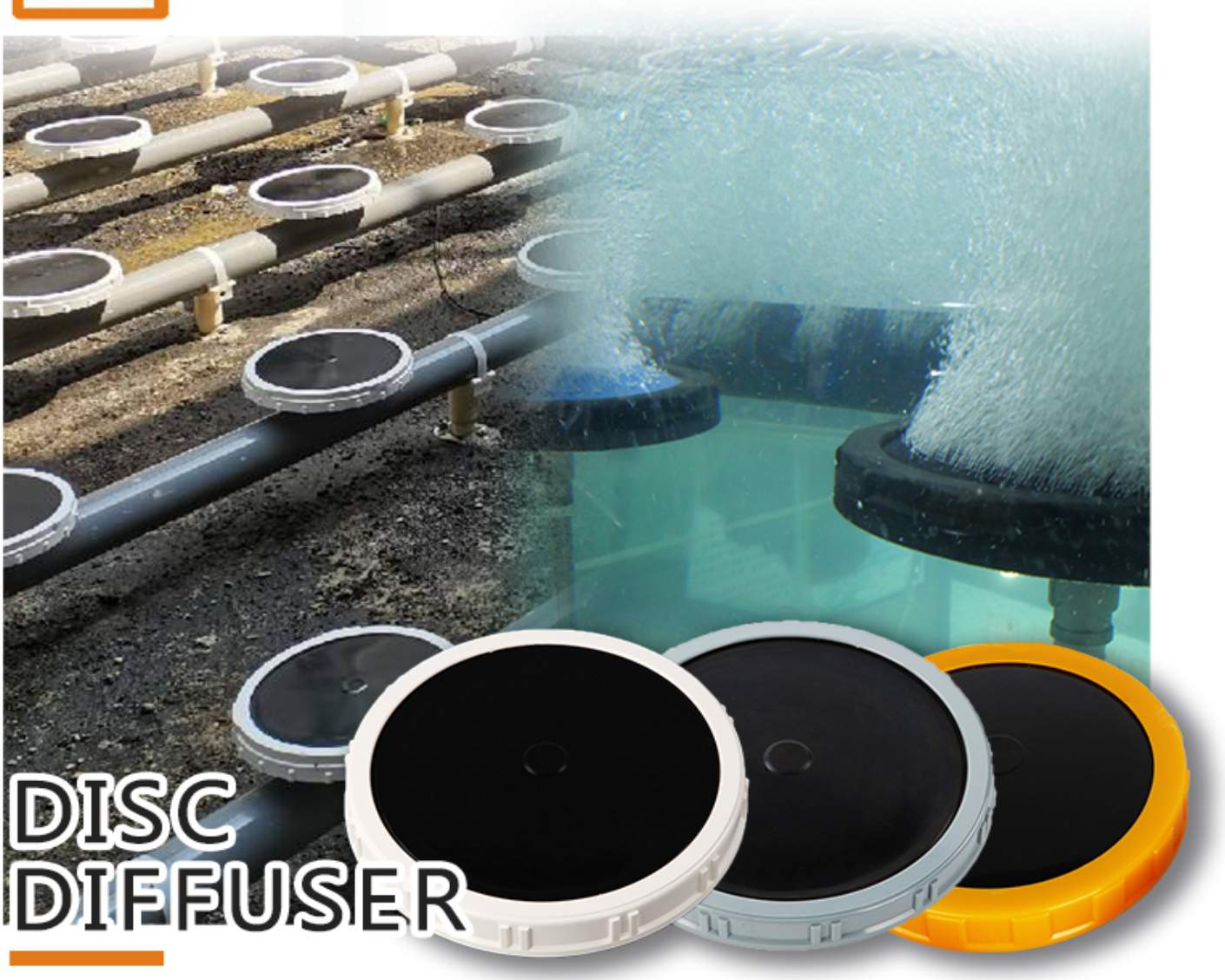
JUNTAI PLASTIC



Juntai Disc Diffuser

Installation Operation & Maintenance Manual

Applicable Disc diffuser model

DD215 DD270 DD350

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1. Overview

This manual provides detailed instructions for the installation, operation, and maintenance requirements of Juntai Disc Diffusers (DD215, DD270, DD350). Each batch of diffusers shipped by Juntai includes an installation guide. It is crucial to strictly follow all recommendations in the manual to prevent diffuser malfunction or damage.

