

Installation, Operation,
and Maintenance Manual



Sanitaire, Silver Series



SANITAIRE

a xylem brand

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1 Introduction and Safety

1.1 Introduction

Purpose of the manual

The purpose of this manual is to provide necessary information for working with the unit. Read this manual carefully before starting work.

Read and keep the manual

Save this manual for future reference, and keep it readily available at the location of the unit.

Intended use



WARNING:

Operating, installing, or maintaining the unit in any way that is not covered in this manual could cause death, serious personal injury, or damage to the equipment and the surroundings. This includes any modification to the equipment or use of parts not provided by Xylem. If there is a question regarding the intended use of the equipment, please contact a Xylem representative before proceeding.

Other manuals

See also the safety requirements and information in the original manufacturer's manuals for any other equipment furnished separately for use in this system.

1.2 Safety terminology and symbols

About safety messages

It is extremely important that you read, understand, and follow the safety messages and regulations carefully before handling the product. They are published to help prevent these hazards:

- Personal accidents and health problems
- Damage to the product and its surroundings
- Product malfunction

Hazard levels

Hazard level	Indication
DANGER:	A hazardous situation which, if not avoided, will result in death or serious injury
WARNING:	A hazardous situation which, if not avoided, could result in death or serious injury
CAUTION:	A hazardous situation which, if not avoided, could result in minor or moderate injury
NOTICE:	Notices are used when there is a risk of equipment damage or decreased performance, but not personal injury.

Special symbols

Some hazard categories have specific symbols, as shown in the following table.

Electrical hazard	Magnetic fields hazard
 <p>Electrical Hazard:</p>	 <p>CAUTION:</p>

1.3 User safety

All regulations, codes, and health and safety directives must be observed.

The site

- Observe lockout/tagout procedures before starting work on the product, such as transportation, installation, maintenance, or service.
- Pay attention to the risks presented by gas and vapors in the work area.
- Always be aware of the area surrounding the equipment, and any hazards posed by the site or nearby equipment.

Qualified personnel

This product must be installed, operated, and maintained by qualified personnel only.

Protective equipment and safety devices

- Use personal protective equipment as needed. Examples of personal protective equipment include, but are not limited to, hard hats, safety goggles, protective gloves and shoes, and breathing equipment.
- Make sure that all safety features on the product are functioning and in use at all times when the unit is being operated.

1.4 Special hazards

Confined spaces



DANGER: Inhalation Hazard

The chamber or tank where the equipment is installed should be treated as a confined space. Always follow the applicable safety laws, regulations and guidelines for confined spaces.

Never work alone in a confined space. Before entering the space, check that the following requirements are complied with:

- The atmosphere contains sufficient oxygen
- The atmosphere contains no explosive or toxic gases
- If there is a risk of insufficient oxygen or toxic or hazardous gases, then use an airline respirator or self-contained breathing apparatus.
- All energy sources are locked out and tagged out
- Adequate ventilation is in place
- There is a clear path of retreat
- Monitoring is in place for hazards which can develop after entering the confined space
- The applicable safety laws, regulations, and guidelines for enclosed spaces are understood and followed.

Drowning

Spaces that are not fully drained or dry can pose a risk of drowning. It takes relatively little standing water or other liquid to create a drowning hazard. For example, insufficient oxygen or the presence of a toxic material can make a worker unconscious, which makes

them vulnerable to drowning if they fall face down into a small pool of water. Never work alone where there is a risk of drowning.

Working with solvents



WARNING: Explosion/Fire Hazard

Before starting any permit-required hot work such as welding, gas cutting, grinding, or using electrical handtools, do the following: 1. Check the explosion risk. 2. Provide sufficient ventilation.



CAUTION: Chemical Hazard

Contact the supplier for information for proper handling and use.

Be aware of changing conditions when using solvents. Follow all health and safety rules and local codes and ordinances.

Organic dust



WARNING: Biological Hazard

Infection risk. Rinse the unit thoroughly with clean water before working on it.

When performing maintenance on the product inside or close to the tank or pit where the product is used, workers may be exposed to organic dust contaminated with microorganisms.

Employers and workers can minimize the risks of exposure to organic dust by taking the following precautions:

- Be aware of the adverse health effects of breathing organic dust.
- Use engineering controls such as local exhaust ventilation, and wet methods of dust suppression to minimize exposure to organic dust.
- Use appropriate respirators when exposure to organic dust cannot be avoided.
- Follow all health and safety rules and local codes and ordinances.

Biological hazards

The product is designed for use in liquids that can be hazardous to your health. Observe these rules when you work with the product:

- Make sure that all personnel who may come into contact with biological hazards are vaccinated against diseases to which they may be exposed.
- Observe strict personal cleanliness.



WARNING: Biological Hazard

Infection risk. Rinse the unit thoroughly with clean water before working on it.

Wash the skin and eyes

Follow these procedures for chemicals or hazardous fluids that have come into contact with your eyes or your skin:

Condition	Action
Chemicals or hazardous fluids in eyes	<ol style="list-style-type: none"> 1. Hold your eyelids apart forcibly with your fingers. 2. Rinse the eyes with eyewash or running water for at least 15 minutes. 3. Seek medical attention.

Condition	Action
Chemicals or hazardous fluids on skin	<ol style="list-style-type: none"> 1. Remove contaminated clothing. 2. Wash the skin with soap and water for at least 1 minute. 3. Seek medical attention, if necessary.

1.5 Protecting the environment

Emissions and waste disposal

Observe the local regulations and codes regarding:

- Reporting of emissions to the appropriate authorities
- Sorting, recycling and disposal of solid or liquid waste
- Clean-up of spills

Exceptional sites



CAUTION: Radiation Hazard

Do NOT send the product to Xylem if it has been exposed to nuclear radiation, unless Xylem has been informed and appropriate actions have been agreed upon.

1.6 Spare parts



CAUTION:

Only use the manufacturer’s original spare parts to replace any worn or faulty components. The use of unsuitable spare parts may cause malfunctions, damage, and injuries as well as void the warranty.

1.7 Warranty

For information about warranty, see the sales contract.

2 Transportation and Storage

2.1 Inspect the delivery

2.1.1 Inspect the package

1. Inspect the package for damaged or missing items upon delivery.
2. Note any damaged or missing items on the receipt and freight bill.
3. File a claim with the shipping company if anything is out of order.
If the product has been picked up at a distributor, make a claim directly to the distributor.

2.1.2 Inspect the product

1. Inspect the product to determine if any parts have been damaged or are missing.
2. If applicable, unfasten the product by removing any screws, bolts, or straps.
For your personal safety, be careful when you handle nails and straps.
3. Contact your sales representative if anything is out of order.

2.2 Transportation guidelines

Precautions



DANGER: Crush Hazard

Moving parts can entangle or crush. Always disconnect and lock out power before servicing to prevent unexpected startup. Failure to do so could result in death or serious injury.

2.2.1 Lifting



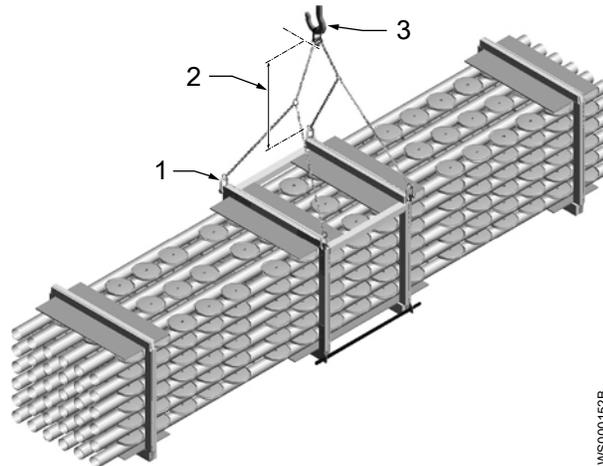
WARNING: Crush Hazard

1) Always lift the unit by its designated lifting points. 2) Use suitable lifting equipment and ensure that the product is properly harnessed. 3) Wear personal protective equipment. 4) Stay clear of cables and suspended loads.

Lifting with crane

Cranes used to lift the equipment components must fulfill the following requirements:

- The lifting equipment must be able to hoist the equipment components straight up and down, preferably without the need for resetting the lifting hook.
- The lifting strap must be fastened to the lifting points on top of the package.

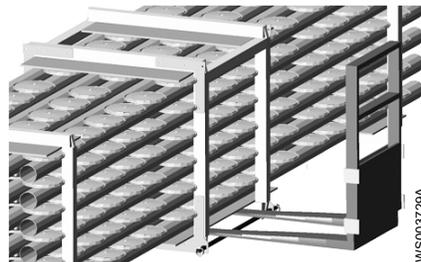


1. Lifting point
2. Minimum 2 m (6 ft 7 in.)
3. Lifting device

Figure 1: Lifting points

1. Check that the site where the equipment components will be placed has a clean and level surface.
2. Fasten a suitable lifting strap or sling to the lifting points on top of the pallet, if used.
3. If the equipment components are secured to the flatbed or other surface, then cut the transportation straps.
4. Lift using proper lifting equipment.
5. Place the equipment components on a clean, rigid, horizontal surface so that they cannot fall over.

Lifting with pallet and forklift



1. Align the forklift prongs with the forklift hole(s), and insert the prongs.
2. If the pallet is secured to the flatbed or other surface, then cut the transportation straps.
3. Lift the pallet and move it to its new position.
4. Place the pallet on a clean, rigid, horizontal surface so that it cannot fall over.

2.3 Storage guidelines

2.3.1 Dry storage location

The storage site must be available before equipment arrival. The equipment must be stored in a level and dry location free from heat and dirt. It is recommended that the equipment is stored indoors or in a covered area.

NOTICE:

Do not cover the pipe components with plastic. Excessive heat build-up can damage plastic pipes and void the warranty.

NOTICE:

Do not stack shipping units.

NOTICE:

Do not place heavy weights on the packed product.

NOTICE:

Protect the product against humidity, heat sources, and mechanical damage.

NOTICE:

Risk of wear. Make sure the equipment is clean before it is placed into service.

2.3.2 Specific storage requirements

Component	Storage
Diffusers	<ul style="list-style-type: none"> • Original packaging until final installation
PVC piping	<ul style="list-style-type: none"> • Uncovered • Maximum stack of two bundles
PVC piping with diffusers installed (pre-mounted)	<ul style="list-style-type: none"> • Uncovered • A sheet of wood placed on top of the piping bundles To keep membrane diffusers shielded from the elements
Wooden crates	<ul style="list-style-type: none"> • Uncovered • Maximum stack of two crates
Cardboard boxes	<ul style="list-style-type: none"> • Uncovered • Unstacked • Dry location <p>The cardboard box pallets can loose structure integrity and topple if they get wet</p>

For more information on long-term storage of installed equipment, see [Tank storage](#) (page 33).

3 System Description

Diffusers included

Type	Model
Fine bubble	Silver Series II LP, 7 and 9 in.
	Silver Series II, 7 and 9 in.

3.1 Diffuser design

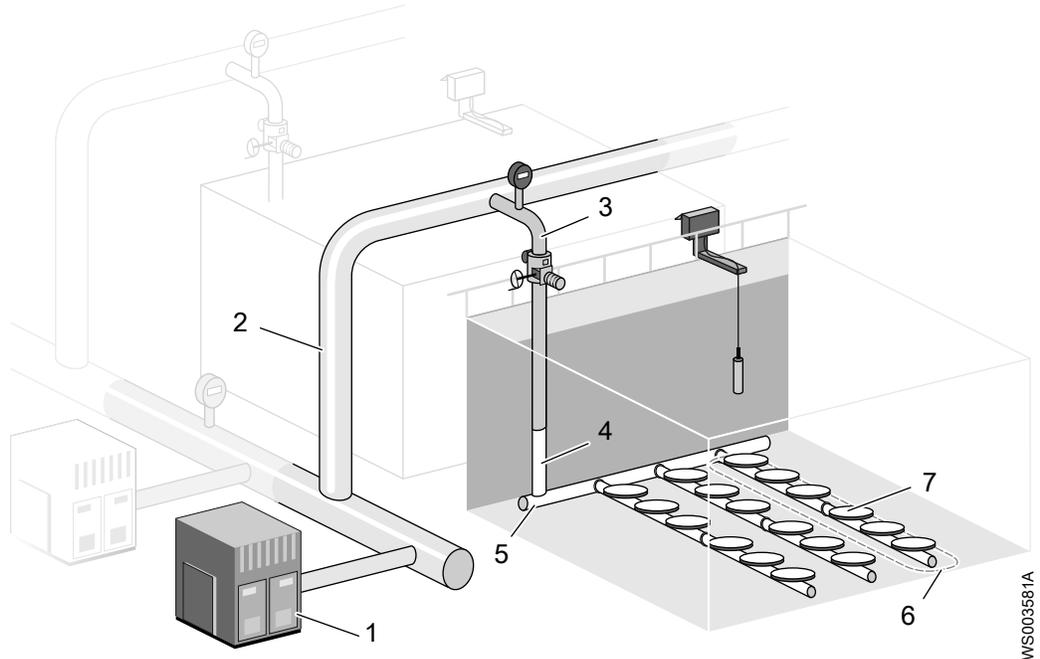
Fine bubble disc diffusers are designed for an efficient and reliable aeration and mixing process of industrial and municipal wastewater. The fine bubble diffuser is completely compatible with other Sanitaire aeration equipment.

Intended use

The product is only for use with municipal and industrial wastewater. If there is a question regarding the intended use of the equipment, then contact a sales representative.

Definition of system components

The main components in an aeration system are shown in the figure below.



