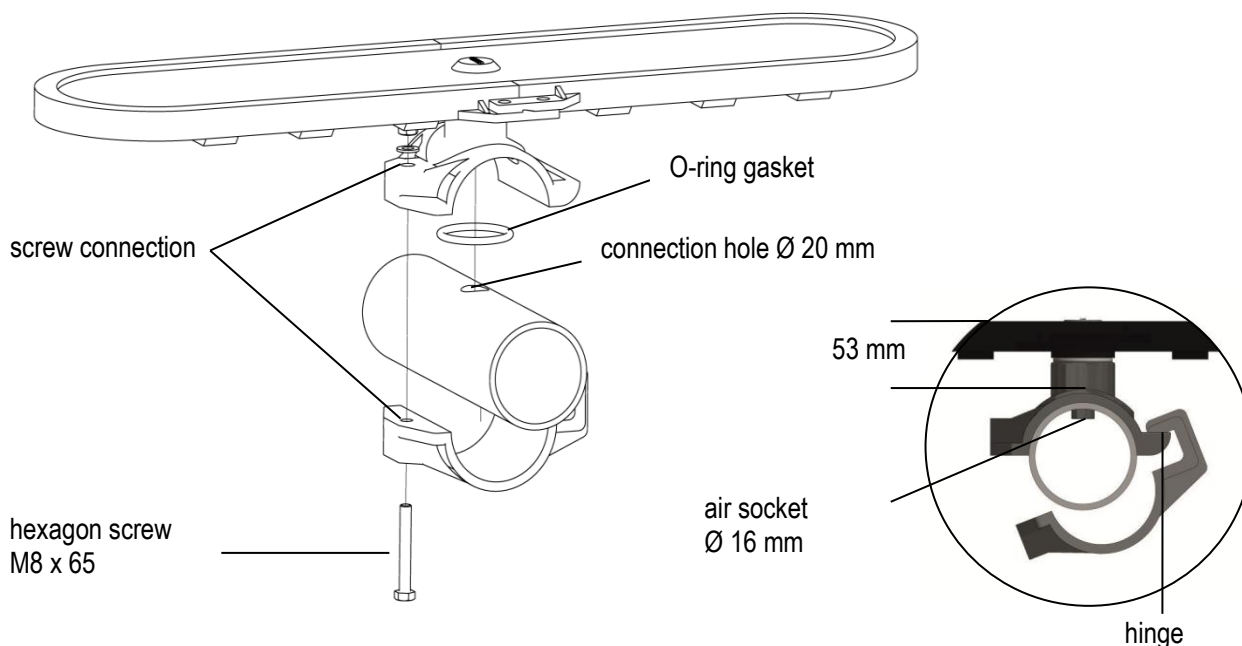
Always make sure that the diffuser is firmly and horizontally seated.



## Type 'AS': Installation on round pipe

The OXYFLEX® - MF650 type 'AS' membrane plate diffuser is attached to a round pipe made from stainless steel or plastic using a clamp saddle.

Bore holes with a diameter of Ø 20 mm are drilled in a central position on top of the round pipe. The top part of the clamp saddle that is welded to the OXYFLEX® - MF650 membrane plate diffuser has a supply air pipe connection. This acts as an installation aid and is inserted into the hole of the round pipe from above.



An O-ring made from EPDM is inserted between the upper part of the clamp saddle and the distribution pipe. The gasket between the diffuser and the pipe must be clean and undamaged.

The hinge of the lower part of the clamp saddle is hooked into the upper part. Now the clamp saddle is closed and screwed in place using an M8 x 65 mm hexagon screw, a washer and a self-locking nut (7 Nm). The thread of the hexagon screws have to be lubricated beforehand to avoid seizing.

Always make sure that the diffuser is firmly and horizontally assembled.

Possible pipe dimensions:

For stainless steel pipes:

DN 50 (60,3 mm) with additional spacer/ DN 65 (75 mm) / DN 80 (88.9 mm))

For plastic pipes (outside Ø):

63mm / 75 mm / 90 mm / 110 mm

(Further sizes are available on request.)

