Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services
John E. Baldacci, Governor Brenda M. Harvey, Commissioner

Department of Health and Human Services
Maine Center for Disease Control and Prevention
286 Water Street
11 State House Station
Augusta, Maine 04333-0011
Tel: (207) 287-5689
Fax: (207) 287-3165; TTY: 1-800-606-0215

February 25, 2010

American Manufacturing Company, Inc.
Attn.: Robert Mayer, President
P. O. Box 97
Elkwood, VA 22718

Subject: Product Registration, Perc-Rite Wastewater Drip Dispersal Systems

Dear Mr. Mayer:

The Division of Environmental Health has completed a review of a registration application for your company's product. This information was submitted pursuant to Section 1802 of the Maine State Plumbing Code, Subsurface Wastewater Disposal Rules (Rules), for code registration, for use in Maine.

The Perc-Rite Wastewater Drip Dispersal System consists of an electronic controller, a disc filter module, a pump and float switch package, polyethylene tubing with integral drip emitters, and assorted back-flushing pipes and wiring. The System is designed to accommodate secondary treated effluent (Models QM-12, WD-15, and the ASD series) and primary treated effluent (ASD series the Model ASD-15 and ASD-25).

According to the information you provided, the Perc-Rite Wastewater Drip Dispersal System has been approved in the States of Pennsylvania, Massachusetts, Delaware, and New Hampshire. On the basis of the information submitted, the Division has determined that the Perc-Rite Wastewater Drip Dispersal Systems is acceptable for use in the State of Maine, provided that it is installed, operated, and maintained in conformance with the manufacturer's directions. The System must be sized at 1.33 square feet per linear foot of drip tubing, multiplied by the soil sizing factors in Table 600.1 of the Subsurface Wastewater Disposal Rules.

Because installation and owner maintenance has a significant effect on the working order of onsite sewage disposal systems, including their components, the Division makes no representation or guarantee as to the efficiency and/or operation of Perc-Rite Wastewater Drip Dispersal Systems. Further, registration of this product for use in the State of Maine does not represent Division preference or recommendation for this product over similar or competing products.

This letter supersedes the letter dated 10/08/09. If you have any questions please feel free to contact me at (207) 287-5695.

Sincerely,

James A. Jacobsen

James A. Jacobsen, Environmental Specialist IV
Wastewater and Plumbing Control Program
Division of Health Engineering
e-mail: james.jacobsen@state.me.us

/jaj

xc: Product File

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October 8, 2009

American Manufacturing Company, Inc.
Attn.: Robert Mayer, President
P. O. Box 97
Elkwood, VA 22718

Subject: Product Registration, Perc-Rite Wastewater Drip Dispersal Systems

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If you have any questions please feel free to contact me at (207) 287-5695.

Sincerely,

James A. Jacobsen

James A. Jacobsen, Environmental Specialist IV
Wastewater and Plumbing Control Program
Division of Health Engineering
e-mail: james.jacobsen@state.me.us

/jaj

xc: Product File

Jacobsen, James

From: Jacobsen, James
Sent: Thursday, October 08, 2009 4:00 PM
To: 'smayer@americanonsite.com'
Subject: FW: approval, Perc-Rite drip disposal system
Attachments: perc-rite.doc

Mr. Steve Mayer,

Thanks for your help.

Jim Jacobsen, ES IV

James A. Jacobsen, Environmental Specialist IV
Department of Health and Human Services
Division of Environmental Health
286 Water Street, Augusta, ME 04333
Phone: 207-287-5695 Fax: 207-287-3165
http://www.maine.gov/dhhs/eng/plumb/index.htm

From: Jacobsen, James
Sent: Thursday, October 08, 2009 3:52 PM
To: 'rmayer@americanonsite.com'
Subject: approval, Perc-Rite drip disposal system

Mr. Mayer,

Please find the approval for use of the Perc-Rite drip dispersal system in Maine. Please feel free to contact me with any questions.

James A. Jacobsen, Environmental Specialist IV
Department of Health and Human Services
Division of Environmental Health
286 Water Street, Augusta, ME 04333
Phone: 207-287-5695 Fax: 207-287-3165
http://www.maine.gov/dhhs/eng/plumb/index.htm

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Jacobsen, James

From: Mail Delivery System [Mailer-Daemon@eigbox.net]
Sent: Thursday, October 08, 2009 3:52 PM
To: Jacobsen, James
Subject: Mail delivery failed: returning message to sender

This message was created automatically by mail delivery software.

A message that you sent could not be delivered to one or more of its recipients. This is a permanent error. The following address(es) failed:

  rmayer@americanonsite.com
    mailbox is full: retry timeout exceeded

------ This is a copy of the message's headers. ------

Return-path: <james.jacobsen@maine.gov>
Received: from bosimpinc02.eigbox.net ([10.20.13.2])
     by bosmailscan18.eigbox.net with esmtp (Exim)
     id 1Mvz1j-0005Bq-1D
     for rmayer@americanonsite.com; Thu, 08 Oct 2009 15:51:51 -0400
Received: from zixvpm02.maine.gov ([198.182.162.128])
     by bosimpinc02.eigbox.net with NO UCE
     id qKrq1c0562mXRMA0AKrqy6; Thu, 08 Oct 2009 15:51:51 -0400
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     by zixvpm02.maine.gov (Proprietary) with ESMTP id 97C214C0D8
     for <rmayer@americanonsite.com>; Thu, 8 Oct 2009 15:27:54 -0400 (EDT)
Received: from SOM-TEAQASMAIL6.som.w2k.state.me.us ([10.110.79.21]) by som-
isa1assmtp1.som.w2k.state.me.us with Microsoft SMTPSVC(6.0.3790.1830);
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Content-class: urn:content-classes:message
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Subject: approval, Perc-Rite drip disposal system
Date: Thu, 8 Oct 2009 15:51:49 -0400
Message-ID: <DDCB451060537F40BD425A36663C33B102D4DD60@SOM-
TEAQASMAIL6.som.w2k.state.me.us>
X-MS-Has-Attach: yes
X-MS-TNEF-Correlator:
Thread-Topic: approval, Perc-Rite drip disposal system
Thread-Index: AcpIUMWZkTVWFokRQ6yhy/2P9dUxgQ==
From: "Jacobsen, James" <James.Jacobsen@maine.gov>
To: <rmayer@americanonsite.com>
X-OriginalArrivalTime: 08 Oct 2009 19:51:48.0808 (UTC)
FILETIME=[C5E36C80:01CA4850]

X-EN-Class: impinc

American Manufacturing Company, Inc.
P.O. Box 97, Elkwood VA 22718
1-800-345-3132

COVER LETTER

August 4, 2009

James Jacobson
Department of Health & Human Services
Maine Center for Disease Control and Prevention
Division of Environmental Health
Key Plaza Building
286 Water St. 3rd Floor
11 State House Station
Augusta, Maine 04333-0011
Telephone (207) 287-5689

RE: APPLICATION for REGISTRATION: ONSITE SEWAGE DISPOSAL SYSTEM PRODUCT

Dear Mr. Jacobson,

Enclosed please accept American Manufacturing Company's information and background material regarding our application for the Perc-Rite® drip dispersal system as a Registered Onsite Sewage Disposal System Product. This information is compiled for review to obtain Registration and General Approval as specified in SECTION 1802.0 REQUIREMENTS FOR PRODUCT REGISTRATION of the MAINE SUBSURFACE WASTE WATER DISPOSAL RULES,10-144 CMR 241.

The PERC-RITE® drip dispersal product is a patented integrated fluid handling system based on sound engineering principle and practice. The system has been demonstrated to be a dependable and tested method of providing enhanced wastewater treatment dispersal into the upper levels of the soil profile. The PERC-RITE® drip dispersal system can accept septic tank or more highly treated effluent. Its slow application rate and placement close to the soil surface makes for improved wastewater attenuation and treatment. The PERC-RITE® drip dispersal system has been specifically approved in a number of other states. American Manufacturing has been providing the PERC-RITE® drip dispersal system in the United States since 1992.

The American Manufacturing Company's PERC-RITE® drip dispersal system meets or exceeds the intent of the code and requirements of the Rules as outlined in SECTION 2200.0 DRIP IRRIGATION DISPOSAL of the MAINE SUBSURFACE WASTE WATER DISPOSAL RULES,10-144 CMR 241.

AMERICAN MANUFACTURING
Company, Inc.
www.americanonsite.com

Drip dispersal has been the subject of extensive research and publications by non-partial entities such as (attached) the U.S. EPA, National Decentralized Water Resources Capacity Development Project ,Tennessee Valley Authority and the subject of numerous University research studies. The PERC-RITE® Drip Dispersal system has been demonstrated to be an effective means for dispersing wastewater to the ground even in cold weather climates such as Maine. Two recent applicable University Research studies addressing cold climate and septic tank effluent applications (Wisconsin and Pennsylvania) have been provided.

This letter for your review contains the following basic design standards:

- The drip dispersal system would be sized at a minimal equivalency of conventional stone & pipe bed effluent disposal areas based on 1.33 ft^2 per linear foot of tubing.
- The Perc-Rite drip dispersal system may be used as an equivalent to pressure distribution of wastewater as specified in the regulations.

Our New England representative is Oakson Inc, Daniel Ottenheimer at 1-978-282-1322.

We look forward to meeting with you and staff to discuss the details of our request.

If you have any questions or require any further information please feel free to contact me at 1-800-345-3132.

Sincerely,

Robert Mayer M.S., P.E., President
American Manufacturing Company, Inc.

AMERICAN MANUFACTURING
Company, Inc.
www.americanonsite.com

Table of Contents

Attachments

1. Designer's Guide and Appendixes
2. Owner's & Dealer's Manuals ASD-15
3. Owner's & Dealers Manuals QM - 12
4. Owner's & Dealers Manuals WD - 15
5. ASD-25 Owner's / Dealer's Manual and Specification
6. AMERICAN "PERC-RITE®" DRIP DISPERSAL SYSTEMS ENGINEERING DESIGN GUIDELINES FOR COMMUNITY AND COMMERCIAL SIZED DISPERSAL SYSTEMS
7. Monitoring Data Sheet
8. American On-Site Products Compact Disc
9. Component Specification Literature including Netifim Bioline and Arkal Disc Filters
10. *Wastewater Subsurface Drip Distribution: Peer Reviewed Guidelines for Design, Operation, and Maintenance*, EPRI, Palo Alto, CA and Tennessee Valley Authority, Chattanooga, TN: 2004. Author and Principal Investigator, J. Watson P.E. TVA. (Disc)
11. On-Site Wastewater Treatment Systems Manual, Chapter 4: *Treatment Processes and Systems* (portions) , U.S. Environmental Protection Agency. EPA/625/R-00/008 Washington, D.C.: 2002.
12. *Wastewater Treatment Subsurface Drip Dispersal Module Text*, Bruce Lesikar, PhD Texas A and M University and James Converse, PhD University of Wisconsin *in* (M.A. Gross and N.E.Deal, eds.) University Curriculum Development for Decentralized Wastewater Management. National Decentralized Water Resources Capacity Development Project. University of Arkansas, Fayetteville, AR.
13. *Subsurface Drip Dispersal Systems*. National On-Site Wastewater Recycling Association (NOWRA), Laurel, MD.
14. *Soil Treatment Performance and Cold Weather Operations of Drip Distribution Systems*, R. M. Bohrer and J. C. Converse, Graduate Research Assistant and Professor, Biological Systems Engineering, College of Agricultural and Life Sciences, University of Wisconsin-Madison WI.

AMERICAN MANUFACTURING Company, Inc.
www.americanonsite.com

15. *Reduction of Bacteriologic and Chemical Constituents of Septic Tank Effluent with Depth Using a Drip Dispersal System* L.D. Hepner$_1$ D. Linde$_2$, C. Weber$_3$, D. Smith$_4$ (1 Professor Agronomy & Environ Sci Delaware Valley College, 2 Assoc. Prof Agronomy & Environ Sci Delaware Valley College, 3 Assoc. Prof Chemistry Delaware Valley College, 4 Res. Assoc. Agronomy & Environ Sci Delaware Valley College)

Perc-Rite® Drip Dispersal State Approval Documents

16. Pennsylvania
17. Delaware
18. Massachusetts
19. New Hampshire

Maine Department of Health and Human Services
Bureau of Health
Division of Health Engineering
Wastewater and Plumbing Control Program

Application for REGISTRATION

APPLICATION for REGISTRATION of
EXPERIMENTAL SYSTEM/INNOVATIVE TECHNOLOGY
OR ONSITE SEWAGE DISPOSAL SYSTEM PRODUCT

Please complete the following Sections. Please print or type.