Position number	Description	Definition
1	Blower	The device that distributes the air to the air main.
2	Air main	The pipe that connects the blower to the upper dropleg.
3	Dropleg	The pipe that connects the air main to the manifold.
4	Manifold	The pipe that connects the dropleg to the air distributor. There are no diffuser connectors mounted on this pipe.
5	Air distributor	A set of pipes, couplings, and holders with diffusers from the manifold to the end cap.
6	Holder with diffuser	The diffuser is attached to the holder. It forms part of the air distributor, and distributes the air to the liquid.

4 Installation

4.1 Precautions

Before starting work, make sure that the safety instructions in the chapter [Introduction and Safety](#) (page 3) have been read and understood.

Requirements

The following requirements apply:

- Never work alone.
- Make sure to have a clear path of retreat.
- Make sure that the work area is properly ventilated.
- Provide a suitable barrier around the work area, for example a guard rail.
- Check the explosion risk before you weld or use electrical hand tools.
- Ensure that welding or construction work does not damage the aeration system equipment.
- Use the installation drawings, containing the required part number designation, in order to ensure proper installation.
- Remove all debris from the air main before installation.

The figures in the instructions can differ from the delivered products.

4.1.1 Leveling guidelines

To ensure an installation where maximum system efficiency is obtained, and where leaks, adjustments, and damage to products are minimized, follow these guidelines:

- Always use the highest point of the tank floor as a reference when leveling. The height of the grid should be as low as possible at this point.
- Use a level system which ensures installation within the given tolerance (6 mm [$\frac{1}{4}$ in.] horizontally).
- Allow for movement of the pipes when securing the clamps.
- Align pipes correctly before couplings are assembled.

4.2 Support types

There are three types of supports:

- Single anchor support that is used for 110 mm (4 in) diameter manifolds or air distributors.
- Support with strut that is used for 160 mm (6 in) diameter or greater manifolds where the manifold centerline elevation is less than 559 mm (22 in) from the floor.
- Support with strut that is used for 160 mm (6 in) diameter or greater where the manifold centerline elevation is above 559 mm (22 in) from the floor.

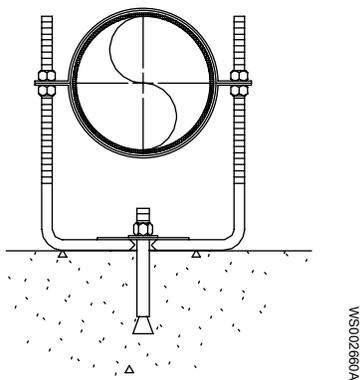


Figure 2: Single anchor support

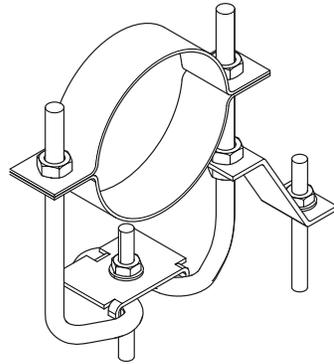


Figure 3: Support with strut, low

WS007948B

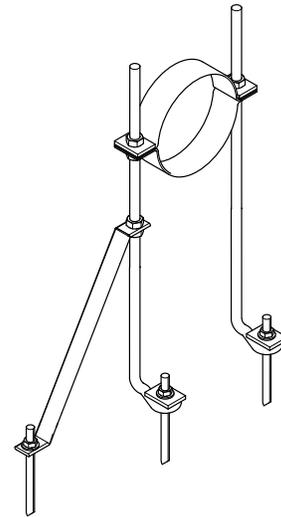


Figure 4: Support with strut, high

WS007949A

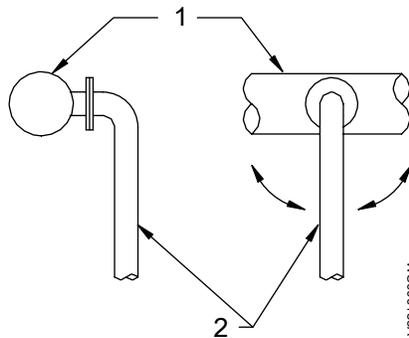
4.3 Dropleg and manifold installation

Prerequisites

- Always use the highest point of the tank floor as a reference when leveling.
- Ensure that the air filtration equipment is installed and operating.
- Ensure that all dirt and debris are removed from the air main.

If air blowers are used, then follow the instructions from the manufacturer. Blowers can require a minimum back pressure when operating.

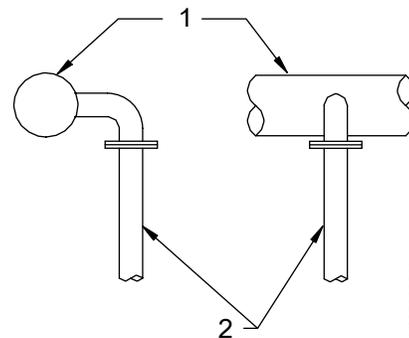
Upper dropleg connection requirement



1. Air main
2. Upper dropleg

Figure 5: Vertical flange connection

WS000153A



1. Air main
2. Upper dropleg

Figure 6: Horizontal flange connection

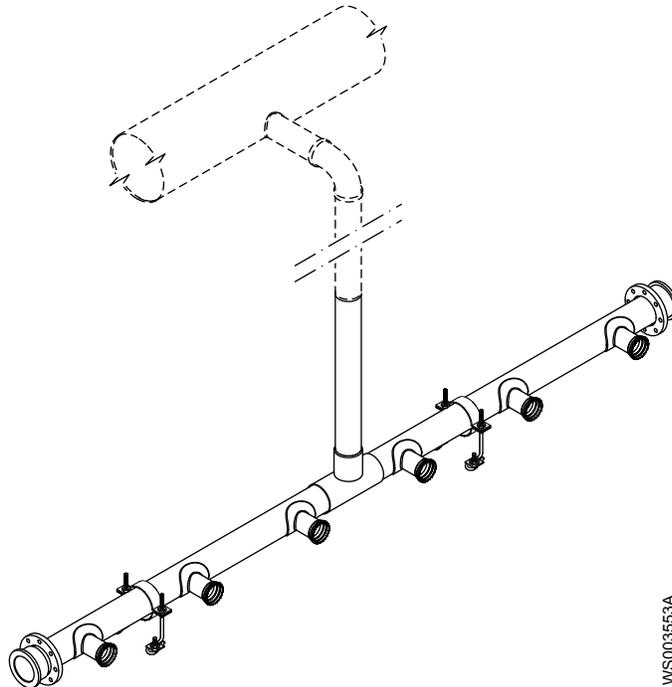
WS000296A

Ensure that the upper dropleg is attached to the air main, and vertical to its centerline. Refer to the installation drawings. In order to allow easy installation of the lower dropleg, the dropleg must be attached loosely.

- If the dropleg is connected with a vertical flange, then ensure that it can be swung to the side.
- If the dropleg is connected with a horizontal flange, then ensure that it can be easily removed.

Ensure that the end plugs of the upperdroplegs are removed.

Installation procedure overview



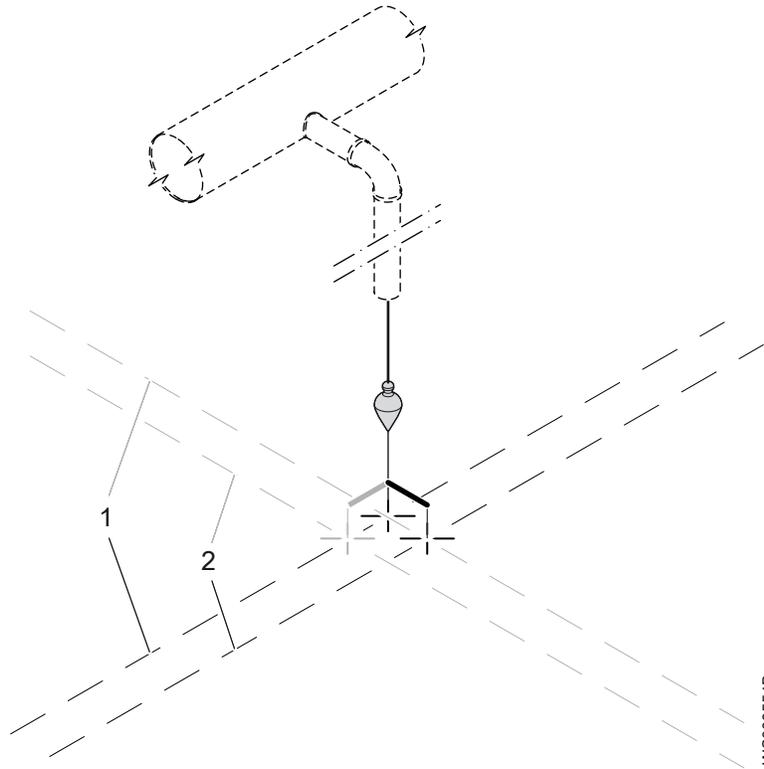
The manifold installation includes the following steps:

- [Lay out the manifold centerline](#) (page 13)
- [Lay out the manifold support locations](#) (page 14)
- [Install the manifold anchors and supports](#) (page 15)
- [Assemble the manifold pipe sections](#) (page 17)
- [Install the lower dropleg](#) (page 19)

4.3.1 Lay out the manifold centerline

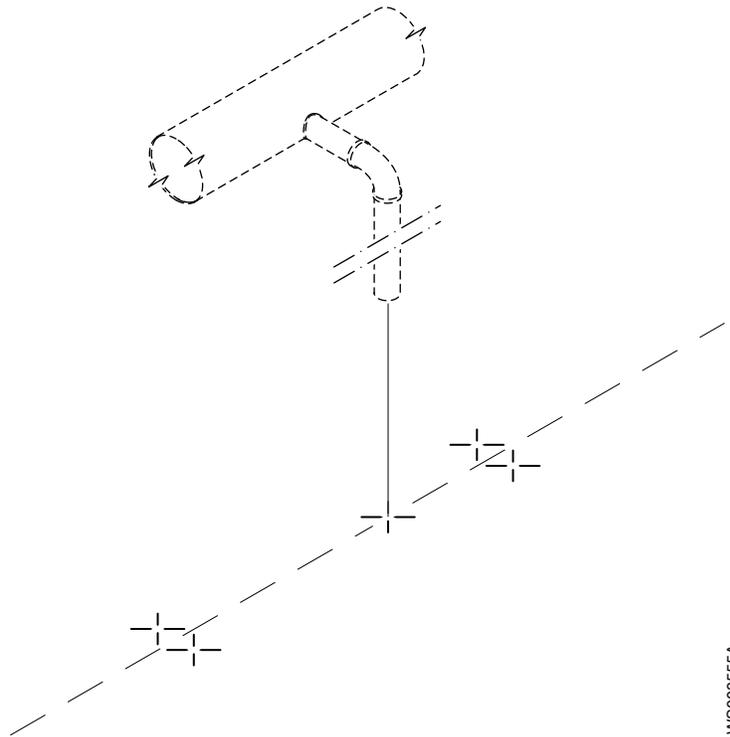
The dropleg connection to the manifold is located directly under the dropleg. In some installations, the dropleg connection is offset.

- 1. In-line manifold
- 2. Offset manifold



- 1. Locate the centerline of the manifold.
Use the installed upper dropleg and the installation drawings.
- 2. Mark clearly the position on the floor.

4.3.2 Lay out the manifold support locations



- 1. Locate and layout all manifold support locations.

Use the installation drawings and shippings lists.

2. Mark clearly the positions on the floor.

4.3.3 Install the manifold anchors and supports

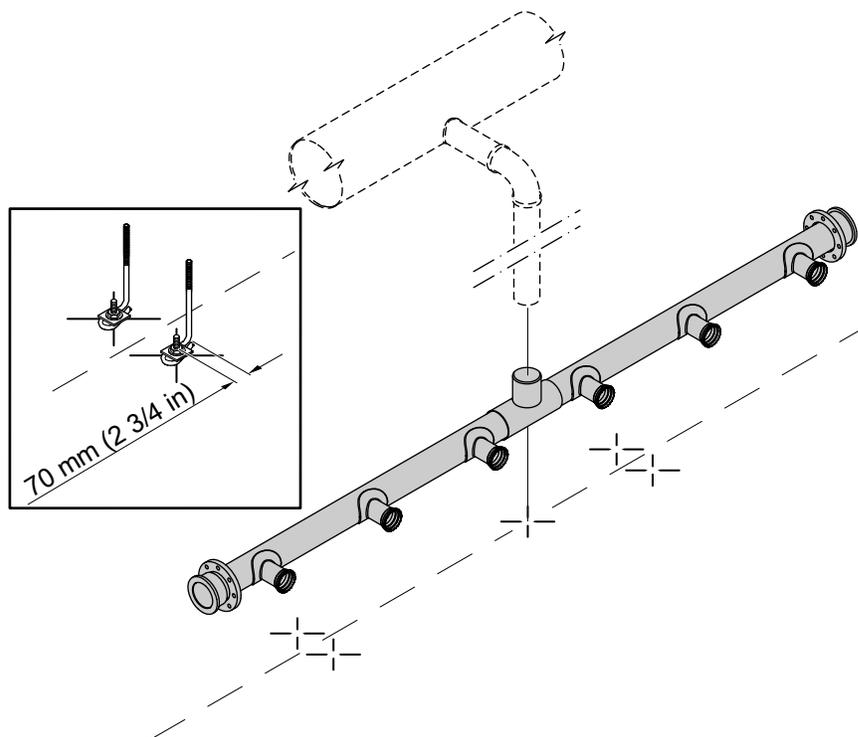
The manifold sections must be placed according to the manifold and anchor layout before the anchors are installed.