## Type "SA": Fitting to square pipes with holes at side

The OXYFLEX® - MF650 type 'SA' membrane plate diffuser is secured using side adapters to square pipes with two bore holes in the side.

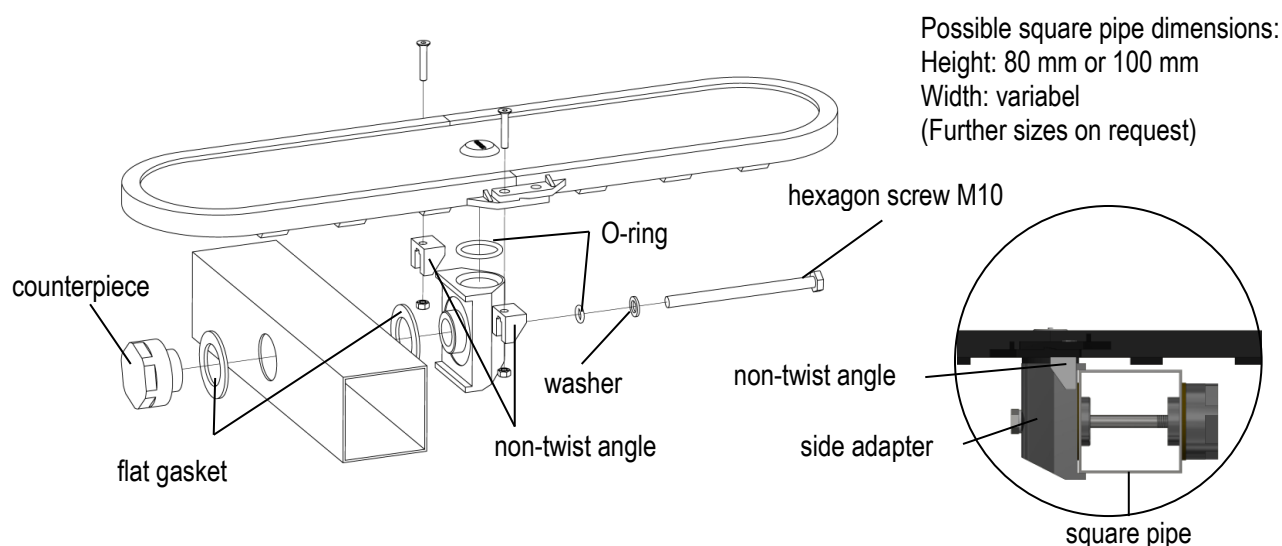
A flat gasket made from EPDM is inserted between the square pipe and the side adapter or the square pipe and the counter piece. The surfaces must be clean and straight; the gaskets must sit clean and undamaged between the adapter and the pipe.

The side adapter is inserted into the 38 to 45 mm diameter bore holes at the sides and screwed in place with the counter piece at the opposite side using an M10 hexagonal through-screw (16 Nm). The thread of the hexagon screws have to be lubricated beforehand to avoid seizing.

An O-ring made from EPDM is inserted between the side adapter and the connecting thread of the diffuser. The gasket between the diffuser and the adapter must be clean and undamaged.