Applicant

Company Name: American Manufacturing Company, Inc

Contact Person: Robert B. Mayer, President

Address: 22011 Greenhouse Road
P.O. Box 97

Town/City: Elkwood State/Province: Virginia Zip Code: 22718

Country: United States

Telephone: 1-800-345-3132 e-mail: Rmayer@Americanonsite.com

Product

Product Name: **PERC-RITE® drip dispersal system**

Models: **ASD, QM, & WD.**

AMERICAN MANUFACTURING
Company, Inc.
www.americanonsite.com

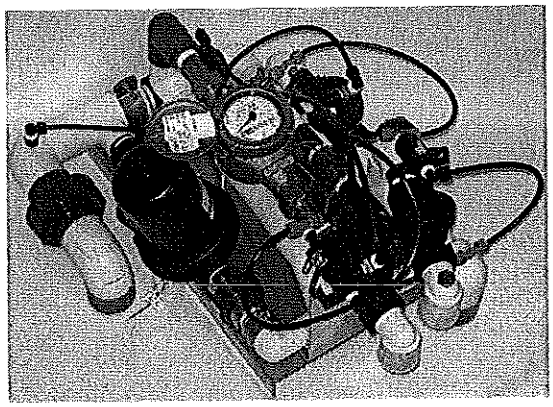
American Manufacturing "Perc Rite®" Drip Dispersal System applicable (example) Model Numbers / Package components

QM & WD Models, Secondary effluent only

Line #	Package Number	Package Description
QM - A	ABD151-S121	1 Zone Simplex Wash down Filter w/ LCD Field Programmable Control
QM - B	ABD151-S122	2 Zone Simplex Wash down Filter w/ PLC Panel & Remote Zone Valves (See Note)
QM - C	ABD151-S121-SV2	2 Zone Simplex Wash down Filter w/ LCD Field Programmable Control & Sequence Valve
QM - D	ABD121-S121	1 Zone Simplex Semi-Auto w/ LCD Field Programmable Control (See Note)
QM - E	ABD121-S122	2 Zone Simplex Semi-Auto w/ PLC Panel & Remote Zone Valves (See Note)
QM - F	ABD121-S121-SV2	2 Zone Simplex Semi-Auto w/ LCD Field Programmable Control & Sequence Valve

The QM – A, and QM- B represent the 15 GPM WD, "washdown" system.

Perc-Rite **WD – 15** Hydraulic Unit



Perc-Rite **QM-12** Hydraulic Unit

Following are two example packages:

The "Washdown" filtration unit:

C - ABD151-S121-SV2
2 Zone QM WASHDOWN w/ Sequencer & LCD Control

LINE#	COMPONENT	DESCRIPTION	QTY
	CENTRAL UNIT EQUIP PACKAGES		
1	DH0-1B	1 FILTER QM WASHDOWN UNIT	1
2	SWITCHBARDRIP4	FLOAT BAR 4, (2) PO15 & (2) DO15M	1
3	DP0-B9114	SIMPLEX 1 ZONE LOGO CONTROL	1
4	PUTURB1512112W	15 GPM TURBINE	1
5	COOLGUIDE15	LAMINAR FLOW COLLAR, 6", 15 GPM	1
6	PUMPKITDRIP	DRIP PUMP KIT 1½"	1
7	BIOLINE1000	DRIP TUBING PER 1000' ROLLS	2
8	PVC12FLEX	½" FLEX PVC 100'	1
9	BIOINSERT12X34	BIOLINE INSERT ADAPTER ½" X ¾"	50
10	PVCPRFIP12X34	FEMALE ADAPTER ½" X ¾" SxT SCH40	50
11	BIOCOUP	BIOLINE REPAIR COUPLING ½"	6
12	DH-TOPFEEDKIT1	TOP FEED MANIFOLD KIT 1"	2
13	SEQUENCEVALVE2	SEQUENCE VLV 1¼" 4 OUTLET 2 ZN	1

The semi automatic "QM" (Quality Monitoring) filtration unit:

E - ABD121-S122
2 Zone QM Skid Mount w/ LCD Control

LINE#	COMPONENT	DESCRIPTION	QTY
	CENTRAL UNIT EQUIP PACKAGES		
1	DH0-2B	2 FILTER 1 ZONE SEMI-AUTO QM UNIT	1
2	SWITCHBARDRIP4	FLOAT BAR 4, (2) PO15 & (2) DO15M	1
3	DP1-B9140P	SIMPLEX 2 ZONE PLC CONTROL	1
4	PUTURB1512112W	15 GPM TURBINE	1
5	COOLGUIDE15	LAMINAR FLOW COLLAR, 6", 15 GPM	1
6	PUMPKITDRIP	DRIP PUMP KIT 1½"	1
7	BIOLINE1000	DRIP TUBING PER 1000' ROLLS	2
8	PVC12FLEX	½" FLEX PVC 100'	1
9	BIOINSERT12X34	BIOLINE INSERT ADAPTER ½" X ¾"	50
10	PVCPRFIP12X34	FEMALE ADAPTER ½" X ¾" SxT SCH40	50
11	BIOCOUP	BIOLINE REPAIR COUPLING ½"	6
12	DH-TOPFEEDKIT1	TOP FEED MANIFOLD KIT 1"	2
13	DH-SOLVLV1KIT	SOLENOID VALVE & VALVE BOX	2

The fully automatic ASD-15 unit

A	ASD152-S122	15 gpm, 2 Zone Drip w/ Simplex 2 Filter, 2-Zone Control Panel, Max 1000 gpd*
B	ASD153-S124	15 gpm, 3 Zone Drip w/ Simplex 2 Filter, 4-Zone Control Panel, Max 1500 gpd*
C	ASD154-S124	15 gpm, 4 Zone Drip w/ Simplex 2 Filter, 4-Zone Control Panel, Max 2000 gpd*
D	ASD153-D124	15 gpm, 3 Zone Drip w/ Duplex 2 Filter, 4-Zone Control Panel, Max 2000 gpd*
E	ASD154-D124	15 gpm, 4 Zone Drip w/ Duplex 2 Filter, 4-Zone Control Panel, Max 2500 gpd*
F	ASD151-S124	15 gpm, 2 Remote Zone Drip w/ Simplex 2 Filter, 4-Zone Control Panel, Max 1000 gpd*

A - ASD152-S122
2 Zone Drip w/ Simplex 2 Filter, 2 Zone Control Panel

LINE#	COMPONENT	DESCRIPTION	QTY
	CENTRAL UNIT EQUIP PACKAGES		
1	DH2-22KIT	2 ZONE DRIP SYSTEM KIT	1
2	DP1-B9140P	SIMPLEX 2 ZONE CONTROL	1
3	PUTURB1512112W	15 GPM TURBINE	1
4	COOLGUIDE15	LAMINAR FLOW COLLAR, 6", 15 GPM	1
5	PUMPKITDRIP	DRIP PUMP KIT 1½"	1
6	BIOLINE1000	DRIP TUBING PER 1000' ROLLS	2
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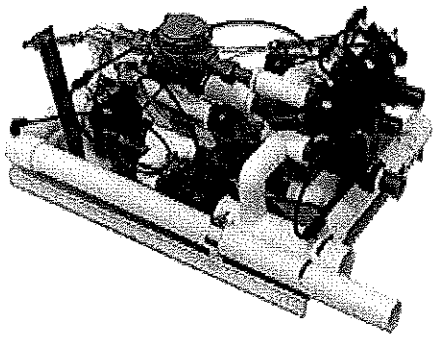
11	DH-TOPFEEDKIT1	TOP FEED MANIFOLD KIT 1"	2



Perc-Rite **ASD-15** Hydraulic Unit

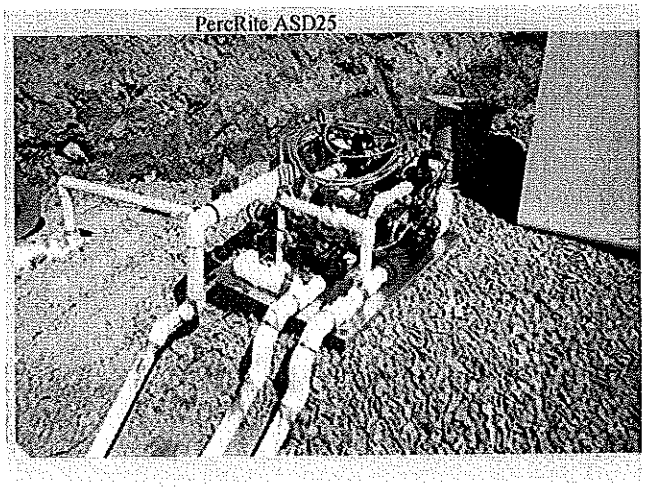
The fully automatic **MODEL ASD25**

STANDARD 4 ZONE COMMERCIAL DRIP SYSTEM

No.	DESCRIPTION	ITEM NO.	QUANTITY
1	25 GPM H.U. & CONTROLLER	ASD 25	1
2	1 HP, 240V, 1 PHASE	PUMP 25	2
3	FIBERGLASS HU DRIP ENCLOSURE	DRIPENCLOFIBER	1
4	4 FLOAT SWITCH BAR	FLOATBAR4	1
5	Drip Tubing Per 1000 Ft Roll	BIOLINE1000	10
6	1/2 X 100 PVC Flex Tube	PVC12FLEX	2
7	3/4 X 100 PVC Flex Tube	PVC34FLEX	2
8	Bioline Repair Coupling 1/2"	BIOCOUP12	50
9	1/2 Bioline X 3/4 MIP Drip Adapter	BIOINSERT12/34	150
10	1/2 X 3/4 PVC Press S X FIP Adapter	PVCPRFIP12X34	75
11	3/4 X 3/4 PVC Press S X FIP Adapter	PVCPRFIP34X34	75
12	PUMPKITDRIP	PUMPKITDRIP	1
13	1" 24V ZONE VALVE ASSEMBLY (Box, Riser, Unions & Shut-Off Valve)	ZONEVALVE1"	4
14	Top Feed Supply Manifolds W/Shutoff	DRIPTFMS DROP	8
15	Top Feed Return Manifolds W/Shutoff	DRIPTFMR DROP	8
16	COOLGUIDE	COOLGUIDE	2

MATERIALS FOR EACH ADDITIONAL ZONE *2,400 LF/Zone*

No.	DESCRIPTION	ITEM NO.	QUANTITY
1	Drip Tubing Per 1000 Ft Roll	BIOLINE1000	3
2	1/2 X 100 PVC Flex Tube	PVC12FLEX	1
3	3/4 X 100 PVC Flex Tube	PVC34FLEX	1
4	Bioline Repair Coupling 1/2"	BIOCOUP12	10
5	1/2 Bioline X 3/4 MIP Drip Adapter	BIOINSERT12/34	50
6	1/2 X 3/4 PVC Press S X FIP Adapter	PVCPRFIP12X34	25
7	3/4 X 3/4 PVC Press S X FIP Adapter	PVCPRFIP34X34	25
8	CONTROL UPGRADE	65ARIA2	1
9	1" 24V ZONE VALVE ASSEMBLY (Box, Riser, Unions & Shut-Off Valve)	ZONEVALVE1"	1
10	Top Feed Supply Manifolds W/Shutoff	DRIPTFMS DROP	2
11	Top Feed Return Manifolds W/Shutoff	DRIPTFMR DROP	2



ASD - 25

Note that units are sized by the GPM capacity of the filter assemblies. Presented here are the WD-15, QM-12, ASD-15, and ASD-25 component packages as outline above. Additional engineered systems can address up to 500 GPM.

Product Classification (choose one)

Primary or Secondary Treatment Unit ***NA***

[ ] Septic Tank [ ] Extended Aerobic Treatment Unit [ ] Recirculating Aerobic Unit

[ ] Aerobic Fixed Film Unit [ ] Other (specify) _____

Effluent Filter ***NA***

[ ] Septic Tank Outlet Filter [ ] Post-Tank Filter [ ] Other (specify) _____

Disposal Device

[ ] Gravel-less Disposal Pipe [ ] Gravel-less Disposal Bed [ ] Chamber, Plastic

[ ] Chamber, Other [x] Other (specify) **Drip Dispersal**

Miscellaneous ***NA***

[ ] Pipe [ ] Effluent Flow Distribution Device [ ] Other (specify)

Claim

Describe the product's features (attach additional sheets if necessary).

SYSTEM TECHNOLOGY

System Description

INTRODUCTION

Utilization of drip irrigation technology for the treatment and dispersal of wastewater has been successfully applied throughout the United States with increasing acceptance over the last several years. The technology's characteristic low volume, time dosed, and equal distribution of effluent dispersed over an entire soil absorption area provide increased soil retention time and provides for enhanced dose management. The system lends itself to shallower installation thus maximizing aeration and separation to soil or site limitations. The wastewater is applied to the soil matrix in small doses evenly throughout the day using timed dosing.

The Perc-Rite® drip dispersal unit is a tested and dependable method for applying both septic tank effluent and more highly treated wastewater to the upper soil matrix. The wastewater passes through a filtration mechanism prior to being discharged to one of several zones of drip tubing which have been placed at a shallow depth in the soil. The tubing is constructed with continuously self-cleaning emitters typically spaced every 2' allowing for dispersal of the effluent to the entire area covered by the drip tubing. Sophisticated emitters assure even distribution of the wastewater for the entire length of the tubing.