Always use the highest point of the tank floor as a reference when leveling.

1. Lower the manifold sections into the tank.
2. Place the sections according to the layout and double check for possible interference.
Use the reference numbers from the installation drawings to identify the pipe sections.
3. Check, and if necessary, correct the positions of the support anchors.

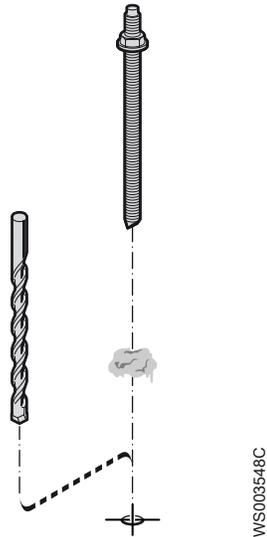
Consider the offset from the anchor position to the center line of the support, and install all supports in the same direction.

Ensure that the maximum support spacing does not exceed 2400 mm or 8 ft.



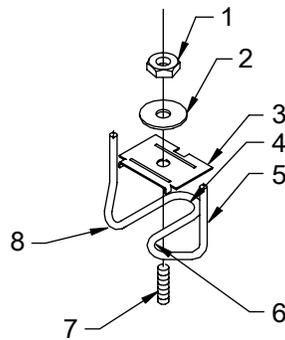
4. Install the manifold support anchors according to the instructions from the manufacturer.

The threaded projection from the floor level must correspond to the installation drawing anchor table.

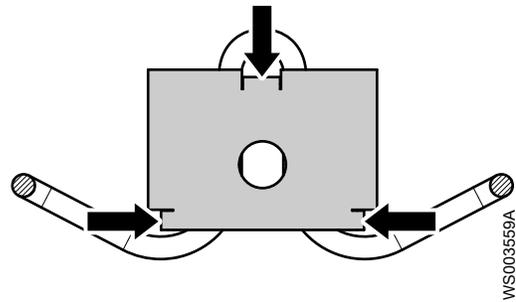


The tightening torque values are listed in the installation instructions from the anchor bolt manufacturer.

5. On a single anchor support, install the locating plate with the two bent prongs in front, inside the support rod, and the single prong to the back, inside the u-bend. Install all supports in the same direction.

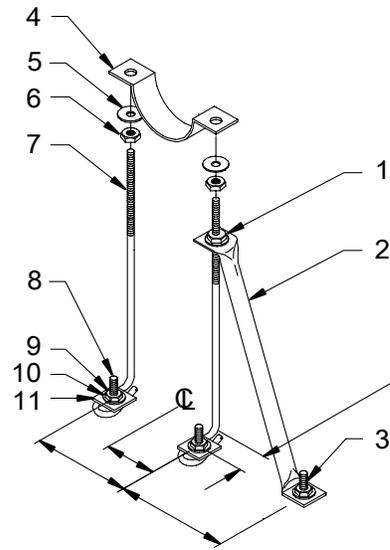


1. Hexagon nut
2. Flat washer
3. Locating plate
4. Back of support
5. Support rod
6. Inside of support rod
7. Anchor bolt
8. Front of support rod



6. Install the struts, if applicable.
7. Install the hexagon nuts and place the lower pipe support clamp on them.

Project-specific anchor dimensions are found in the erection drawing.



1. Hexagon nut
2. Strut
3. Anchor bolt
4. Clamp
5. Washer
6. Hexagon nut
7. Rod
8. Anchor bolt
9. Hexagon nut
10. Washer, round
11. Washer, square

8. Use the installation drawings and a level system to find the correct clamp flange elevation.

The correct elevation is equal to the manifold center line, and the tolerance is ± 6 mm ($\frac{1}{4}$ in.).

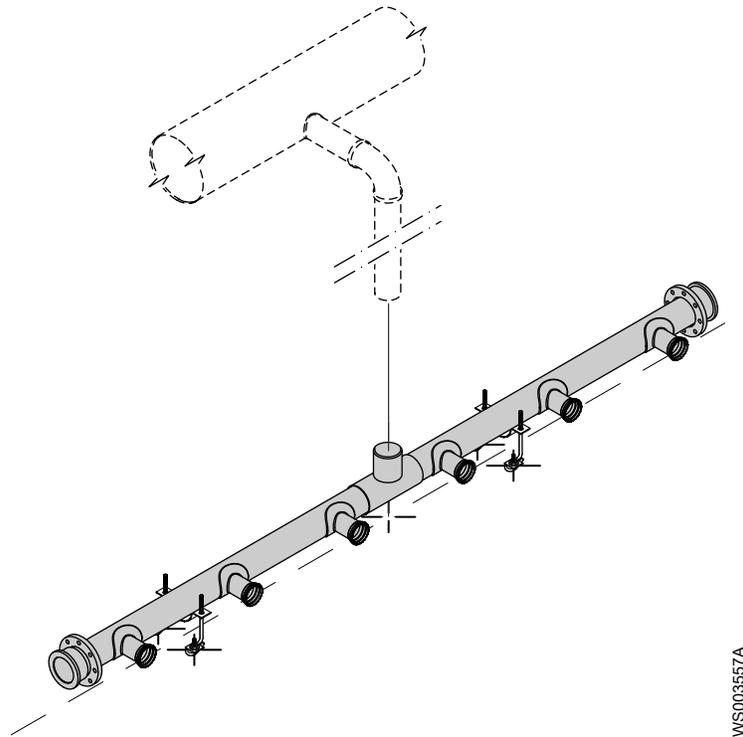
4.3.4 Assemble the manifold pipe sections



CAUTION: Chemical Hazard

Contact the supplier for information for proper handling and use.

1. Examine the manifold sections.
If the sections are dirty and contain debris from storage, then flush with water before installation.
2. Remove all protective dust covers from the pipe ends and connections.
3. Place the manifold sections in the lower part of the support clamp.



4. Connect the manifolds:
 - a) Connect flanges with bolts loosely.
 - b) Connect joints with glue.
 - c) Connect spline couplings without tightening.
5. Install the upper part of the support clamp with washers and nuts. Tighten loosely.
6. Level the manifold sections which attach to the droplegs.
 - For in-line manifolds, ensure that the air distributor connections are horizontal.
 - For raised manifolds, ensure that the air distributor connections are vertical.

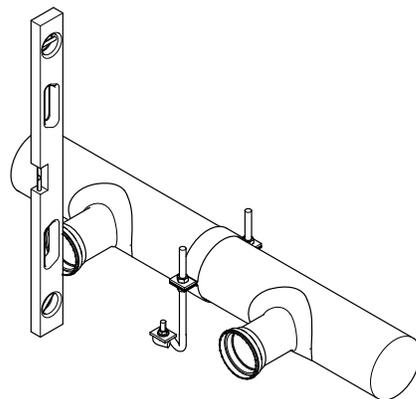


Figure 7: In-line manifold

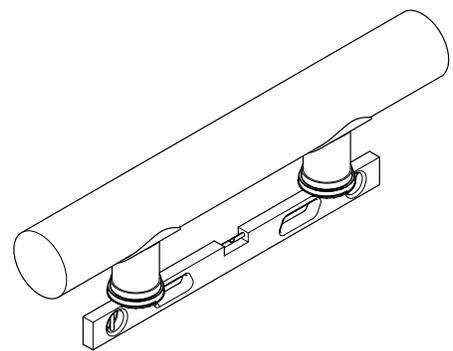


Figure 8: Raised manifold

7. Secure the clamps on the sections which attach to the droplegs by tightening the hexagon nuts. Ensure that the manifold is horizontal.
8. Install all manifold sections according to the installation drawings.

- Do not secure the clamps on these sections at this point.
9. Install the lower dropleg according to *Install the lower dropleg* (page 19).
 10. Complete the manifold installation:
 - a) Level the remaining manifold sections and ensure that the air distributor connections are level.
 - b) Tighten the flange connections between the manifold sections.
 - c) Secure the pipes by tightening the hexagon nuts on the upper part of the clamps.

4.3.5 Install the lower dropleg



CAUTION: Chemical Hazard

Contact the supplier for information for proper handling and use.

An in-line manifold (see figure below) does not require a feed pipe. See the installation drawings.

1. Install the feed pipe and support, if applicable. This is only applicable to an offset manifold.
 - a) Glue the feed pipe and fittings.
 - b) Install the feed pipe and the supports, if applicable.

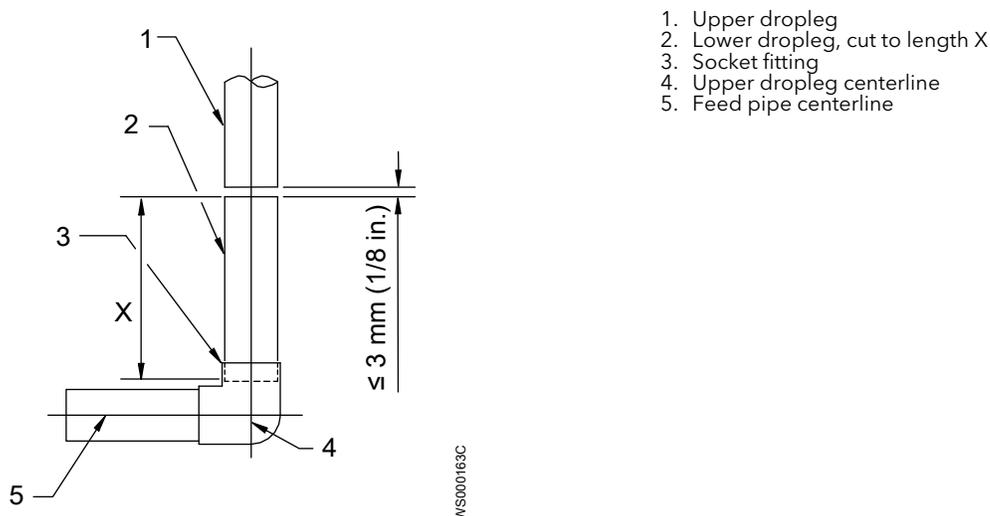


Figure 9: Parts between dropleg and manifold, offset manifold

2. Measure the distance X from the end of the installed upper dropleg to the insertion depth of the socket fitting.

If a flange connection is used, then consider the flange, the socket depth, and the gasket thickness.
3. Remove the upper dropleg out of the work area.
4. Cut or trim the lower dropleg to the measured distance.
5. Glue the lower dropleg into the socket fitting.
6. Reinstall the upper dropleg.

Ensure that the gap between the upper and lower dropleg is maximum 3 mm (1/8 in.).

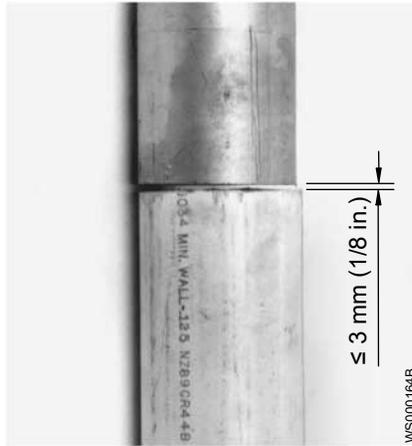


Figure 10: Upper and lower dropleg

7. Install the clamp coupling or tighten the flange connection.
Tighten the clamp coupling bolts to a torque of 70-75 Nm (50-55 ft-lbs).

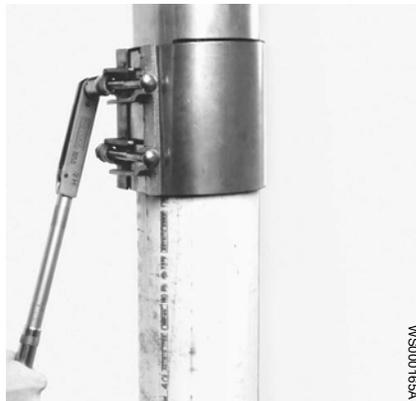


Figure 11: Example of clamp coupling

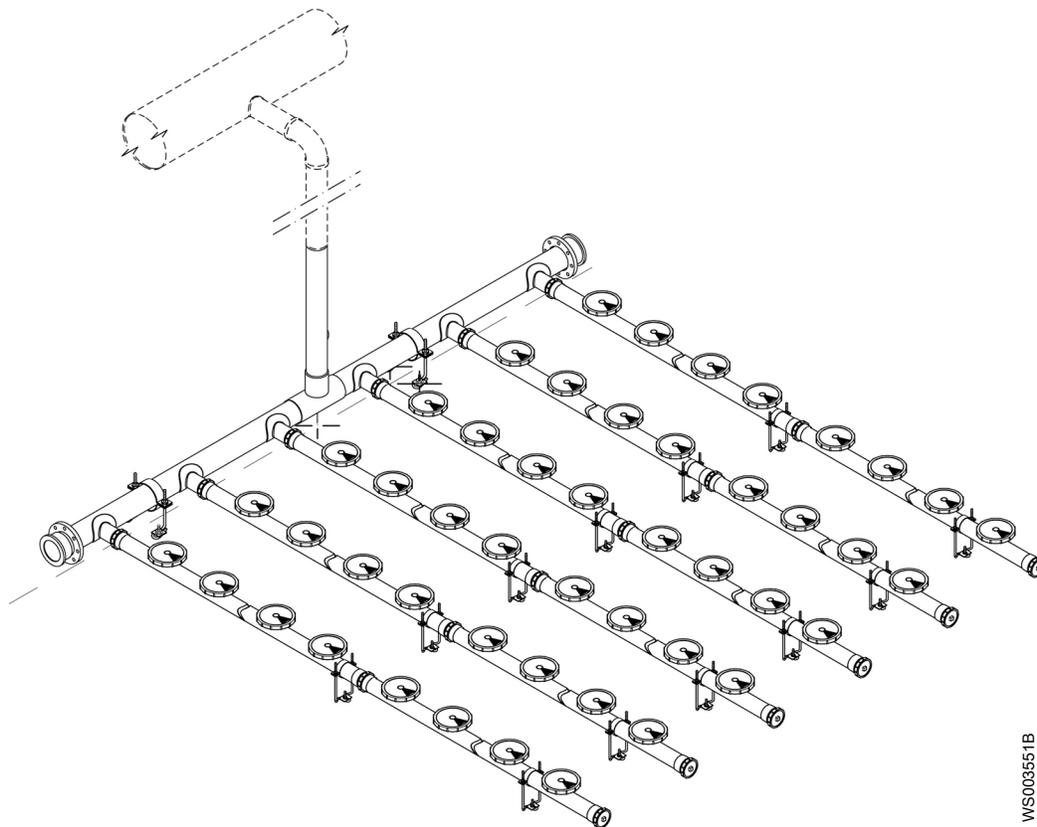


Figure 12: Example of flange connection

8. Tighten the upper dropleg to the air main.
9. Complete the manifold installation according to the last step in [Assemble the manifold pipe sections](#) (page 17).