Juntai maintains strict control over every step, from raw materials to the final assembly of the product. The production process of the diffusers is meticulously documented, and all assembly is completed within the Juntai factory. Care should be taken to protect the diffusers during transportation, storage, and assembly to avoid any damage.

2. Juntai Disc Fine Bubble Diffuser

2.1 Application Scope

Juntai provides disc diffusers for the aeration process in wastewater treatment plants. In sewage treatment plants utilizing the activated sludge process, the microbubble aeration provided by Juntai's disc diffusers significantly enhances wastewater treatment efficiency. Juntai employs EPDM membranes synthesized with a special formula, offering excellent elasticity and durability, enabling the diffuser discs to support long-term intermittent operation in sequencing batch processes.

2.2 Composition of Wastewater

EPDM membranes produced by Juntai are primarily intended for conventional municipal wastewater as defined in DWA-M115. Wastewater plant staff must continuously monitor and check the consistency of water quality parameter records. Certain chemicals may affect the performance of the diffuser disc: specifically, solvents and halogen components may damage EPDM. Other hydrocarbons such as petroleum, oils, and fats can also cause damage to EPDM membranes when present at concentrations above normal (damage can occur even at 25ppm). Industrial wastewater treatment (typically considered industrial wastewater when it constitutes more than 10% of the treated wastewater) may require the use of other materials such as silicone, fluoroelastomers, etc. Most membranes required for industrial wastewater treatment may need to be pre-tested, and relevant warranty terms should be specially confirmed.

2.3 Pretreatment

Properly setting up mechanical screens, sedimentation tanks, and oil separation tanks is crucial for optimal performance of diffuser discs in subsequent biological treatment tanks. Inadequate pretreatment or the absence of pretreatment can reduce aeration efficiency. Regularly check if diffuser discs in the aeration tank are accumulated with filamentous matter and clean them as needed. This is especially important for units that need maintenance; when a diffuser unit with attached filaments is lifted to the water surface, the disc membranes are prone to rupture.

2.4 Sunlight and Ultraviolet Radiation

In general, EPDM membranes are not affected by weather conditions and are resistant to ultraviolet radiation. However, direct sunlight on the diffuser disc should be avoided, as exposure to sunlight can heat up black membranes to 80-100°C, accelerating membrane aging. When emptying the aeration tank, rinse the diffuser discs and keep the membranes as wet as possible. Once the sludge adhered to the diffuser discs dries and hardens, the micropores on the membranes will be permanently blocked, causing the aeration system to malfunction. Therefore, when the aeration tank cannot operate normally, water should be injected into the tank, and the liquid level should be maintained above the diffuser discs.

2.5 Temperature

The water temperature should be maintained between +5°C and +30°C. Freezing of the diffuser discs should be avoided, as it can result in permanent damage. The working temperature of the diffuser discs should not exceed +60°C, and stainless steel air headers typically significantly reduce the air temperature. For any uncertainties, please confirm with Juntai.

2.6 Air

Under all circumstances, it must be ensured that the blower provides oil-free air. A blower failure could potentially discharge oil contamination into the air header, and the remaining blowers would continue to push oil contamination into the diffuser discs. Dust filters meeting the DIN EN779 standard with a dust removal efficiency of 90%, Grade G4, should be used: the air entering the blower should also comply with local regulatory requirements.