Models applicable for non engineered small disposal system flows (<2000 GPD) as specified in Maine regulations are the QM-12, WD-15, ASD-15, and the ASD-25 series. The numbers in each series represent the maximum flushing flow in gallons per minute (gpm). These unit packages are pre engineered and lend themselves to General approval referencing a design manual.

The *Designer's Guide* provides for design in most small flow applications. With the *Designer's Guide*, system design is accomplished through the use of charts with little, if any mathematic computation required. The designer's guide, provides the information to determine the maximum field size, maximum length of supply / return lines, and maximum static lift for an individual hydraulic unit and standard pump package for a given site.

The *American* PERC RITE® *Drip System*, by virtue of the use of the *Designer's Guide and Appendixes*, and the packages' standard design, coordinated and tested by the manufacturer, and with the use of pressure compensating emitters providing equal distribution between orifices, is a "pre-engineered septic system".

Systems greater than 2000 gpd can be accommodated by ASD-25 or as necessary larger units with flows of between 60 and 500 gpm. The system design methodology of these larger flows is similar. The AMERICAN "PERC-RITE®" DRIP DISPERSAL SYSTEMS ENGINEERING DESIGN GUIDELINES FOR COMMUNITY AND COMMERCIAL SIZED DISPERSAL SYSTEMS, addresses additional parameters.

The QM-12 and WD-15 are designed to accept wastewater after having passed through an approved secondary treatment unit. The ASD units can accept septic tank effluent or more highly treated effluent and is utilized on all larger flow applications.

A control panel specifically designed to operate with drip dispersal is provided on all sites. The panel is comprised of a programmable logic controller, alarms and electrical connections. Larger flow systems (ASD 25 and larger) include a remote operation and monitoring capability in the control panel.

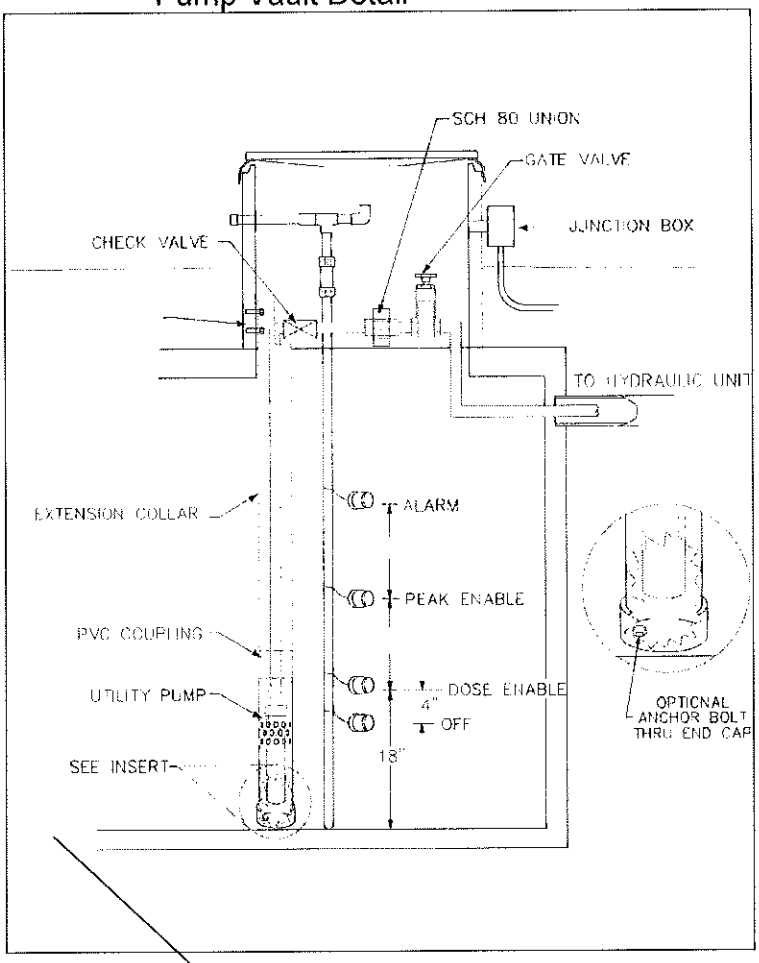
The Hydraulic Unit (HU) provides filtration of the effluent and the management of the system including dosing and flushing of the of the tubing network.

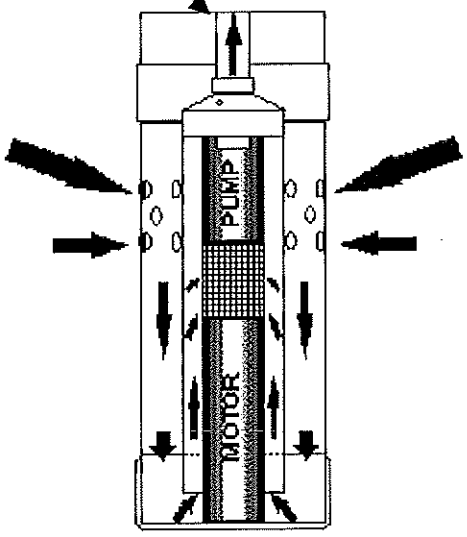
PUMP & PUMP CHAMBER

The pump chamber to be utilized must comply with the construction specifications in the Maine Rules. Notably, the tank is to be watertight, non-buoyant, and the wiring and controls are to meet appropriate standards. The tank size is determined by the design flow of the project and the type of pre-treatment component which precedes the Perc-Rite dispersal system. Septic tanks and some treatment units do not provide emergency storage capacity which must then be made available in the pump chamber used as part of the drip dispersal system. Some other systems with treatment units accommodate emergency storage within their design so the pump chamber for the Perc-Rite pump may be of minimal size.

All Perc-Rite® dispersal systems utilize the Cool Guide pump mounting system. This mechanism allows effluent to enter the inlets under slow laminar flow conditions inside the pump chamber drawing from a minimum 14" above the chamber bottom. Once inside the Cool Guide, the -wastewater moves downward, then upward between the cooling collar and the motor towards the pump and final discharge. During this path it provides the opportunity to cool the motor and creates non-turbulent flow inside the pump chamber, drawing a minimum of 14" from the bottom of the chamber.

Pump Vault Detail





"Cool Guide" Detail

CONTROL / SEQUENCE OF OPERATION

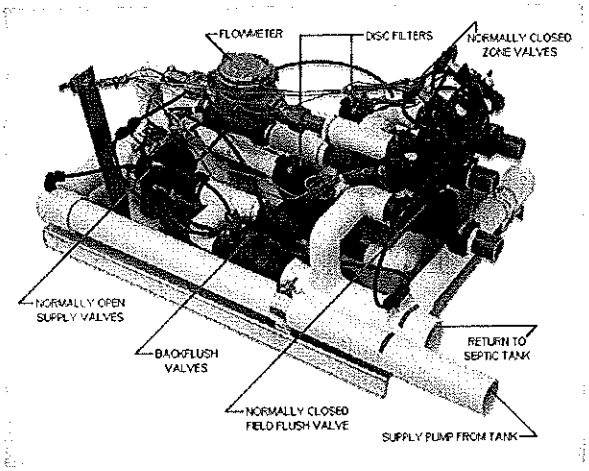
The Perc-Rite® Dispersal system is equipped with four float switches inside the pump chamber which, in conjunction with the panel, control the timed doses to be discharged. The Hydraulic Unit and control panel select which zone of the soil absorption system is to be dosed with each pump cycle in a sequential manner. That zone is termed the "lead zone". Each zone is pre-programmed to dose 4 times per day (adjustable). Each zone also automatically receives a forward flush every 25 cycles to maintain the drip tubing clean of particles.

When the water level in the pump chamber is high enough to overcome the "Redundant Off" (bottom) float, the pumps is enabled to run. When the water level rises higher to overcome the "Dose Enable" (second) float, the pump will be activated. Upon starting, the pump automatically back flushes the disc filters and then provide a dose of a pre-determined volume to the lead zone. The pump will continue to run for the length of time set on the pump run timer to provide a complete dose. The system then remains in the off setting until the preprogrammed timer enters a new pump cycle enable mode, at which time the pump will dose the new lead zone (as long as the "Dose Enable" float is still up). This process continues until the water level drops below the "Dose Enable" float and the pump run timer has completed its cycle.

If the water level in the pump chamber rises enough to overcome the "Peak Flow" (third) float, the pump will be activated regardless of the time clock position. If the Peak Flow float is triggered, the system will continue to cycle at a more frequent rate (reduced rest time) disposing at the peak system design flow until deactivated by the circuit, at which time the system will return to the average daily flow dosing cycle frequency. If the water level continues to rise to overcome the "High Level" (fourth) float, the audiovisual alarm will be activated. The alarm circuit will automatically reset when the "High Level" float returns to its normal position and an operator acknowledges the alarm event.

The standard small flow application provides for dosing throughout the day at an average flow rate of 60% of the design flow, increasing the frequency of dosing to 100% when the Peak Flow float is activated. The peak flow float is typically located at the halfway point in the equalization chamber.

HYDRAULIC UNIT WITH FILTERS



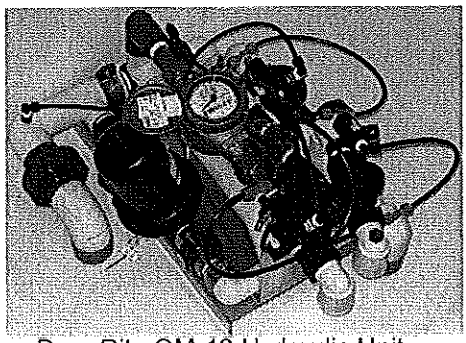
Perc-Rite ASD-15 Hydraulic Unit

The Perc-Rite® dispersal system is managed by a microprocessor which controls solenoid activated diaphragm valves in the Hydraulic Unit. The valves are used to back flush the filters, to dose individual zones, and to open the return side of a zone to forward flush the distribution network. A meter in the Hydraulic Unit records the total flow of disposed effluent. Once installed and properly started, the system is totally automatic for the end user with only an annual operation check required.

Protection from solid particles clogging for the drip tubing and the emitters is by a disc filtration system (Arkal-brand) built into the Perc-Rite Hydraulic Unit. This filter cartridge is compact in size yet contains a stack of grooved plastic discs which are compressed together during the filtration process. Filtration is accomplished on the surface and within the disc grooves. Solids and algae are retained within the filters. The minimum size of particles retained is 115 microns.

A minimum of two filters are provided for the ASD series. At the beginning of each dose cycle the filters are individually backwashed with filtered effluent. The accumulated material is returned back to the head of the treatment system or septic tank. During the backwashing process a spring within the filter allows the discs to loosen and separate from each other. This occurs at a minimum of 50 psi which allows the trapped material to be removed from the filter discs. The backwash cycle is completed in less than 45 seconds for both filters and utilizes only a small amount of wastewater which is then returned to the septic tank inlet.

The Perc-Rite® QM-12 Hydraulic Unit contains a larger 1" disc filter to pre-filter effluent to backwash a smaller disc filter. The dispersal system is then dosed and flushed through the smaller filter.



Perc-Rite QM-12 Hydraulic Unit

The WD-15 unit surface washes a 1" disc filter at the beginning of each dose at a high velocity. Both the QM and WD units are designed for use with secondary treated effluent and will require inspection (cleaning) of the 1" manual filters at the required operational monitoring frequency of the pretreatment units. Plant upsets may result in clogged filters, resulting minimal dosing to the drip fields and an alarm condition.

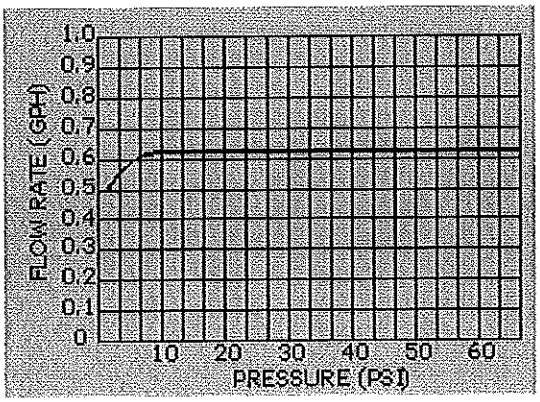
Perc-Rite WD – 15 Hydraulic Unit

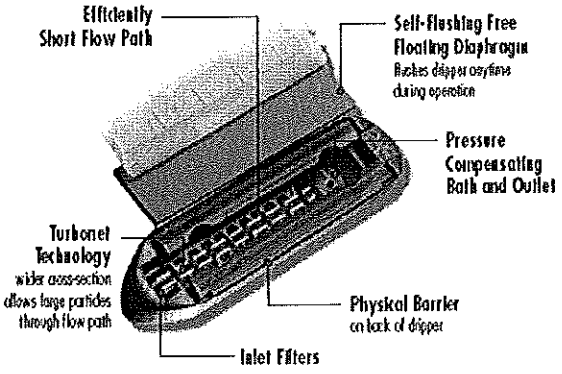
TUBING and EMITTERS

The Perc-Rite® drip dispersal system utilizes flexible plastic tubing with pressure compensating emitters (Bioline-brand as manufactured by Netafim) located every two feet within the tubing. The emitter is the mechanism which allows the wastewater to be dispersed into the soil. The emitter operates based on the pressure differential on either side of the emitter. As the effluent passes through a large turbulent flow labyrinth, friction losses create a pressure differential across a free floating diaphragm located inside the emitter. The pressure loss across the diaphragm causes the discharge orifice to be closed. When the flow into the emitter stops, the pressure inside and outside the emitter then equalizes which causes the orifice to open again. As the emitter diaphragm pressurizes and depressurizes at great speed it results in effluent being discharged from the emitter in extremely small doses. Once accumulated to the size of a water drop it will drip out of the tubing through the orifice in the tubing located at the emitter.

