
AKE

AquaKlear Eng

AKE DRIP IRRIGATION DISPOSAL SYSTEMS

AKE PRODUCT MANUAL

COMMERCIAL & RESIDENTIAL
DRIP IRRIGATION DISPOSAL SYSTEMS

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“AquaKlear Engineering, Inc. is proud to say that we have combined our 100 plus years of combined experience in the Onsite Wastewater industry with a worldwide drip disposal expert, James F. Prochaska, M.S.,P.E., and created the most cost effective and user friendly drip disposal system the onsite industry has to offer.”

Our AKE drip disposal systems offer the end user the best method known in disposing of their treated wastewater. It also gives the property owner the comfort in knowing they have taken the “going green” phrase to a whole new level.

The pre-assembled drip disposal units manufactured by A.K.E. are unique in design due to features such as:

- 1) pressure throttle valve (proper functioning at minimum head pressure on your delivery pump = longer pump life)
- 2) oversized disc filters (more surface area of filtration)
- 3) sample port located after the drip filter (
- 4) schrader valves (pressure check valves located pre- and post filter and disposal field to assure proper functioning of all components).
- 5) flow metering (similar to your water meter, but allows pinpoint accuracy of disposal).
- 6) smart IDEC relay in control box (counts all pump, override, alarm, and dosing cycles from the start up date. Also has a 30 day battery backup to reserve data in case of power outages)
- 7) pre-programed ,daily automatic disposal field flush (to minimize organic deposits and/or scaling).

With features like this, the contractor/service provider can remain confident in knowing he or she will always have the information needed to determine exactly what is being delivered to the disposal area, thus, minimizing pre-mature maintenance needs and offering a hassle free, and service friendly disposal system.

AT AquaKlear Engineering, we are 100% confident in the ability of our products, to meet and exceed the demands and expectations of your onsite waste water disposal needs.

For any assistance in designs or choosing the proper package, our courteous and field experienced staff is more than willing to assist in any manor necessary.

Please take advantage of our available assistance and call with any questions,
(601)936-7711

Sincerely,

A.K.E., Staff members

Overview

We face a global challenge to responsibly use and protect our finite supply of fresh water, yet all too often we overlook ways to guard and extend this precious resource.

Of all fresh water, $\frac{2}{3}$ rd is tied up in ice caps and $\frac{1}{3}$ rd is groundwater. Surface water only accounts for 0.025%. Of that, 20% is in the Great Lakes and 20% is in Lake Baikal in southern Siberia. That means much of the water we use has been recycled from some prior use. For example, a city treating wastewater through its municipal sewage treatment plant collects wastewater through a network of pipes, treats and disinfects it to near potable levels and then discharges it into lakes, rivers, streams, and oceans where much of tomorrow's water is drawn. Today the new goal is to take that same treated water and return it through separate piping networks to homes and businesses where it can be used in outdoor applications that do not require pure drinking water such as irrigation. By doing so we reduce the strain on our potable water by using clean, but not potable water, for uses where pure drinking water is not needed.

In areas where municipal treatment is not available, "onsite systems" are used. These systems support approximately 25% of all homes in North America today, (about 50% of all suburban homes in the U.S.) they process about 3½ billion gallons of wastewater per day, and their numbers are on the rise as communities grapple with the infrastructure strain that new housing and commercial development puts on existing municipal treatment systems. Most commonly known as "septic tank" systems, these units provide basic treatment to the waste stream and deliver the effluent to a drainfield.

These basic systems are not very sophisticated and are prone to failure rates as high as 25% as reported by the USEPA. They have been notorious for causing pollution of lakes, rivers, and streams, not to mention surfacing issues that can occur in the drainfield. As they fail, many regulatory agencies are requiring that more effective treatment systems be installed in their place.

In order to meet the increasing need for clean water, and the world population outstripping nature's ability to deliver it, we must seek out and implement smart practices that provide sustainable solutions.

Netafim Bioline Dripperline

The good news is that today more sophisticated advanced treatment units are available and do a far better job of treating the waste stream. Along with them, products like Netafim Bioline further support the treatment process by precisely delivering the effluent into the soil.

Soil is one of the nature's most sophisticated purification tools. Whether clay, loam, or sand; soil is an extremely effective treatment tool. When we deliver just the right amount of wastewater to it, at just the right time, the soil effectively provides additional and critical treatment before it reaches surface water or groundwater supplies. The key to success is delivering just the right amount of wastewater at just the right time to just the right spot. This is where other techniques fail and Netafim Bioline succeeds.

While most people are aware of septic tanks and how they operate, most do not consider what happens to wastewater once it has passed through the tank.

Septic tanks are nothing more than large chambers that allow wastewater to settle and separate. When the resulting liquid portion or "effluent" leaves the tank, it moves to a drainfield. The field was typically built by digging out the soil and replacing it with stone and perforated pipe, or chambers of PVC pipe with holes under the chambers. These technologies are becoming less popular today because they do not provide the precision needed to properly disperse the wastewater into the soil. Instead, they simply dispose of it, and often in an unbalanced way.

On the other hand, Netafim Bioline dripperline delivers the effluent into the soil with great precision, ensuring that the effluent does not flood an area or become exposed to people or animals. By distributing the effluent into the 'biologically active soil horizon', we not only allow the soil to break down the effluent, we also allow plants, trees, bushes and grass to use it, along with its nitrogen and phosphorus content – two of the three ingredients in fertilizer. This ecologically sound process helps protect against the contamination of lakes, rivers, streams and drinking water sources, it prevents objectionable odors, and it provides an important benefit – the "wastewater" is no longer "wastewater". It is reusable, renewable and beneficial water that becomes a supplement to or replacement for an irrigation system. What does not get used by the plants is effectively treated by the soil so that when it does reach groundwater or other bodies of water, you can be assured that it will not cause harm to our ecosystem.

Table 1

Infiltration Rates for Drip Irrigation Systems

<u>PERC RATE</u> Mins/Inch	<u>SOIL GROUP</u> U.S.D.A. Textures	<u>DRIP FIELD</u> GPD/SQ. FT.
<5	Group I	0.45
5	Sand, Loamy Sand	0.45
10		0.45
15		0.45
20		0.45
25	Group II	0.40
30	Sandy Loam, Loam	0.40
35		0.40
40		0.40
45		0.40
50		0.40
55	Group III	0.30
60	Sandy Clay Loam, Silt Loam, Clay Loam, Silty Clay Loam	0.30
65		0.20
70		0.20
75		0.10
80		0.10
85		0.10
90		0.10
95		0.10
100	Group IV	0.075
105	Sandy Clay, Silty Clay, Clay	0.05
110		0.05
115		0.05
120		0.05
>120		0.05
>120		0.05

Design Notes:

Netafim Bioline Tubing is 0.61 gph on 24" Centers. Laterals lengths for all designs shall be no greater than 300 linear feet. Laterals will be laid on 24" centers along contour lines and buried between 8" and 10".

Residential design: All residential designs shall use a 20 gpm, high head 4" turbine pump such as the Schaefer Pump 20LE05P4-2W115. Irrigated zones shall be limited to 3,000 square feet with 1,500 linear feet of tubing. Recommended piping will be limited to 1-1/4" force mains and 1" return mains. Mainlines should be no longer than 150 feet with a maximum elevation difference of 10 feet between the water level and highest zone.

Commercial: Commercial designs are custom and designed for the particular circumstances. It is recommended that all designs be developed around the 20 gpm pump with the dual pump operations for flushing. This will allow the designer to specify larger zones.

Client: Mr. John Q Public

Date: 11/5/2010

Location: Sweet Home Alabama

Netafim Bioline: 17mm .6gph 24in spacing @ 2fps Flush

Maximum Recommended Bioline Lateral Length: 300

1. Soil Texture or Perc Time: 0

2. Soil Structure Shape: 0

3. Soil Structure Grade: 0.05 gal/day/ft^2

4. Infiltration Loading Rate(ILR): 0 %

5. Slope: 0 in.

6. Infiltration Depth: 2 gal/day/ft

7. Hydraulic Linear Loading Rate: 160 ft

8. Maximum Contour Length (MCL): 300.00

9. Daily Flow 2.00 X 150.00 = 300.00 GPD

10. No. of Bedrooms 300.00 / 0.05 = 6000.00 sqft

11. Dosing Area 300.00 / 2.00 = 150.00 ft

11a. Dosing A. Width 6000.00 / 150.00 = 40.00 ft

12. Dosing Design Width & Length Adjustment 40.00 ft Adjusted Dosing Length 150.00 ft

13. Required Zones 150.00 / 160.00 = 0.94 = 2 Design Zones

14. Zone Breakout Table

15. Zone 1 3000.0 1500.0 300.0 7.6 5.0 8.0 15.6 51.5 1 1/4 150.0 5.0 150.0 5.5 10.0 72.0

16. Zone 2 3000.0 1500.0 300.0 7.6 5.0 8.0 15.6 51.5 1 1/4 150.0 5.0 150.0 5.5 10.0 72.0

17. Zone 3 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0 0.0 0.0 0.0 0.0 0.0 0.0 0.1

18. Zone 4 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0 0.0 0.0 0.0 0.0 0.0 0.0 0.1

19. Zone 5 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0 0.0 0.0 0.0 0.0 0.0 0.0 0.1

20. Zone 6 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 0 0.0 0.0 0.0 0.0 0.0 0.0 0.1

21. Notes: Areas in light blue are for states requiring hydraulic linear loading as part of the analysis. Zones are limited by a maximum of 1,500 linear feet of tubing. Design Zones are dictated by Dosing Length or Maximum tubing per zone.

22. Friction loss calculations made using Hazen-Williams Equation

23. Max Required Total Flow: 15.6 (Largest RTF Based on 14g.)

24. Max Total Field Head Loss: 72.0 (Largest TFHL Based on 14p.)

25. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

26. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

27. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

28. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

29. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

30. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

31. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

32. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

33. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

34. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

35. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

36. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

37. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

38. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

39. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

40. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

41. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

42. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

43. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

44. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

45. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

46. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

47. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

48. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

49. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

50. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

51. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

52. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

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54. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

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62. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

63. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

64. Dosing A. Length MCL+ 160.00 = 0.94 = 2 Design Zones

Table 2

	Single Headworks	Dual Headworks	
gpd/sf	3 Bedrooms 450 GPD	4 Bedrooms 600 GPD	5 Bedrooms 750 GPD
0.450	1000 SQ FT Area 500 LFT of Tube, 1 Zone	1333 SQ FT Area 667 LFT of Tube, 1 Zone	1667 SQ FT Area 833 LFT of Tube, 1 Zone
0.400	1125 SQ FT Area 563 LFT of Tube, 1 Zone	1500 SQ FT Area 750 LFT of Tube, 1 Zone	1875 SQ FT Area 938 LFT of Tube, 1 Zone
0.300	1500 SQ FT Area 750 LFT of Tube, 1 Zone	2000 SQ FT Area 1000 LFT of Tube, 1 Zone	2500 SQ FT Area 1250 LFT of Tube, 1 Zone
0.200	2250 SQ FT Area 1125 LFT of Tube, 1 Zone	3000 SQ FT Area 1500 LFT of Tube, 1 Zone	3750 SQ FT Area 1875 LFT of Tube, 2 Zone
0.100	4500 SQ FT Area 2250 LFT of Tube, 2 Zone	6000 SQ FT Area 3000 LFT of Tube, 2 Zone	7500 SQ FT Area 3750 LFT of Tube, 3 Zone
0.075	6000 SQ FT Area 3000 LFT of Tube, 2 Zone	8000 SQ FT Area 4000 LFT of Tube, 3 Zone	10000 SQ FT Area 5000 LFT of Tube, 4 Zone
0.050	9000 SQ FT Area 4500 LFT of Tube, 3 Zone	12000 SQ FT Area 6000 LFT of Tube, 4 Zone	15000 SQ FT Area 7500 LFT of Tube, 5 Zone

Maximum # Distal End/Zone = 5, Maximum of 1500 LFT/Zone
 Simplex 20GPM Schaefer Pump, Model #: 20LE05P4-2W115
 1-1/4" Supply Manifold and Main, 1" Return Manifold and Main

Table 3

	200 Auto Filter Flush Commercial Headworks
gpd/sf	1500 GPD
0.450	3334 SQ FT Area 1667 LFT of Tube, 1 Zone
0.400	3750 SQ FT Area 1875 LFT of Tube, 1 Zone
0.300	5000 SQ FT Area 2500 LFT of Tube, 1 Zone
0.200	7500 SQ FT Area 3750 LFT of Tube, 2 Zone
0.100	15000 SQ FT Area 7500 LFT of Tube, 3 Zone
0.075	20000 SQ FT Area 10000 LFT of Tube, 4 Zone
0.050	30000 SQ FT Area 15000 LFT of Tube, 5 Zone

Maximum # Distal End/Zone = 10, Maximum of 3000 LFT/Zone
 Duplex 20GPM Schaefer Pump, #: 20LE05P4-2W115, Single Pump Dose – Dual Pump
 Flush
 2" Supply Manifold and Main, 1-1/4" Return Manifold and Main

Single SF Filter Packages

Single Filter Headworks, Single Zone Kit	
Qty	Description
1	SF-1 Filter Unit
1	Controller w/Floats
1	20GPM Schaefer Pump 20LE05P4-2W115
1	Residential Top Down Manifold Kit
1	Simplex Pump Connection Kit
	Add Drip Tube as required in Table 2