4.4 Air distributor installation

Installation procedure overview



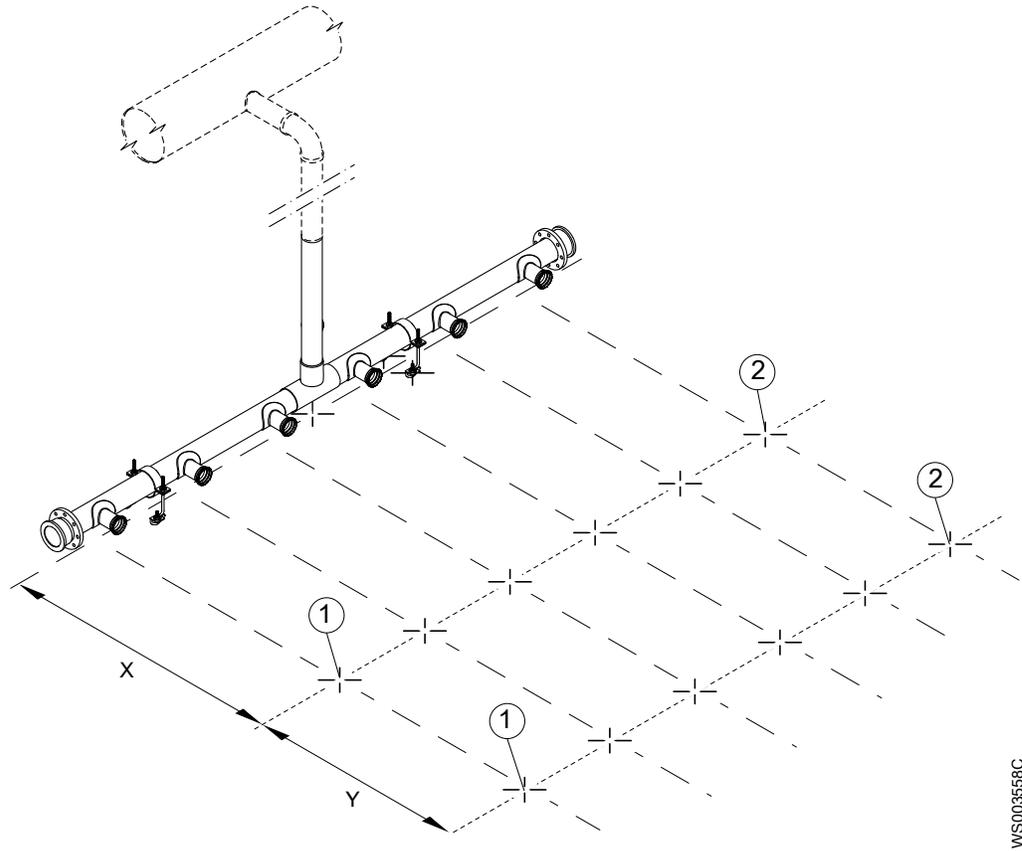
The installation includes the following steps:

- [Lay out the air distributor support locations](#) (page 21)
- [Install the air distributor anchors and supports](#) (page 22)
- [Assemble an air distributor section](#) (page 23)
 - [Place the sections](#) (page 24)
 - [Assemble with spline couplings](#) (page 24)
 - [Assemble with expansion couplings](#) (page 25)
 - [Level and tighten the air distributors](#) (page 27)

For drainline installation, see [Drainline installation](#) (page 28).

4.4.1 Lay out the air distributor support locations

1. Lay out the centerline for each air distributor.
Use the installation drawings and the manifold air distributor connections. Start measuring from the center line of the manifold.
2. Mark the air distributor support locations for the first air distributor from one side. See (1) in the figure below.
The distance between the manifold center line and first support location is marked X in the figure below. The distance to the second support location is marked Y.

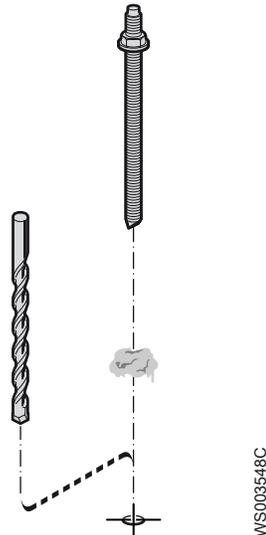


3. Ensure that there is no interference between the holders, couplings, and supports.
4. Make the required adjustments.
If spacing is extended beyond the installation drawing specification, then consult your Xylem representative.
5. Mark the support locations for the air distributor located at the opposite end of the manifold. See (2) in the figure above.
6. Use a chalk line to mark all support locations between the outside layout lines.

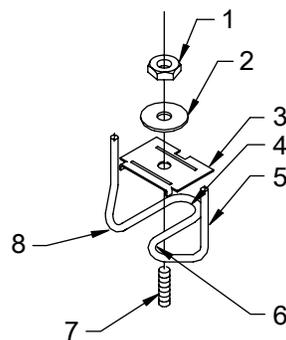
4.4.2 Install the air distributor anchors and supports

Sloped floors can require the use of several different support types or support rod diameters. Refer to the installation drawings for identification of the correct support at each location.

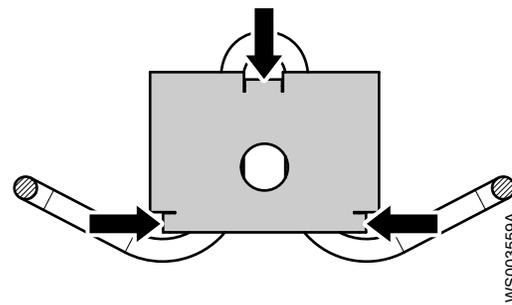
1. Install the anchor bolts according to the instructions from the anchor manufacturer.
The threaded projection from the floor level must correspond to the installation drawing anchor table.
The tightening torque values are listed in the installation instructions from the anchor bolt manufacturer.



2. Install the locating plate with the two bent prongs in front, inside the support rod, and the single prong to the back, inside the u-bend.
Install all supports in the same direction.



1. Hexagon nut
2. Flat washer
3. Locating plate
4. Back of support
5. Support rod
6. Inside of support rod
7. Anchor bolt
8. Front of support



3. Tighten the hexagon nut to the recommended torque value as listed by the anchor bolt manufacturer.
4. Using a level system, find the correct elevation to put the hexagon nut on all air distributor supports.

The correct elevation is the air distributor center line, which is shown on the installation drawings. The difference in height cannot exceed a tolerance of ± 6 mm ($\frac{1}{4}$ in.) from one side to the other throughout the whole grid.

5. Install the lower clamp sections on all air distributor supports.

4.4.3 Assemble an air distributor section

This instruction describes the assembly of a complete air distributor section from the manifold to the end cap.

Use the following:

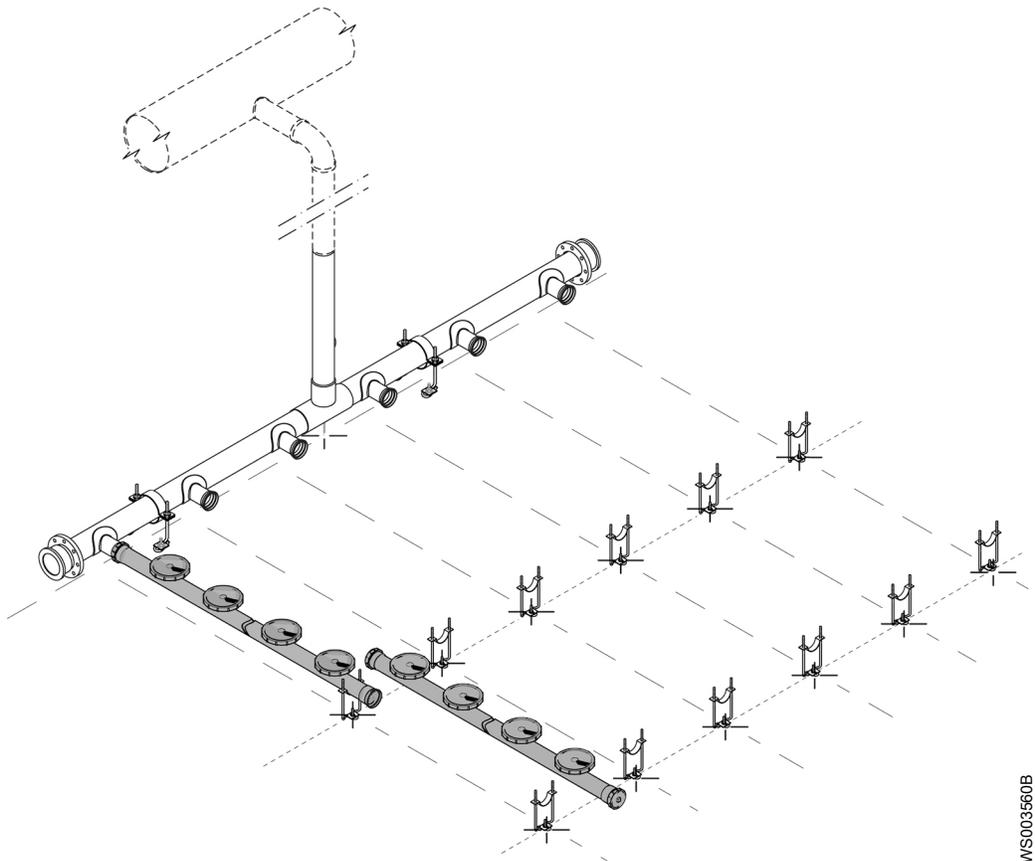
- Air distributor sections, see the installation drawings and the corresponding markings on the sections
- Spline couplings
- Expansion couplings, if applicable
- Drainline sections, if applicable

Piece markings can be printed or hand written on pipe.



Figure 13: Markings on installation drawings and sections

Place the sections



1. Starting from the manifold, check, and flush out any dirt from the first section and place it in the supports.
2. Assemble the first section according to the instructions in [Assemble with spline couplings](#) (page 24).
3. Check and flush out any dirt from the subsequent section and assemble according to the instructions in [Assemble with spline couplings](#) (page 24) or [Assemble with expansion couplings](#) (page 25). Repeat this step until all the sections have been assembled.

Do not place the flanges closer than 153 mm (6 in) to an anchor support.

Tighten loosely.

Assemble with spline couplings

Before starting the assembly, ensure that the air distributor sections are as level as possible.

The spline coupling is a coupling that is used to prevent an air distributor section from rotating.

To adjust the spline coupling after the initial installation, it must be loosened and backed off until the splines are disengaged.

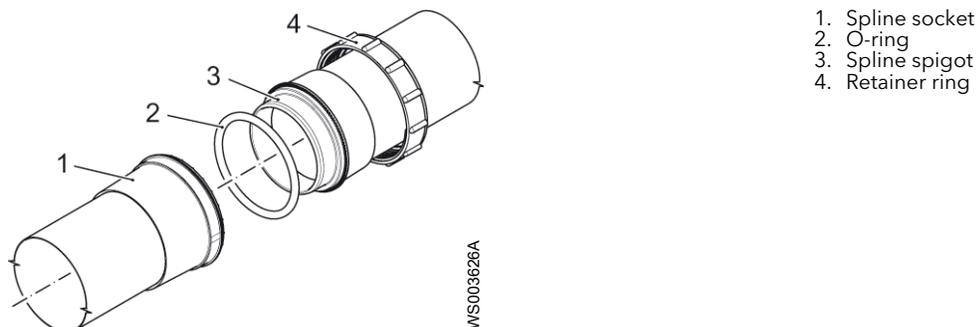


Figure 14: Spline coupling

1. Lubricate the O-ring for ease of installation.
Use a common dish soap solution. Do not use oil or grease.
2. Fit the O-ring into the spline socket.
3. Push the spline spigot into the spline socket.
Ensure that the splines are fully engaged.
4. Thread the retainer ring onto the spline socket.
5. Tighten the retainer ring to a hand-tight position.
Do not use a strap wrench, pipe wrench, spanner wrench or other tool to tighten the retainer ring. The spanner wrench sent together with spares is used for disassembly only.

Assemble with expansion couplings

Expansion couplings are used in some installations and always together with fixed supports.