The inlet on the emitter has a filter to prevent the entrance of particles and sediment. Additionally, the large turbulent flow path within the emitter allows particles which do not discharge to pass freely through the emitter back into the tubing. The emitter may pass particles in size up to 800 microns though the filters screen down to 115 microns. Unlike other emitters, the Bioline emitter continuously flushes during operation.

The discharge rate from each emitter is 0.6 gallons per hour resulting in a very low application rate per square foot of soil absorption system. Uniformity of soil loading is provided regardless of pump pressure, distance to the field, slope, or topography as the emitters are designed to provide even distribution across a wide range of internal pressures (7-70 psi) within the tubing.

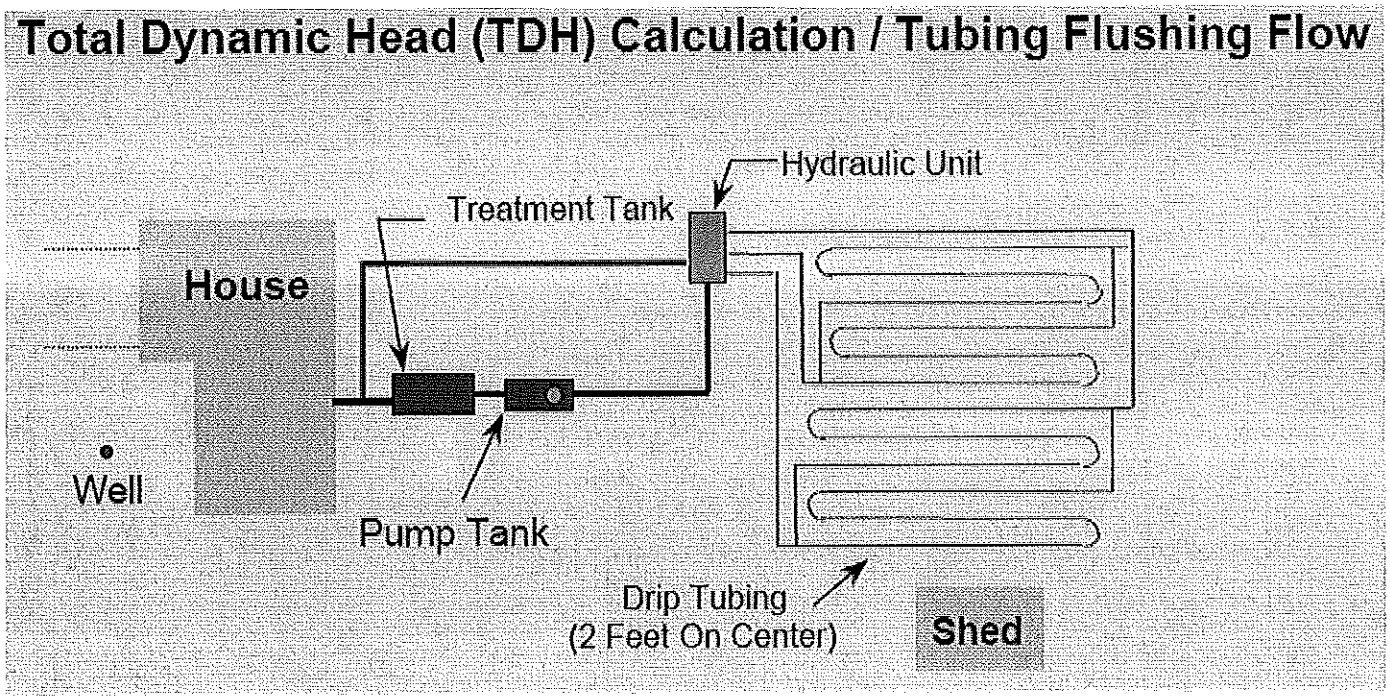




Over time there can be expected to be some solids accumulation on the walls of the drip tubing. This occurs regardless of the level of pretreatment which precedes the Perc-Rite® system. Periodic forward flushing of the entire distribution network is provided once every 25 dose runs to provide routine cleaning of the tubing walls. The system is forward flushed at a velocity of greater than two feet per second with the flushed waste deposited to the inlet side of the septic tank.

The typical installation setting uses tubing spacing of 2' between lines. Maine requires a minimum separation of 1'. However, site conditions may dictate some variability of this spacing.

Several adjacent runs of tubing looped together with a single supply and return manifold connection is termed a lateral. Several laterals together become a zone. Laterals within a zone may be of differing lengths but should be close as possible in size to maximize flushing efficiency. An air release valve is installed inside a gate box in the ground at the connection between the drip field and the return line.



Describe the product's performance (attach additional sheets if necessary).

Performance Data

Drip dispersal is a long-accepted method for placing septic tank effluent and more highly treated wastewater into the soil matrix in much of the United States and throughout the world. The technology and the principles of siting and design have been the subject of numerous research projects. Attached are relevant documents which address engineering standards and summarize research / performance data for drip dispersal:

Wastewater Subsurface Drip Distribution: *Peer Reviewed Guidelines for Design, Operation, and Maintenance*, EPRI, Palo Alto, CA and Tennessee Valley Authority, Chattanooga, TN: 2004. Author and Principal Investigator, J. Watson P.E. TVA.

Abstract: "Guidelines are summarized for the use of drip distribution technology for wastewater. The guidelines were developed over a period of 3 years through the assistance of the drip line manufacturers (Geoflow and Netafim), a peer review team of national experts, and engineers and other professionals that design, use, or regulate drip systems. The guidelines represent a standard for the design, performance, operation, and maintenance of drip technology as it is currently applied for subsurface dispersal of wastewater."

On-Site Wastewater Treatment Systems Manual, Chapter 4: Treatment Processes and Systems, U.S. Environmental Protection Agency. EPA/625/R-00/008 Washington, D.C.: 2002.

Pages 4-27 through 4-31, generally overview drip dispersal as an accepted fluid handling system for surface and subsurface land application.

Wastewater Treatment Subsurface Drip Dispersal Module Text, Bruce Lesikar, PhD Texas A and M University and James Converse, PhD University of Wisconsin *in* (M.A. Gross and N.E.Deal, eds.) University

Curriculum Development for Decentralized Wastewater Management. National Decentralized Water Resources Capacity Development Project. University of Arkansas, Fayetteville, AR.

These documents, as the TVA / EPRI Manual, represents a report on the various current application of drip dispersal for waster water.

Subsurface Drip Dispersal Systems. National On-Site Wastewater Recycling Association (NOWRA), Laurel, MD.

This document is an engineering standard adopted by the Technical Practices Committee, and executive committee of NOWRA. The standard is in an ASTM type format addressing minimal criteria such as prefiltration, emitter type consideration, system flushing etc.

Two recent applicable University Research studies addressing cold climate and septic tank effluent applications (Wisconsin and Pennsylvania) have been provided.

SOIL TREATMENT PERFORMANCE AND COLD WEATHER OPERATIONS OF DRIP DISTRIBUTION SYSTEMS, R. M. Bohrer and J. C. Converse, Graduate Research Assistant and Professor, Biological Systems Engineering, College of Agricultural and Life Sciences, University of Wisconsin-Madison WI.

Portion of the abstract:

"During the summer of 1999, soil samples were collected to a depth of 105 cm (42 in.) beneath six drip distribution sites in Wisconsin to evaluate the treatment performance of the soil. Three of the sites received septic tank effluent (STE), one site received recirculating gravel filter (RGF) effluent and two sites received effluent treated by aerobic treatment units (ATU). The soils at these sites ranged from coarse sand to clay loam. The depth of the driplines ranged from 10-50 cm (4-20 in.) below the ground surface.

The systems receiving STE showed very low fecal coliforms at 45-60 cm (18-24 in.) below the dripline with no detects below 60 cm (24 in.). The systems with pretreatment showed even better results, both for the RGF, which was very heavily loaded, and the ATU systems. This could probably allow for a reduction in the separation distance to 45 cm (18 in.) for systems receiving STE and 30 cm (12 in.) if the effluent is aerobically pretreated to a fecal coliform level of <1,000 colonies/100 ml."

Reduction of Bacteriologic and Chemical Constituents of Septic Tank Effluent with Depth Using a Drip Dispersal System L.D. Hepner$_1$ D. Linde$_2$, C. Weber$_3$, D. Smith$_4$ (1 Professor Agronomy & Environ Sci Delaware Valley College, 2 Assoc. Prof Agronomy & Environ Sci Delaware Valley College, 3 Assoc. Prof Chemistry Delaware Valley College, 4 Res. Assoc. Agronomy & Environ Sci Delaware Valley College)

"Abstract. The ability of a moderately well drained soil to treat septic tank wastewater at depths of 1, 2, 3, and 4 feet beneath the surface was evaluated using drip dispersal technology. Three drip dispersal systems of 1200 lineal feet of tubing each were dosed with 400 gpd septic tank treated wastewater (loading rate of 0 .17gpd/ft2.). Zero tension lysimeters were installed at 1, 2, 3, and 4 feet beneath the surface to capture gravity water moving through the soil. Samples were analyzed for Fecal Coliform, Fecal Strep, BOD5, NH3-N, NO3-N, and Soluble P. ***Median value reductions of 99% for Fecal Coliform, 99% for Fecal Strep***, 86% for BOD5, ***85% for NH3-N+NO3-N*** and 90% Soluble P were obtained at the 1 foot lysimeters. ***Based on these trials 1 foot of aerobic soil appeared to provide significant treatment of septic tank wastewater*** when loaded at 0.17gpd/ft2 with a landscape linear load of approximately 6gpd/ft."

From the Introduction:

"Soil based treatment systems reduce contaminants in wastewater by utilizing the natural physical, chemical, and biological processes that occur in the soil (Maier, etal.,2000). These natural mechanisms used to reduce contaminants include filtration, chemical absorption, and microbial activity (Metcalf and Eddy.1991). Water flow in unsaturated conditions is also an important factor in allowing sufficient treatment to occur. Unsatu-

rated flow allows for long residence times in the soil and provides the needed oxygen for microbial and chemical processes to treat wastewater. Drip dispersal systems are a method of introducing wastewater into the soil to maintain unsaturated flow conditions. Eventually saturated flow conditions will occur and gravity will move the treated water down through the soil profile. It is this gravity flow water that was captured in lysimeters and analyzed. The objective of this research was to determine changes in fecal coliform and fecal strep bacteria numbers with depth and changes in levels of BOD, ammonia nitrogen, nitrate nitrogen, and phosphorus with depth."

ADVANTAGES

The benefits to using Perc-Rite® drip dispersal are many. For the purposes of environmental protection, these include micro-dosing of the wastewater to spread the effluent evenly throughout the entire soil absorption system. For ease of design, the benefits include a pre-engineered system for flows up to 2,000 gpd; no pressure distribution calculations required; and long distances between the pump tank and drip field can easily be accommodated. For the installer the benefits include ease of installation; reduced fill, walls and tree removal; and all the components for the drip system are supplied in kit form.

RISKS

The risks associated with using drip dispersal to provide the wastewater into the ground are generally no greater than other types of leaching systems. Due to the shallow placement of the tubing, it is possible for the tubing to be cut during installation of planters, bird feeders or other features in the yard. These instances are exceedingly rare, but when they do occur, they are quickly fixed with a simple two-headed barbed fitting.

STATE APPROVALS

Attached are Perc-Rite® approvals for the following states, with recommended contacts:

Pennsylvania: Karen Fenchak Department of Environmental Protection PA 717-787-8184
Dr. Larry Hepner, Delaware Valley College, 215-489-2334

Delaware: Hillary Moore, Department of Natural Resources and Environmental Control, 302-739-4762 x168

Massachusetts: David Ferris, Department of Environmental Protection, 617-654-6514

New Hampshire: Paul L. Heirtzler, P.E., Administrator Wastewater Engineering Bureau, 603-271-3503

Additionally, the states of Vermont, Virginia, and Wisconsin have general drip dispersal design and approval criteria which require adherence to fundamental engineering standards. These standards are met or exceeded by the Perc-Rite drip dispersal system. These state approvals are also included for review.

SYSTEM DESIGN PARAMETERS

System sizing is to be based on the tubing linear loading rate, as derived from the Rules below.