Single Filter Headworks, Dual Zone Kit	
Qty	Description
1	SF-1 Filter Unit
1	Controller w/Floats
1	20GPM Schaefer Pump 20LE05P4-2W115
2	Top Down Manifold Kit
1	Simplex Pump Connection Kit
1	4402 K-Rain Multiplex Valve
	Add Drip Tube as required in Table 2

Single Filter Headworks, Three Zone Kit	
Qty	Description
1	SF-1 Filter Unit
1	Controller w/Floats
1	20GPM Schaefer Pump 20LE05P4-2W115
3	Top Down Manifold Kit
1	Simplex Pump Connection Kit
1	4403 K-Rain Multiplex Valve
	Add Drip Tube as required in Table 2

Dual SF Filter Packages

Dual Filter Headworks, Single Zone Kit	
Qty	Description
1	SF-2 Filter Unit
1	Controller w/Floats
1	20GPM Schaefer Pump 20LE05P4-2W115
1	Top Down Manifold Kit
1	Simplex Pump Connection Kit
	Add Drip Tube as required in Table 2

Dual Filter Headworks, Dual Zone Kit	
Qty	Description
1	SF-2 Filter Unit
1	Controller w/Floats
1	20GPM Schaefer Pump 20LE05P4-2W115
2	Top Down Manifold Kit
1	Simplex Pump Connection Kit
1	4402 K-Rain Multiplex Valve
	Add Drip Tube as required in Table 2

Dual Filter Headworks, Three Zone Kit	
Qty	Description
1	SF-2 Filter Unit
1	Controller w/Floats
1	20GPM Schaefer Pump 20LE05P4-2W115
3	Top Down Manifold Kit
1	Simplex Pump Connection Kit
1	4403 K-Rain Multiplex Valve
	Add Drip Tube as required in Table 2

Dual Filter Headworks, Four Zone Kit	
Qty	Description
1	SF-2 Filter Unit
1	Controller w/Floats
1	20GPM Schaefer Pump 20LE05P4-2W115
4	Top Down Manifold Kit
1	Simplex Pump Connection Kit
1	4404 K-Rain Multiplex Valve
	Add Drip Tube as required in Table 2

Dual Filter Headworks, Five Zone Kit	
Qty	Description
1	SF-2 Filter Unit
1	Controller w/Floats
1	20GPM Schaefer Pump 20LE05P4-2W115
3	Top Down Manifold Kit
1	Simplex Pump Connection Kit
1	4605 K-Rain Multiplex Valve
	Add Drip Tube as required in Table 2

Commercial AF Filter Packages

Commercial Filter Headworks, Single Zone Kit	
Qty	Description
1	AF-2 Filter Unit
1	Controller w/Floats
2	20GPM Schaefer Pump 20LE05P4-2W115
1	Commercial Top Down Manifold Kit
1	Simplex Pump Connection Kit
	Add Drip Tube as required in Table 3

Commercial Filter Headworks, Two Zone Kit	
Qty	Description
1	AF-2 Filter Unit
1	Controller w/Floats
2	20GPM Schaefer Pump 20LE05P4-2W115
2	Commercial Top Down Manifold Kit
1	Duplex Pump Connection Kit
2	1" Dorot Field Zone Valve
	Add Drip Tube as required in Table 3

Commercial Filter Headworks, Three Zone Kit	
Qty	Description
1	AF-2 Filter Unit
1	Controller w/Floats
2	20GPM Schaefer Pump 20LE05P4-2W115
3	Commercial Top Down Manifold Kit
1	Duplex Pump Connection Kit
3	1" Dorot Field Zone Valve
	Add Drip Tube as required in Table 3

Commercial Filter Headworks, Four Zone Kit	
Qty	Description
1	AF-2 Filter Unit
1	Controller w/Floats
2	20GPM Schaefer Pump 20LE05P4-2W115
4	Commercial Top Down Manifold Kit
1	Duplex Pump Connection Kit
4	1" Dorot Field Zone Valve
	Add Drip Tube as required in Table 3

Commercial Filter Headworks, Five Zone Kit	
Qty	Description
1	AF-2 Filter Unit
1	Controller w/Floats
2	20GPM Schaefer Pump 20LE05P4-2W115
3	Commercial Top Down Manifold Kit
1	Duplex Pump Connection Kit
5	1" Dorot Field Zone Valve
	Add Drip Tube as required in Table 3

Kit Components

Residential Top Down Manifold Kit	
Qty	Description
2	10" Round Valve Box
3	1-1/4" x 3/4" Reducing Tee
1	1-1/4" x 1" Reducing Ell
4	3/4" x 1/2" Reducing Tee
6	3/4" x 1/2" Reducing Ell
2	3/4" Coupler
3	1" x 3/4" Reducing Tee
1	1" Ell
2	1" Female Adapter
2	1" A/V (VBKV-1) Air Vacuum Breaker
1	1" Swing Check Valve
10	36" x 1/2" IPS Flex Tubes
25	1/2" SOC / 3/4" SPIG x .55 Tube Power-loc

Commercial Top Down Manifold Kit	
Qty	Description
2	10" Round Valve Box
5	2" x 3/4" Reducing Tee
1	2" Ell
10	3/4" x 1/2" Reducing Tee
10	3/4" x 1/2" Reducing Ell
5	1-1/4" x 3/4" Reducing Tee
1	1-1/4" x 1" Reducing Ell
1	2" Male Adapter
1	1" Female Adapter
2	1-1/4" Male Adapter
2	1" A/V Continuous Air Vacuum Breaker
1	2" A/V Continuous Air Vacuum Breaker
1	1-1/4" Swing Check Valve
20	36" x 1/2" IPS Flex Tubes
50	1/2" SOC / 3/4" SPIG x .55 Tube Power-loc

Simplex Pump Connection Kit	
Qty	Description
1	1-1/4" Male Adapter
1	1-1/4" Grey PVC Ball Valve
1	1-1/4" SHCD 40 Union

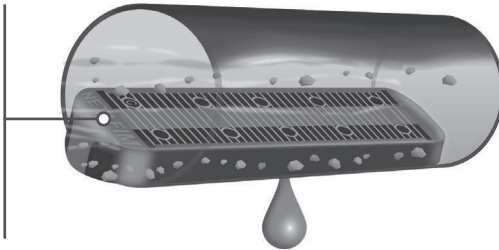
Duplex Pump Connection Kit	
Qty	Description
2	1-1/4" Male Adapter
2	1-1/4" Grey PVC Ball Valve
2	1-1/4" SHCD 40 Union

BIOLINE® DRIPPERLINE

THE WORLD'S MOST ADVANCED CONTINUOUS
SELF-CLEANING, PRESSURE COMPENSATING
DRIPPERLINE SPECIFICALLY DESIGNED FOR WASTEWATER

CROSS SECTION OF BIOLINE DRIPPERLINE

Bioline dripper inlets are positioned in the center of flow where water is the cleanest



PRODUCT ADVANTAGES

- Pressure compensation - all drippers deliver equal flow, even on sloped or rolling terrain.
- Unique flow path - Turbonet technology provides more control of water and a high resistance to clogging.
- Continuous self-flushing dripper design - flushes debris, as it is detected - throughout operation, not just at the beginning or end of a cycle. Ensures uninterrupted dripper operation.
- Single hole dripper outlet from tubing:
 - Better protection against root intrusion
 - Allows the dripperline to be used in subsurface applications without need for chemical protection
- Drippers capture water flow from the center of the tubing - ensures that only the cleanest flow enters the dripper.
- Built-in physical root barrier - drippers are protected from root intrusion without the need for chemical protection. Water exits dripper in one location while exiting the tubing in another.
- Three dripper flow rates - provides the broadest range of flow rates available. Allows the designer to match the dripperline to any soil or slope condition.
- Bioline tubing is completely wrapped in purple - easily identifying it for non-potable use, regardless of how the tubing is installed.
- Anti-bacterial-impregnated drippers - prevents buildup of microbial slime.
- Can be used subsurface - Bioline can be installed on-surface, under cover or subsurface.
- No special storage requirements - does not degrade if stored outdoors.
- Techfilter compatible - an optional level of protection, provides a limited lifetime warranty against root intrusion.

APPLICATIONS

- Typically installed following a treatment process
- Can be used with domestic septic tank effluent with proper design, filtration and operation
- Reuse applications including municipally treated effluent designated for irrigation and other disinfected and non-disinfected water sources.

SPECIFICATIONS

- Dripper flow rates: 0.4, 0.6 or 0.9 GPH
- Dripper spacings: 12", 18" or 24" dripper spacings and blank tubing
- Pressure compensation range: 7 to 70 psi (stainless steel clamps recommended above 50 psi)
- Maximum recommended system pressure: 50 psi
- Tubing diameter: 0.66" OD, 0.57" ID
- Tubing color: Purple color indicates non-potable
- Coil lengths: 500' or 1,000' (Blank tubing in 250')
- Recommended filtration: 120 mesh
- Bending radius: 7"
- UV resistant
- Tubing material: Linear low-density polyethylene

Additional spacing and pipe sizes available by special order. Please contact Netafim USA Customer Service for details.

BIOLINE DRIPPERLINE

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 3.0 fps FLUSH VELOCITY ADDITIONAL FLOW OF 2.3 GPM REQUIRED PER LATERAL TO ACHIEVE 3 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	102	94	84	136	127	113	161	151	137
	25	151	136	118	203	184	161	245	223	197
	35	193	171	146	260	232	200	315	283	245
	40	211	186	158	286	254	218	347	311	267
	45	228	200	169	310	274	233	377	335	287
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 3 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 2.5 fps FLUSH VELOCITY ADDITIONAL FLOW OF 2.0 GPM REQUIRED PER LATERAL TO ACHIEVE 2.5 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	128	115	100	172	155	136	205	187	165
	25	183	161	137	248	220	188	301	268	231
	35	228	198	166	310	272	229	379	333	283
	40	248	214	178	338	295	247	413	362	305
	45	266	229	190	364	316	263	447	389	327
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 2.5 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 2.0 fps FLUSH VELOCITY ADDITIONAL FLOW OF 1.6 GPM REQUIRED PER LATERAL TO ACHIEVE 2.0 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	161	141	119	217	191	164	263	233	201
	25	221	190	157	302	261	218	369	321	270
	35	269	229	187	370	316	260	455	391	324
	40	290	246	200	399	340	278	493	421	347
	45	310	261	212	427	362	296	527	449	369
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 2 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 1.5 fps FLUSH VELOCITY ADDITIONAL FLOW OF 1.2 GPM REQUIRED PER LATERAL TO ACHIEVE 1.5 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	201	171	140	275	235	194	337	289	241
	25	266	222	179	366	308	251	453	383	313
	35	316	262	210	437	365	295	543	455	369
	40	337	280	223	469	391	313	583	487	393
	45	358	296	235	497	413	331	619	517	415
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 1.5 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 1.0 fps FLUSH VELOCITY ADDITIONAL FLOW OF 0.8 GPM REQUIRED PER LATERAL TO ACHIEVE 1.0 fps

DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	248	205	163	344	285	228	427	355	285
	25	315	258	203	440	361	286	549	453	359
	35	367	299	234	513	419	331	643	527	417
	40	389	316	248	545	445	350	683	559	441
	45	409	332	260	574	468	367	721	589	463
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 1 fps flushing/scouring velocity

MAXIMUM LENGTH OF A SINGLE LATERAL WITH 0.5 fps FLUSH VELOCITY ADDITIONAL FLOW OF 0.4 GPM REQUIRED PER LATERAL TO ACHIEVE 0.5 fps

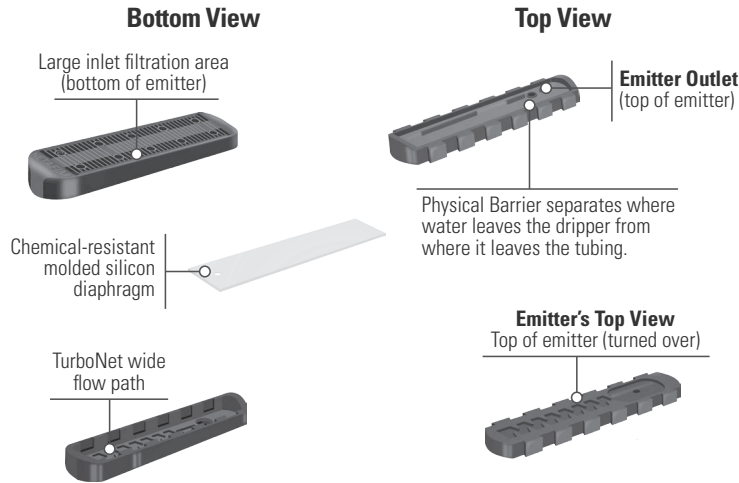
DRIPPER SPACING		12"			18"			24"		
DRIPPER FLOW RATE (GPH)		0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH	0.4 GPH	0.6 GPH	0.9 GPH
INLET PRESSURE	15	301	242	188	422	341	265	531	429	335
	25	369	296	228	520	418	323	655	527	409
	35	421	337	260	595	476	368	749	603	467
	40	443	354	273	626	501	387	790	635	491
	45	464	371	285	656	524	404	829	665	513
Flow per 100' (GPM / GPH)		0.67/40	1.02/61	1.53/92	0.44/26.67	0.68/41	1.02/61	0.34/20	0.51/31	0.77/46

Lateral lengths are based on flows allowing for a 0.5 fps flushing/scouring velocity

Netafim recommends flushing velocities capable of breaking free any accumulated bioslimes and debris in the piping network.