2.7 Air Risers, Main Distribution Pipes, and Branch Pipes

The dimensions and layout of the piping system must comply with calculation and design requirements, and the pipe materials must meet the environmental requirements. The chemical resistance of the pipes should consider all possible aspects from wastewater to air, including but not limited to acids or other chemicals sprayed into the airflow, as well as water impact from external sources. For the expansion or upgrade of existing pipes, check the applicability of all existing pipes, valves, fittings, etc., to new requirements. Any corrosion will eventually lead to the failure of the diffuser disc, even causing the entire aeration system to malfunction. All air distribution pipes connected to the diffuser disc must be leveled, with a tolerance range of 10mm, to ensure uniform aeration. By controlling the total air volume, the airflow is automatically distributed to each tank. If this is not achievable, at least ensure that all air distribution pipes in the aeration tank are leveled to the same immersion depth.

2.8 Diffuser Disc Size, Material, Weight, Buoyancy, and Resistance

For detailed parameters of the diffuser disc, please refer to the data sheet in our product sample. The buoyancy of the diffuser disc is related to the air volume.

2.9 Air Piping for Diffuser Disc Installation

The diffuser disc is generally installed on a round pipe, which can be a UPVC/ABS/SS304 pipe connected to the pipe through the proprietary rubber saddle provided by Juntai.

2.10 Aeration Disc Layout Density

Please refer to the aeration layout diagram provided by Juntai for general situations. If a layout diagram is provided by a third party, check whether the density of the diffuser discs is within the range listed in Table 1. This empirical data is for reference only, and specific situations should be verified with the design party.

Table 1: Recommended minimum and maximum spacing of diffuser discs in the aeration tank

Diffuser Disc Model	Minimum Spacing(m)	Maximum Spacing(m)
DD215	0.5	1.0
DD270	0.6	1.2
DD350	0.7	1.4

3. Installation Requirements

3.1 Weather Conditions

Avoid installing the diffuser disc when the temperature is below +5°C. If installation is necessary, cover the top of the tank and provide forced ventilation and heating (follow all safety guidelines for heating). The diffuser disc should be heated to above +5°C before removal from the warehouse.

3.2 Operation Sequence and Cleaning

All operations inside and above the aeration tank must be completed before installation, especially welding, drilling, cutting, grinding, spraying, concrete pouring, sealing, caulking, etc. Remove all debris from the tank bottom, including stones, glass, nails, wood, and other sharp fragments. Inspect the edges and all beams and columns of the tank to prevent objects from falling into it. The aeration tank should be in a ready-to-fill state before the diffuser disc installation.

3.3 Blowing the Pipeline System (First Blowing)

Check the blower to ensure it is ready to deliver air to the aeration tank at the maximum flow rate. Use the maximum airflow to blow all the pipes, closing the intake valves of all remaining aeration units if necessary, and blow each unit/area individually to clear any debris in the pipes. Any residual debris in the pipes could eventually clog or damage the diffuser disc; such cases are not covered by our warranty.

3.4 Installing the Diffuser Disc

· The opening diameter of the aeration branch pipe should be 31mm (±0.5mm) and should be compatible with a 3/4" rubber saddle. Check the vertical axis alignment of the pipes, with a tolerance of ±3°.

· Remove all burrs from the openings in the pipes.

· For easy installation, wet the rubber saddle with a lubricant. It is recommended to use a commercial-grade water-based soap (concentration 5% ± 1%) or household detergent (0.01~0.1%) as a lubricant. Lubricants containing mineral oil or hydrocarbons are not allowed.

· Press the rubber saddle into the openings in the pipes, rotating it repeatedly until the rubber saddle matches the curvature of the pipe and is fully inserted into the pipe.

· Screw the external threaded head of the diffuser disc into the internal thread of the rubber saddle and tighten it clockwise as much as possible. To prevent the rubber saddle from rotating, a 45mm open-end wrench can be used to assist in fixing during the installation process.

