



# Wastewater Division Specifications

## Sample Only

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## **BIOLINE® CONTINUOUS SELF-CLEANING, PRESSURE COMPENSATING DRIPPERLINE**

### **Description**

Bioline® is low volume dripperline designed for use with on-site wastewater drip dispersal systems. It has integral and evenly spaced pressure compensating drippers inside the tubing, and it is available

in three discharge rates (0.4, 0.6, and 0.9 gallons per hour [GPH]) evenly spaced on 12", 18", or 24" centers. Bioline is available in 500' and 1,000' coils. Blank Tubing is available in 250' coils.

### **Construction**

Bioline shall consist of nominal sized one-half inch (1/2") low-density linear polyethylene tubing with internal pressure compensating, continuously self-cleaning, integral drippers at a specified spacing, (12", 18", or 24" centers) or blank tubing without drippers. The tubing shall be purple in color and shall conform to an outside diameter (O.D.) of 0.66 inches and an inside diameter (I.D.) of 0.57 inches. Individual pressure compensating drippers shall be welded to the inside wall of the tubing as an integral part of the tubing assembly and shall be chemically impregnated with Vinyzene to prevent the buildup of microbial slime. These drippers shall be constructed of plastic with a hard plastic diaphragm retainer and a continuously self-flushing elastomer diaphragm capable of flushing dirt or debris that may enter the dripper. Each dripper shall have an individual filter at the inlet and it shall be integral to the dripper. This filter shall have a cross-sectional area not less than five (5) times larger than the minimum cross sectional area of the dripper flow path. The dripper shall have a built-in physical root barrier whereby water/effluent shall exit the dripper from a point different than where it shall exit the tubing. This physical barrier shall create an air gap inside the exit portion of the dripper.

### **Operation**

Each dripper shall have the ability to independently regulate discharge rates, with an inlet pressure between seven to seventy (7 - 70) pounds per square inch (psi), at a constant rate of flow and with a manufacturer's coefficient of variability (Cv) of 0.03 or less. Recommended operating pressure shall be between 15 - 50 psi. The dripper discharge rate shall be 0.4, 0.6, or 0.9 gallons per hour (GPH) utilizing a combination turbulent flow/reduced pressure compensation cell mechanism and diaphragm to maintain uniform discharge rates. The drippers shall be capable of continuously cleaning themselves while in operation. The dripperline shall be available with 12", 18", and 24" spacing between drippers unless otherwise specified. Maximum system pressure shall be 50 psi. Filtration shall be 120 mesh (130 microns) or finer. Bending radius shall be 7".

Bioline shall be Netafim Model Number 08WRAM\_-. Bioline Blank Tubing shall be Netafim Model Number 08WRAM-250.

## **BIOLINE® FITTINGS (0.57")**

### **Description**

Bioline® fittings shall be constructed in one of the following end configurations:

- Barbed insert fittings only,
- Male pipe threads (MPT) with barbed insert fittings, or
- Female pipe threads (FPT) with barbed insert fittings.

### **Construction**

All fittings shall be constructed of injection molded, brown plastic having a nominal outside dimension of 17mm (0.57"). Female and male threaded ends shall be capable of mating to standard PVC pipe with tapered threads.

## **Operation**

Bioline fittings shall be mated with Netafim Bioline dripperline by pushing the fitting into the tubing while twisting side to side until the tubing abuts to either adjoining tubing or a fitting stop.

Maximum system pressure without clamps shall be 50 psi.

Bioline fittings shall be Netafim Model Numbers TLTEE, TLCOUP, TL2W075MA, TLELL, TLCROS, TL050MA, TL075MA, TL075FTEE, TLIAPE, and TLIAPVC.

## **BIOLINE<sup>®</sup> SPECIALTY FITTINGS**

### **Bioline<sup>®</sup> Insert Adapter for Polyethylene**

#### **Description**

The Bioline<sup>®</sup> Insert Adapter for Polyethylene shall be a 2-piece threaded-connection fitting designed to transition from 1" or larger polyethylene pipe to Bioline.

#### **Construction**

The Bioline Insert Adapter for Polyethylene shall be constructed of injection-molded plastic.