- Notes:
1. Refer to local regulations for information on flushing velocities that may be written into codes.
 2. Netafim does not endorse a specific flushing velocity.
 3. Flushing velocities should be determined based on regulations, quality of effluent, and type of flushing control.
 4. Using a flushing velocity less than 1 fps does not provide turbulent flow as defined by Reynolds Number.
 5. Higher flushing velocities provide more aggressive flushing.

EXPLODED VIEW OF BIOLINE EMITTER



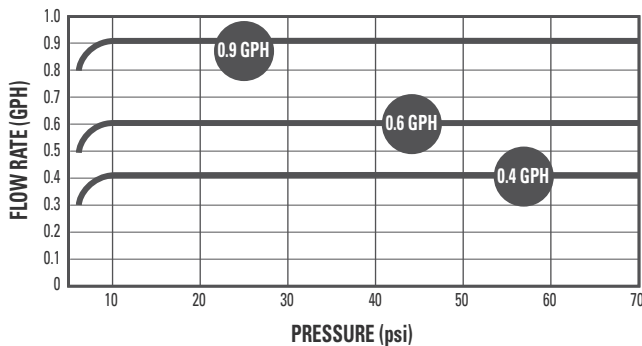
BIOLINE EMITTER OPERATION

Bioline® dripperline emitters are pressure compensating - delivering the water uniformly into the soil for further treatment or for reuse by the landscape. These unique emitters allow the tubing to be installed on flat topography or steep slopes.

Bioline emitters are protected against microbial slime. Each emitter is impregnated with an antimicrobial agent to resist biological build-up.

Netafim emitters are continuously self-cleaning during operation, not just at the beginning and end of a cycle. The result is dependable, clog-free operation, year after year.

DRIPPER FLOW RATE VS. PRESSURE



Between 0 and 7 psi, the dripper functions as a turbulent flow emitter, ensuring that the nominal design flow is not exceeded at system start-up.

FLOW PER 100 FEET

DRIPPER SPACING	0.4 GPH DRIPPER		0.6 GPH DRIPPER		0.9 GPH DRIPPER	
	GPH	GPM	GPH	GPM	GPH	GPM
12"	40.0	0.67	61.0	1.02	92.0	1.53
18"	26.7	0.44	41.0	0.68	61.0	1.02
24"	20.0	0.34	31.0	0.51	46.0	0.77

SPECIFYING INFORMATION

SAMPLE MODEL NUMBER

A Bioline Dripperline = **08WRAM**

1 **DRIPPER FLOW RATE**
0.4 GPH = .4
0.6 GPH = .6
0.9 GPH = .9

2 **DRIPPER SPACING**
12" = 12
18" = 18
24" = 24

3 **COIL LENGTH**
500' = V500
1,000' = V

08WRAM.6-24 V

BLANK Tubing Model Number: 250' = 08WRAM-250

ORDERING INFORMATION

FLOW RATE	DRIPPER SPACING	COIL LENGTH	MODEL NUMBER
0.4 GPH	12"	1,000' 500'	08WRAM.4-12V 08WRAM.4-12V500
0.4 GPH	18"	1,000' 500'	08WRAM.4-18V 08WRAM.4-18V500
0.4 GPH	24"	1,000' 500'	08WRAM.4-24V 08WRAM.4-24V500
0.6 GPH	12"	1,000' 500'	08WRAM.6-12V 08WRAM.6-12V500
0.6 GPH	18"	1,000' 500'	08WRAM.6-18V 08WRAM.6-18V500
0.6 GPH	24"	1,000' 500'	08WRAM.6-24V 08WRAM.6-24V500
0.9 GPH	12"	1,000' 500'	08WRAM.9-12V 08WRAM.9-12V500
0.9 GPH	18"	1,000' 500'	08WRAM.9-18V 08WRAM.9-18V500
0.9 GPH	24"	1,000' 500'	08WRAM.9-24V 08WRAM.9-24V500
Blank Tubing 17mm		250'	08WRAM-250



High Head Filtered Effluent Pump

Features:

- Ideal for filtered effluent pumping applications.
- Stainless steel or thermoplastic discharge and motor bracket are tough and non-corrosive. Both materials are highly resistant to damage by minerals, metals and other substances typically found in water.
- Heavy duty, 300 V, 10' SJOOW motor leads.
- Ceramic bearing sleeve has time proven durability for years of reliable service.
- Hex rubber bearing has extra large surface assuring shaft stability and multiple flow channels keeping particles away from bearing surfaces.
- Proven Noryl® staging allows close tolerances and increased performance.
- Carbon phenolic up thrust washer prevents excessive wear in severe applications.
- Removable built in check valve on 10-20 gpm pumps. No built in check valves on high capacity pumps.
- Powered by Franklin Electric super stainless submersible motor.

Noryl® is a registered trademark of G.E.

Applications:

- Filtered effluent service.
- Aeration.
- Ornamental fountains/waterfalls.

Submersible Pumps



Thermoplastic Ordering Information

(See pages 2-3 for model number information)

E-Series

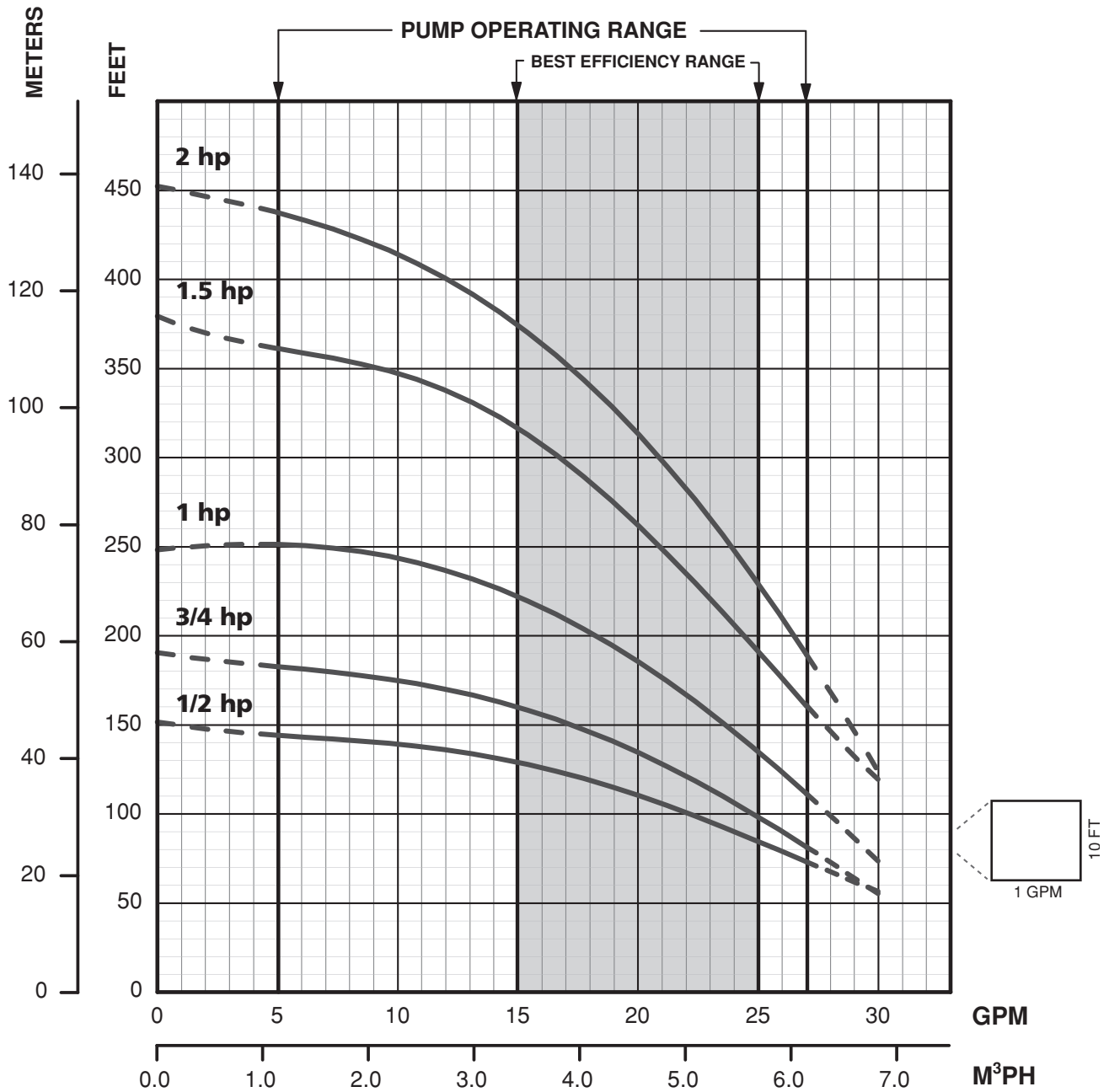
1/2 - 1.5 HP SINGLE-PHASE UNITS						
GPM	HP	VOLT	WIRE	ORDER NO.	MODEL	WT.
10	1/2	115	2	94701005	10LE05P4-2W115	24
	1/2	230	2	94701010	10LE05P4-2W230	24
	3/4	230	2	94701015	10LE07P4-2W230	28
	1	230	2	94701020	10LE1P4-2W230	31
	1.5	230	2	94701025	10LE15P4-2W230	46
20	1/2	115	2	94702005	20LE05P4-2W115	25
	1/2	230	2	94702010	20LE05P4-2W230	25
	3/4	230	2	94702015	20LE07P4-2W230	28
	1	230	2	94702020	20LE1P4-2W230	31
	1.5	230	2	94702025	20LE15P4-2W230	40
1/2 - 2 HP PUMP ENDS						
GPM	HP	VOLT	WIRE	ORDER NO.	MODEL	WT.
10	1/2	N/A	2	94711005	10LE05P4-PE	6
	3/4	N/A	N/A	94711010	10LE07P4-PE	7
	1	N/A	N/A	94711015	10LE1P4-PE	8
	1.5	N/A	N/A	94711020	10LE15P4-PE	12
20	1/2	N/A	N/A	94712005	20LE05P4-PE	6
	3/4	N/A	N/A	94712010	20LE07P4-PE	7
	1	N/A	N/A	94712015	20LE1P4-PE	8
	1.5	N/A	N/A	94712020	20LE15P4-PE	10
	2	N/A	N/A	94712025	20LE2P4-PE	11

Notes: Discharge is 1-1/4" NPT. Maximum diameter across cable guard is 3.90" on all models. Weight in pounds.

Submersible Pumps

E. J. Scharf

E-Series Thermoplastic 20 gpm Performance Curves



Submersible Pumps

E. J. Schaefer

Capacities in U.S. Gallons per Minute

E-Series Thermoplastic 20 gpm Performance

HP	PSI	DEPTH TO PUMPING WATER LEVEL, OR LIFT, IN FEET.																
		20	40	60	80	100	120	140	160	180	200	250	300	350	400	450	500	550
1/2	0				26	22	18	9										
	20		24	21	16													
	30	24	21	15														
	40	20	13															
	50	12																
	60																	
	70																	
	80																	
Shut-off PSI		57	48	40	31	22	14	5										
3/4	0				27	25	22	19	15	7								
	20		26	24	21	18	13											
	30	26	24	21	18	12												
	40	23	20	17	11													
	50	20	16	9														
	60	15	8															
	70	6																
	80																	
Shut-off PSI		74	65	57	48	39	31	22	13	5								
1	0						26	25	23	20	18	6						
	20			27	26	24	22	20	18	15	8							
	30		27	26	24	22	19	17	14	7								
	40	27	25	23	21	19	17	13										
	50	25	23	21	19	16	12											
	60	23	21	18	16	11												
	70	20	18	15	10													
	80	18	15	9														
Shut-off PSI		100	91	83	74	65	57	48	40	31	22	1						
1.5	0							27	26	24	21	17	9					
	20						27	25	24	23	21	17	10					
	30					26	25	24	22	21	20	15						
	40				26	25	23	22	21	19	18	11						
	50		27	26	25	23	22	21	19	17	15							
	60	27	26	24	23	22	20	19	17	15	11							
	70	26	24	23	21	20	19	17	14	11	5							
	80	24	23	21	20	18	16	14	10									
Shut-off PSI		156	147	138	130	121	112	104	95	86	78	56	34	13				
2	0								27	27	24	21	17	12				
	20							27	26	25	24	21	18	13				
	30						27	26	25	24	23	19	16	9				
	40					27	26	25	24	23	21	18	13					
	50				27	26	25	24	22	21	20	16	10					
	60		27	27	26	25	23	22	21	19	18	14	5					
	70	27	27	26	24	23	22	21	19	18	16	10						
	80	26	25	24	23	22	20	19	18	16	14	6						
Shut-off PSI		187	178	170	161	153	144	135	127	118	109	88	66	44	23			

- Notes:** 1. Performance shown does not include friction loss in the drop pipe.
2. All performance data is based on rated motor nameplate voltage.

In order to provide a complete subsurface drip dispersal system, Netafim USA Wastewater Division recommends that the following minimum function/configurations/products be incorporated into every installation design. Care must be given to the proper selection and sizing of the components.