· When tightening the diffuser disc, avoid damaging the diffuser disc membrane and rubber saddle. If necessary, remove the diffuser disc and tighten it again. During the installation process, replace rubber saddles that have undergone irreversible deformation or damage.

3.5 Second Blowing

Follow the steps described in section 3.3 for the secondary blowing, then install all remaining pipe fittings onto the air distribution pipe to complete the installation of the pipeline and diffuser disc.

4. Leak Point Testing and Commissioning

The aeration system of each aeration tank must undergo leak testing and commissioning, repairing all leakage points, and repeating the tests. The owner must provide written acceptance of the commissioning. Missing, incorrect, or incomplete commissioning will result in warranty invalidation, and Juntai will not be responsible for the consequences and damages caused by this. Inject non-foaming clean water into the tank to a level about 10 cm above the diffuser disc. Operate the diffuser disc at the lowest or as low as possible airflow rate (see section 7 , Table 1), carefully inspect all connections of pipes, pipe fittings, connectors, and the diffuser disc for leaks. If it is necessary to walk through and inspect the tank, appropriate personal protective equipment should be used. Then raise the water level to about 20 cm above the diffuser disc for commissioning, operate the diffuser disc at a medium airflow rate (see section 7, Table 1), and check if the immersion depth of the diffuser disc deviates significantly from the average. Minor deviations may be caused by differences on the surface of the membrane and typically disappear after 1 or 2 weeks of operation (formation of a biofilm).

5. Idle time before start-up

Start leak testing and commissioning immediately after installation. If for any reason the commissioning cannot be started immediately after completion, follow the steps below:

· Inject clean water into the aeration tank and raise the water level to 1 meter while operating the diffuser disc at a medium airflow rate (see section 7, Table 1).

· The blower should supply air to the diffuser disc for at least 10 minutes at a medium airflow rate every day.

· If the temperature is below freezing, raise the water level (below freezing, add 20 cm of water for every 1-degree decrease) and increase the aeration time and airflow as needed.

· Before the diffuser disc is put into formal operation, it must operate at the maximum designed air velocity for 1 week.

6. Initial Startup

The end user must formally start the aeration system only after signing the "Installation and Commissioning Confirmation Letter" in writing. Approval must also be obtained for all air distribution facilities, including blowers , valves, control devices, pressure monitoring equipment, etc. Operate the diffuser disc only within the specified airflow range (for detailed information, refer to section 7, Table 1).

7. Routine Operation of Diffusers

During regular operation, adjust the airflow of the diffuser disc to control the dissolved oxygen concentration in the wastewater of the aeration tank. Always keep the airflow of the diffuser disc within the recommended range (see Table 1). Excessive airflow can reduce oxygen transfer efficiency and may eventually cause irreversible damage to the diffuser disc membrane. Insufficient airflow may lead to uneven aeration/oxygen supply and a large amount of debris depositing on the membrane surface. Use the maximum overload airflow for periodic flushing, but not exceeding 10 minutes every 24 hours.

Table 1:

Product Specifications	Standard Aeration Flow(Nm^3/h)	Maximum Overload Airflow(Nm^3/h)
DD215	1.0-5.0	8.0
DD270	1.5-8.0	11.0
DD350	2.0-12.0	15.0

If the diffuser disc operates intermittently (nitrification/denitrification), it is only necessary to ensure that the pipeline system is leak-free. However, if the diffuser disc is closed for an extended period, preventive measures must be taken for the following scenarios:

· Sludge Accumulation - Use a separate mixing system.

· Accumulation of Condensate - Gradually increase the airflow when restarting.

· Dirt Accumulation on the Diffuser Disc - Flush the diffuser disc weekly or run the diffuser disc daily, or re-commission the aeration system before restarting.

· Maintain a sufficient safe distance between the diffuser disc and water accelerators (mixers, propellers), and the water flow rate at the diffuser disc should not exceed 0.5 m/s.