#### **Operation**

The fitting shall unthread to allow the inlet end of the fitting to be pressed into a pre-drilled 11mm, 15/32" or 1/2" hole created using a forstner drill bit or punch in 1" or larger medium or higher density PE pipe. The fitting shall be tightened by threading the 2 pieces together to create a watertight connection. Maximum system pressure without clamps shall be 50 psi.

The Bioline Insert Adapter for Polyethylene shall be Netafim Model Number TLIAPE-B.

### **Bioline<sup>®</sup> Insert Adapter for PVC**

#### **Description**

The Bioline<sup>®</sup> Insert Adapter for PVC shall be a two-piece fitting designed to transition from rigid 1½" or larger CL160, CL200 or Sch. 40 PVC pipe to Bioline.

#### **Construction**

The Bioline Insert Adapter for PVC shall consist of a rubber grommet and an injection molded plastic insert adapter.

#### **Operation**

The rubber grommet shall fit into a hole drilled with a Netafim TDBIT16.5 drill bit or other pre-drilled 16.5mm (21/32") hole in rigid 1½" or larger CL160 or Sch. 40 PVC pipe. The flared top of the grommet shall seat against the outside of the PVC pipe. The short end of the insert adapter is then press-fit into the seated rubber grommet. Maximum system pressure without clamps shall be 50 psi.

The Bioline Insert Adapter for PVC shall be Netafim Model Number TLIAPVC-B.

## **STAINLESS STEEL CLAMPS (for operating pressures in excess of 50 psi)**

### **Description**

Stainless steel clamps are used to secure Bioline to barbed insert fittings. Clamps shall be as manufactured by "Oetiker" and will be the "1-Ear Clamp with Mechanical Interlock" type. The Oetiker clamp for use with Bioline shall be Item Number 15500011 - Size Reference Number 198R.

### **Construction**

Oetiker clamps will be constructed of 304 AISI Stainless Steel. Clamps will be the "1-Ear Clamp with a formed "Dimple" in the Ear to provide for thermal expansion and contraction while maintaining a strong seal. The bottom of the clamp will have a "Mechanical Interlock" and not be spot welded.

The interior of the clamp band shall be smooth to prevent surface damage to the tubing. Band thickness of the clamp shall be 0.0236" (0.6 mm) with an overall band width of ¼" (7 mm).

### **Operation**

Oetiker stainless steel clamps are used to secure Bioline over barbed insert fittings when design-operating pressures exceed 50 psi. Clamps are to be slipped over the tubing before being fitted to barbed insert fittings. Place the clamp between the first and second ridge of the barbed insert fittings. Crimp (close) the "Ear" of the clamp firmly with an Oetiker Pincer Tool. Crimp the "Ear" again to ensure proper seating.

## **TECHFILTER®**

### **Description**

Techfilter® is the incorporation of a disc filter and a chemical root intrusion preventer (trifluralin) with a required amount of Bioline® dripperline. Techfilter is available in 5 filter sizes, (¾", 1", 1" Long, 1½" Long, and 2") with dripper flow rates of, 0.4, 0.6, and 0.9 GPH spaced at 12", 18", or 24" centers, and a specific amount of Bioline with each Techfilter ordered. The mesh rating shall be 120, and maximum system pressure is 140 psi for the filter and 50 psi for the Bioline.

### **Construction**

**Filter** The filter shall be a multiple disc filter with trifluralin incorporated into the replaceable disk ring assembly inside the filter housing. The disc filter body shall be molded of black plastic with male pipe threads for both inlet and outlet. The disc filter shall be capable of periodic servicing and replacement of the chemically treated disk ring set by unscrewing a threaded cap or unlatching the band.

**Dripperline** The Bioline® drippers shall have the ability to independently regulate discharge rates, with an inlet pressure of seven to seventy (7 - 70) pounds per square inch (psi), at a constant flow and with a manufacturer's coefficient of variability (Cv) of 0.03 or less. Recommended operating pressure shall be between 15 - 50 psi. The dripper discharge rate shall be 0.4, 0.6, or 0.9 gallons per hour (GPH) utilizing a combination turbulent flow/reduced pressure compensation cell mechanism and a diaphragm to maintain uniform discharge rates. The drippers shall continuously clean themselves while in operation. The dripperline shall be available in 12", 18", and 24" spacing between drippers unless otherwise specified. Maximum system pressure shall be 50 psi.