(A) System Size	(B) Ft2 / Gal STE 240mg/l	(C) Ft2 / Gal 30mg/l	Maine Drip Loading Rates (D) 'Gal per Linear Ft. STE 240mg/l	(D) 30mg/l	(E) Gal per Ft2 (2' centers) STE 240mg/l	(E) 30mg/l
Small	2	1.00	0.67	1.33	0.33	0.67
Medium	2.6	1.30	0.51	1.02	0.26	0.51
Med. Large	3.3	1.65	0.40	0.81	0.20	0.40
Large	4.1	2.05	0.32	0.65	0.16	0.32
Xtra Large	5	2.50	0.27	0.53	0.13	0.27

(A) Per Table 600.1
(B) Per Table 600.1
(C) Per Table 603.1(50% REDUCTION)

(D) Based on 1.33' per Linear foot of tubing (porus pipe standard) *reflects GPD/Ft2 with one foot tubing centers.

(E) "D" divided by 2.

A Drip dispersal soil absorption area is to be sized based on the table below.

Maine Drip Loading Rates

'Gal per Linear Ft. STE 240mg/l	30mg/l	System Size
0.67	1.33	Small
0.51	1.02	Medium
0.40	0.81	Med. Large
0.32	0.65	Large
0.27	0.53	Xtra Large

These linear loading rates are to be used in lieu of the ft^2/gal loading rates in Table 600.1. The minimum length of tubing needed is the GPD divided by the linear loading rate above, assuming a minimum one foot on-center installation the linear loading rate above is equivalent to gal./ft^2/ day area (footprint) loading rate. Further separation of tubing maybe necessary as the site and design conditions may require.

DESIGN EXAMPLE -

Drip absorption areas are to be sized as: Total Flow in GPD / Gal.,linear foot per day = required linear feet of tubing.

The following example for a four-bedroom home illustrates the design parameters:

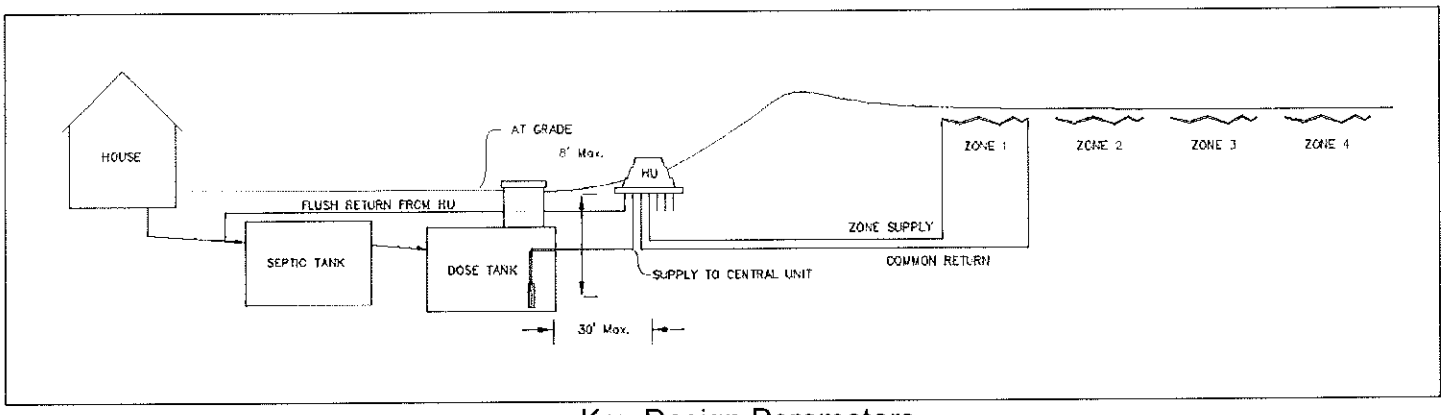
4 bedroom house = 360 gallons per day (gpd)
Medium Large System or .65 gallons per linear foot per day, pretreated effluent.

(360 gpd / .65 gal. Lin. ft ^{per} day) = 553'.

The minimum amount of tubing required would be 553' of tubing for this site.

Other critical design parameters to consider include:

1. The distance and elevation between the pump inlet and the Perc-Rite® Hydraulic Unit. These components must be placed no more than 30' apart and no more than 8' different in elevation in order to effectively complete the backflushing process.
2. Laterals are not recommended to exceed 300'.
3. Minimum tubing required per zone = 350 - 400'.



Key Design Parameters

LOCATIONS IN USE

The Perc-Rite® system has been used extensively throughout the country and in Canada. In New England, the system has been installed in about 25 locations in Massachusetts and Rhode Island. There are approximately 900 systems in Pennsylvania. Over 5,000 perc-rite drip dispersal systems have been installed and are in use over the past 15+ years.

OPERATION AND MAINTENANCE

The Perc-Rite® drip dispersal system is configured for easy operation and monitoring with a user- friendly interface on its control panel. Startup, operational monitoring, and routine troubleshooting / repair require the maintenance person to perform manual operation through standard toggle switches and flow meter verification. A Data Monitoring Sheet is completed for all operational monitoring visits to assure consistency and to record findings. Perc-Rite drip dispersal systems also use a comprehensive monitoring program developed by Carmody Systems, Inc. to track and report system activities. The database is a web-based system which enables certified maintenance entities to log in startup information, operational monitoring visits, and service events. This information may also be made available to the regulatory agency. Larger flow systems (ASD 25 and larger) include a remote operation and monitoring capability.

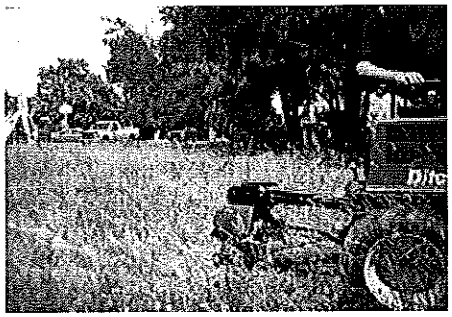
The recommended frequency for performing operational monitoring of the Perc-Rite® drip dispersal system is once each year. This standard applies to all installation situations, whether dispersing septic tank effluent or more highly treated wastewater.

Installation Requirements

The pump chamber is installed in accordance with standard practice as specified in the regulation.

The typical ASD-15 Hydraulic Unit is mounted on an aluminum skid which is 24" x 36" x 4" deep. The skid comes with a cover in most configurations. The Hydraulic Unit is to be placed at or within 4" of grade, then soil mounded around the cover for insulation. In some instances the skid may be buried into existing grade but the drain at the bottom must be equipped with piping to which has a discharge point to allow any accumulated surface water to be able to discharge. In all instances, there should be a minimum of 4" of gravel placed on the bottom of the skid for stability and drainage.

The tubing is typically installed with a vibratory plow, static plow, trencher, or by hand. The Perc-Rite® drip dispersal system lends itself to shallow installation (<30") with a 6-12" depth being preferred. Tubing is installed on contour and as flat as possible and tubing runs may be of varying lengths.



Traditionally, the preferred method of drip tubing installation is with a vibratory plow. There are two types of vibratory plows, those that pull the tubing, and those that lay the tubing. Both methods lend themselves well to shallow installations. A static plow pulls the tubing but without the vibratory action. Static plows are commonly used shallow at installations with coarser textured soils and flatter topography. Trenchers ("ditch witches") are utilized on a limited basis, typically in shallow installations on rocky sites or rooty sites. Manual (hand tool) installation is often indicated at sites with extensive specimen planting or many dense trees as installation can be achieved which protects the vegetation. Both trenching and manual installation are more time consuming than other methods.

Other methods, such as the utilization of rock saws maybe acceptable in some cases.

All pipes and fittings are made of Schedule 40 PVC. All joints must be sealed with an appropriate PVC cleaner and cement and all threaded fittings must have Teflon pipe tape or dope installed on the threads.

Air vent/vacuum breakers are required at the high point of every drip field zone and significantly uphill zone return lines. Air vents are to be installed in a valve box at least 6" below the surface and the valve boxes should be filled with gravel. Brass check valves are installed after each air release valve.

Electrical requirements for the system include: a dedicated 115V/230V 20 amp 1 ph. service with disconnect for the pump; a 115 volt 10 amp alarm service attached to a commonly used lighting circuit; and a pilot circuit for control and the 115 volt 450 watt heater circuit.

Has the product received National Sanitation Foundation or Canadian Standards Authority approval? ***NA***

[ ] No [ ] Yes (If "yes", enclose a copy of the certification.)

IMPORTANT NOTE!

Don't forget to enclose relevant product literature, engineering specifications, studies, and third party certifications with this application.

I, **Robert Mayer**, am the [x] applicant [ ] agent for the applicant of the subject product.
(print name)
I state that the information submitted is correct to the best of my knowledge and understand that any falsification is reason for the Department to deny registration for use of the product in Maine.

_____ August 4 , 2009

[X] Signature of Applicant Date
[ ] Signature of Agent for Applicant

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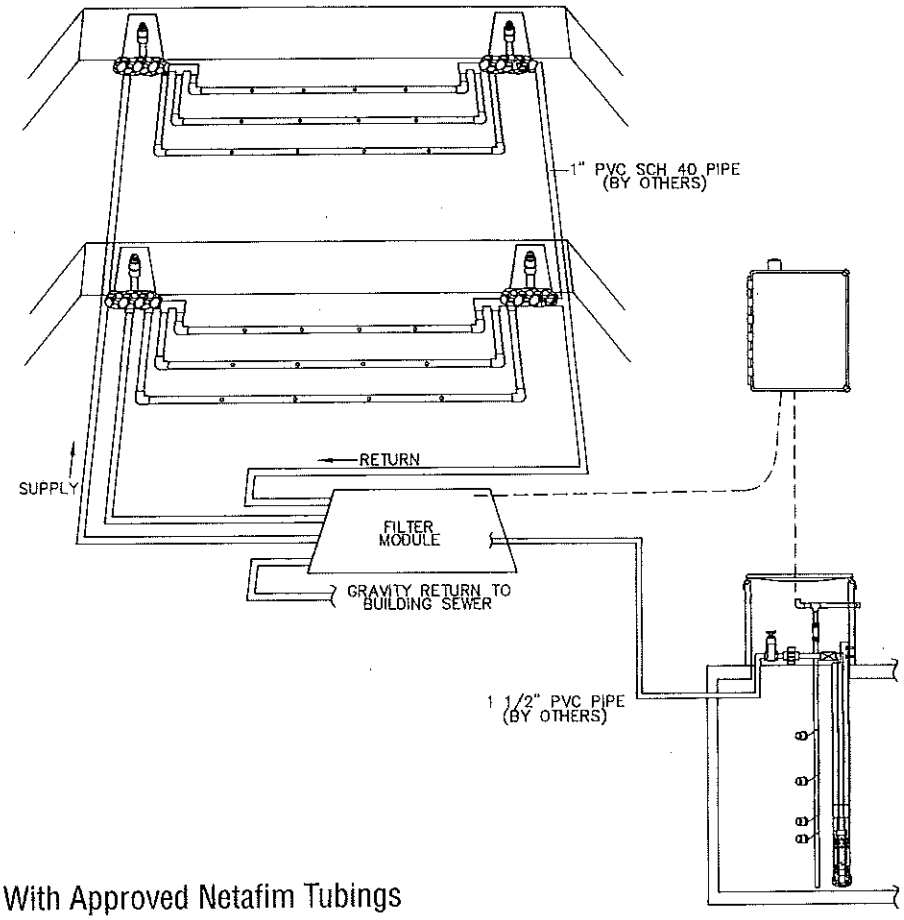
PERC-RITE® WASTEWATER DRIP DISPERSAL SYSTEMS

DESIGNERS' GUIDE



Use With Approved Netafim Tubings

PATENT NO. 5,200,065 PATENT NO. 5,984,574

PATENT NO. 6,261,452B1

Innovative Technology for the Environmental Age

American Manufacturing Company, Inc. 1-800-345-3132
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DESIGNERS' GUIDE

AMERICAN "PERC-RITE®"