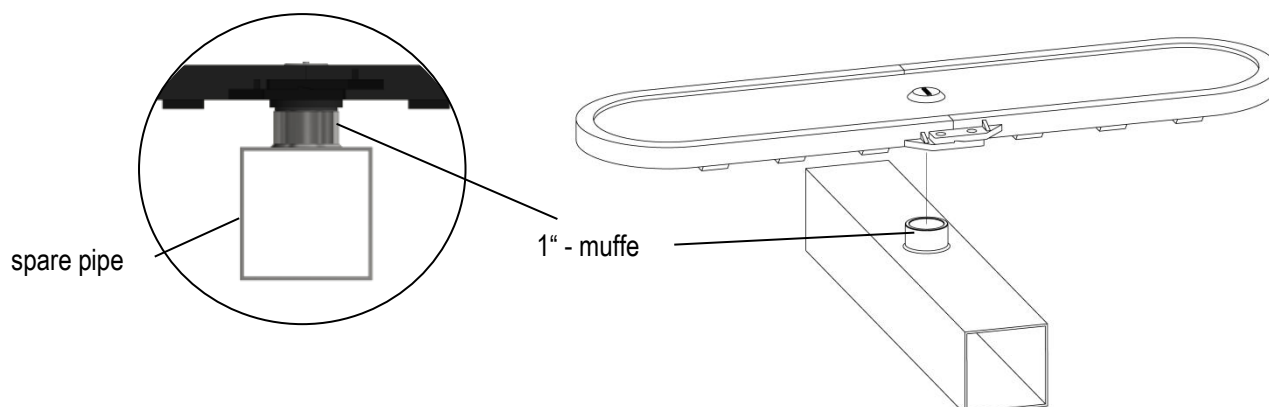
The OXYFLEX® - MF650 type 'SA' membrane plate diffuser is screwed into the 1" female thread of the side adapter in a secure and stable way using the air-socket. In order to secure the installation position firmly, 2 additional non-twist angles are screwed into the lugs of the frame (M6 x 30 mm)

Always make sure that the diffuser is firmly and horizontally seated.



## Type „G“: installation by 1" male thread

The OXYFLEX® - MF650 type „G“ have an air socket with 1"-male thread. By using existing 1"-sockets at the distribution pipe, this diffuser type is screwed in (minimum distance between sockets of 470mm is required).



Screw connection between diffuser and socket must be sealed on site.

## **OPERATING INSTRUCTIONS**

### Functional check and leakage check

After the OXYFLEX® - MF650 membrane plate diffuser has been installed, a functional and leakage check must be performed. In order to do this, fill the tank up to a level of approx. 10 cm above the top edge of the diffuser with clean water. It is recommended to operate with minimum air amount (see tables on page 8), before the water level reached the aeration grid, in order to avoid water ingress by some bad sealing.

To check the function visually, the diffusers are loaded with the specified amount of air in accordance with the diffuser version (see tables on page 8).

After ensuring that all diffusers are functional, the air quantity is reduced in accordance with the diffuser version (see tables on page 8) in order to make it easier to perform the leakage check. Rising large bubbles indicate leaks (e.g. due to gaskets that have been dislodged) those must be remedied.

The successfully performed functional and leakage check must be documented and the water level increased to at least 100 cm above the top edge of the diffuser with clean water as quickly as possible. If immediate commissioning is planned, the tank can also be filled directly with waste water.

### Diffuser run-in

Different procedures are recommended depending on the membrane material and the diffuser version:

- EPDM membranes:  
The compressed air must not be turned off between the function and leak-tightness check and the run-in of the diffuser. Before normal operation the OXYFLEX® - MF650 membrane plate diffusers with EPDM membranes must be operated in clean or waste water continuously for at least 60 hours with the specified specific load (see run-in of diffusers in table 1 on page 8).
- TPU membranes:  
OXYFLEX® - MF650 membrane plate diffusers with TPU membranes do not have to be run in for normal operation. However, a bubble pattern test or an oxygen transfer test can be carried out no sooner than 24 hours after start-up (for specific load see table 2 on page 8).

Deviating procedures are possible in consultation with Supratec.

### Bubble pattern

The bubble pattern should be assessed no sooner than when the above-described run-in of the diffusers has been completed. For this purpose the diffusers are operated from the maximum down to the minimum specific load.

The evenness of the aeration (bubble pattern test) should be checked when the tank is filled to a level of approx. 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 proof of the efficiency of the OXYFLEX® - MF650 membrane plate diffuser, the above-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 and/or system is decommissioned later on, it must be ensured that the diffusers are sufficiently covered by water (at least 100 cm) so that the OXYFLEX® - MF650 membrane plate diffuser is protected against strong sun, frost and mechanical damage caused by falling objects, for example.