### **Operation**

When water passes through the filter, a very low concentration of trifluralin (parts per billion) is transmitted throughout the Bioline® piping network. This provides for precise and even distribution of trifluralin throughout the piping network and effectively inhibits root growth into the dripper outlets.

The trifluralin-treated filter ring set shall be replaced every two (2) years, or two hundred (200) hours of operation, whichever occurs first.

The Techfilter system shall be Netafim Model Number TFB \_\_\_\_\_ - \_\_\_\_\_.

## **½” AIR/VACUUM RELIEF VENT**

### **Description**

The Air/Vacuum Relief Vent serves two purposes:

- To evacuate air from the Bioline® laterals during system start-up and,
- To prevent a vacuum from occurring after the remote control valve has closed, thus preventing debris intrusion into the drippers via back siphonage.

### **Construction**

The Air/Vacuum Relief Vent shall be constructed of thermoplastic with male or female pipe thread capable of mating to a threaded fitting.

### **Operation**

Bioline® installations require that air/vacuum relief vents be installed at the highest elevation in each zone (some zones may require more than one) in order to expel air and relieve vacuum. In a zone where the highest elevation occurs between the supply and return manifolds (headers), such as a mound or berm, an air/vacuum relief lateral shall interconnect all the Bioline dripperlines to avoid the necessity of installing one air/vacuum relief valve on each Bioline lateral. Air/Vacuum Relief Vents can be installed below grade in valve boxes to allow for periodic inspection.

The Air/Vacuum Relief Vent shall be Netafim Model Number TLAVRV.

## **GUARDIAN AIR/VACUUM RELIEF AIR VENT**

### **Description**

The Guardian Air/Vacuum Relief Vent serves two purposes:

- To evacuate air from the Bioline® laterals during system start-up and,
- To admit air into the piping network at high flow rates during drain down to prevent a vacuum from occurring, and thus preventing debris intrusion into the drippers via back siphonage.

### **Construction**

The Guardian Air/Vacuum Relief Vent shall allow for high flow rate air discharge, up to 8 psi differential for the 2" & 3" models and up to 5 psi for the ¾" & 1" model, thus preventing premature closing. It shall be constructed of UV-protected materials as follows: It shall be constructed of UV-protected materials as follows:

Part	¾" & 1"	2"	3"
Body	Polypropylene	Reinforced Nylon	Reinforced Nylon
Cover	Polypropylene	Polypropylene	Reinforced Nylon
Disc	-	Reinforced Nylon	Reinforced Nylon
Seal	BUNA-N	E.P.D.M.	E.P.D.M.
Float	Polypropylene	Reinforced Nylon	Polypropylene

The ¾" & 1" Guardian Air/Vacuum Relief Vents shall be available with or without a Shrader valve. The Shrader valve shall allow pressure readings during system operation. The base of the ¾" and 1" Guardian shall be MPT. The base of the 2" & 3" Guardian shall be FPT. Maximum working pressure range shall be 3 - 150 psi (0.2 - 10 bar).

**Operation**

Bioline® installations require that air/vacuum relief vents be installed at the highest elevation in each zone (some zones may require more than one) in order to expel air and relieve vacuum. In a zone where the highest elevation occurs between the supply and return manifolds (headers), such as a mound or berm, an air/vacuum relief lateral shall interconnect all the Bioline dripperlines to avoid the necessity of installing one air/vacuum relief vent on each Bioline lateral. Air/Vacuum Relief Vents can be installed below grade in vented valve boxes to allow for periodic inspection.

The Guardian Air/Vacuum Relief Air Vent shall be Netafim Model Number 65ARIA\_\_\_\_\_.