WASTEWATER DRIP SYSTEMS

2 ZONE or 4 ZONE — SIMPLEX or DUPLEX

PATENT NO. 5,200,065, 5,984,574 and 6,261,452B1

CONTENTS

INTRODUCTION

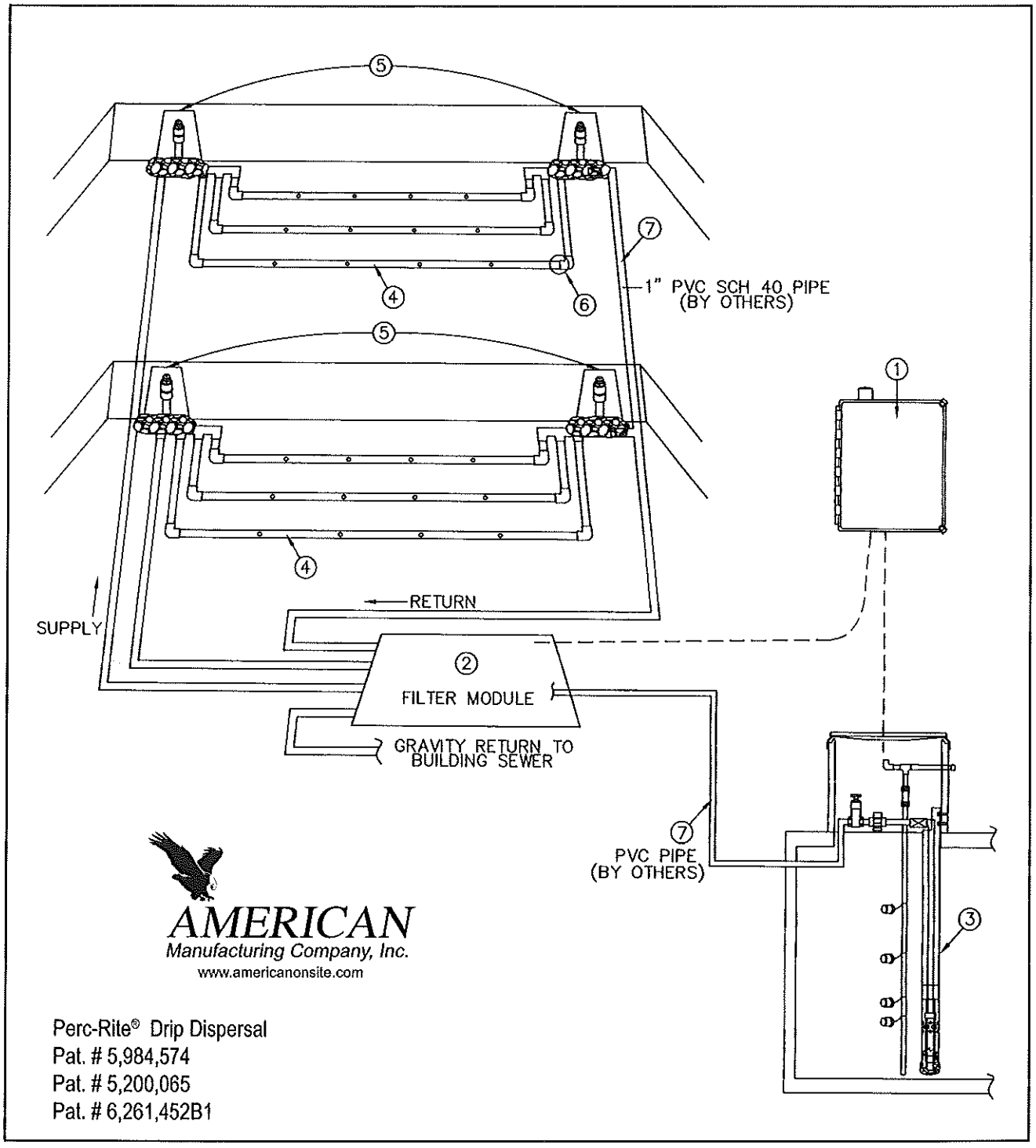
This ***Perc-Rite® Drip System Designers' Guide*** is for the non-engineer designer. Procedures have been developed to size, layout and design a ***Perc-Rite® Drip*** system using tables instead of performing extensive calculations. The tables have conditions which allow the designer considerable flexibility to layout systems in a variety of siting conditions without being required to do detailed engineering calculations to determine design suitability. When advanced system design is required, outside the limitations of this design procedure, the designer may reference the design manual located on our web site and complete a detailed calculation sheet to determine suitability. Reference ***"www.americanonsite.com".***

The ***Perc-Rite® Drip System*** is a unique fluid handling system for dispersal of effluent wastewater in soil systems. The system incorporates filtration, time and level controlled application and ultra low rate drip distribution. In conditions where aerobic dispersal, such as "Low Pressure Distribution", of septic effluent is required or where land application with the use of conventional soil absorption fields are not acceptable, this system offers a unique method for subsurface distribution of the waste water effluent.

State regulations require varying effluent treatment quality for onsite systems. ***Preconditioning Treatment requirements for Perc-Rite® Drip Systems*** are minimum. The process will accommodate virtually any type of pretreatment process, aerobic, lagoon, or any type of approved treatment facility. The removal of large settleable solids in sewage is necessary for the successful operation of the system. Local soil and site conditions may require additional treatment for excessive organics, oil and grease or other contaminants.

There is virtually *No Site Disturbance during* installation of the field distribution lines. Typical vibratory plow installation causes very little soil disturbance. The effluent discharge volume from each emitter hole is very small. The system has little site impact even in established lawns or park areas. After installation there are no visible indications that the installation site is being used for disposal. The system is especially suited for landscaped or wooded areas near buildings, trailer parks, apartment complexes or residential subdivisions.

TYPICAL LAYOUT



SYSTEM COMPONENTS

1. The **PERC-RITE® DRIP SYSTEM CONTROLLER** is a "state of the art" control panel, activated by level sensing devices (standard mechanical differential float switches) located in a dosing tank downstream from the pretreatment process or processes. When activated by the rising level of effluent in the dosing tank, the controller will enable the dose or dispersal. The system controller on a time clock basis will pump the effluent through the filter module and then to final drip dispersal. Patent No. 5,200,065.

2. **FILTER MODULE** - Disc filters, automatic control valves, solenoid activated diaphragm valves, and a flow meter are assembled in a enclosure (with optional heating) and provided with a labeled wire harness for easy connection to the control panel.

3. **PUMP SYSTEM** - The pump, Cool Guide™ (Patent No. 6,261,452B1) and float switches for level indication are provided for installation into the pump tank. The pump is a 15 gpm turbine pump and will be suitable for most residential installations. Reference **lift and distance table** for pumping limits.

4. **DRIPPER TUBING** - The dripper tubing is pressure compensating dripperline for wastewater. The tubing delivers a nominal 0.65 gallons per hour (+/- 5% flow rate from 7 to 60 psi). The tubing functions as a turbulent flow emitter between 0 and 7 psi, ensuring that the nominal design flow is not exceeded at system start-up. The tubing is polyethylene with a 120 psi pressure rating.

5. **TOP FEED MANIFOLD SYSTEM** - The Top Feed Manifolds are located at the highest point in the drip zone and are provided with air release valves to prevent drain down of upper laterals in the zone to lower laterals in the zone, thus preventing saturation of the lower laterals after the pump shuts off. The system provides for the fastest possible pressurization of the zone and the most efficient method of providing drain down control. If the site is flat, Top Feed Manifolds may not be required. Patent No. 5,984,574.

6. **DRIP FIELD MATERIALS** - All special drip fittings and equipment are supplied by American Manufacturing Company, Inc., including the tubing insert fittings, connectors, flex tube and non- schedule 40 PVC standard fittings.

7. **STANDARD FIELD MATERIALS** - All tanks, wire, standard pipe and fittings are provided by the contractor at the local site. The 1" supply and return pipes, the 1/2" pipe for installation between the top feed manifold system and the laterals and other miscellaneous PVC pipe are to be purchased locally.

DESIGN PROCEDURES

1. **DEMAND ANALYSIS** - Local codes determine the amount of wastewater to design for. Many codes have a safety factor or peak flow factor in the prescribed design flow. Others are based on more of an average usage. In either event, the designer must determine what the peak (design) flow is. The ***Perc-Rite® Drip System*** will disperse the average flow through out each day unless the "Peak " float is enabled, at which time the system will disperse effluent at an accelerated design daily flow rate. Record the number of bedrooms and the peak design flow on ***line 3*** of the worksheet.

2. **SITE AND SOILS EVALUATION** - Soil and site evaluation is required according to state and local criteria (see page 7). The design loading rate shall be expressed as the "area" and the linear feet of tubing required. The delineated area for installation, effluent quality and the installation depth need to be determined. Long and narrow runs along contour are best. The professional judgement of the evaluator and designer should be used in applying the regulation to determine the wastewater application rate for any specific site. Record the determined soil type on ***line 2*** and selected loading rate area on ***line 7*** of the worksheet.

3. **DELINEATE AREA** - On a site plan or a site sketch, the designer should lay out the area of installation on contour. The width along contour should be determined and this distance will determine the necessary down slope distance in order to allocate sufficient total area. The distance down slope will dictate the number of runs which can be installed in the dispersal site. Make sure enough runs can be installed for the total wastewater capacity and the amount of tubing required. Site conditions determine the run separation. Runs can vary from 1 to 3 feet of separation but are more frequently from 1-1/2 to 2 feet on center. The total linear feet of tubing required is recorded on ***line 9***.

4. **SELECT ZONE DETAIL** - Once the area and total tubing length is determined, enter the contour run length in worksheet ***line 4***. A standard zone detail is selected based on the width across contour and the total tubing length. Make sure the needed number of runs can be installed in the delineated area **(see Zone Detail Table)**. Record the selected zone detail on ***line 11.*** If there is not a zone detail with the exact run length, select a zone detail from the column with the next larger run length. Determine the minimum number of runs and record in ***line 10b***. Select the zone detail with the same or more number of runs. For Example, let's say a zone detail using a 15 GPM Standard Zone Detail Table that has 85' runs needs 1800 LF at 2' OC. The minimum runs = 22 (1800 LF tubing / 85 contour RL = 21.17, rounded up to 22 runs). Since there is no system available for 22, scroll down to 24 and record in ***line 10b*** under Spec. (Specified) # runs. The zone detail is a ***Z243*** and the installed spacing between runs will be 1.75' OC. The total linear feet is the number of runs for the selected zone detail times ***line 4***. Record the total linear feet per zone provided on ***line 13***. See the ***Zone Detail Table*** (either septic and secondary or secondary only). Also, see the ***Dosing & FF Flow Table.***

5. **LAYOUT SITE** - On a site plan or site sketch show the route for the supply and return pipes. Show the distance the supply and return pipes travel. On a site plan or site sketch show the location of the tanks, filter module and the control panel. Determine the length of supply line run and record on ***line 5***. Determine the lift to the field and record on ***line 6.***

6. **DETERMINE SUITABILITY** - Reference the ***Lift and Distance Table*** (page 11 or 13) and show the maximum lift on ***line 12*** (page 5). Using the pipe length to the farthest field (Supply/Return Line column) and the number of laterals, record the maximum static lift suitable for the 1" supply and return pipe on ***line 6***. If the maximum lift on ***line 12*** is greater than the lift recorded in ***line 6***, check "Yes" in ***line 15*** of the worksheet; otherwise, check "No".

PERC-RITE® WORKSHEET - Dispersal system design worksheet for residential systems.

