



Disc Diffuser

Assembly, Operating and Maintenance Instruction

HD 200, HD 270, HD 340, HD 235, HD 325, ECO 21, ECO 34



JÄGER

Umwelt-Technik

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1. Aeration System

This manual gives a detailed description of installation and operating of the disc diffuser JetFlex HD 270, HD 340, HD 235, HD 325, ECO 21 and ECO 34.

Dimensions

Type	Height [mm]	Diameter total/effective [mm]	Overall height membrane top of tube [mm]	Perforated area [m ²]	Material of plastic base	Membrane- material	Total weight [kg]
HD 200	58	235/170	30	0,023	PP GF30	EPDM & Silicone	0,5
HD 270	58	270 / 220	30	0,037	PP GF30	EPDM & Silicone	0,6
HD 340	76	340 / 310	46	0,060	PP GF30	EPDM	0,85
HD 235	45	240 / 209	32	0,030	PA GF30	EPDM	0,5
HD 325	45	330 / 290	32	0,059	PA GF30	EPDM	0,9
ECO 21	55	270(*) / 240	24	0,045	PP GF30	EPDM	0,7
ECO 34	55	270(*) / 240	24	0,045	PP GF30	EPDM	0,7

(*) without fastener ring

All diffuser are equipped with 3/4" NPT thread

Grommets for 3/4" NPT Threads

Type	Permitted wall thick- ness of header tube [mm]	Diameter of straight- drilled hole [mm]	Material	Colour
Grommet 4,7	4,7	31,8 (1 1/4")	EPDM 75 Sh A	Black
Grommet 6,3	6,3	31,8 (1 1/4")	EPDM 75 Sh A	Black
Universal Saddle	2 - 8	31,8 (1 1/4")	EPDM 75 Sh A	Black

2. General

Gummi-Jaeger GmbH Aeration Components delivers aerating systems for applications in aeration basins in communal and industrial waste water treatment plants.

The aerating systems are intended for fine-bubble compressed air ventilation of activated sludge in biological waste water treatment. With membranes made of EPDM-rubber an intermittent operation is possible due to the long-term elasticity of the membrane material.

Please consult Gummi-Jaeger regarding suitability of membrane materials for applications in industrial waste water treatment plants and/or in residential plants that have more than 10% industrial share. Quality properties of materials, perforation and bubble size/uniformity are controlled and recorded generally.

The aeration systems are delivered completely assembled. Gummi-Jaeger GmbH Aeration Components recommends a careful treatment of storage, transport and installation, to avoid damage of the membranes.

The Gummi-Jaeger GmbH General Conditions of Sale are valid in their new version respectively.

3. Shipping

We ship diffusers in cardboard boxes. See individual data sheets for packaging details.

4. Incoming Inspection

Upon delivery check packages, equipment and products for structural damage during shipment, particularly the rubber membranes. Any damages of packages, equipment and products must be reported to Gummi-Jaeger and shipping agent within 5 work days of delivery.

Gummi-Jaeger GmbH reserves the right for damage inspection.

Warranty takes place only for original and unharmed packaging.

5. Storage of Equipment

- Store equipment and diffuser as well as all accessories in their original packaging in a dry and aerated room regarding to DIN 7716.
- Prevent from frost, excessive heat, direct sunlight, dust, mineral oils and hydrocarbons.
- Avoid works which can lead for the damage of the aerators and their packaging.
- Do not store outdoors! Storage time of rubber parts up to the installation / starting operation should not exceed 1 year.
- At on-site delivery, all rubber and plastics parts must be stored in their original packaging. Crates exposed to direct sunlight must be covered with tarpaulin to protect against UV-radiation.
- Do not use packaging material containing plasticizers.

6. Assembly

6.1 Preparations

- Prior to assembly of the aeration systems pipings and basins have to be cleaned of all pollutions like stones, wood pieces, etc.
- As lateral should be used standard PVC (Schedule 40 or 80). The wall thickness specifies the type of grommet.
- Air distribution through any disc diffuser is a function of individual diffuser elevation. For proper system operation all lateral pipes must be levelled within a tolerance of $\pm 0,6 \text{ cm} / \pm 1/4''$.
- Predilled outlets at the top of the lateral should have a diameter of 31,8mm / 1,25" and are aligning on vertical axis with a tolerance of $\pm 3^\circ$.
- Outlet holes may not be located in the weld area.
- Contractor is to confirm the cleanliness of the air piping. Corrosion damages (rust) are to be eliminated. Air purge or water flush cleaning is recommended prior to diffuser installation to remove any internal debris and tailings that may have accumulated in the header piping.

6.3 Diffuser Alignment

- Maximum velocity of flow at diffusers should not exceed 0,5 m/s.