**1" & 2" COMBINATION AIR/VACUUM RELIEF & CONTINUOUS ACTING AIR VENTS**

**Description**

The Combination Air/Vacuum Relief & Continuous Acting Air Vent serves three purposes:

- To evacuate air from the Bioline® laterals during system start-up and,
- To admit air into the piping network at high flow rates during drain down to prevent a vacuum from occurring, and thus preventing debris intrusion into the drippers via back siphonage.
- Continue to dispel air when the system is operating under pressure.

**Construction**

The Combination Air/Vacuum Relief & Continuous Acting Air Vent shall allow for high flow rate air discharge, up to 10 psi differential, thus preventing premature closing. It shall be constructed of UV-protected materials as follows:

Model Number	Size	Body	Base	Maximum Operating Pressure (psi)
65ARIB1	1"	Reinforced Nylon	Reinforced Nylon	150
65ARIB1-B	1"	Reinforced Nylon	Brass	150
65ARIB2	2"	Reinforced Nylon	Reinforced Nylon	230
65ARIB2-B	2"	Reinforced Nylon	Brass	230
65ARIB2PP	2"	Polypropylene	Polypropylene	150
65ARIB2-BPP	2"	Polypropylene	Brass	150

The body shall be made of high strength plastic and all operating parts shall be designed and manufactured from specially selected corrosion-resistant materials. Due to its light weight, the vent shall be capable of being installed on plastic piping systems, as well as other lightweight piping. A threaded drainage outlet (1½" on the 2" vent and ⅜" on the ¾" & 1") shall enable removal of excess fluids.

The base shall be MPT. Maximum working pressure range shall be as noted in table. Testing pressure shall be 367 psi (25 bar) for the 230 psi valves and 235 psi (16 bar) for the 150 psi valves. Maximum working temperature shall be 203° F (95° C).

### **Operation**

The vent's large orifice air/vacuum component shall be designed to discharge large volumes of air during the filling of the system and shall admit air into the system at high flow rates, during its drainage and/or at water column separation. At any time during system operation, should internal pressure fall below atmospheric pressure (negative pressure), air will re-enter the system through the air valve. Admitting air in response to negative pressure shall protect the system from destructive vacuum conditions, and prevent damage caused by water column separation. The vent shall incorporate a small orifice component that shall release trapped air in the system while it is under pressure.

The Combination Air/Vacuum Relief & Continuous Acting Air Vent shall be Netafim Model Number 65ARIB\_\_\_\_\_.

## **PRESSURE REGULATOR - HIGH FLOW PRESSURE REGULATOR**

### **Description**

The purpose of the Pressure Regulator is to maintain downstream pressure at or below the specified system operating pressure. Unregulated pressures in excess of the recommended operating ranges can cause the Bioline® fitting connections to weaken or fail.

### **Construction**

The Pressure Regulator shall be a Netafim spring-operated piston-type regulator with an externally accessible regulation unit that can be serviced without removing the valve body from the piping. The body shall be molded of black plastic with a combination of male/female pipe threaded inlet and outlet.

### **Operation**

The Pressure Regulator shall have a built-in indicator that indicates when it is operating. It shall be able to respond immediately to any inlet pressure variation. The regulator shall be capable of regulating downstream pressure to 15 psi, 20 psi, 25 psi, 35 psi, or 43 psi in ¾" or 1½" configurations. The Pressure Regulator shall operate in a flow range of 3.5 - 17.6 GPM in the ¾" configuration and 7 - 35 GPM in the 1½" configuration. Maximum pressure at inlet shall be 145 psi.

The Pressure Regulator shall be a Netafim Model Number PRV \_\_\_\_\_V2K.

## **PRESSURE REGULATOR - IN-LINE LOW FLOW PRESSURE REGULATOR**

### **Description**

The purpose of the Pressure Regulator is to control downstream pressure at or below the specified system operating pressure. Unregulated pressures in excess of the recommended operating ranges can cause the Bioline fitting connections to weaken or fail.

### **Construction**

The Pressure Regulator shall be a Netafim spring-operated, in-line piston-type regulator. The body shall be molded of black plastic with ¾" female/female pipe threaded inlet and outlet. Directional arrows shall indicate flow direction of water.