HEADWORKS BOX

The **Filter** is necessary to prevent introduction of suspended solids into the drip tubing which may cause plugging of the emitters or other components. Netafim USA recommends a robust disc-type filter, 120 to 140 mesh (130 or 100 microns respectively). The disc filter should be installed upstream of the water meter and downstream of the dosing tank.

At a minimum, the filter should allow for a continuous surface flush, but a full backwash where the discs are lifted and separated to allow complete cleaning of the discs is preferred. Filtered water should be used for the backflush operation. This can be accomplished by utilizing dual filters - one for dosing the other for filtering the flushing water.

Where a surface flush configuration is employed, the filter should be sufficiently large enough (1" and 1 1/2" Super) to operate satisfactorily between manual cleanings.

The filter(s) should be positioned in the box to allow for the disc cover and disc elements to be easily removed for servicing. Shrader valves should be placed on both the inlet and outlet of the filter to facilitate evaluation of the filter's operation. These Shrader valves are integral to the larger Netafim disc filters (1" and 1 1/2").



DISC FILTERS

Part Number	Size	Flow Range	Filtering Volume
25A45-XXX	3/4"	1 to 18 GPM	5.8 cu. in.
25A47-XXX	1"	5 to 26 GPM	26.8 cu. in.
25A48-XXX	1" Super	10 to 35 GPM	36.1 cu. in.
25A15-XXX	1 1/2"	10 to 35 GPM	26.8 cu. in.
25A17-XXX	1 1/2" Super	10 to 52 GPM	36.1 cu. in.

Air Release and Vacuum Valves can be mounted outside the headworks box and are required for releasing the air in the drip system upon start-up to provide for vacuum relief and proper draining at shut-down. A minimum of two valves are recommended per zone, located at the highest point of both the supply and flush manifolds. Valves that come equipped with integral Shrader Valves are highly recommended to facilitate field operation evaluation.

AIR VACUUM RELEASE VALVES

Part Number	Description
65ARIA075S	3/4" Guardian Air/Vacuum Vent with Shrader Valve
65ARIA100S	1" Guardian Air/Vacuum Vent with Shrader Valve
65ARIB1	1" Air/Vacuum Vent (Automatic + Kentoc Air Release)



The **Water Meter** measures the actual flow of effluent to the drip field. Netafim USA recommends an impeller-type sized for the maximum flow of the system (flushing volume) with a hermetically sealed register, 6 digit-totaling counter and output for electronic sensor (optional). The unit should also be sized to minimize head loss. The water meter should be placed after the filter.

WATER METERS

Part Number	Size	Maximum Flow
36MPO.75	3/4"	22 GPM
36M251T	1"	30 GPM
36M401.5T	1 1/2"	85 GPM

RECOMMENDED RESIDENTIAL HEADWORKS CONFIGURATION

HEADWORKS BOX

Zone Valves are required when multiple zones are used. These valves automate the zone selection and control the zone dosing selection. Special care must be given to the selection of these valves to ensure they are sufficiently robust to withstand the rigors of wastewater applications.

Manual Valves should be used to isolate components where there are no other means for isolation.

MANUAL AND AUTOMATIC VALVES

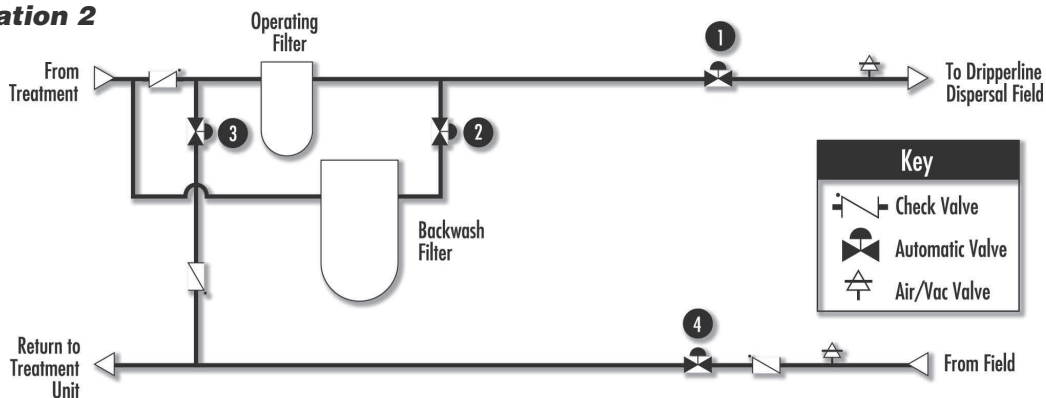
Part Number	Description
61EL1PL	1" Nylon Threaded Electric 24VAC
61M1.5PL	1 1/2" Nylon Threaded Manual
61EL1.5PL	1 1/2" Nylon Threaded Electric 24VAC
61M2PL	2" Nylon Threaded Manual
61EL2PL	2" Nylon Threaded Electric 24VAC
61M323PL	323 Nylon Threaded Manual
61EL323PL	323 Nylon Threaded Electric 24VAC
61M3PLT	3" Nylon Threaded Manual
61EL3PLT	3" Nylon Threaded Electric 24VAC

System Configurations below are the system schematics, which describe the headwork's discussed above.

Configuration 1



Configuration 2



VALVE POSITIONS (Configuration 2)

Valve Number	Dosing	Filter Backflush	Field Flush
1	Open	Closed	Open
2	Closed	Open	Closed
3	Closed	Open	Closed
4	Closed	Closed	Open

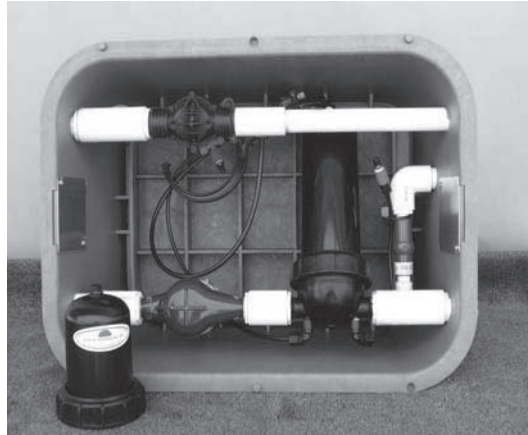


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 888.638.2346 • 559.453.6800
 FAX 800.695.4753
www.netafimusa.com



AquaKlear, Inc

Klearly The Smartest Choice



SF Filtration System for Wastewater Drip Dispersal

Product Advantages

- 3 dimensional filtration – not a screen
- Corrosion-free plastic filter and manifold
- Easy to install maintain and service
- Simple and reliable design
- Freeze protection available
- Uses proven **RING DISC FILTRATION TECHNOLOGY**.
- Filtration level easily changed by replacing disc rings with desired mesh size
- Use on single or multiple zones
- Minimal pressure loss vs. flow across filter
- Increased differential pressure does not affect level of filtration

Applications

- Ideally suited for Residential Subsurface Drip Irrigation or Spray

Water Sources

- Secondary treated wastewater

Specifications

Inlet: 1 1/4"

Outlet: 1 1/4"

Flush Return: 1" or 1 1/4"

Maximum Operating Pressure: 100 psi

Materials of Construction

Valves:

Nuts, bolts and washers: 304 Stainless Steel

Valve Body: Glass Reinforced Polyamide

Spring: Stainless Steel AISI 302

Diaphragm: Natural Rubber

Filter:

Modified 1" Super Manual Filter

Filter Body and Disc Spine: Reinforced Polyamide, PVC and Polycarbonate

Disc Rings: Polypropylene and Polyethylene (upon request)

O-Rings: EPDM Rubber

Options:

Automatic Field Flush

Field Flow Control

Pulsed Reed Switch output Flowmeter

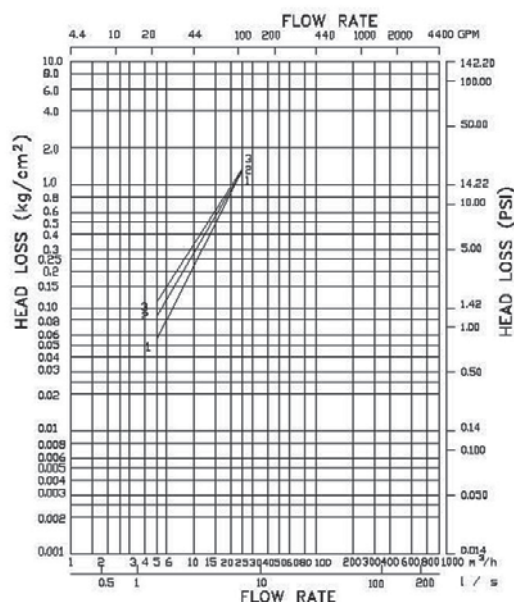
Manual or Automatic Field Flush

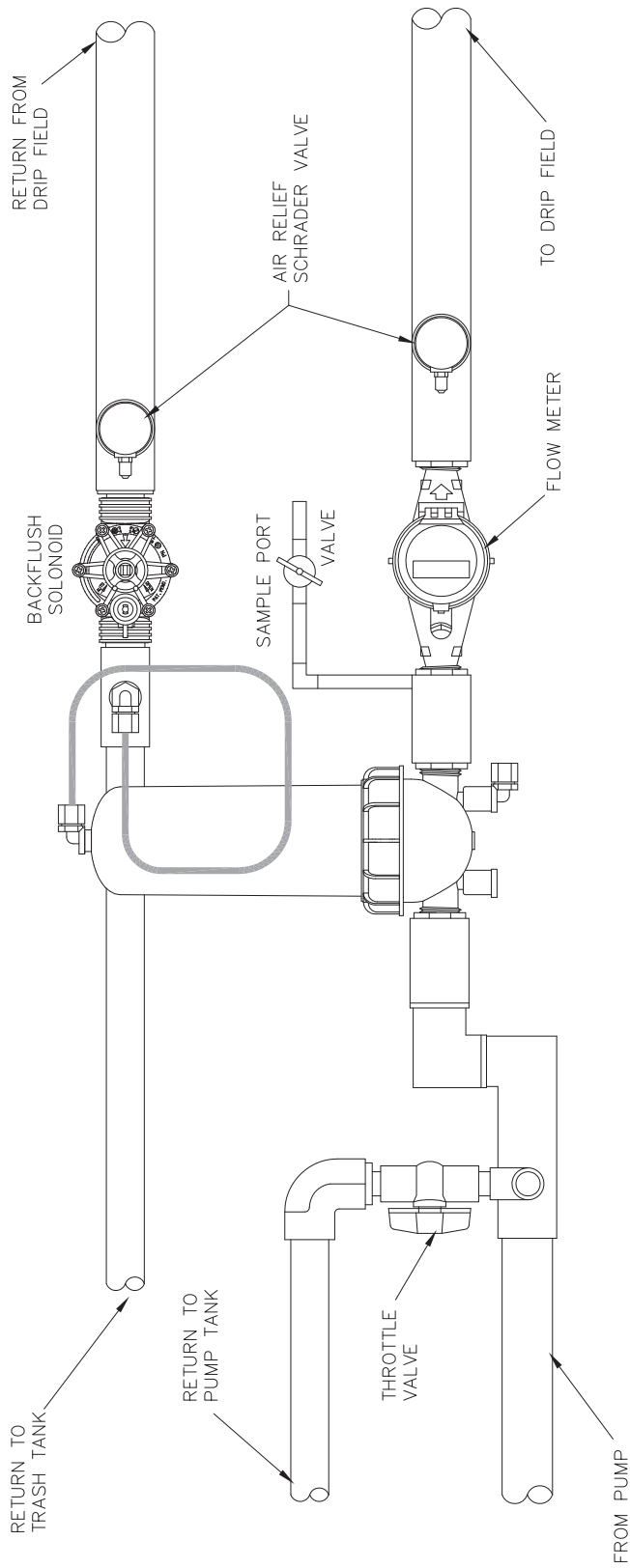
Multiple Enclosure Options

AquaKlear, Inc.
876 North Bierdman Road
Pearl, MS 39208
601.936.7711
601.936.7723 fax
info@aquaklear.com

HEAD LOSS

- | | |
|------------|-------------------------|
| 1 – BLUE | (400 MICRON / 40 MESH) |
| 2 – YELLOW | (200 MICRON / 80 MESH) |
| 3 – RED | (130 MICRON / 120 MESH) |
| 3 – BLACK | (100 MICRON / 140 MESH) |
| 4 – GREEN | (55 MICRON) |