Job Name:_____ Job No:_____

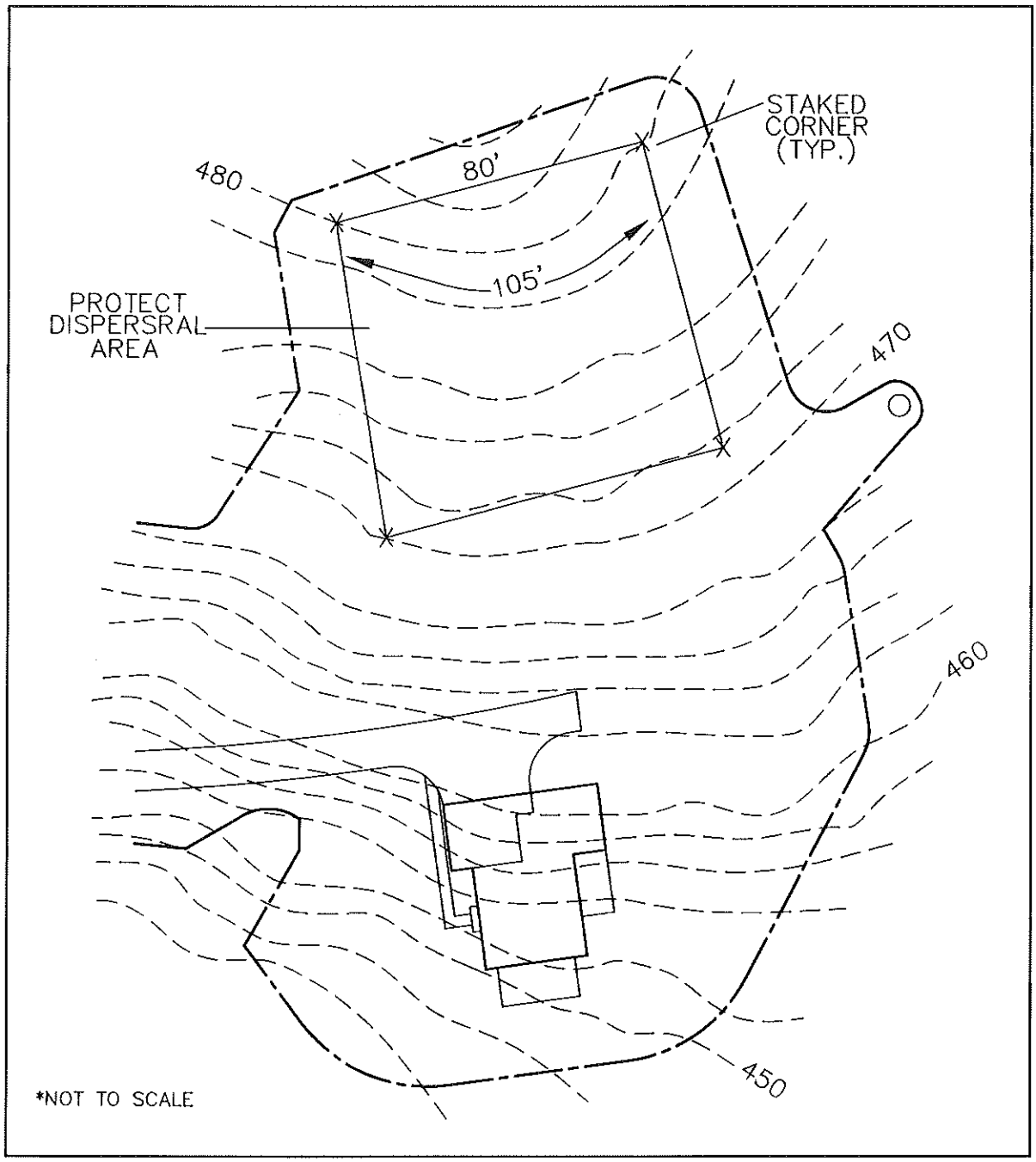
	Y ( ) N ( ) ( ) ( )	Are supply and return pipes 1"? Is the lift to the HU <8' and the run to the HU <30' with 1-1/2" pipe? Septic ( ) or Secondary ( ) ?
1	Anaerobic ( ) Aerobic ( )	Effluent Quality
2	_____ Soil Texture/ Structure	Found in column 1 on the Loading Rate Chart (page 7).
3a	_____ GPD	Design quantity of wastewater to disperse. (150 GPD per bedroom)
3b	_____ # Bedrooms	
4	_____ Contour Run Length	Enter the tubing run length. If run length is not on table, use the actual run length. Example:85 ft.
5	_____ Supply LF	Length of supply line between hydraulic unit and farthest zone.
6	_____ Lift ft.	Vertical lift from off level in the pump chamber and highest zone elevation.
7	_____ Area (gal/ ft²/day) per code	Area loading rate required to treat and disperse wastewater. (See Loading Rate Chart)
8	_____ Min. Area Calculation	Total land area needed to disperse wastewater. (line 3a / line 7)
9	_____ Total LF Tubing	Required total linear feet of tubing to treat and disperse wastewater. (line 8 / 2)
10a	_____ Calculated Runs	Number of runs (line 9 / line 4).
10b	_____ Min. # Runs	Round up to next whole number to determine Min. # Runs. Reference Zone Detail Table.
11	_____ Zone Detail	Select zone detail from column with next higher Contour Run Length (line 4) and with equal or greater # of Runs (line 10b).
12	_____ Max. Lift Allowed	Found on the Lift & Distance Table. Cross supply/return equal to line 5 with the appropriate number of laterals.
13	_____ LF Provided	Total linear feet of tubing provided to disperse wastewater. (# of zones x laterals per zone x runs per lateral x Contour Run Length)
14	_____ LF/Zone	Total linear feet of tubing per zone. (LF Provided / # of zones)
15	Will zone flush? Y ( ) N ( )	Reference Lift & Distance Table for pump capacity determined by the length of run to the farthest field and the number of laterals. For 1" supply and return only.

Designer:_____ Date:_____

AREA DELINEATION

A complete site evaluation includes a surface characterization of topographic features and horizontal setbacks, a subsurface (soil) evaluation, and the accurate delineation of the soil absorption area. This delineation is best performed by the site evaluator. The area should be marked and measured in the field to insure protection of the area and a representative final absorption area design. Tools required would include a measuring tape to dimension the site, stakes to delineate the area and a leveling device such as a builders level, lock level, or clinometer to determine contour.

Care should be exercised to insure accuracy on sites with limited area and those that are topographically complex. It is important to minimize site skewing, account for topographic contour wrapping and verify available area. The header ditch(es) area should be as perpendicular to topographic contour as possible.



NATIONAL
LOADING RATE CHART
For ***AMERICAN*** Perc-Rite® Drip Systems

SOIL LOADING RATE TABLE

This is based on a standard tubing spacing between runs of 2 feet on center. Therefore a typical area-loading rate would be a number that is one half the linear feet loading rate number. For example, for a 1.2 gallons/L.ft./day rate would be equivalent to 0.6 gallons/ft2/day. Spacing may be changed for specific site conditions. For example: a tubing-loading rate of 0.4 is an area load of 0.2. By placing the tubing 1' on center, the resulting area loading would be at 0.4, or 1/2 of the area. This can only be done with proper site and soil evaluation.

		ANAEROBIC		AEROBIC	
Soil Textures	**Soil Structure**	**Maximum Monthly Average BOD5 > 30mg/L BOD < 220mg/L**		**Maximum Monthly Average BOD5 < 30mg/L**	
		(gal./ft2/day)	**(gal./LF/day)**	**(gal./ft2/day)**	**(gal./LF/day)**
Coarse sand or coarser	N/A	.3 - .4	.6 - .8	.3 - 1.6	.6 - 3.2
Loamy coarse sand	N/A	.25 - .3	.5 - .6	.25 - 1.4	.5 - 2.8
Sand	N/A	.25 - .3	.5 - .6	.25 - 1.2	.5 - 2.4
Loamy sand	Weak to strong	.25 - .3	.5 - .6	.25 - 1.4	.5 - 2.4
Loamy sand	Massive	.15 - .2	.3 - .4	.15 - .7	.3 - 1.4
Fine sand	Moderate to strong	.25 - .3	.5 - .6	.25 - .9	.1 - 1.8
Fine sand	Massive or weak	.15 - .2	.3 - .4	.15 - 0.6	.3 - 1.2
Loamy fine sand	Moderate to strong	.2 - .3	.4 - 0.6	.2 - 0.9	.4 - 1.8
Loamy fine sand	Massive or weak	.15 - .2	.3 - .4	.15 - .6	.3 - 1.2
Very fine sand	N/A	.15 - .2	.3 - .4	.15 - .6	.3 - 1.2
Loamy very fine sand	N/A	.15 - 0.2	.3 - .4	.15 - .6	.3 - 1.2
Sandy loam	Moderate to strong	.15 - 0.2	.3 - .4	.15 - 1	.3 - 2
Sandy loam	Weak, weak platy	.15 - 0.2	.3 - .4	.15 - .6	.3 - 1.2
Sandy loam	Massive	< .1	< .2	.1 - .5	.2 - 1
Loam	Moderate to strong	.15 - .2	.3 - .4	.15 - .9	.3 - 1.8
Loam	Weak, weak platy	.1 - 0.2	.2 - .4	.1 - .6	.2 - 1.2
Loam	Massive	< .1	< .2	.1 - .5	.2 - 1
Silt loam	Moderate to strong	.15 - .2	.3 - .4	.15 - .8	.3 - 1.6
Silt loam	Weak, weak platy	< .1	< .2	.1 - .3	.2 - .6
Silt loam	Massive	0	0	.1 - .2	.2 - .4
Sandy clay loam	Moderate to strong	.15 - .2	.3 - .4	.15 - .6	.3 - 1.2
Clay loam	Weak, weak platy	< .1	< .2	.1 - .3	.2 - .6
Clay loam	Moderate to strong	.1 - .2	.2 - .4	.1 - .6	.2 - 1.2
Silty clay loam	Weak, weak platy	< .1	< .2	.1 - .3	.2 - .6
Silty clay loam	Massive	0	0	0	0
Silty clay loam	Moderate to strong	.1 - .2	.2 - .4	.1 - .6	.2 - 1.2
Sandy clay	Moderate to strong	< .1	< .2	.1 - .3	.2 - .6
Sandy clay	Massive to weak	0	0	0	0
Clay	Moderate to strong	< .1	< .2	.1 - .3	.2 - .6
Clay	Massive to weak	0	0	0	0
Silty clay	Moderate to strong	< .1	< .2	.1 - .3	.2 - .6
Silty clay	Massive to weak	0	0	0	0

Site suitability, loading rate, and installation depth determination must be assigned based on thorough site/soil evaluation. The characterization of a soil based receiver site involves a systematic evaluation by trained individuals. Conditions to consider consist of a variety of topographic and soil conditions such as landscape position, slope, soil depth, depth to water table, depth to restriction, soil consistence, clay mineralogy, compaction, density, and site geometry and uniformity.

Drip disposal lends itself to shallow installation. Typical depths are from 6-18", with 8-10" preferred and 18-24" installations infrequent. Separation to limitations should always be maximized while maintaining a consistent depth on contour in a permeable horizon.

Refer to state and local regulatory requirements for appropriate site suitability guidance.

ZONE DETAIL NUMBERING SYSTEM

Each zone is designated by a "Z" indicating it is a Zone Detail Designation followed by three groups of numbers, the first is the number of zones, the second is the number of laterals per zone, the third is the runs per lateral.

Z = Zone	# Zones	# Laterals	# Runs/Lat

EXAMPLE 1

Z	1	2	2
Z = Zone	# Zones	# Laterals	# Runs/Lat

This example shows a one zone detail with two laterals per zone and two runs per lateral.

ZONE DETAIL SELECTION PROCEDURE

Reference the site plan layout to determine the width across contour of the delineated area. From the site and soils evaluation determine the total amount of tubing required. The area divided by two is the total linear feet of tubing required. The total linear feet of tubing divided by the length across contour equals the minimum number of runs. The total number of linear feet of tubing and runs will typically be more than the minimum since the preferred layout for flushing the supply and return lines will typically result in more than the minimum tubing.

Increasing the number of runs in order to install a standard zone configuration is encouraged. This provides an additional safety factor to the tubing interface loading rate. Use the following step by step procedure to select a zone detail.

1. Determine width across contour.
2. Determining number of runs that can be installed in area.
3. Select a standard zone detail from under the column for contour with which has enough tubing to satisfy total tubing requirements.
4. In the event more runs are needed to yield enough tubing for the site, the tubing may be placed closer than 2' on center.

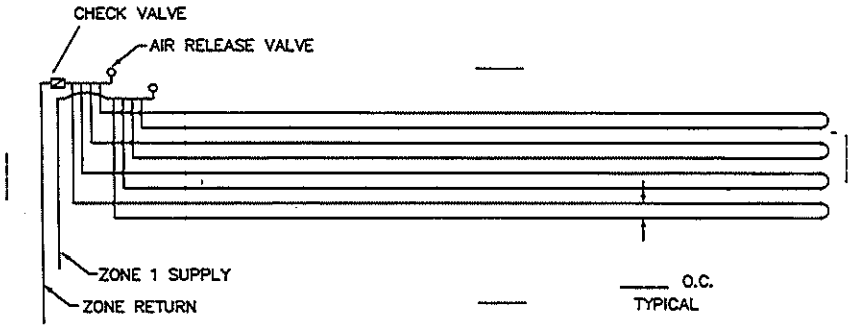
EXAMPLE 2
(Using 12gpm Semi Automatic Zone Detail Table on Page 12)
This configure does not work for the ASD 15

Contour width	=	100 Feet
Tubing required	=	700 Linear Feet

From the table, the linear feet of tubing provided in 100 foot runs will be between 600 LF and 800 LF. Therefore select 8 runs for 800 LF. The zone detail could be;

Z	1	4	2
Z = Zone	# Zones	# Laterals	# Runs/Lat

Z142



INSTALLATION INSTRUCTIONS

1. Prepare field location for installation. Verify contour and design. No wet weather installation. No activity on drainfield other than minimum to install system. Clearing of vegetation to be performed with minimal site disturbance. Do not park equipment or store materials on drainfield area.
2. Set pretreatment and pump tanks.
3. Dig header ditch for field manifold.
4. Install dripper tubing. Horizontal spacing between dripper lines shall be as specified and installation depth shall be as specified. Install on contour.
5. Install loops (flex tubing) and construct field supply / return manifolds. All PVC pipe and fittings shall be PVC SCH 40 type 1 rated for pressure applications. All glued joints shall be cleaned and primed with purple (dyed) PVC primer prior to being glued. All cutting of PVC pipe, flexible PVC and/or dripper tubing shall be accomplished with pipe cutters. Sawing of PVC pipe, flexible PVC and/or dripper tubing shall be followed by cleaning all shavings or sawing shall not be allowed. All open PVC pipe, flexible PVC and/or dripper tubing in the work area shall have the ends covered with duct tape during construction to prevent construction debris from entering the pipe. Prior to gluing all glue joints shall be inspected for and cleared of construction debris.
6. Dig ditches for conveyance lines, pump supply line, and flush return line. Install. Connect supply / return lines with manifolds.
7. Place Central Unit and mount control panel. Connect conveyance, supply, and flush return lines to hydraulic unit.
8. Set switch tree in pump tank.
9. Install electrical (and phone line if applicable). Check power supply and power up unit.
10. Provide one day volume of clean water for startup. Prior to startup of the drip disposal system the air release valves shall be removed and each zone in the system shall be flushed as follows: a) using an appropriate length of flexible PVC pipe with a male fitting attached to the air release connection to direct the flushing away from the construction are, b) flush the zone with a volume of water (clean water to be provided by contractor) equal to 1.5 times the volume of the pipes from the central unit to the air release valve, c) repeat this procedure for each zone (the flushing of the system is accomplished by manual override of the control panel by the manufacturer or engineer.) Once completed replace and glue air relief valves.