1. Spline socket
2. O-ring
3. Retainer ring
4. Spline spigot
5. Retainer ring
6. O-ring

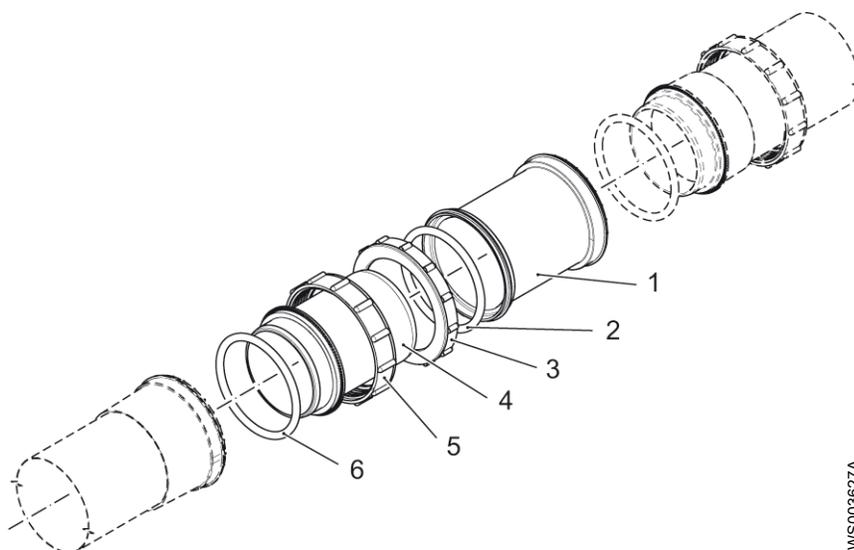
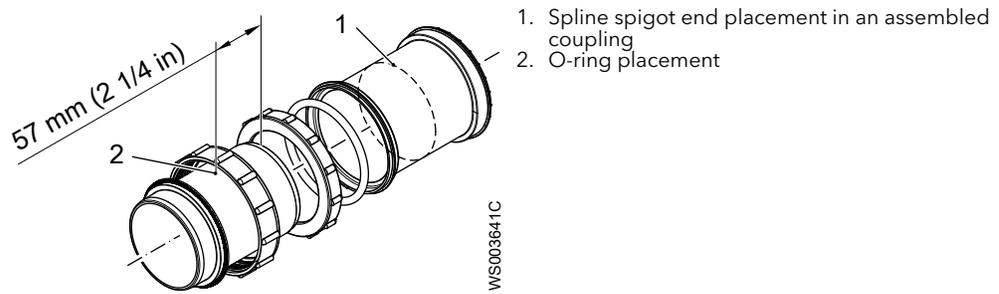


Figure 15: Expansion coupling

1. Assemble the coupling:

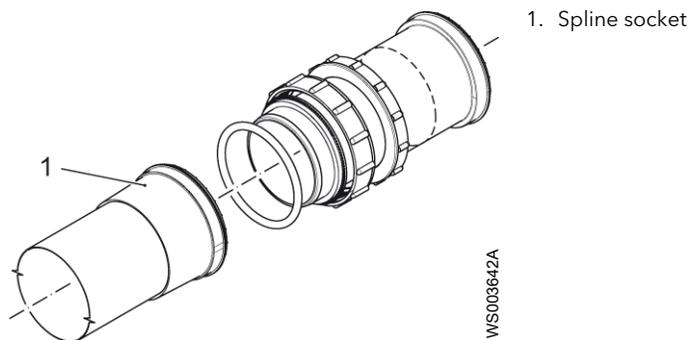


- a) Fit both retainer rings on the spline spigot.
- b) Lubricate the O-ring for ease of installation.
Use the supplied silicone grease.

NOTICE:

Risk for damaged O-ring. Always use the supplied grease for the expansion coupling O-ring.

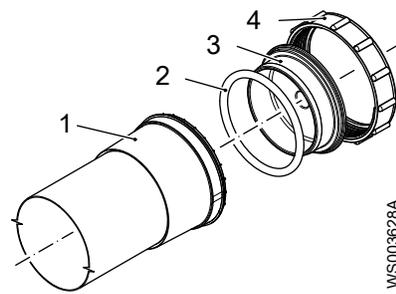
- c) Fit the O-ring on the spline spigot.
Place the O-ring at half the length of the spline spigot, which is 60 mm (2 3/8 in.) from the end.
 - d) Push the spline socket onto the spline spigot.
See the exploded view for spline spigot end placement in the spline socket.
 - e) Thread the retainer ring onto the spline socket, until the O-ring seats.
 - f) Tighten the retainer ring to a hand-tight position.
2. Install the assembled coupling:



- a) Lubricate the O-ring for ease of installation.
Use a common dish soap solution. Do not use oil or grease.
- b) Fit the O-ring into the spline socket.
- c) Push the assembled coupling into the spline socket.
- d) Thread the retainer ring onto the spline socket.
- e) Tighten the retainer ring to a hand-tight position.

Install the end cap

The end cap is in some cases factory assembled with the air distributor.

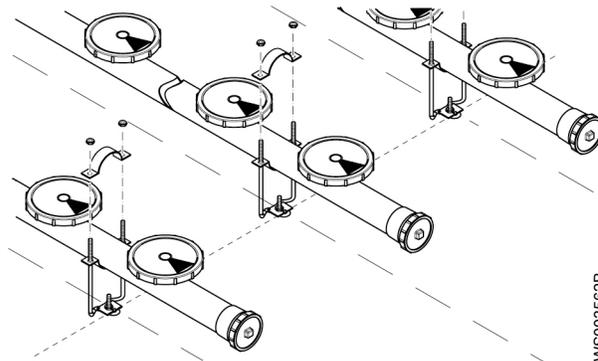


1. Spline socket
2. O-ring
3. End cap
4. Retainer ring

1. Lubricate the O-ring for ease of installation.
Use a common dish soap solution. Do not use oil or grease.
2. Fit the O-ring into the spline socket.
3. Push the end cap into the spline socket.
4. Thread the retainer ring onto the spline socket.
5. Tighten the retainer ring to a hand-tight position.

Level and tighten the air distributors

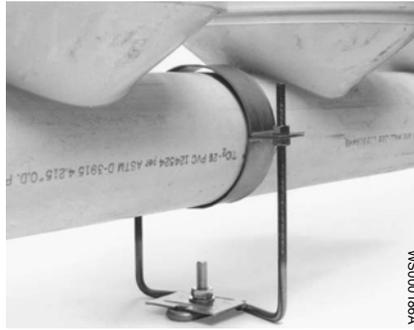
1. Install the top half clamp on each support, and loosely install the top hexagon nuts.



2. Rotate the distributor section until the diffuser is level.
Use a level system. Make sure to disengage the splines before rotating.
3. Hold the pipe section level and do one or both of the following:
 - a) Retighten all corrected spline couplings.
 - b) If expansions couplings are used, then tighten all fixed support clamps on those sections.
4. Recheck for level both perpendicular and parallel to the distributor section.
5. Continue this procedure for all distributor sections.
6. Tighten all nuts on the supports.

NOTICE:

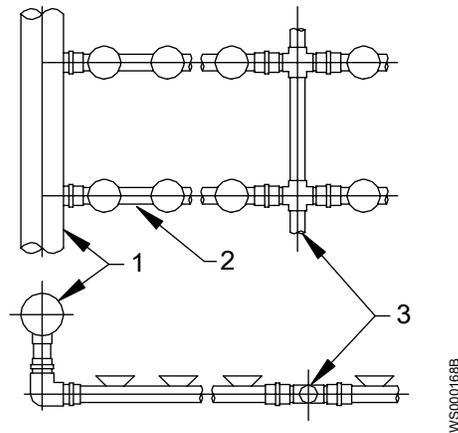
The clamps must be loose around the pipe to allow for movement. Do not wrap anything around the pipe to tighten the clamps against the pipe.



4.5 Drainline installation

Separate drainlines are primarily used on fine bubble systems with raised manifolds. On systems with in-line manifolds, the manifold normally serves as drainline.

Ensure that the installation of the drainline is made according to the installation drawings.



1. Raised manifold
2. Air distributor
3. Drainline

Figure 16: Raised manifold with drainline

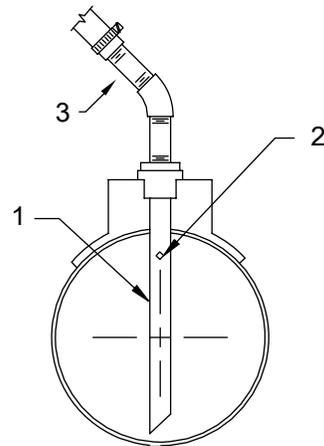
4.6 Purge system installation

There are two types of purge systems:

- The manual purge system, with sump and evacuation pipe
 - This system uses a sump with an eductor line that extends from the grid to above the water surface and ends with a manual ball valve.
- The continuous purge system, with a diffuser unit that is attached to the bottom of the manifold or the drainline
 - The entrapped moisture is continuously purged from the system.

4.6.1 Install a manual purge system

The manual purge system consists of a sump and an evacuation pipe.



1. Suction tube
2. Air orifice hole
3. Evacuation pipe

The sump for systems using in-line manifolds is built into the manifold pipe.

The sump for systems using the raised manifold is installed between air distributor or drainline sections.

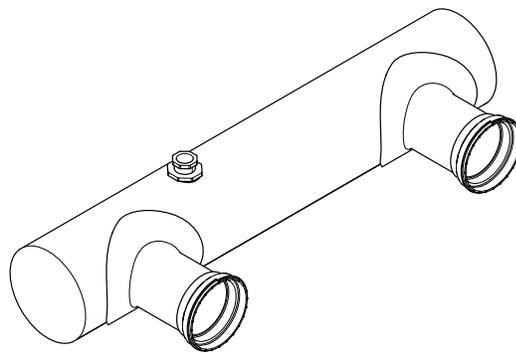


Figure 17: Sump in in-line manifold

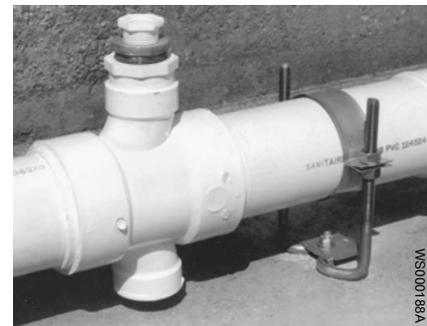


Figure 18: Sump between air distributor sections

1. Identify the parts of the purge system.
2. Install the purge system according to the installation drawings.

4.6.2 Install a continuous purge system

The continuous purge system consists of a tube diffuser unit or a flex-cap diffuser unit that is attached to the bottom of the manifold, air distributor, or drainline.

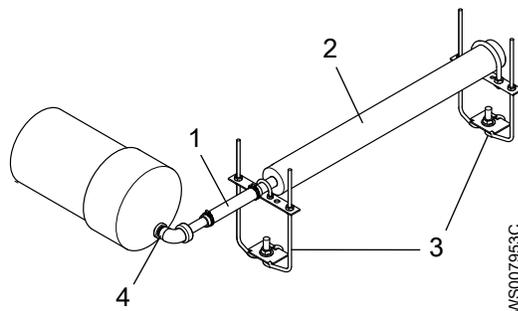


Figure 19: Tube diffuser

1. Hose
2. Tube diffuser
3. Support
4. Cap with drainline tap

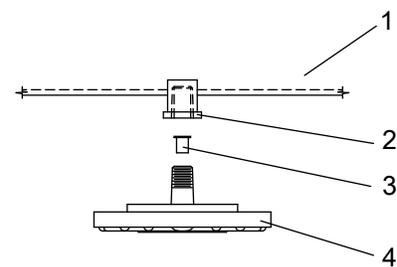


Figure 20: Flex-cap diffuser

1. Manifold
2. Reducer bushing
3. Orifice
4. Flex-cap

The installation is made according to the installation drawings.

1. Mount the diffuser.

Condition	Action
Tube diffuser	<ol style="list-style-type: none"> Assemble the continuous purge. Install the supports on the tank floor according to the installation drawings and the instructions from the anchor bolt manufacturer. Ensure that the tube diffuser is placed horizontally, aligned with the orifice and at an elevation lower than the section to which it is attached. Cut the hose to the correct length Attach the hose to the cap with drainline tap.
Flex-cap diffuser	Thread the flex-cap diffuser into the solvent welded bushing of the manifold. Hand-tight only.

2. Make sure that the manifold, air distributor, or drainline is tapped at a low point.

4.7 Diffuser installation

Prerequisites

The diffusers should be installed just before the scheduled start-up of the aeration system. If the diffusers are pre-mounted, then ensure that all retainer rings are in a hand-tight position. If not, tighten according to the applicable steps in [Install the diffusers](#) (page 30). If the diffusers are not delivered pre-mounted, they must be assembled. Before the assembly, ensure that:

- The holders are clean.
- The orifices are not obstructed.
- Blank holders are plugged according to the instructions in [Plug blank holders](#) (page 31). See the installation drawings for the location of blank holders.

The orifices must be drilled with the correct tool if they are obstructed. Contact your local sales representative.