· Damage caused by unforeseen accidents is not covered by our warranty.

8. Troubleshooting

8.1 General Recommendations

Due to the use of high-performance materials, Juntai aeration discs require minimal maintenance even with prolonged use. Juntai strongly recommends a regular check every 12 to 15 months to detect any deviations from expected performance at an early stage. Precise pressure gauges should be used to monitor pressure loss, and an increase of more than 20 mbar in pressure loss within a year may indicate fouling of the membrane or other issues.

8.2 Common Failures and Solutions

Symptom 1: Excessive airflow in a specific area

· Possible Cause 1: Leakage in the air distribution pipe

Solution 1: Lower the water level in the tank, enter the problematic area, operate at a moderate airflow, inspect fittings and pipe joints for signs of damage, and repair or replace damaged parts.

· Possible Cause 2: Damage or detachment of the membrane of the aeration disc

Solution 2: Lower the water level in the tank, enter the problematic area, operate at a moderate airflow, visually inspect the aeration disc, and replace the aeration disc if necessary.

Symptom 2: Uneven aeration

· Possible Cause 1: Insufficient capacity of the blower

Solution 1: Confirm that the blower is functioning properly, and consider turning on another blower.

· Possible Cause 2: Valve(s) in the air main are closed (partially or completely)

Solution 2: Check the position of the butterfly valve; if necessary, fully open it.

· Possible Cause 3: Uneven air distribution in the aeration disc.

Solution 3: Lower the water level in the tank, enter the problematic area, inspect the levelness of the aeration disc, adjust its tolerance to +10mm, check for blockages in pipes and joints caused by debris, and use air blowing or water flushing for cleaning.

· Possible Cause 4: Deposits on the membrane of the aeration disc

Solution 4: Inspect the membrane of the aeration disc for deposits and fouling; clean or replace the aeration disc as needed.

Symptom 3: Decrease in dissolved oxygen or increase in system resistance

· Possible Cause: Deposits on the membrane of the aeration disc

Solution: Check for deposits and fouling on the membrane of the aeration disc; clean or replace the aeration disc as needed.

Symptom 4: Uneven distribution of dissolved oxygen throughout the entire tank

· Possible Cause 1: Insufficient air supply

Solution: Confirm that the blower is functioning properly, consider turning on another blower, and inspect equipment and operating conditions.

· Additionally, design flaws in the aeration tank itself (such as inadequate mixing) may lead to unpredictable issues. If necessary, coordinate with contractors, design units, and Juntai to analyze the problem.

9. Maintenance and Cleaning

9.1 Maintenance

During routine operations, continuous monitoring of aeration is necessary to promptly identify uneven aeration and higher-than-expected pressure losses. Depending on the wastewater type, treatment process, and operating conditions, if fouling occurs on the membrane, reducing the oxygen transfer efficiency of the aeration disc, it is essential to regularly remove deposits from the membrane. Care must be taken during the cleaning process to prevent sludge from drying on the membrane. Once dried, sludge can adhere permanently to the membrane and potentially block the aeration disc.

9.2 Mechanical Cleaning

Good-quality household detergents can effectively remove deposits from the membrane: simply brush gently and rinse with plenty of water. If necessary, a high-pressure water cleaning machine can be used (following the safety guidelines of the manufacturer). Ensure that the nozzle is approximately 50cm away from the membrane and set to a wide spray rather than a direct jet. It is recommended to use a high-pressure cleaning machine to remove scaling caused by aluminum and iron salts. Although chemicals themselves do not corrode the membrane surface, they may occasionally contribute to additional scaling.

9.3 Chemical Cleaning

Formic acid is a hazardous chemical that can cause severe injury or death. Only personnel trained in its use should employ specialized equipment for cleaning. The use of formic acid must strictly adhere to all safety instructions and recommendations.