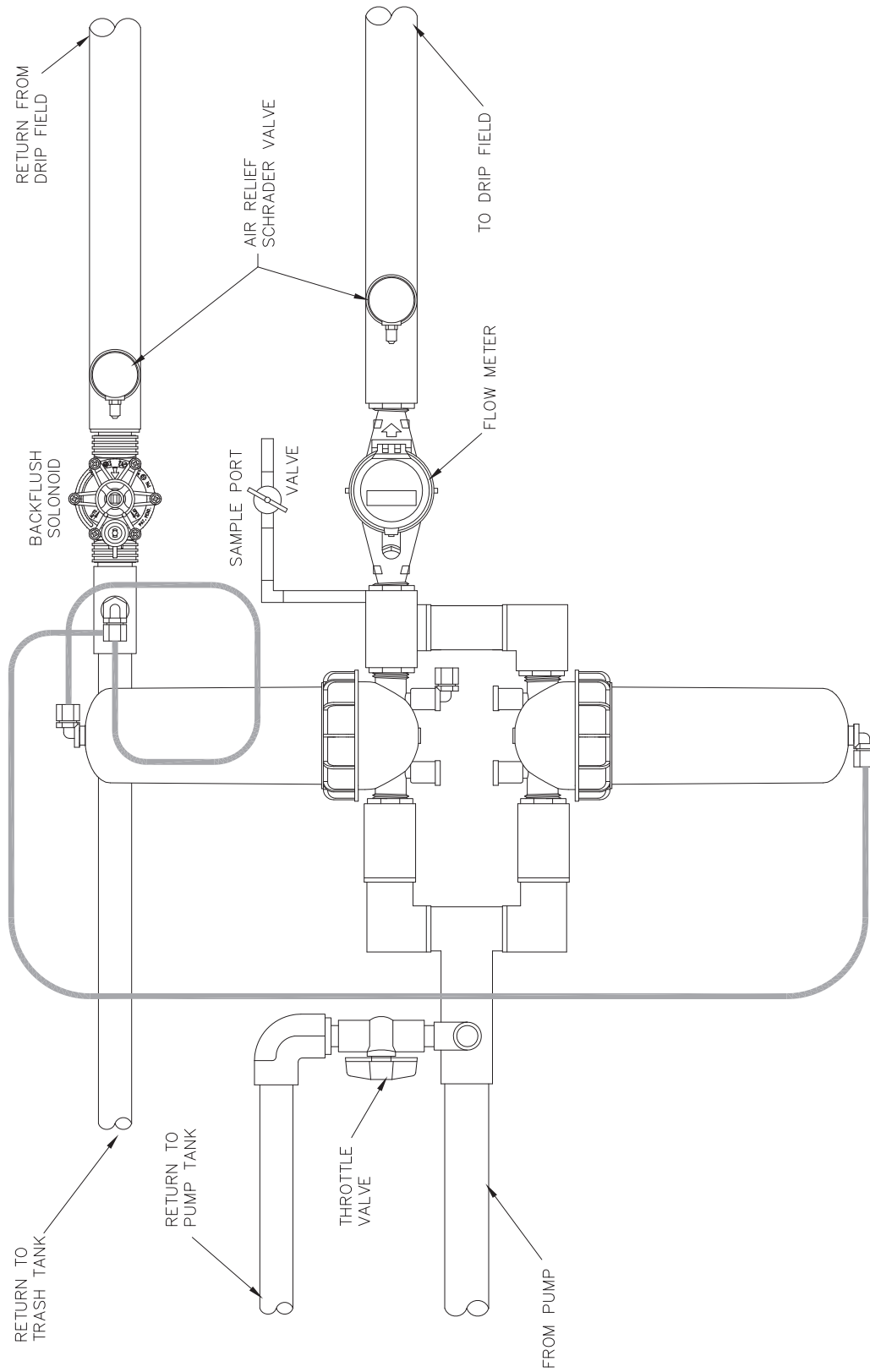




AQUAKLEAR

AKE Single Filter Drip Headworks Assembly

NOT TO SCALE



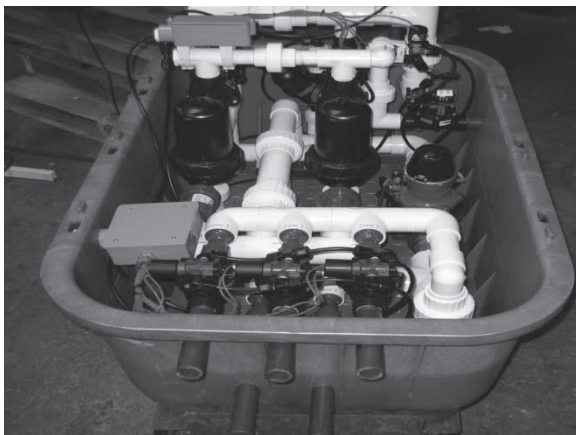
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AKE Dual Filter Drip Headworks Assembly

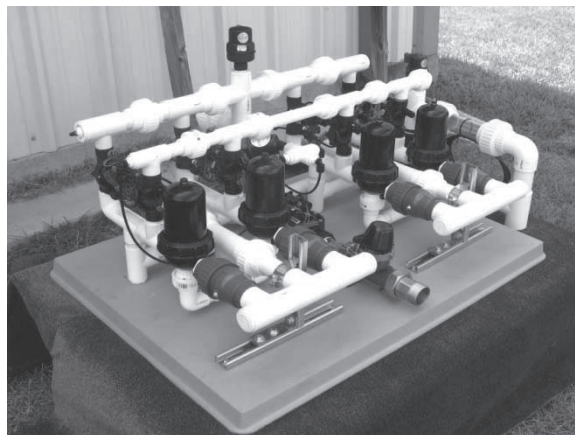
NOT TO SCALE

ACT WATER FILTRATION SYSTEMS™

Advanced Cleaning Technology



ACT C200S



ACT C400S

Product Advantages

- Self-cleaning filter for low flow applications (1 TO 60 GPM).
- Corrosion-free plastic filter, manifold, and stand.
- Uses proven **RING DISC FILTRATION TECHNOLOGY**.
- Filtration level easily changed by replacing disc rings with desired mesh size.
- Wrap around compact design ready for immediate hookup.
- Capable of using internal and external sources of back flush water.
- Requires low back flushing flow rates (12-15 gpm).

Applications

- Ideally suited for Residential, Light Industrial and Commercial Use
 - Wastewater treatment and reuse
 - Potable and process water treatment systems
 - HVAC
- Greenhouse and Nursery irrigation
 - Mister systems
 - Micro sprinklers and drippers
- Landscapes
 - Micro-irrigation in isolated landscaped settings
 - Subsurface drip irrigation of turf grass areas
 - Tree and shrub systems

Water Sources

- City water supplies
- Well water
- Surface water
- Primary and secondary treated domestic strength wastewater

Available Units

ACT C200, C300 and C400

Specifications

Inlet: 1 1/4" (ACT I), 1 1/2" (ACT II, III) and 2" (ACT IV)

Outlet: 1 1/4" (ACT I), 1 1/2" (ACT II, III) and 2" (ACT IV)

Flush Return: 1"

Maximum Operating Pressure: 100 psi

Minimum Pressure for Back flush: 40 psi

Minimum Flow for Back flush: 12 GPM

Materials of Construction

Valves:

Nuts, bolts and washers: 304 Stainless Steel

Valve Body: Glass Reinforced Polyamide

Spring: Stainless Steel AISI 302

Diaphragm: Natural Rubber

Solenoids: 24 VAC (other voltages available upon request)

Filter:

Modified 1" Standard and 1" Super Manual Filters

Filter Body and Disc Spine: Reinforced Polyamide, PVC and Polycarbonate

Disc Rings: Polypropylene and Polyethylene (upon request)

O-Rings: EPDM Rubber

ACT DISTRIBUTOR:

JNM TECHNOLOGIES, INC.

PO Box 5667

Bryan, TX 77805-5667

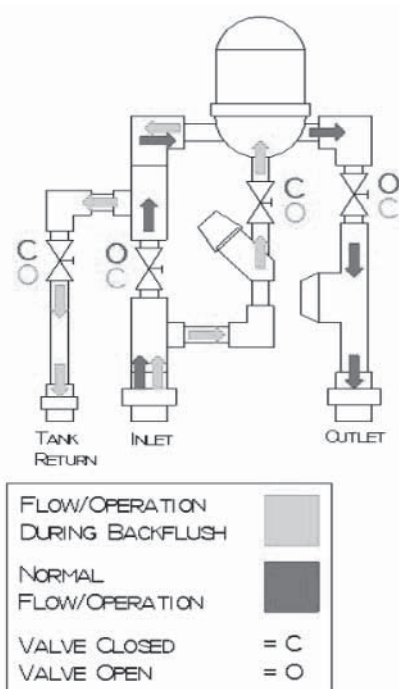
979-779-6500

979-779-6505 fax

jnmtexas@jnmtechnologies.com

Flow Diagram

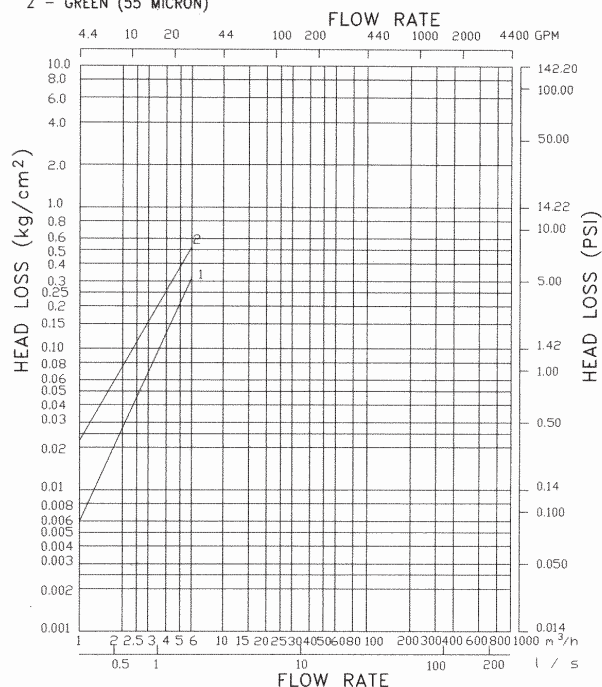
ACT 100



Filter Pressure Losses

1 - BLUE, YELLOW, RED (400-130 MICRON/ 40-120 MESH)

2 - GREEN (55 MICRON)

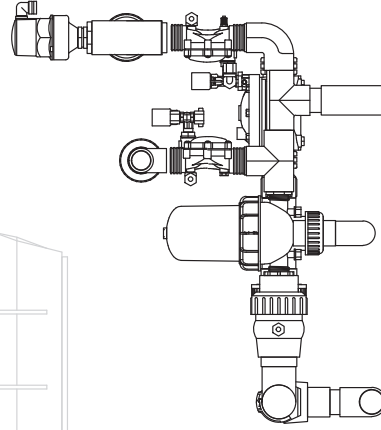
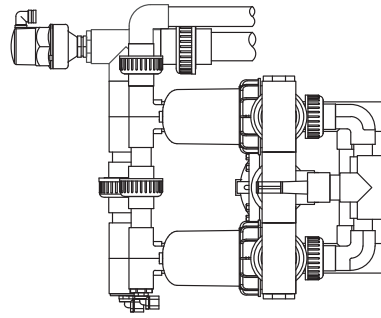
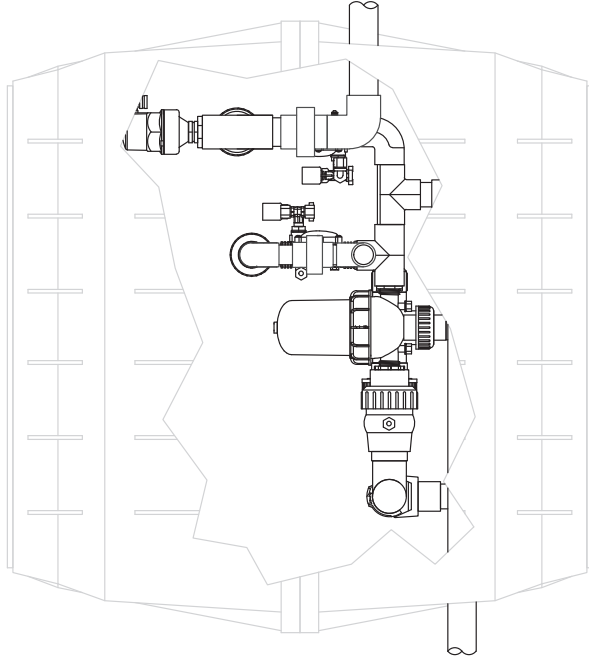


ACT-C200 SERIES HEADWORKS

FILTER DISCHARGE

FILTER INLET

FILTER FLUSH RETURN



CONNECTIONS

- 1) FILTER INLET 1-1/2" SCH 40
- 2) FILTER DISCHARGE 1" SCH 40
- 3) FILTER FLUSH RETURN 1" SCH 40

1 TYPICAL INSTALLATION DETAIL

SCALE: 1" = 12"