4.7.1 Install the diffusers

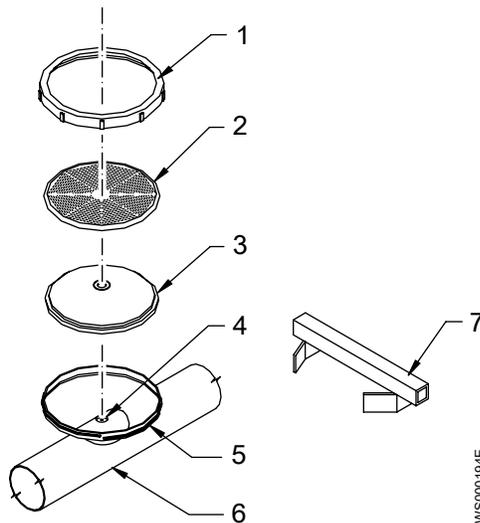


Figure 21: Assembly

1. Retainer ring
2. Diffuser
3. Base plate
4. Orifice
5. Holder
6. Air distributor pipe
7. Spanner wrench

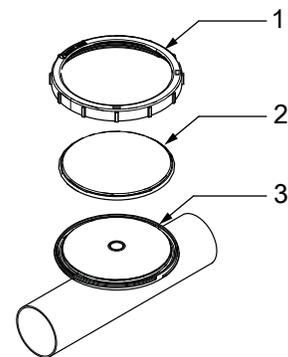


Figure 22: Assembly

1. Retainer ring
2. Diffuser
3. Premounted holder and base plate

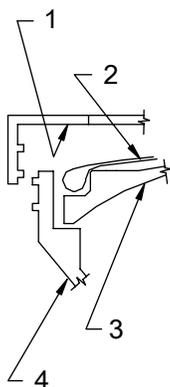
1. Set the base plate, if applicable, in the holder with the flat side up.

In some equipment the holder and base plate are incorporated as one piece.



2. Mount the diffuser.

The diffuser O-ring edge must fit down into the void at the edge of the holder to ensure good sealing.



1. Retainer ring
2. Diffuser
3. Base plate
4. Holder

Figure 23: Diffuser placement

3. Lubricate the retainer ring with the silicone grease provided.

Use a small amount, approximately the size of a finger tip. Do not use excessive silicone grease and only lubricate the underside of the retainer ring, in three or four places. Avoid getting lubricant on the threads.

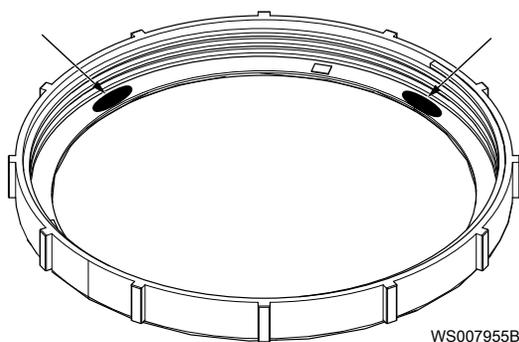


Figure 24: Lubrication of retainer ring

4. Turn the retainer ring to a hand-tight position.
5. Turn the retainer ring an additional 45-90°, using the spanner wrench.
Do not over tighten.

4.7.2 Plug blank holders

A holder that is not put into operation must be plugged. This is known as a blank holder. If the aeration process requirements change, then the holder can be put into operation later.

1. Locate blank holder positions. See the installation drawings.
2. To ensure proper embedment, add the provided silicone grease in the plugging tool before inserting the plug.
3. Plug the orifice.

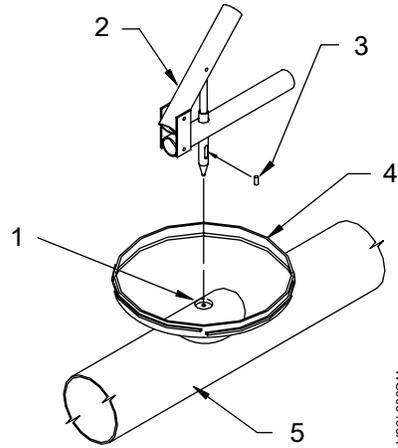


Figure 25: Example of plugging tool

1. Orifice
2. Tool
3. Plug
4. Holder
5. Air distributor

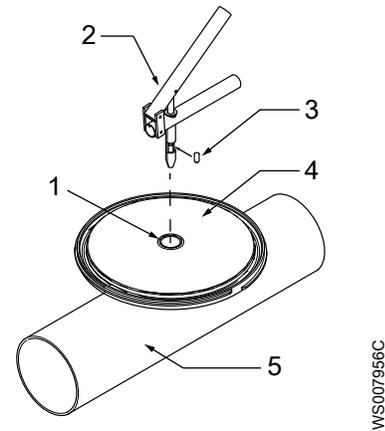


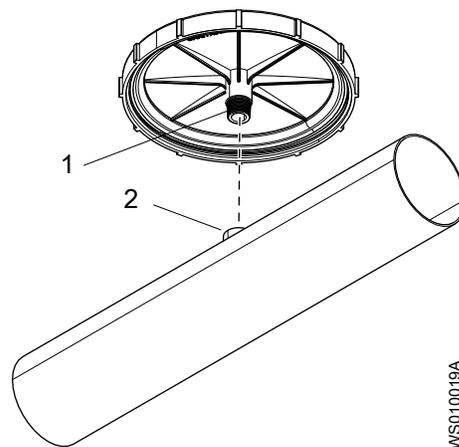
Figure 26: Example of plugging tool

1. Orifice
2. Tool
3. Plug
4. Pre-mounted holder and base plate
5. Air distributor

4.7.3 Install pre-assembled diffusers

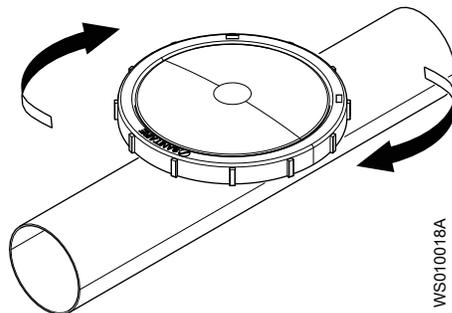
Some aeration systems consist of stainless piping with factory-welded 3/4-in. NPT female fittings. Pre-assembled diffusers will be shipped to the site, ready to be threaded onto the installed piping.

1. Apply a suitable thread sealant compound to the polypropylene pipe nipple. Follow the instructions from the thread sealant manufacturer.



1. Polypropylene pipe nipple
2. 3/4-in. NPT female fitting

2. To install the pre-assembled diffuser holder onto the piping, do the following:
 - a) Insert the polypropylene nipple into the NTP female fitting.
 - b) Turn the diffuser clockwise until it is finger-tight.



3. When the diffuser is finger-tight, tighten an additional 1/4 turn. Only a small amount of force is required.

NOTICE:

Do not overtighten. Overtightening will cause the polypropylene nipple to shear off inside the stainless steel NPT pipe fitting.

4.8 Tank storage

The different options have been developed to protect the pipes and diffusers from environmental damage, and are listed in order of preference.

Xylem assumes no responsibility for damage and cleaning requirements as a result of long-term storage.

- Equipment flooded by overflows, misdirected sewage flows, and excessive airborne dirt build-up requires cleaning before being placed in service.
- Standing water which is allowed to freeze around the pipe can break the pipe or cause diffusers to crack.
- UV light degradation and heat build-up in the tank bottom can cause warping and loss of some structural properties.

NOTICE:

Risk of wear. Make sure the equipment is clean before it is placed into service.

4.8.1 Store in tank when air and water is available

This procedure describes storage of an installed system, before placing it into operation.

1. Add protection around the dropleg and the carrier columns in the tank when there is a risk of ice build-up.
Use for example Styrofoam blocks.
2. Fill the tank with clean water to a minimum level of 1 m (3.1 ft) above the lower droplog. This action gives the pipe and the diffusers protection from UV light and heat build-up.
3. Run a small amount of air through the system to secure that the pipes remain free from water and to minimize the growth of algae on the diffusers.
4. Take appropriate measures against excessive algae growth.
5. Before bringing the system into operation:
 - a) Drain and check all hardware.
 - b) Check the diffusers and clean if fouling is evident.

The operator may have to adjust the air flow rate to a higher level to prevent ice formation during severely cold temperatures.

4.8.2 Store in tank without air, removed diffusers

This procedure describes storage of an installed system in a flooded tank, before placing it into operation.

1. If there is a risk of ice build-up, then start by installing styrofoam blocks around the dropleg and carrier columns installed in the tank.
If ice builds up around the pipes, these blocks prevent crushing.
2. Remove all diffusers, O-rings, retainer rings, base plates, and so on.
3. Clean as required, and store in a clean, dry environment.
4. Fill the tank with clean water to a minimum level of 1 m (3.1 ft) above the lower dropleg.
5. Take appropriate measures against excessive algae growth.
6. Before bringing the system into operation:
 - a) Ensure that there is no ice in the tank.
 - b) Drain and check all hardware.
 - c) Check all holders.
 - d) Spot check pipe internals for algae growth and fouling.
 - e) Clean as required before installing the diffusers.

NOTICE:

Falling ice can crush the system. If water freezes, then do not drain the water below the ice layer.

4.8.3 Store in tank without air, with diffusers

This procedure applies to storing in a flooded tank with diffusers installed.

1. If there is a risk of ice build up, then start by installing styrofoam blocks around the dropleg and carrier columns installed in the tank.
If ice builds up around the pipes, these blocks prevent crushing.
2. Fill the tank with clean water to a minimum level of 1 m (3.1 ft) above the lower dropleg.
3. Take appropriate measures against excessive algae growth.
4. Before bringing the system into operation:
 - a) Ensure that there is no ice in the tank.
 - b) Drain and check all hardware.
 - c) Spot check pipe internals for algae growth and fouling.
 - d) Remove the diffusers and spot check the underside to determine the extent of fouling, and if cleaning is required before use.
 - e) Clean as required before use and then remount the diffusers.

NOTICE:

Falling ice can crush the system. If water freezes, then do not drain the water below the ice layer.

4.8.4 Store in tank with neither air nor water

This procedure applies to storing in tanks when flooding is undesirable.

1. Drain tanks dry.
2. Clean out solids and debris.
3. Open spline couplings and loosen support band clamps as required.
4. Roll the air distributor sections over 180°.
5. Make sure that spline couplings and floor drains remain open to prevent water from standing in the pipe system and tank.

5 Operation

5.1 Precautions

Before starting work, make sure that the safety instructions in the chapter [Introduction and Safety](#) (page 3) have been read and understood.

The following requirements apply:

- Never work alone.
- Make sure that you have a clear path of retreat.
- Never operate the system without safety devices installed.
- Make sure that all safety guards are in place and secure.

Preconditions

Perform a final tank inspection:

- Tighten any loose nuts, couplings, or end caps
- Replace any missing or improperly placed hardware.

Before starting the system, ensure that all repair work is completed. Before doing any work, see [Introduction and Safety](#) (page 3).

Drowning

Spaces that are not fully drained or dry can pose a risk of drowning. It takes relatively little standing water or other liquid to create a drowning hazard. For example, insufficient oxygen or the presence of a toxic material can make a worker unconscious, which makes them vulnerable to drowning if they fall face down into a small pool of water. Never work alone where there is a risk of drowning.

5.2 Start the system

Complete the start-up procedure before the site visit by authorized service personnel.



CAUTION: Fall Hazard

Slips and falls can cause severe injuries. Watch your step.

NOTICE:

To avoid damage to the piping, introduce water to the tank at a low flow rate and avoid water flow impacting directly on the piping.

1. Start filling the aeration tank with clean water.
2. If a manual purge system is installed, then disconnect the purge hoses from the sumps.
3. When the water level reaches a point just above the top of the air distributor pipes, then turn on the air at a low air flow rate of approximately 0.85 Nm³/h/diffuser (0.5 SCFM/diffuser) or 1.7 Nm³/h/diffuser (1.0 SCFM/diffuser) for LP.
4. Check all submerged couplings for air bubbles which indicate leaks.

Leaking at spline or expansion couplings is normally due to:

- The O-ring is pinched or out of place.
- The coupling retainer ring is cross threaded in the spigot.
- The coupling is not tight.

Repair as required, see chapter [Maintenance](#) (page 38).

5. With the air on, check each purge.

Any water in the pipe should be discharging from the purge.

Condition	Action
There is water in the pipe	The water should be discharging from the purge exit
There is no water in the pipe	Air should be discharging
Neither air nor water is discharging	Check, and if necessary, clean or redrill the purge air orifice to 5 mm (0.2 in.)

6. Turn the water supply off when it has reached a level of 25 mm (1 in.) below the top of the diffusers.

This is half way up the retainer ring.

- a) Visually check the level of the aeration system using the water line.

The distance from the top of the perimeter of the diffusers to the static water level should be ± 6 mm (1/4 in.).

- b) Adjust the air distributor sections as required in order to level the aeration system.

7. Check for small leaks in the holders.

8. Increase the air rate to about 1.7-2.6 Nm³/h/diffuser (1-1.5 SCFM/diffuser) and turn the water supply back on.

9. Fill the aeration tank to a maximum water level of 50-75 mm (2-3 in.) above the diffusers, and then turn off the water.

10. Check all diffuser units for uniform air distribution or excessive air discharge.

Air should be discharging uniformly across the diffuser surface. Large coarse bubbles around the perimeter or halo of the diffuser indicate a loose retainer ring or an improperly seated O-ring.



Figure 27: Uniform air discharge



Figure 28: Excessive air discharge

- a) Remove the retainer ring.

Use the spanner wrench.

- b) Reseat the diffuser.

Ensure that the diffuser is correctly seated.

- c) Retighten the retainer ring to a hand-tight position.

- d) Turn the retainer ring an additional 45-90°, using the spanner wrench.

Do not over tighten.

11. If no air is discharging from the diffuser surface, then the air control orifice can be plugged with debris.

- a) Remove the retainer ring, the diffuser, and the base plate, if applicable.

- b) Clean or drill the orifice.

Use an appropriate tool. Contact your local sales representative.

- c) Reinstall the retainer ring, the diffuser, and the base plate, if applicable.