### **Operation**

The Pressure Regulator shall be able to respond immediately to any inlet pressure variation. The regulator shall be capable of regulating downstream pressure to 15 psi, 20 psi, 25 psi, 35 psi, or 43 psi. The Pressure Regulator shall operate in a flow range of 0.25 - 4.4 GPM. Maximum pressure at inlet shall be 145 psi.

The Pressure Regulator shall be a Netafim Model Number PRV075LF \_\_\_\_\_V2K.

## **DISC FILTER**

### **Description**

The purpose of the Disc Filter is to capture and retain water-transported debris or sediment.

### **Construction**

The filter shall be a multiple disc filter with color-coded filter elements indicating the mesh size of the element being used. The discs shall be constructed of chemical-resistant thermoplastic for corrosion resistance.

The disc filter body shall be molded of black plastic with male pipe threads for both inlet and outlet. The disc filter shall be capable of periodic servicing by unscrewing a threaded cap or unlatching the band. The ¾" DFV model shall have an integral manual shut-off valve.

Disc filter ring color-coding shall be: Yellow (80 Mesh / 200 Micron), Red (120 Mesh / 130 Micron), Black (140 Mesh / 100 Micron), or Green (200 Mesh / 70 Micron).

### **Operation**

Installation of the Disc Filter shall be as detailed. Disc filters can be installed downstream of the remote control valve to allow for periodic servicing when the remote control valve is not operating. It can be installed upstream of the remote control valve if the disc filter is specified with manual shut-off valve or when a line-sized shut-off valve is also specified to allow for periodic servicing with a pressurized main line. Recommended installation of disc filters shall be as specified. It may be installed below grade positioned in a valve box large enough to remove the disk filter cap and internal disc element, or above grade. A gravel sump in the bottom of the valve box is recommended.

The Disc Filter shall be a Netafim Model Number \_\_\_\_\_.

## **2" COMPACT AUTOMATIC DISC KLEEN FILTER**

### **Description**

The purpose of the 2" Compact Disc Kleen Filter is to capture and retain water-transported debris or sediments in areas where no power is available.

The filter is designed to fit into small, tight locations. The automatic backflush reduces the need for frequent maintenance and is operated by a built-in controller and powered by a 9V battery.

### **Construction**

The filter shall be a multiple disc filter with color-coded filter elements indicating the mesh size of the element being used. The discs shall be constructed of chemical-resistant polypropylene thermoplastic for corrosion resistance.

Disc filter ring color-coding shall be: Red (120 Mesh / 130 Micron), or Black (140 Mesh / 115 Micron).

The flush valves shall be 12 VDLC, of bronze construction with plastic covers, seals shall be nitrate rubber/EPDM, filter and spine shall be reinforced polyamide, and all clamps and screws shall be stainless steel.

The filter body inlet shall be 2" MPT, the outlet shall be 2" FPT with union assembly, and the flush port shall be 2" FPT.

### **Operation**

Installation of the Disc Filter shall be as detailed.

**Standard Model** The 2" Compact standard model filter shall be designed to operate in the 30 - 80 GPM range, (approximately 50 GPM maximum in very dirty water) with a minimum pressure for backflush of 40 psi and a minimum flow for backflush of 35 GPM. It shall have a maximum operating pressure of 140 psi.

**Low Flow Model** The 2" Compact low flow model filter shall be designed to operate in the 20 - 40 GPM range, (approximately 20 GPM maximum in very dirty water) with a minimum pressure for backflush of 40 psi and a minimum flow for backflush of 20 GPM. It shall have a maximum operating pressure of 140 psi.

The backflush cycle shall be activated by a Pressure Differential Switch (PDS) without the need of an outside controller. The backflush shall operate on a 9 VDC battery.

### **Dimensions**

- Overall Dimensions: 30" x 25"
- Inlet to Outlet: 21½"
- Inlet to Outlet offset: 8<sup>5</sup>/<sub>8</sub>"
- Weight: 37 lbs. net

The filter shall be Netafim Model Number 26ASK2A1T-XXX for flow rates of 30 - 80 GPM. The filter shall be Netafim Model Number 26ASK2A1TF-XXX for flow rates of 20 - 40 GPM. Substitute proper mesh size for "XXX" - 120 or 140 mesh is standard.