W
101
SHEET 1 OF 5

Connection Detail

NAME OF CLIENT
ADDRESS OF CLIENT
CITY, STATE ZIP CODE

REVISIONS

DATE ISSUED

CHECKED BY

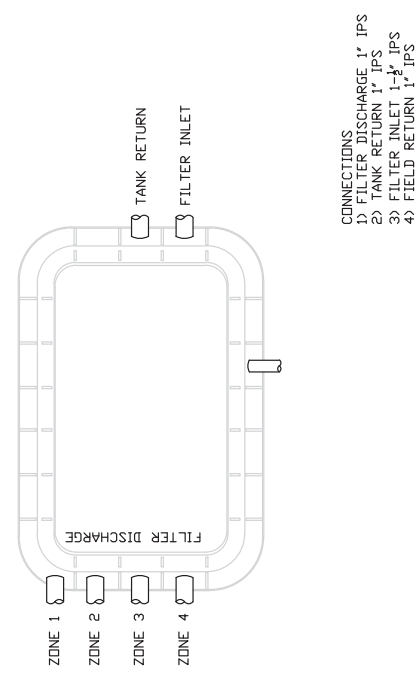
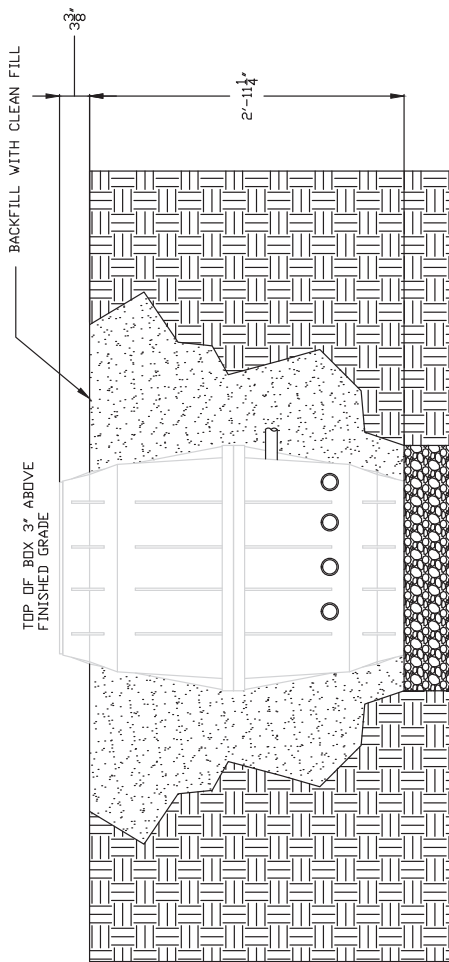
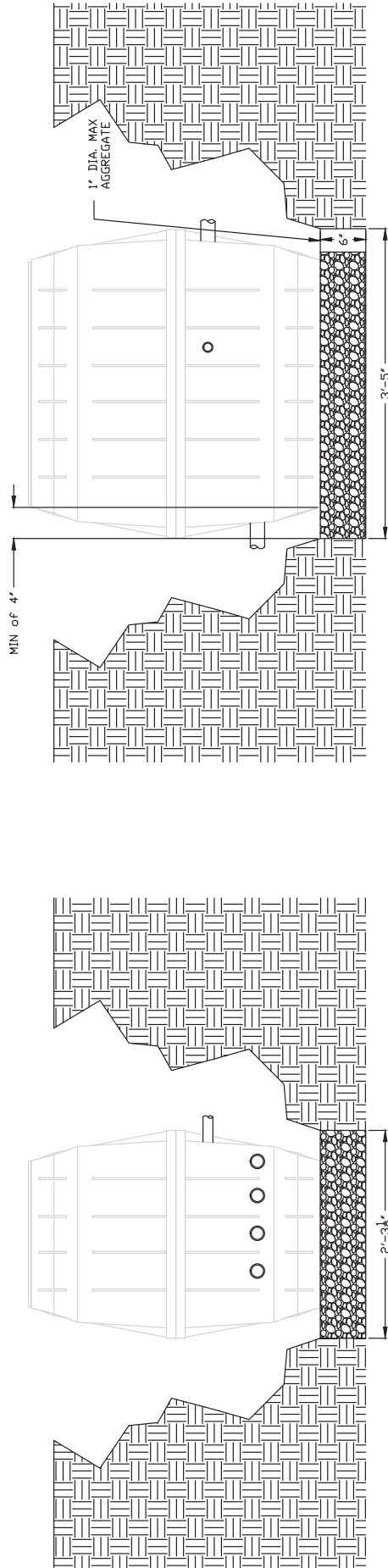
DRAWN BY

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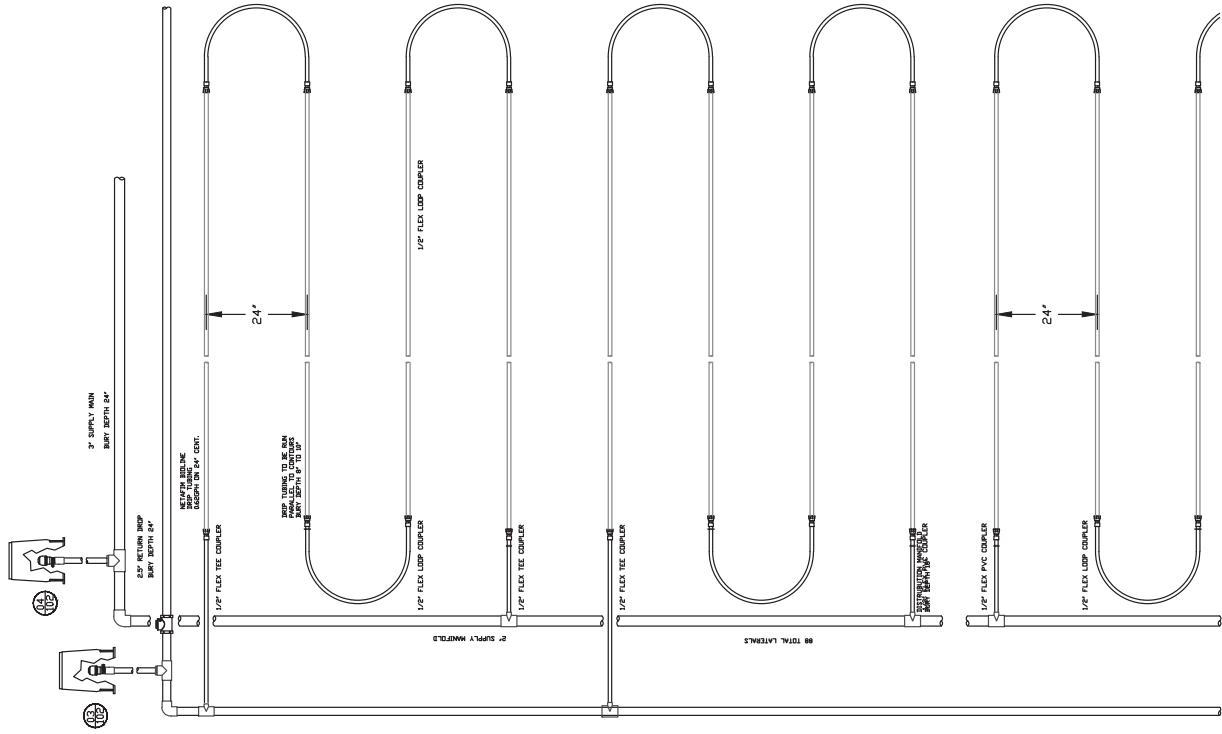
C200-S DRIP DISPERSAL HEADWORKS



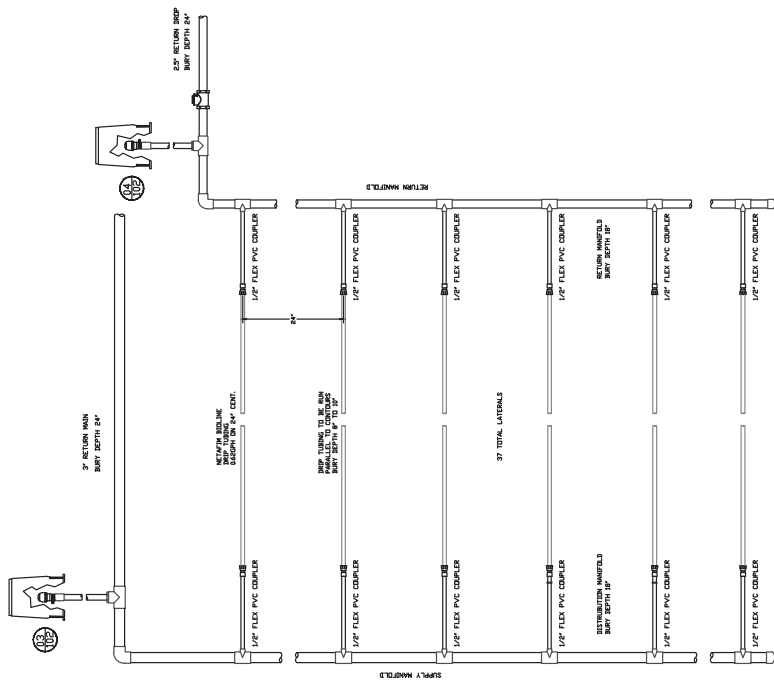
- CONNECTIONS
- 1) FILTER DISCHARGE 1" IPS
 - 2) TANK RETURN 1" IPS
 - 3) FILTER INLET 1-1/2" IPS
 - 4) FIELD RETURN 1" IPS

1 TYPICAL INSTALLATION DETAIL
SCALE: 3/4" = 12"

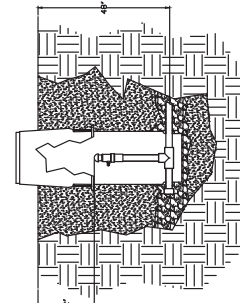
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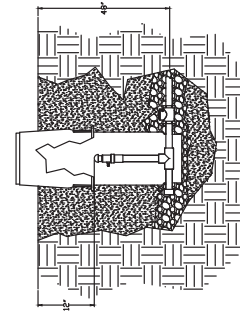
02 TYPICAL STANDARD MANIFOLD LOOPED
SCALE NONE



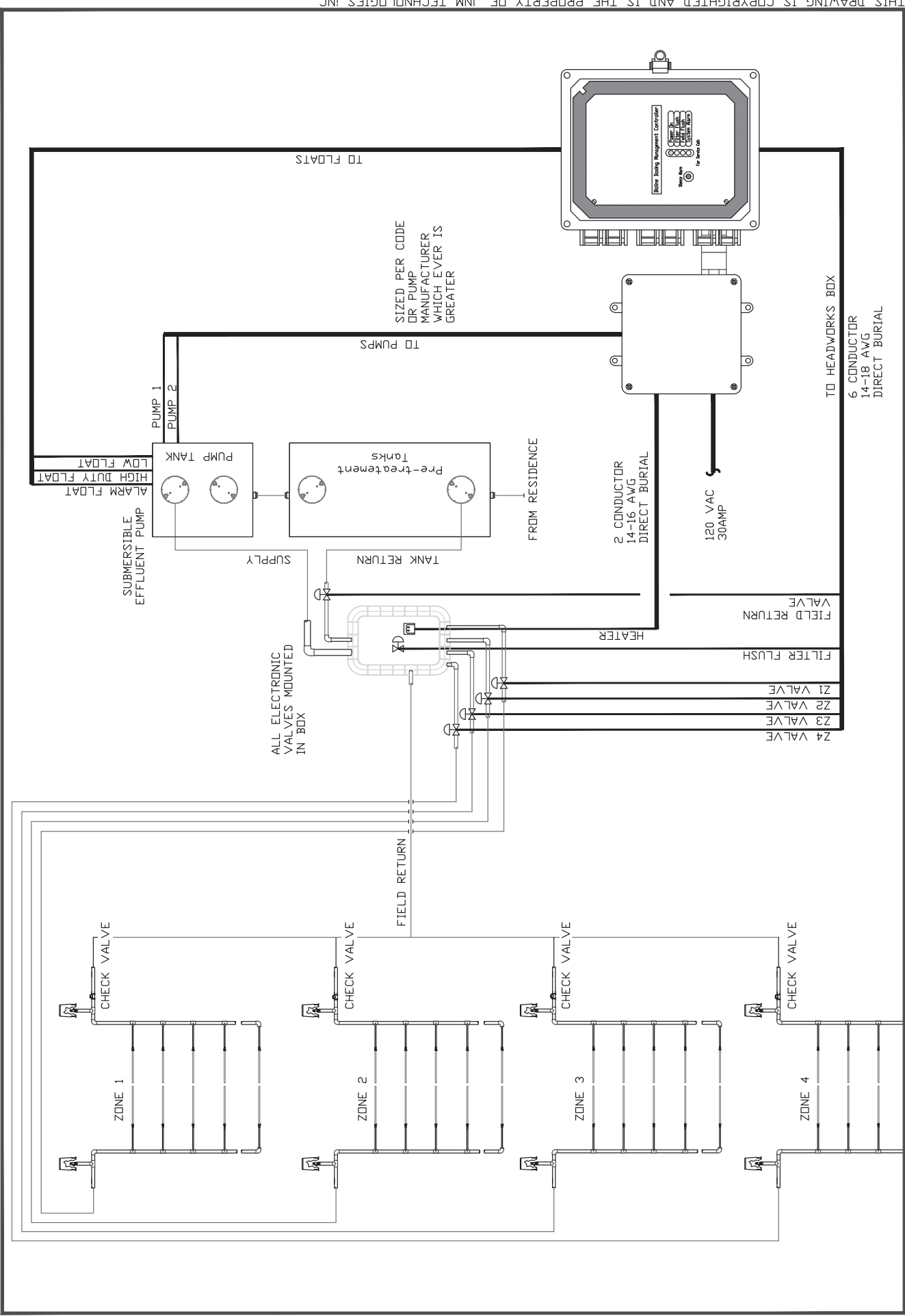
01 TYPICAL STANDARD MANIFOLD NON-LOOPED
SCALE NONE