12. Reattach the purge hoses to the purge sumps when the system is leak free and is purged of any entrapped water.
13. Leave the tank before filling with more water.
14. Continue filling the tank to a point 1 m (3.1 ft) over the diffusers.
If the system has a raised manifold, then check for manifold connection leaks. Repair as required.
15. Continue to fill with water and check for leaks at the connection between the upper and lower dropleg. Use soapy water or a spray bottle of cleaning solution and inspect for bubbles. Bubbles will indicate a leaking connection.
Adjust as required.
16. Allow the system to operate 3-4 hours in this mode before introducing the process media (liquid).

6 Maintenance

6.1 Precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and Safety* (page 3) have been read and understood.

Requirements

The following requirements apply:

- Never work alone.
- Make sure to have a clear path of retreat.
- Make sure that the work area is properly ventilated.
- Provide a suitable barrier around the work area, for example a guard rail.
- Check the explosion risk before you weld or use electrical hand tools.
- Make sure that the product and its components have been thoroughly cleaned.

The figures in the instructions can differ from the delivered products.

6.2 Preventive maintenance

The operator should keep a regular log of pressure and dissolved oxygen readings.

Diffuser fouling is indicated by a continuous increase in:

- Operating pressure
- Air demand without a change in the aeration tank loading
- Air demand with a decrease of dissolved oxygen levels

This chapter includes instructions for:

- Empty the moisture purging system
- Air bumping
- Power failure and loss of air supply
- Visual inspection

6.2.1 Moisture purging

Moisture enters the pipe system in the following ways:

- Condensate build-up inside the pipe system due to high blower discharge temperatures, or moist or humid air
- Minor leaks in the pipe system

The effects of entrapped moisture are:

- Increased air velocity and headloss
- Poor air distribution

1. Lower the air flow to the grid for maximum purge results.

The air velocity is reduced and more of the liquid is forced to the sump.

2. Open the ball valve on the eductor line.

The trapped liquid is purged from the system.



CAUTION: Compressed Gas Hazard

Air inside may cause parts or liquid to be propelled with force. Be careful when opening.

3. Close the ball valve when the water flow stops and mist appears.

6.2.2 Air bumping

Air bumping is a technique that operators can employ to remove settled debris temporarily on a system in operation, between diffuser cleaning. It means increasing the air flow rate for 5-10 minutes once a week. Use an air rate per diffuser as stated in [Operational limits](#) (page 51).

6.2.3 Power failure and loss of air supply

The result of a power failure and loss of air supply on membrane diffusers is that solids settle on the diffuser surface. The short-term affect is none.

The long-term effect is that the potential of surface fouling is possible and the diffusers can require a cleaning. This is generally the case for long-term intermittently used membrane diffuser aeration systems (for example Anoxic Zones or Batch Reactors).

Due to the described long-term effect, the operator can be required to shut off adjacent grids or turn on additional blowers to increase the air flow rate and force the membrane off the base plate surface.

6.2.4 Visual inspection

Visual inspection is an ongoing preventative maintenance step and can be done while taking routine samples.

- Visually inspect the aeration tank surface pattern.
The flow should be, for the most part, a nice quiescent pattern. Some coarse bubbling at the tank inlet may occur due to surfactants in the wastewater and is generally dispersed shortly downstream.
- Look for excessive coarse bubbling throughout the tank.
Coarse bubbling indicates that the diffusers can be fouled.
- Look for large boiling in an isolated area.
Large boiling indicates a failure in the submerged pipe system or a broken diffuser.

6.3 Recurrent maintenance

Maintenance schedule

The following service schedule is recommended to be observed at least once per year.

1. Drain each tank.
2. Remove excess settled solids that have accumulated.
3. Clean diffusers. See [Diffuser cleaning](#) (page 39).
4. Inspect support hardware to ensure that all components are intact and tight.
5. Inspect diffuser retainer rings to make sure all rings are in place and tight.
6. Inspect spline and expansion coupling retainer rings to make sure that they are tight.

For hardware inspection, see also the corresponding section in the installation chapter, or in other appropriate documentation.

6.4 Diffuser cleaning

6.4.1 Clean the diffusers

1. Drain the aeration tank.
The air supply must remain on when the tank is drained and the water is above the diffusers. The valve on the dropleg has to be adjusted as the tank is being drained. Excessive air flow to the tank being drained must be prevented, and enough air must be supplied to adjacent operating grid systems supplied from the same source.

NOTICE:

Excessive heat build-up can damage plastic pipes.

2. Clean each diffuser.

Use a hose with clean water at a nozzle pressure of 410 kPa (60 psig).

3. Scrub each diffuser with a rag or soft bristle brush in order to remove stubborn slime growth, chemical precipitates, or oils.

NOTICE:

Acids should not be directly applied on the membranes.

Use only the gas or liquid In-Situ Acid Cleaning System from Xylem to deliver acid to the diffusers.

4. Inspect the aeration system visually. Ensure that no hardware was loosened or broken during the cleaning.

6.5 Manifold repair

Commercially available PVC/CPVC primer and glue is acceptable for use on the Xylem aeration equipment to make the repairs described here.

6.5.1 Replace a saddle

This section shows how to replace a damaged air distribution connection, a saddle tee, on the manifold. A cracked saddle tee, or a damaged socket end, is hard to detect until the air is turned on. Always replace the entire saddle tee, even if only the socket is damaged.

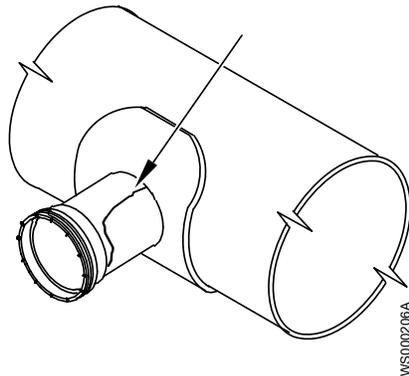


Figure 29: Cracked saddle tee

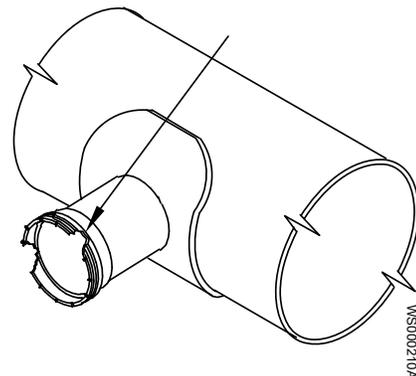
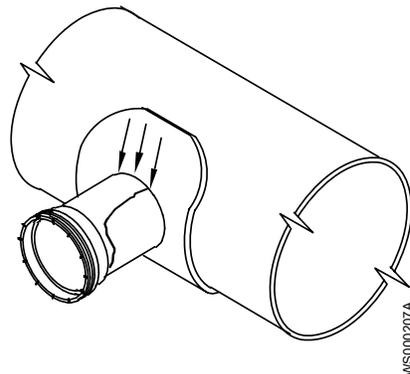
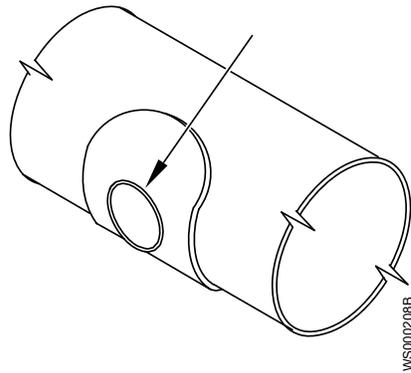


Figure 30: Damaged socket

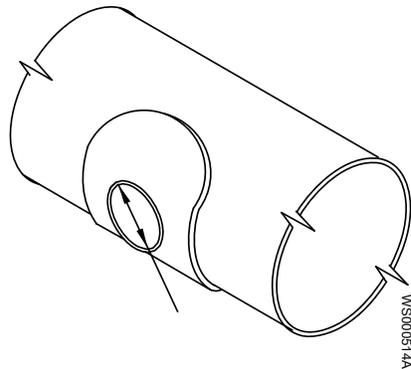
1. Cut the pipe section off flush with the saddle.
Use a reciprocating type saw (Sawzall).



2. Chamfer the inside edge of the saddle opening to remove any saw cut projections.



3. File the saddle opening using a half round file.
4. File off the saddle projection on each side of the opening.
The clear opening diameter must be 108 mm (4 1/4 in.) for a proper fit of the new saddle piece.



5. Clean and prime the surfaces.
6. Glue the new saddle assembly directly over the existing saddle.



CAUTION: Chemical Hazard

Contact the supplier for information for proper handling and use.

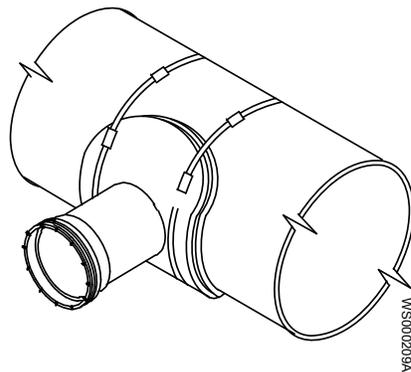


Figure 31: 1-piece saddle tee

7. Secure the saddle assembly to manifold using strap clamps.
8. Allow appropriate time to cure.

6.5.2 Repair a minor leak

This instruction shows how to repair a minor leak around the edge of a saddle tee. Air release at startup indicates a leak.

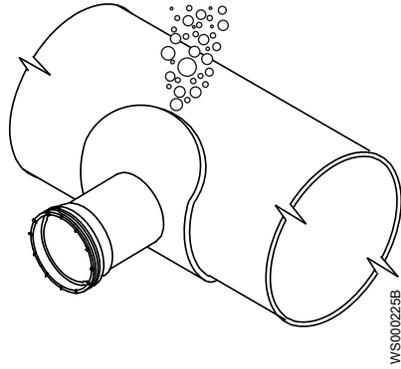


Figure 32: Air release

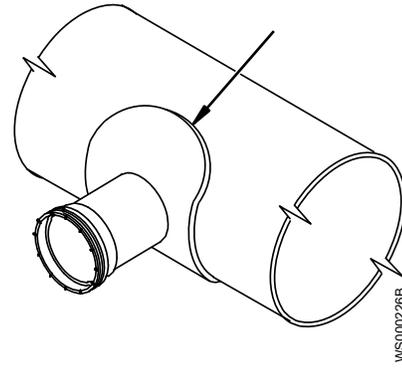


Figure 33: Glue

1. Apply a bead of glue around the edge of the pipe saddle.



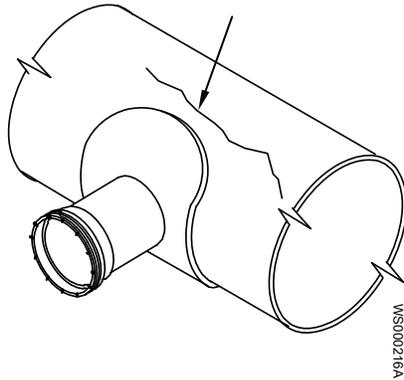
CAUTION: Chemical Hazard

Contact the supplier for information for proper handling and use.

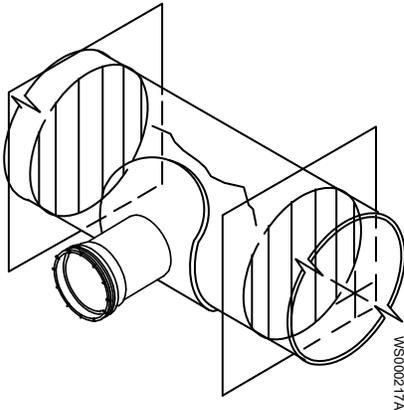
2. Allow adequate time to cure (>24 hours).

6.5.3 Replace a cracked manifold pipe section

This instruction shows how to replace a cracked manifold pipe section. The crack can extend further down the pipe.

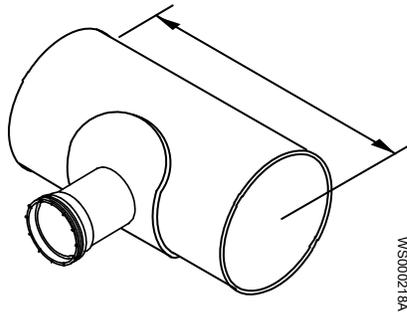


1. Cut the broken pipe section between the saddles.



2. Remove saw cut burrs by filing or sanding the outside edge of the pipe.
3. Cut a length of pipe of the correct diameter and the correct number of tee connections.

The ends must be cut perpendicular to the pipe.

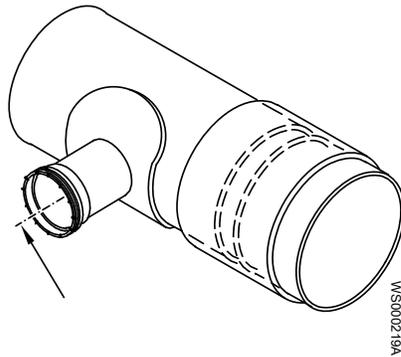


WS000218A

4. Remove the burrs from the cut pipe ends.
5. Glue the repair section to the new couplings.
Ensure that the couplings are the correct size and type.

**CAUTION: Chemical Hazard**

Contact the supplier for information for proper handling and use.



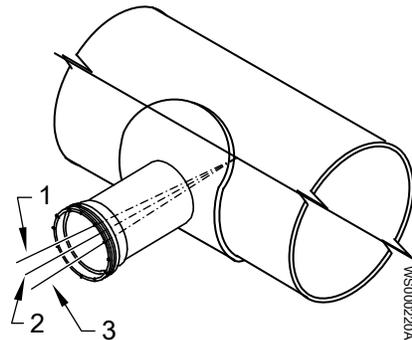
WS000219A

6. Glue the repair section to the original manifold sections.
Ensure that the manifold air distributor connections are level.