6.3 Diffuser Installation

1. For easy installation the EPDM grommets can be moistened with a lubricant. The grommet is fitted into the drilling in such a manner, that the undercuts engage in the drilling and the curved contour of the upper part of the grommet fits to the pipe curvature.
2. A commercial grade water-based soap (concentration 5% - 10%) is recommended as lubricant. Lubricants containing mineral oils or hydrocarbons are not allowed.
3. Press the disc diffuser NPT-joint into the grommet. Turn the diffuser clockwise as far as it will go to strain the grommet in the outlet. To avoid rotation of the grommet use the special offset fork wrench (Part-No. GJ-12013, Drw.-No. E-2-7622-0-HA-3).
4. During tightening the membrane must not be deformed, otherwise a non uniform bubble pattern might occur or a possible tear up of the perforated membrane, which could lead to leakage.
5. The grommet must be equally deformed for proper sealing, otherwise turn-off the diffuser, adjust the grommet and tighten again. Replace an irreversible deformed or damaged grommet.

7 Operating Instructions

7.1 Start-Up Instructions

Prior to start-up operation cleaning of the basin regarding contamination like stones, wood pieces etc. is mandatory. Time between assembly and filling of the basin should be as short as possible. If this is not possible, the following must be taken into account:

- It is not permitted to carry out other jobs in the area of the aerators, which could cause damage to the diffuser system, like painting, welding, concrete sealing etc.
- The aerators must be protected against dropped parts.
- To check the air tightness, fill the basin with clean water. Potable water is not necessary, but the water must be free of silt or debris. Water level should be at least 20 cm / 8" above diffuser. Start short time aerating. Immediately after turning or shutting off the air supply, inspect visually on excessive airflow. A large air volume in localized area points could be a possible air leak of the piping or damaged diffuser membrane.
- If normal operation does not start directly after leakage inspection raise water level to at least 1 m / 40" above diffuser (protection against UV-radiation and severe cold or hot weather conditions). For longer dwell times compensate evaporation losses.
- Diffusers must operate at least 10 minutes daily at medium air flow rate.
- At temperatures below freezing, the water level must be chosen in such a manner, that a through freezing can be avoided safely (approx. 1,5 - 2 m / 60" - 80").
- All diffusers must operate at least 3 days at maximum air flow rate prior to oxygen transfer measurements because of increasing SOTE.

7.2 Standard Operation

At standard operation, the air flow rate must be adjusted to maintain desired dissolved oxygen levels in the basin. When adjusting the air flow rate, the diffusers should be operated within the permitted operational range of the diffuser. An excessive air flow rate leads to high pressure drops and reduced oxygen transfer performance. Low air flow rates may result in uneven utilization of the diffuser (membrane) and reduced air distribution.

Furthermore, at low air flow rates incidentally an increased growth of biological materials on the membrane occur, which leads to agglutination of the perforation and therefore to increasing pressure drop.

Keep the air flow rate not higher than maximum diffuser air flow rate. This is depending on diffuser design, material, slitt pattern, etc.

Keep the water temperature within 5°C / 41°F and 35°C / 95°F (ATV A-115).

The air temperature at diffuser entrance may not exceed 60°C / 140°F. Higher temperatures are possible, please consult Gummi-Jaeger GmbH Aeration Components.

Good air filtration is required for operating fine bubble aeration systems. The air blown into the system must be free of oil, dust and solvents. The compressed air must correspond to the guidelines the German TA-Luft or corresponding regional regulations.

Dust filters for environmental dust have to be designed in accordance with DIN EN 779 for a removal by at least 80% (filter class G3), better 90% (filter class G4) to prevent clogging of the diffuser media.

Diffuser head loss should be constantly monitored. An increase of more than 20 hPa / 8" WC reflects a possible clogging problem. Clogging may be caused by deposit of carbonates, biological film etc. which can usually be removed by high pressure water hosing.

Inspection of diffusers should be made on a regular basis, at least once a year.

7.3 Trouble Shooting

The JetFlex Disc Diffuser TD requires very little maintenance for long term operations because of the use of high-performance materials. Gummi-Jaeger GmbH Aeration Components recommends a periodical visual inspection of the diffuser system, especially for the occurrence of deposits and the pressure drop. This should allow the operator to determine if the aeration system is performing at optimum levels.

Below one can find indications of disturbances and procedures for repair.