03 TYPICAL INSTALLATION ON DISTRIBUTION MANIFOLD
SCALE NONE



04 TYPICAL INSTALLATION ON RETURN MANIFOLD
SCALE NONE



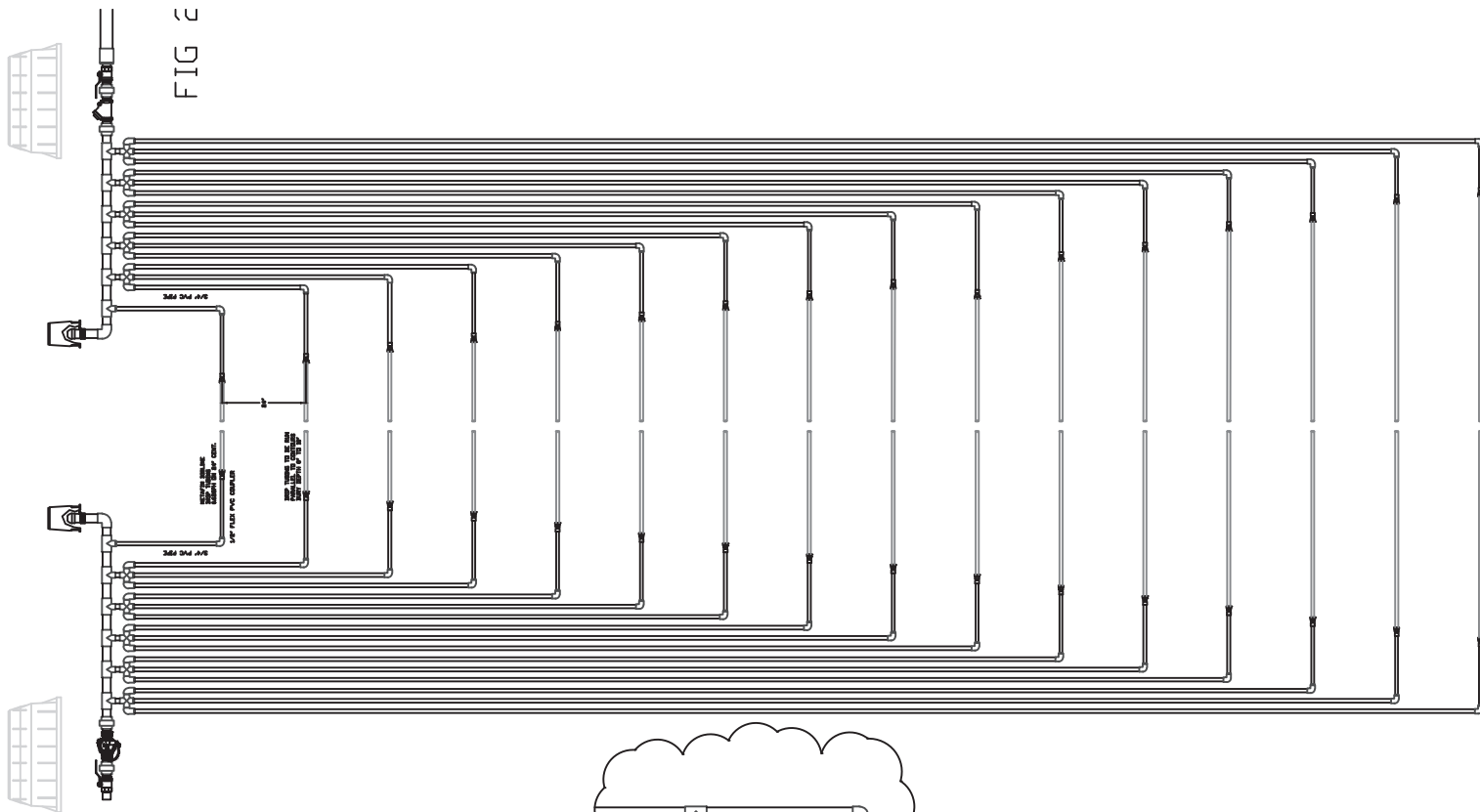


FIG 2

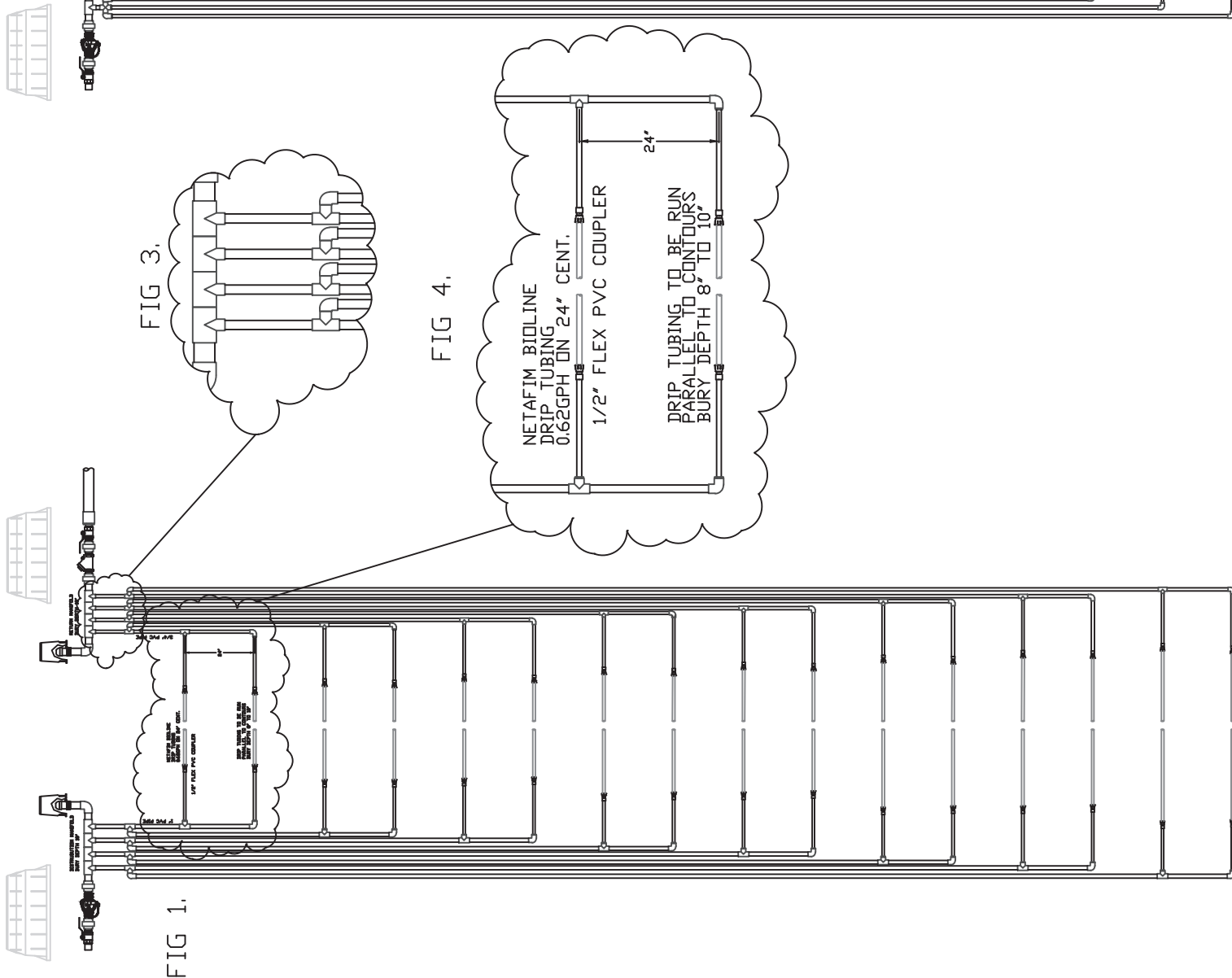
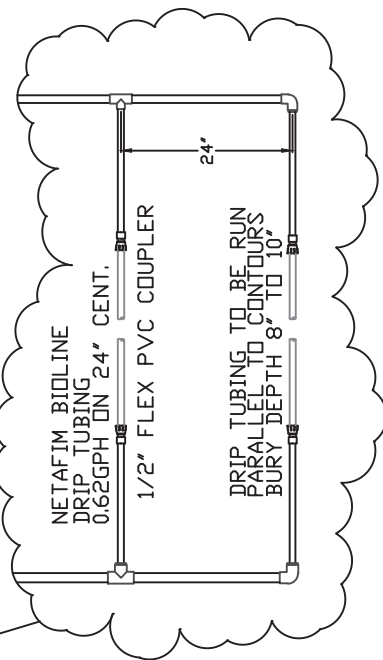


FIG 3.

FIG 4.



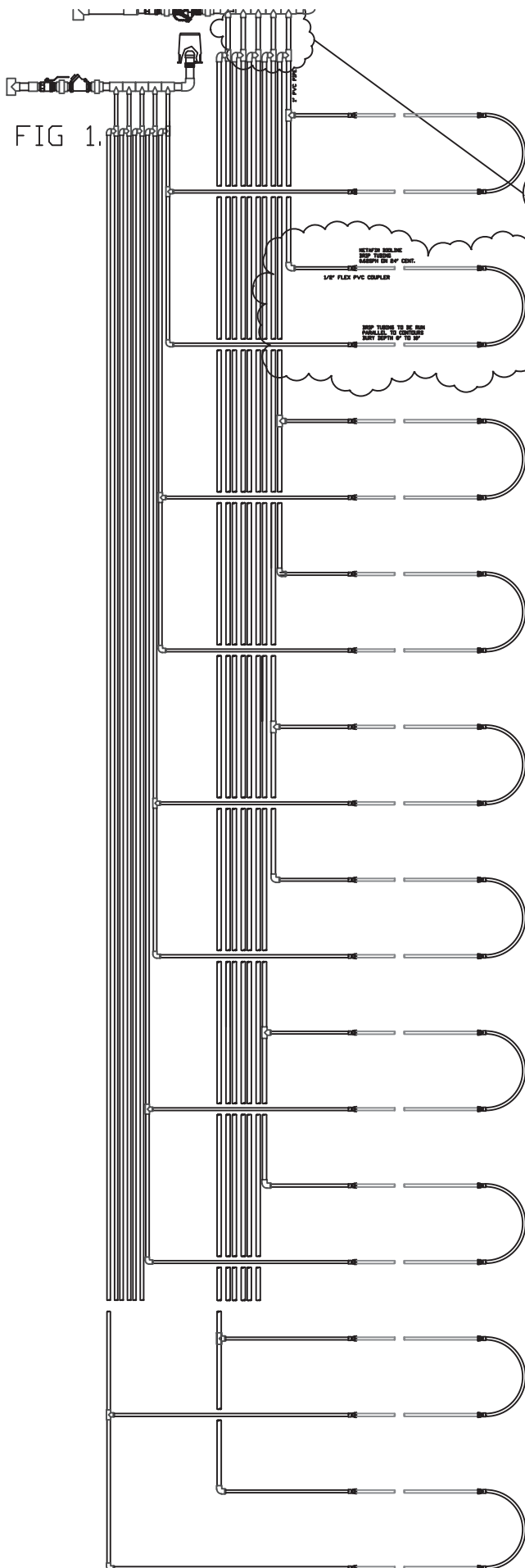


FIG 3.