After successful commissioning, a reference pressure loss measurement enables the evaluation of actual state of aeration system in operation.

## MAINTENANCE INSTRUCTIONS

The OXYFLEX® - MF650 membrane plate diffuser 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 we recommend an appropriate maintenance cycle. 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.

- EPDM membranes:

We recommend daily and no less than weekly maintenance loading in accordance with the diffuser version (see table 1 on page 8) 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.

- TPU membranes:

We recommend a brief pressure relief on minimum daily basis (system pressure reduction of approx. 100mbar) for the duration of minimum 5 minutes and a quick restart to the maintenance loading in accordance with the diffuser version (see table 2 on page 8) for the duration of approx. 5-10 minutes. Using intermittent operation, pressure is to be briefly relieved at the end of each aeration cycle, next aeration cycle is to be started for the first 5-10 minutes with the higher maintenance air flow (see table 2 on page 8) in advance of standard operation.

Deviating procedures are possible in consultation with Supratec.

### 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 emptied. Particular attention must be paid to soiling (deposits, sludge, coverings 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. During manual cleaning, a continuous air flow is required. We recommend to operate the diffusers acc. to "functional check" (compare table 1, 2).
- Alkaline solutions: Diluted alkaline cleaning agents can usually be used to help with manual cleaning.
- Acids: Recognizing pressure increase, dosing of diluted acids in to the compressed air can be required in order to clean the membranes (compare below information)

### Acid dosing

In systems in which limescale deposits are to be expected, we recommend that these systems are cleaned with diluted acid ( $\leq 85\%$  formic acid for EPDM membranes or  $\leq 30\%$  acetic acid for TPU membranes) at regular intervals. If necessary, diluted acid is metered 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 dosing station for perfectly metered cleaning.

Please contact Supratec for further information about acid dosing.

## Repair measures

Our more than 30 years of experience have shown that the OXYFLEX® - MF650 membrane plate diffuser is an extremely robust and reliable diffuser. If a diffuser element is damaged nevertheless, a diver can be deployed to remedy the problem without having to empty the tank. The diver can remove the damaged diffuser underwater and close off the relevant bore hole. Depending on the diffuser system that is installed, several bore holes can often be closed off without having a major effect on oxygen transfer. The replacement of individual diffusers on an existing grating is not recommended, since new membranes differ considerably from older membranes with regard to pressure loss. We would be pleased to provide advice if necessary.

**Table 1:** Specific loads [ $\text{m}^3/\text{h}$  per diffuser] for the OXYFLEX® - MF650 membrane plate diffuser with EPDM membrane

| Diffuser version                                       | Max Efficient | High Efficient | Efficient |
|--------------------------------------------------------|---------------|----------------|-----------|
| Functional check                                       | 4             | 8              | 12        |
| Diffuser run-in                                        | 4             | 8              | 12        |
| Bubble pattern<br>(starting with higher specific load) | 0,5 - 6       | 1 - 8          | 2 - 12    |
| Minimum specific load / leakage check                  | 0,5           | 1              | 2         |
| Nominal operating range                                | 1 - 4         | 2 - 6          | 3 - 8     |
| Maximum continuous load                                | 5             | 8              | 12        |
| Maximum short-term specific load / maintenance load    | 6             | 10             | 14        |

**Table 2:** Specific loads [ $\text{m}^3/\text{h}$  per diffuser] for the OXYFLEX® - MF650 membrane plate diffuser with TPU membrane

| Diffuser version                                                     | High Performance |
|----------------------------------------------------------------------|------------------|
| Functional check                                                     | 5                |
| Diffuser run-in prior to the oxygen transfer test (at least 24 hrs.) | 4                |
| Bubble pattern<br>(starting with higher specific load)               | 2-7              |
| Minimum specific load / leakage check                                | 1                |
| Nominal operating range                                              | 2-6              |
| Maximum continuous load / maintenance load                           | 8                |

We reserve the right to make technical alterations.

For current version please check our website [www.oxyflex.de](http://www.oxyflex.de)