6.5.4 Align an air distributor connection

This instruction shows how to align an air distributor connection. Alignment is needed in the following situations:

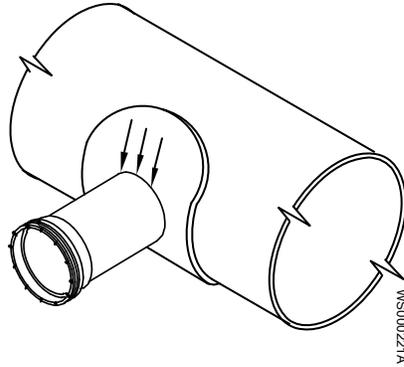
- The in-line manifold air distributor connection is out of horizontal level, causing the air distributor to be out of level.
- The raised manifold air distributor connection is out of vertical plumb, causing the air distributor to be out of level.



WS000220A

1. Out of level
2. Level
3. Out of level

1. Use a reciprocating type saw (sawzall) and cut the spigot section off flush with the saddle.



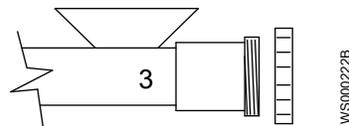
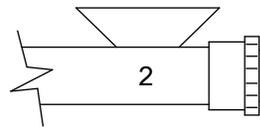
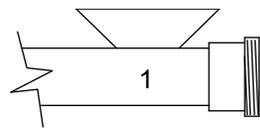
2. Follow the instructions in [Replace a saddle](#) (page 40).

6.6 Air distributor repair

Commercially available PVC/CPVC primer and glue is acceptable for use on the Xylem aeration equipment to make the repairs described here.

6.6.1 Replace an air distributor end

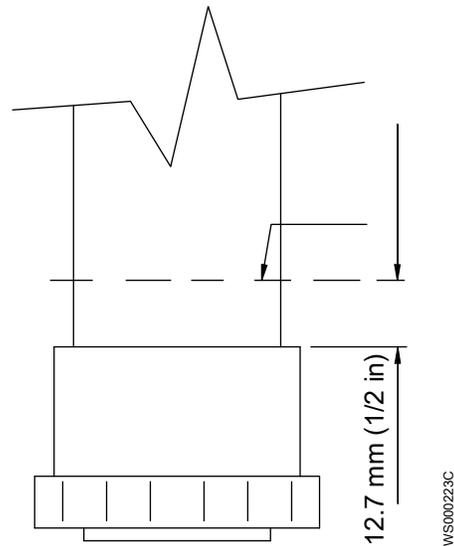
This instruction shows how to repair an air distributor spline coupling, expansion coupling, and socket. Ensure that the required spare parts are available.



1. Spline socket
2. Spline spigot with retainer ring
3. Expansion coupling with retainer ring

1. Remove damaged coupling end by cutting the attached pipe section at a distance of 12.7 mm (1/2 in.) from the end of the fitting.

Care should be taken to make cut as perpendicular as possible.



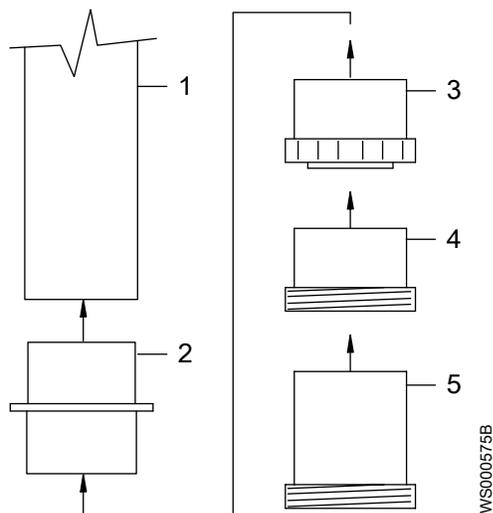
2. Remove the burrs from the cut pipe end.
3. Clean and prime the inside of cut pipe end.



CAUTION: Chemical Hazard

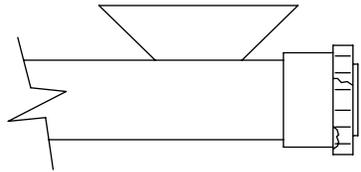
Contact the supplier for information for proper handling and use.

4. Clean and prime the outside of the small end of the adaptor.
5. Glue the pipe adaptor to the pipe end.
6. Clean and prime the opposite outside end of the adaptor.
7. Clean and prime the inside face of the coupling end.
8. Glue the coupling end onto the adaptor.



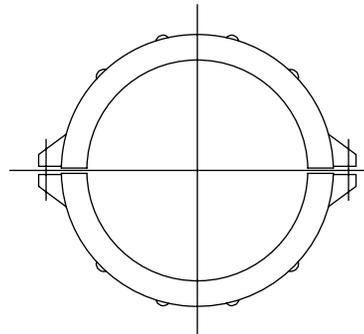
1. Pipe end
2. Adaptor
3. Spline spigot with retainer ring
4. Spline socket
5. Expansion coupling

6.6.2 Replace a spline coupling retainer ring



WIS000227A

Figure 34: Damaged or broken retainer ring



WIS000577A

Figure 35: Retainer ring for replacement

1. Cut off the damaged retainer ring.
Use a hand held hacksaw or pipe saw and be careful not to damage other parts.
2. Install a replacement retainer ring.

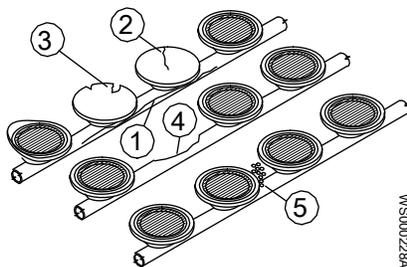
6.6.3 Replace a holder

This instruction shows how to repair a holder due to one or more of the following problems:



CAUTION: Chemical Hazard

Contact the supplier for information for proper handling and use.



WIS000228A

1. Cracked pipe
2. Cracked holder
3. Chipped diffuser holder
4. Broken off holder
5. Holder unable to seal

The repair of the listed problems involves cutting out and replacing a pipe section. The number of diffusers that require removal depend on the extent of the damage.

Ensure that repair components are available before starting the repair work. The components are supplied locally.

1. Remove the diffusers from the holders on the damaged pipe section.
2. Cut out the damaged pipe section.

The minimum distance the pipe should be cut from any adjacent holder is 150-200 mm (6-8 in.), depending on which holder type is installed. Ensure that the coupling does not interfere with the holder after the installation.

If the cut point falls on a support location, then do one of the following:

- If the space allows, then move off the support location towards the next diffuser.
- If the diffusers are tightly spaced, then move down to the space after the next diffuser.

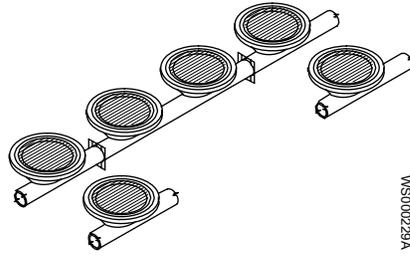


Figure 36: Damaged pipe section cut

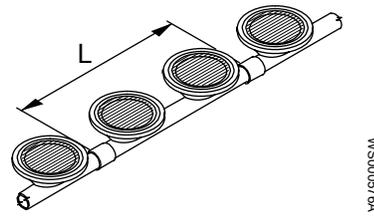


Figure 37: Spare distributor section cut

3. Cut a section to the required length L with the appropriate number of diffusers at the correct diffuser spacing.
4. Remove the burrs, clean and prime all cut ends.
5. Glue the repair pipe section into place.
Use two repair couplings.
6. Clean, prime and glue according to separate instructions.
The retainer ring must be free to rotate. Ensure that no excess glue comes in contact with the retainer ring.

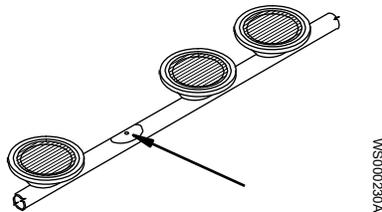
6.6.4 Refit a holder

This instruction shows how to replace a missing holder when there is no pipe damage.



CAUTION: Chemical Hazard

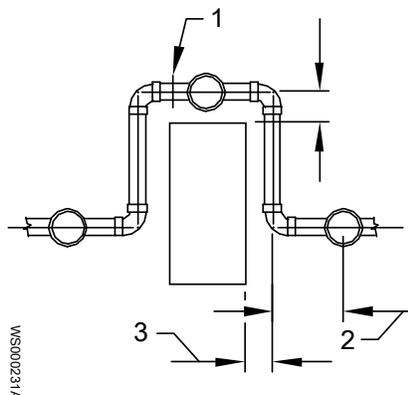
Contact the supplier for information for proper handling and use.



1. Clean the holder area of any old glue residue.
2. Prime the holder area and the bottom of the holder.
3. Attach the holder on the pipe. Ensure that the holder is level.
4. Drill a new hole in the holder and the pipe, if applicable.
5. Allow appropriate time to cure (>24 hours).

6.6.5 Reroute an air distributor section

This instruction shows how to route an air distributor around an obstacle.



1. Support placement
2. Minimum distance 230 mm (9 in.)
3. Minimum distance 150 mm (6 in.)

Use 90° sewer size socket elbows and 110 mm diameter (4.215 in. O.D.) sewer pipe to make necessary modifications.

Ensure that the offset air distributor run is adequately supported.

7 Troubleshooting

7.1 Operational troubleshooting

For instructions, see chapter [Maintenance](#) (page 38). For instructions on how to handle other equipment such as air blowers, see the instructions from the manufacturer.

Symptom	Cause	Remedy
Poor air distribution	Diffusers not level	Level system
Non-uniform air distribution	Grid flooded	Operate grid purge system
	Insufficient air	Provide more air
	Solids settling	Provide more air to the grid, perform air bumping procedure, or clean the diffusers
	Plugged orifice	Clean orifice
Visible mounding of air in one location	Broken pipe	Repair pipe, see Manifold repair (page 40) or Air distributor repair (page 44)
Coarse bubbling (large bubbles)	Diffuser fouling, loose coupling, degraded gasket, broken pipe or diffuser	Clean diffusers, see Diffuser cleaning (page 39), or inspect and repair accordingly
Low dissolved oxygen (D O) concentration	Too little air	Increase air flow
Increased operating pressure	Diffuser fouling	Clean diffusers, see Diffuser cleaning (page 39)
	Line blockage or valve closed	Check air lines and valves
Increased air requirement without load change	Diffuser fouling	Clean diffusers, see Diffuser cleaning (page 39)
	Leak in air system	Inspect and repair accordingly

7.2 Diffuser fouling

Fine bubble diffusers can foul or become clogged during operation. The rate of fouling, type of foulant, and strength of foulant depend primarily on the constituents in the wastewater.

The results of diffuser fouling include:

- Loss of oxygen transfer efficiency due to bubble coalescence and coarse bubbling
- Increased pressure requirements
- Increased air demand
- Increased operating costs

Several ways to determine if the diffusers are fouled are discussed in [Preventive maintenance](#) (page 38).

The corrective action for fouled diffusers is to clean them. See [Diffuser cleaning](#) (page 39).

Diffuser fouling causes

Diffuser fouling is divided into two categories:

- Water side fouling (most common)
- Air side fouling (less common)

Causes of water side fouling include:

- Fibrous material that adheres to the edges of the diffuser units
- Oil or grease in the wastewater

- Precipitated deposits of iron and carbonates
- Biological growths of slime

Causes of air side fouling include:

- Dust and dirt from unfiltered or inadequately filtered air
- Rust and scale from air main corrosion
- Oxidation and subsequent flaking of bituminous air main coatings
- Construction debris
- Mixed liquor solids that enter through system leaks or cracks.

8 Technical Reference

8.1 Operational limits

Use ADA for proper dimensioning and related performance.

Silver Series II

Table 1: Air flow per diffuser

Size (in)	Minimum	Maximum
7	0.60 Nm ³ /h (0.35 SCFM)	<ul style="list-style-type: none"> • Long term 5.10 Nm³/h (3.00 SCFM) • Short term 8.20 Nm³/h (4.80 SCFM)
9	0.85 Nm ³ /h (0.50 SCFM)	<ul style="list-style-type: none"> • Long term 6.80 Nm³/h (4.00 SCFM) • Short term 11.90 Nm³/h (7.00 SCFM)

Silver Series II LP

Table 2: Air flow per diffuser

Size (in)	Minimum	Maximum
7	1.20 Nm ³ /h (0.70 SCFM)	<ul style="list-style-type: none"> • Long term 14.50 Nm³/h (8.50 SCFM) • Short term 29.80 Nm³/h (17.50 SCFM)
9	1.70 Nm ³ /h (1.00 SCFM)	<ul style="list-style-type: none"> • Long term 20.40 Nm³/h (12.00 SCFM) • Short term 42.50 Nm³/h (25.00 SCFM)

8.2 Application limits

Data	Description
Media (liquid) temperature	<ul style="list-style-type: none"> • Minimum +2°C (+36°F) • Maximum +38°C (+100°F)
Average pipe temperature, at diffuser	<ul style="list-style-type: none"> • Minimum -10°C (+14°F) • Maximum +40°C (+104°F)
Average pipe temperature, at lower dropleg	Maximum +55°C (+131°F)

8.3 Maximum piping temperature

Material	Maximum Mean Wall Piping Temperature
PVC	54°C (130°F)
CPVC	99°C (210°F)

Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots
- 2) A leading global water technology company

We're a global team unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

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