1. Indication: **Large volume of air in localized area**

Possible cause: Leakage in lateral piping

Procedure: Drain basin to access area in question, maintain medium air flow, check joints and pipes for evidence of breakage, repair or exchange

Possible cause: Diffuser membrane is damaged or missing

Procedure: Drain basin to access area in question, maintain medium air flow, inspect visually diffuser, exchange membrane or complete diffuser

2. Indication: **Non uniform bubble pattern**

Possible cause: Insufficient blower capacity

Procedure: Confirm blower operations, switch on additional blowers

Possible cause: Valve of drop lines closed or not open enough

Procedure: Inspect position of check valve

Possible cause: Incomplete air distribution to diffusers

Procedure: Drain basin to access area in question, check diffuser horizontal levelling, level within tolerance of $\pm 0,6 \text{ cm} / \pm 1/4''$, inspect piping and joints for internal clogging from debris, air purge or water flush cleaning

Possible cause: Deposits on diffuser membrane

Procedure: Inspect diffuser membranes for deposits and encrustation, clean or exchange membrane or exchange diffuser

3. Indication: **Decreasing of dissolved oxygen level, increase of system pressure drop**

Possible cause: Deposits on diffuser membrane

Procedure: Inspect diffuser membranes for deposits and encrustation, clean or exchange membrane or exchange diffuser

4. Indication: **Non uniform dissolved oxygen profile throughout basin**

Possible cause: Insufficient air volume

Procedure: Confirm blower operations, switch on additional blowers, check equipment and operation conditions, see 1-3

Depending on type of waste, individual constructions and operation conditions other causes can lead to disturbances. If necessary contact the contractor or engineering office.

7.4 Maintenance and Cleaning

7.4.1 Maintenance

The membranes should be checked during their operation continuously by the operator, particularly if sustained use results in an increase of pressure drop or a change to a coarse bubble pattern. The latter leads to a distinct reduction of the oxygen transfer rate, because only a slight part of the perforated membrane excessively blows. Diffusers should be cleaned from deposits (carbonates, iron and aluminium salts, biological slimes, ...) in regular based periods, described by operating instructions.

The build-up of such deposits depends on waste and the special operating conditions of the waste water treatment plant.

After the switching off and draining the aeration basin or the pulling up of the retractable aerator grid consider that sludge deposits on the membranes do not dry and cure. Dried deposits impair the function of the diffuser in further operation.

7.4.2 Mechanical Cleaning

The recommended cleaning procedure of biological deposits is to physically dislodge the growth either through gently brushing the substance off or using a high pressure water jet cleaner¹⁾. A distance of about 50 cm should be kept between membrane and nozzle in order to avoid damage to the membrane through a too sharp jet of water.

During phosphorus precipitation pure Al-sulphate and Fe-sulphate do not attack the membrane material chemically. However isolated strong-sticking deposits can occur, which can be removed in the initial stage with a high pressure water jet cleaner.

7.4.3 Chemical Cleaning / OSHA Regulation MSDS²⁾

The common method for chemical cleaning of carbonate scaling is the metering of formic acid to the air stream. This process can be carried out without basin draining.

Depending on the degree of soiling concentrated formic acid (85 vol. %) should be added twice a year with a commercial grade metering pump into the air stream. Adjust maximum air flow rate by diffuser and add within one hour about 100 cm³ / 3.4 fl. oz. formic acid per diffuser. To remove the formic acid subsequently from the system, flush at least 2 hours at unchanged air flow rate.

The exact amount and proportion depend on the degree of soiling, composition of the waste water as well as the operating conditions and can only be determined by means of appropriate tests.

Pipings, valves and joints must be acid-resistant.

The use of chemical cleaning agents and additives is not allowed and results in the loss of guarantee.

¹⁾ Follow safety guidelines of manufacturer of pressure-washer.

²⁾ Formic acid is dangerous and can cause severe injuries and death. Professional equipment and specially trained personnel required. Follow all safety instructions with the use of formic acid.

8. Replacing Disc Diffusers

If the inspections on a regular basis results in an exchange of the complete diffuser, proceed as described below:

1. The diffuser should be cleaned with a high pressure water jet cleaner of sludge deposits, to avoid an injury risk by possible slide.
2. Unthread diffuser from lateral piping and remove remaining grommet.
3. Corrosion damages (rust) are to be eliminated. Air purge or water flush cleaning is recommended prior to diffuser installation to remove any internal debris that may have accumulated in the header piping.
4. Use new grommet.
5. Assemble diffuser as described in Chapter 6.3.
6. Check air tightness as described in Chapter 7.1.

9. Recycling

Consider the local official regulations for deposit on dump or supply to scrap metal. Decisive are the valid laws at the time of waste disposal.

If our products were not contaminated by other materials, it does not concern a particularly monitored waste. In the case of contamination please ask your responsible authorities.

10. Disclaimer

This information is based on our present state of knowledge and is intended to provide general notes on our products and their uses. It should not therefore be construed as guaranteeing specific properties of the products described or their suitability for a particular application. US units are for convenience only. Any existing industrial property rights must be observed. The quality of our products is guaranteed under our General Conditions of Sale.

11. Reference

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