## **1" SCREEN FILTER**

### **Description**

The purpose of the screen filter is to capture and retain water-transported debris or sediment. The filter shall have a maximum flow rate of 19 GPM @ 3 psi friction loss and 26 GPM @ 6.6 psi friction loss. Maximum temperature shall be 140° F (60° C) and maximum pressure shall be 115 psi (7.93 bar).

### **Construction**

The filter shall be a screen-type filter with a polyester, 120 mesh (130 micron) screen with 15 square inches of surface area and a polypropylene spine.

The filter body shall be molded of black polypropylene with 1" FPT swivel threads inlet and outlet ends. The inlet and outlet shall be constructed like a "union-style" fitting to allow for easy installation and disassembly of the filter without disturbing other assemblies in-line. The body shall incorporate a captured EPDM o-ring on the body to cup connection and on the inlet and outlet ends to help ensure a watertight connection. The filter cup shall have a ¾" MPT end with cap and EPDM o-ring to allow for periodic servicing by unscrewing the threaded cap for flushing.

### **Operation**

Installation of the filter shall be as detailed. Proper direction of installation shall be as directed by the molded directional arrow in the body of the filter. The filter may be installed downstream of the remote control valve to allow for periodic servicing when the remote control valve is not operating. It may be installed upstream of the remote control valve if the filter is specified with manual shut-off valve or when a line size shut-off valve is also specified to allow for periodic servicing with a pressurized main line. Recommended installation of screen filters shall be below grade positioned in a valve box large enough to remove the filter cup and internal screen element, or above grade. A gravel sump in the bottom of the valve box is recommended to drain water during periodic maintenance.

The 1" Screen Filter shall be a Netafim Model Number SF100-120.

## **AQUANET DC VALVES**

### **Description**

The Aquanet DC valve is a "latching solenoid" valve designed to be turned on and off using a momentary 12VDC pulse. The valve is extremely debris resistant through the use of large ports and non-continuous porting of water above the diaphragm. It shall have an FPT inlet and FPT outlet.

### **Construction**

The valve shall be a 9 - 14 VDC (12 VDC nominal) electronically actuated, diaphragm-operated, remote control valve. The body and bonnet shall be molded of glass reinforced nylon plastic. The bonnet screws shall be serviceable with a Phillips screwdriver. The diaphragm assembly shall be

molded from chemically altered EPDM for added resistance against chlorine and other chemicals for fertigation and chemigation applications. The valve shall operate so that water is only allowed above the diaphragm on the closing cycle. The valve shall have 2 mm metering orifices to operate in very dirty water applications.

The motorized actuator shall be 9 - 14 VDC (12 VDC nominal). The motorized actuator shall be encapsulated in a watertight compartment. It shall be equipped with a 3-position manually operated dial on top of the valve to allow, OFF, AUTO, or ON operation. A flow control handle shall be mounted on the bottom of the valve body and have a 170 degree turn from full open to full close.

Wiring to the motorized actuator shall be color-coded to indicate polarity. The black wire shall be Common and the red wire shall be Power.

The 1½" and 2" valve shall be constructed to allow for the addition of an optional, field installed pressure regulating module that shall have a pressure regulation range of 5 - 70 psi (0.5 - 7.0 bar).

### **Operation**

The ¾" and 1" valve shall be have an operational pressure range of 3 - 150 psi, (0.2 - 10 bar) with a maximum operating pressure rating to 150 psi (10 bar). Flow range shall be 0.1 - 28 GPM (0.025 - 7 m<sup>3</sup>/h).

The 1½" and 2" valve shall have an operational pressure range of 6 - 150 psi, (0.4 - 10.0 bar) with a maximum operating pressure rating of 200 psi (14 bar). Flow range shall be 1 - 175 GPM (0.1 - 34 m<sup>3</sup>/h).

The valve shall be able to be operate with a wire run length back to a controller and a 13.5 VDC pulse of 3,150' with #12 gauge, 1,950' with #14 gauge, 1,250' with #16 gauge, 780' with #18 gauge and 495' with #20 gauge.

The Aquanet Valves shall be Netafim Model Number 26-EV-DCN-\_\_\_\_\_.