During normal operation of the aeration system, certain deposits, such as calcium carbonate ($CaCO3$), can be removed by introducing formic acid ($HCOOH$) into the airflow. Depending on the extent of scaling, the formic acid dosage should be prepared based on the standard of injecting 10 mL of 85% concentration formic acid into 1 Nm^3 of air (at a pressure of 1 atm) for approximately 30 to 60 minutes. Set the airflow to the maximum design flow of the aeration disc (for detailed information, refer to Section 7, Table 1). Maintain this maximum design airflow for an additional 2 hours to remove residual formic acid from the pipes and aeration disc. The exact amount of formic acid and cleaning details must be determined through proper testing in advance and followed by the relevant usage instructions.

10. Replacement

When necessary, the entire aeration disc should be replaced. Replacing the membrane typically requires special disassembly tools and more time, so it is generally more economical to replace the entire aeration disc with a new one.

· Use a high-pressure water jet to remove sludge from the surface of the aeration disc.

· Unscrew the aeration disc and adapter.

· Avoid damaging the openings on the air distribution pipe.

· Clean the sealing area.

· Install the new adapter and aeration disc as described in Section 3.

· Perform a leak test as described in Section 4.

11. Conduct oxygen transfer efficiency testing in clear water

Oxygen transfer efficiency testing is used to determine the performance of the aeration system. The testing must comply with the relevant sections of standard CJ/T 475-2015. All details of these tests must be agreed upon in writing by both parties no later than the order confirmation. Before starting oxygen transfer testing, ensure that the aeration disc has been operating at the regular airflow for at least 2 weeks in clear water. Use only tap water for clear water testing; for any other types of water, refer to the recommendations provided by CJ/T. In case of algae growth, empty the pool, clean the aeration disc and aeration tank, and refill the pool with tap water.

12. Packaging, Transportation, and Storage

12.1 General Recommendations

Juntai membrane-type aeration discs must always be protected from weathering (heavy rain, hail, freezing, overheating, direct sunlight, etc.) and continuous mechanical impact. Storage conditions must comply with the requirements of DIN 7716 or ISO 2230 standards. Poor storage conditions and improper handling may result in a shortened lifespan and reduced performance of the aeration disc.

12.2 Packaging and Transportation

Aeration discs and replacement parts can only be stored and transported in their original packaging. The aeration disc is guaranteed only in its original and intact packaging. Do not stack the cardboard pallets of the original packaging, even temporarily. Ensure proper securing of the goods during transport. Do not expose the aeration disc to harsh weather conditions.

12.3 Storage Conditions

Location, Temperature, Humidity, Lighting, Ultraviolet, and Ozone

· According to DIN 7716 or ISO 2230 standards, store the equipment, aeration discs, and all accessories in their original packaging in a dry and ventilated room with a temperature range of +5°C to +25°C. For higher or lower temperatures, consult Juntai.

· Relative humidity must be below 65%, and do not use damp storage rooms.

· Keep away from heat sources to prevent overheating (above 25°C).

· Avoid product frosting, overheating, direct sunlight, exposure to ultraviolet lights (fluorescent lamps), and contact with dust, mineral oils, solvents, and hydrocarbons.

· Do not store the product near electric motors, especially blowers; ozone generated by electric sparks is harmful to rubber products.

Do not store the product outdoors. The storage time before installation/startup should not exceed one year. For additional considerations, consult Juntai.

13. Recycling

Compliance with local regulations for waste storage or disposal of scrap metal should be considered, with adherence to effective legal and environmental requirements for the recycling and disposal of products after the end of their life cycle playing a decisive role.

If our products are not contaminated by other materials, there is no need for special monitoring of waste. In cases of contamination, please consult your regulatory authorities.

14. Disclaimer

The information provided above is based on our existing knowledge and is intended as a general annotation for our products and their applications. Therefore, it does not commit to specific performance or reactivity in particular areas. We adhere to existing industrial property laws and provide a quality guarantee for products under standard sales conditions.

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