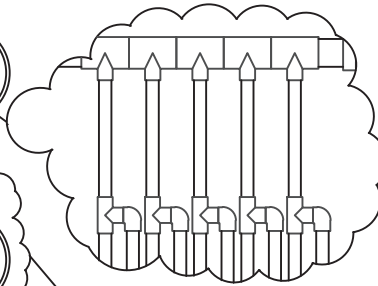
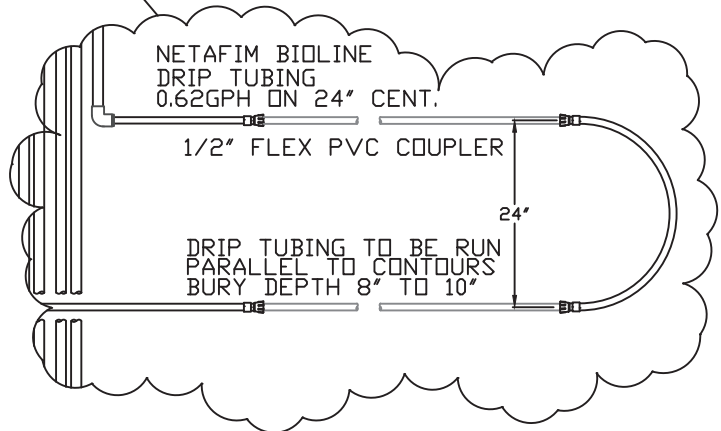
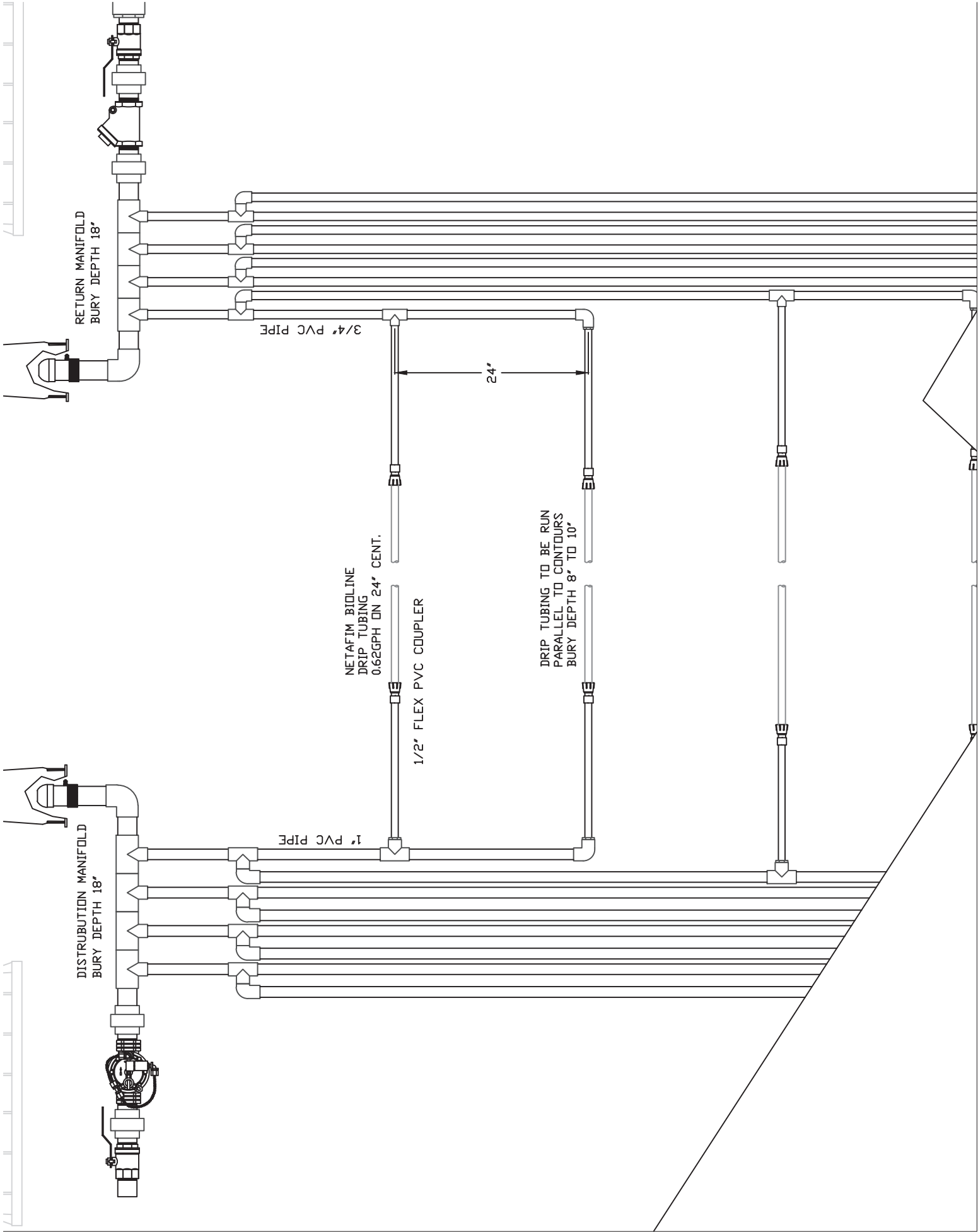
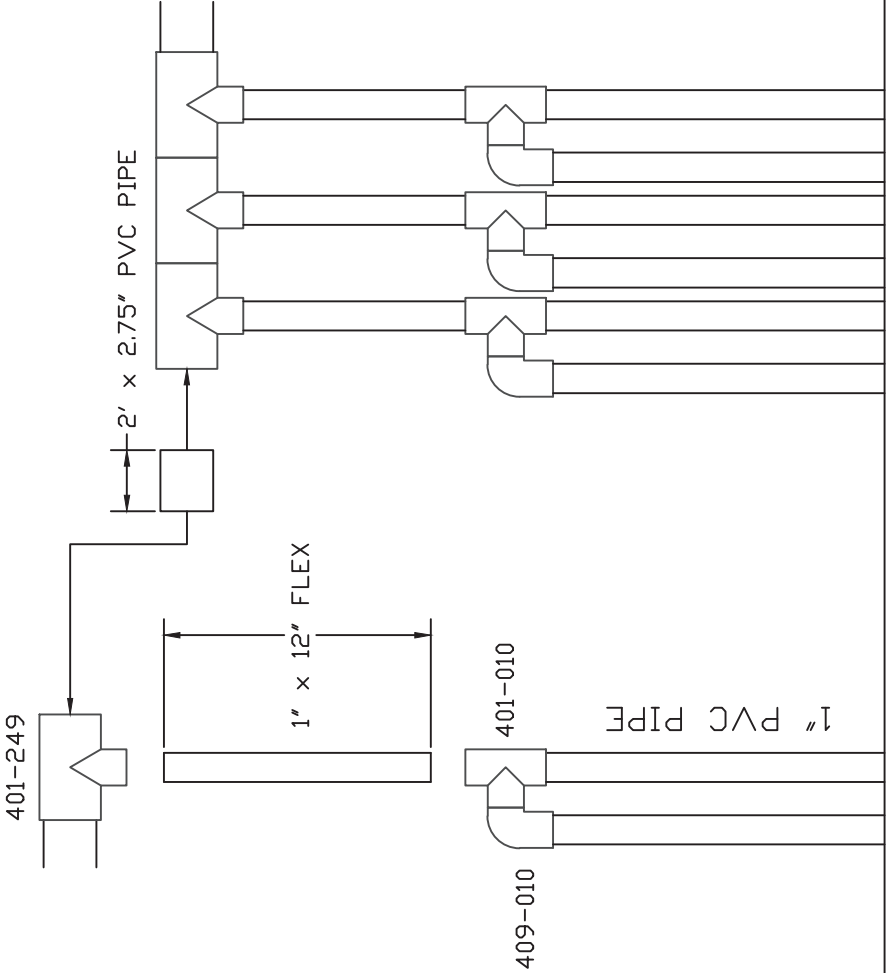


FIG 4.



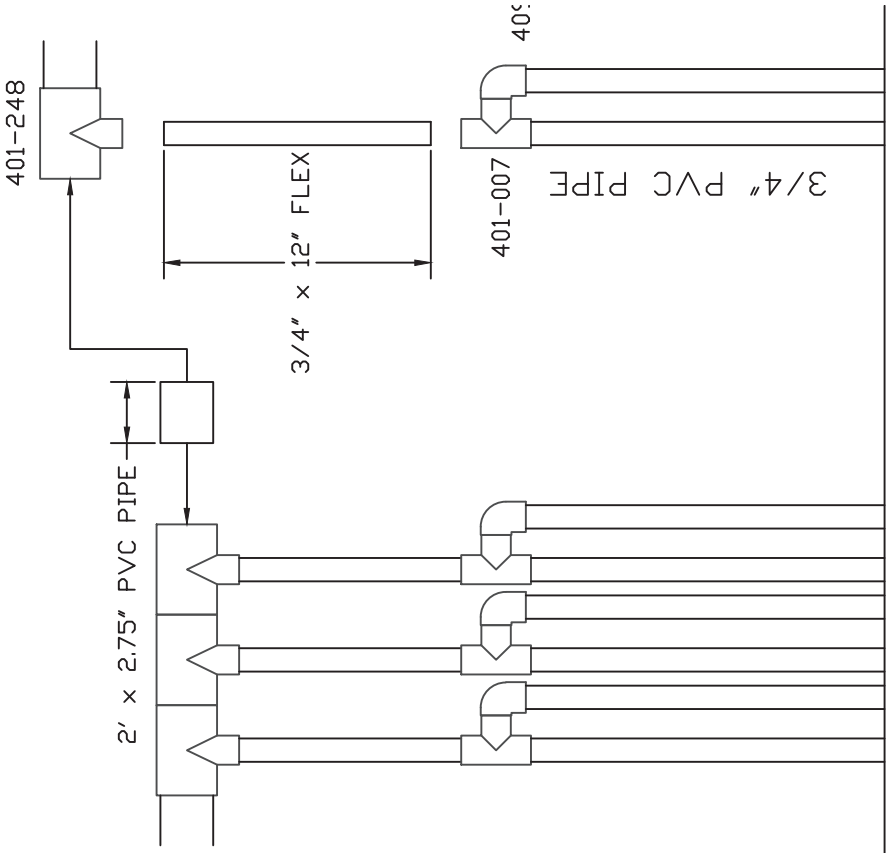


SUPPLY TOP DOWN MANIFOLD ASSEMBLY



- 401-249 - 2" X 1" REDUCING TEE
- 401-010 - 1" TEE
- 409-010 - 1" STREET ELL

RETURN TOP DOWN MANIFOLD ASSEMBLY



- 401-248 - 2" X 3/4" REDUCING TEE
- 401-007 - 3/4" TEE
- 409-007 - 3/4" STREET ELL

AKE WASTEWATER DISPERSAL SYSTEM DESIGN GUIDE

INSTALLATION

Site Preparation:

The drip field should be viewed as a wastewater dispersal field and many of the same considerations for conventional septic drain fields should apply.

These limitations should include:

- No future expectation of building (s), decks, or other impervious surfaces
- No long term storage of equipment or vehicles over the site
- A permanent vegetative cover

Winter dormant grasses should be over seeded with winter grasses when possible.

Drip Tubing Installation:

The drip tubing should be installed 8 to 12 inches below the soil surface with an absolute minimum of 6 inches. Colder climates may require deeper placement or additional cover to avoid freezing during periods of inactivity.

Where winter temperatures and other conditions allow, the depth of the manifold trenches should be the same as the tubing depth in order for the vacuum release valves to work most effectively.

In freezing climates, manifolds may have to be placed below the frost line.

Dig the manifold trenches wide enough to provide sufficient working room to cut and fit tees and to insert the flex connectors between the manifolds and the tubing. Give yourself enough room to work. Always avoid installing drip tubing in wet soil.

There are three common ways to install the Bioline Drip Tubing. They are:

1. **Plowing:** Installed the same way as TV cable, plowing refers to the method of knifing, or using a vibratory plow, to insert the drip tubing. This method is increasingly common as the equipment becomes more widely available. The use of a foot pulled by a small tractor to open a narrow trench ahead of the Bioline tubing is an alternative to the vibrating plow.
2. **Trenching:** This method uses a commonly available chain trenching machine to cut narrow trenches for tubing installation. The advantages of this method are that these machines are widely available and easy to use. The disadvantages are that the trench may leave wall surfaces that are “slicked” and therefore less receptive to horizontal water flow. The trench must be filled with original materials and watered in from the top down.

3. Fill: In this method, tubing is laid on the ground and fill material is placed over it. If there is any vegetative cover, it should be removed and the original soil scarified (plowed or deep-raked) to minimize any inhomogeneity between soil types. If soils of different textures are used, the constraints discussed in the soils section must apply. It is recommended that the fill material be the same as the original, if possible.

For all methods of drip tube installation, it is very important that the disturbed soil above the dripperline be the approximate texture and compaction as the soil around the dripperline to avoid creating a preferential pathway of the effluent to the surface. Some careful, manual compaction of the soil above the dripperline may be advisable when the tube has been trenched or plowed in (local codes permitting).

Every effort must be made to avoid excessive mechanical stress on the tubing before, during, and after installation.

Piping Hook-Up:

The supply and flush lines, and the supply and flush manifolds are installed using standard techniques for PVC piping. A medium body (not fast drying) PVC cement is generally preferred. Use the cement as recommended by the manufacturer.

The installer should use a good quality ratcheting type PVC cutter to prevent the introduction of PVC fillings to distribution lines.

OPERATION & MAINTENANCE:

Start-Up:

The designer should take special precautions to troubleshoot the system and insure that it is working properly over an initial start-up period, typically 2-3 weeks.

Do not start the system with a massive dose. This can cause preferential water passages, or chimneys, to the surface and saturate the soil and it could take a long time to recover the drip field.

- Construction debris (PVC scraps, glue remnants, soil, etc.) found in the pipe network after initial assembly need to be flushed. It is recommended that the initial flushing not be done through the dripperline to avoid plugging with large, unfiltered particles. If the dripperline must be used for flushing, do not exceed the scheduled dosing cycle in the process.
- The pump tank or treatment system may be full of water after installation. Do not simply run it out through the drip tube. Either use the dosing schedule to empty the tank, or set up a sprinkler.
- If the dosing field is extremely dry, it can be advantageous to run a sprinkler on the surface for a while to initially dampen the field.

Routine Maintenance:

Other service and maintenance of the system can be coordinated with regulatory requirements for monitoring of the on-site wastewater treatment system. Most states have regulations that specify a routine maintenance schedule for advanced on-site wastewater treatment systems.

When a drip distribution system is properly sized, designed, and installed, it should operate with little maintenance and easy monitoring. In addition to the fundamental design considerations already outlined, several other installation steps will simplify maintenance. These are as follows:

1. Provide nipples for Schrader valves (tire gauge stems) on critical piping elements (pump output, supply and flush manifolds, inlet and outlet of filters, etc.) in valve boxes to provide easy measurement of system pressure.
2. Maintain access to a short length of drip tubing for inspection.
3. Keep a detailed plot plan, system diagram, and wiring diagram readily accessible in the control panel.

4. Establish a service record chart to record:

- | | |
|---------------------------|-------------------|
| • Pressure at: | Schedule: |
| - pump | - dosing |
| - supply line or manifold | - filter flushing |
| - flush line or manifold | - field flushing |
| - other critical points | |

5. Monitor any changes in the number, activities, and water usage patterns of members of the household.

With this information framework, a system inspector can quickly and easily determine if the system is operating within specifications. If problems are identified by changes in pressure or flow, they can be located and corrected easily using information in the plans and locations of valve boxes.