    If existing septic tanks are to be used, they shall be pumped out by a commercial septic tank pumper, checked for leakage or other problems, and replaced if necessary. After the tank is emptied, the tank shall be rinsed, pumped, and refilled with clean water. Debris in septic tank shall be kept to a minimum since it could clog the disk filters during startup. (Disk filters are not backflushed during startup and any clogging could cause incorrect rate of flow readings for the controller.)
11. Pressure check all fittings and lines. Inspect field and loops. Find leaks and repair.
12. Check setup values against calculated values. Set run time for Central Unit.
13. Backfill once lines and fields are determined to have no leaks. Back filling is to be controlled to prevent the damaging of pipes or fittings. Once completed, drainfield area should be graded to shed surface water with additional clean soil as necessary. Establish fescue or other turf cover, cut long (6-8").
14. In cold weather climates, installer should follow all "cold weather installation" techniques. Refer to local standards.

15 GPM AUTOMATIC PERC-RITE® DRIP SYSTEMS: ASD SERIES - SEPTIC OR SECONDARY EFFLUENT
STANDARD ZONE DETAIL TABLE

AMERICAN

Length Across Contour

RUN LENGTH #RUN	50´ ZD	50´ LF	75´ ZD	75´ LF	100´ ZD	100´ LF	125´ ZD	125´ LF	150´ ZD	150´ LF	200´ ZD	200´ LF	225´ ZD	225´ LF	250´ ZD	250´ LF	300´ ZD	300´ LF
4																	Z221	1200
5																		
6											Z231	1200	Z231	1350	Z231	1500	Z231 Z321	1800 1800
7																		
8									Z222	1200	Z241	1600	Z241	1800	Z241	2000	Z241	2400
9											Z331	1800	Z331	2025	Z331	2250	Z331	2700
10							Z251	1250	Z251	1500	Z251	2000	Z251	2250				
11																		
12					Z223 Z232	1200 1200	Z232	1500	Z232 Z322	1800 1800	Z341 Z431	2400 2400	Z341 Z431	2700 2700	Z341 Z431	3000 3000	Z341 Z431	3600 3600
13																		
14					Z271	1400												
15							Z351	1875	Z351	2250	Z351	3000	Z351	3375				
16			Z224	1200	Z242	1600	Z242	2000	Z242 Z422	2400 2400	Z441	3200	Z441	3600	Z441	4000	Z441	4800
17																		
18			Z233	1350	Z233 Z323	1800 1800	Z332	2250	Z332	2700								
19																		
20			Z252	1500	Z252	2000	Z451	2500	Z451	3000	Z451	4000	Z451	4500				
21					Z371	2100												
22																		
23																		
24	Z226	1200	Z234 Z324	1800 1800	Z243 Z342 Z423	2400 2400 2400	Z342 Z432	3000 3000	Z342 Z432	3600 3600								
25																		
26																		
27			Z333	2025	Z333	2700												
28	Z272	1400			Z471	2800												
29																		
30	Z235	1500	Z253 Z352	2250 2250	Z352	3000												
31																		
32	Z244	1600	Z244 Z424	2400 2400	Z442	3200	Z442	4000	Z442	4800								
33																		
34																		
35																		
36	Z236 Z326	1800 1800	Z334 Z433	2700 2700	Z343 Z433	3600 3600												
37																		
38																		
39																		
40	Z254	2000	Z452	3000	Z452	4000												
41																		
42	Z372	2100																
43																		
44																		
45	Z335	225	Z353	3375														
46																		
47																		
48	Z246 Z344	2400 2400	Z344 Z434	3600 3600	Z443	4800												

DOSING & FF FLOW TABLE (GPM)
15 GPM AUTOMATIC DRIP SYSTEMS: 24" EMITTER SPACING

LF/ ZONE	GPM DOSE RATE	FF NO. LATS	FF NO. LATS	FF NO. LATS	FF NO. LATS	FF NO. LATS	FF NO. LATS
		2	3	4	5	6	7
600	3.3	6.5	8.1	9.7	11.3	12.9	14.5
650	3.5	6.7	8.3	9.9	11.5	13.1	14.7
700	3.8	7.0	8.6	10.2	11.8	13.4	15.0
750	4.1	7.3	8.9	10.5	12.1	13.7	15.3
800	4.3	7.5	9.1	10.7	12.3	13.9	15.5
850	4.6	7.8	9.4	11.0	12.6	14.2	15.8
900	4.9	8.1	9.7	11.3	12.9	14.5	16.1
950	5.1	8.3	9.9	11.5	13.1	14.7	16.3
1000	5.4	8.6	10.2	11.8	13.4	15.0	16.6
1050	5.7	8.9	10.5	12.1	13.7	15.3	16.9
1100	6.0	9.2	10.8	12.4	14.0	15.6	17.2
1150	6.2	9.4	11.0	12.6	14.2	15.8	17.4
1200	6.5	9.7	11.3	12.9	14.5	16.1	17.7

PERC-RITE® LIFT AND DISTANCE TABLE

15 GPM AUTOMATIC DRIP SYSTEMS: 24" EMITTER SPACING

LIFT & DISTANCE TABLE INSTRUCTIONS

1. The vertical lift is the elevation difference between the "Off Level Float" and the highest point in any drip zone.
2. The supply/return line column is the distance from the filter to the farthest drip zone.
3. The diameter of the pipe from the pump tank to the filter unit is 1-1/2" minimum.
4. All zone supply and return pipes are 1".
5. The flush return pipe from the filter box to the pretreatment tank is 1-1/2" gravity.
6. The maximum distance from the pump tank to the filter valve box is 30' and the vertical lift from the pump chamber to the filter valve box is 8'.
7. These tables may be used with the appropriate Perc-Rite® zone detail table only. An engineering calculation sheet (not included herein) must be filled out for any other configuration.
8. Top feed manifolds must be used when any discernible slope is encountered.
9. Remote zone valves are needed when pumping downhill from the filter. For aid in this aplication call American Manufacturing.
10. Return pressure assembly is needed when lift from filters to zones is greater than 10'.

LIFT AND DISTANCE TABLE
15 GPM AUTOMATIC DRIP SYSTEMS: 24" EMITTER SPACING

Maximum Static Lift ("Off Level Float" to Drip Field)							
	Supply/						
1	Return Line	2-Lat	3-Lat	4-Lat	5-Lat	6-Lat	7-Lat
	(feet)	300'	300'	300'	240'	165'	100'
2							
3	100	98	88	75	74	79	77
4	150	96	84	69	66	70	68
5	200	94	81	63	58	61	59
6	250	92	77	57	51	52	49
7	300	90	73	50	43	44	40
8	350	88	70	44	35	35	31
9	400	86	66	38	27	26	21
10	450	84	63	32	19	17	
11	500	82	59	26	12		
12	550	80	55	20			
13	600	78	52	14			
14	650	76	48	8			
15	700	74	45	2			
16	750	72	41				
17	800	70	37				
18	850	68	34				
19	900	66	30				
20	950	64	27				
21	1000	62	23				

12 GPM SEMI-AUTOMATIC PERC-RITE® DRIP SYSTEMS: QUALITY MONITORING "QM" SERIES - SECONDARY EFFLUENT
STANDARD ZONE DETAIL TABLE

AMERICAN

Length Across Contour

RUN LENGTH	50'		75'		100'		125'		150'		200'		225'		250'		300'	
# RUNS	ZD	LF	ZD	LF	ZD	LF	ZD	LF	ZD	LF	ZD	LF	ZD	LF	ZD	LF	ZD	LF
2											Z121	400	Z121	450	Z121	500	Z121	600
3									Z131	450	Z131	600	Z131	675	Z131	750	Z131	900
4					Z122 Z141	400 400	Z122 Z141	500 500	Z122 Z141	600 600	Z141 Z221	800 800	Z141 Z221	900 900	Z141 Z221	1000 1000	Z221	1200
5					Z151	500	Z151	625	Z151	750								
6			Z123 Z132	450 450	Z123 Z132	600 600	Z132	750	Z132 Z231	900 900	Z231	1200	Z231	1350	Z231	1500	Z231	1800
7																		
8	Z124 Z142	400 400	Z124 Z142	600 600	Z142 Z222 Z241	800 800 800	Z142 Z222 Z241	1000 1000 1000	Z222 Z241	1200 1200	Z241	1600	Z241	1800	Z241	2000		
9	Z133	450	Z133	675	Z133	900												
10	Z125 Z152	500 500	Z152	750	Z251	1000	Z251	1250	Z251	1500								
11																		
12	Z126 Z134 Z143	600 600 600	Z134 Z143 Z223 Z232	900 900 900 900	Z223 Z232	1200 1200	Z232	1500	Z232	1800								
13																		
14																		
15	Z135 Z153	750 750																
16	Z144 Z224 Z242	800 800 800	Z224 Z242	1200 1200	Z242	1600	Z242	2000										
17																		
18	Z136 Z233	900 900	Z233	1350	Z233	1800												
19																		
20	Z145 Z225 Z252	1000 1000 1000	Z252	1500														
22																		
24	Z226 Z234 Z243	1200 1200 1200	Z234 Z243	1800 1800														
26																		
28																		
30	Z235 Z253	1500 1500																
32	Z244	1600																
34																		
36	Z236	1800																
38																		
40	Z245	2000																

DOSING & FF FLOW TABLE (GPM)
12 GPM SEMI-AUTOMATIC DRIP SYSTEMS: 24" EMITTER SPACING

	GPM	FF	FF	FF	FF
LF/ZONE	DOSE RATE	NO. LATS.	NO. LATS.	NO. LATS.	NO. LATS.
		2	3	4	5
400	2.2	5.4	7.0	8.6	10.2
450	2.4	5.6	7.2	8.8	10.4
500	2.7	5.9	7.5	9.1	10.7
550	3.0	6.2	7.8	9.4	11.0
600	3.3	6.5	8.1	9.7	11.3
625	3.4	6.6	8.2	9.8	11.4
650	3.5	6.7	8.3	9.9	11.5
675	3.7	6.9	8.5	10.1	11.7
700	3.8	7.0	8.6	10.2	11.8
750	4.1	7.3	8.9	10.5	12.1
800	4.3	7.5	9.1	10.7	12.3
850	4.6	7.8	9.4	11.0	12.6
900	4.9	8.1	9.7	11.3	12.9
950	5.1	8.3	9.9	11.5	13.1
1000	5.4	8.6	10.2	11.8	13.4

PERC-RITE® LIFT AND DISTANCE TABLE

12 GPM SEMI-AUTOMATIC DRIP SYSTEMS: 24" EMITTER SPACING

LIFT & DISTANCE TABLE INSTRUCTIONS

1. The vertical lift is the elevation difference between the "Off Level Float" and the highest point in any drip zone.
2. The supply/return line column is the distance from the filter to the farthest drip zone.
3. The diameter of the pipe from the pump tank to the filter unit is 1-1/2" minimum.
4. All zone supply and return pipes are 1".
5. The flush return pipe from the filter box to the pretreatment tank is 1-1/2" gravity.
6. The maximum distance from the pump tank to the filter valve box is 30' and the vertical lift from the pump chamber to the filter valve box is 8'.
7. These tables may be used with the appropriate Perc-Rite® zone detail table only. An engineering calculation sheet (not included herein) must be filled out for any other configuration.
8. Top feed manifolds must be used when any discernible slope is encountered.
9. Remote zone valves are needed when pumping downhill from the filter. For aid in this aplication call American Manufacturing.
10. Return pressure assembly is needed when lift from filters to zones is greater than 10'.

LIFT AND DISTANCE TABLE
12 GPM SEMI-AUTOMATIC PERC-RITE® DRIP SYSTEMS: 24" EMITTER SPACING
Maximum Static Lift ("Off Level Float" to Drip Field)

Table A:
STANDARD 12 GPM QM LIFT & DISTANCE TABLE

1	Supply/ Return Line (feet)	2-Lat 300'	3-Lat 300'	4-Lat 250'	5-Lat 150'
2					
3	100	100	83	78	86
4	150	98	80	73	80
5	200	96	76	68	74
6	250	94	72	62	68
7	300	92	69	57	63
8	350	90	65	52	57
9	400	88	62	46	51
10	450	86	58	41	45
11	500	84	54	36	39
12	550	82	51	30	
13	600	80	57	25	
14	650	78	44	20	
15	700	76	40	15	
16	750	74	36	9	
17	800	72	33	**Note:**	
18	850	70	29	**Use Table B**	
19	900	68	26	**when using**	
20	950	66	22	**Hydro Seq**	
21	1000	64	18	**Valve**	

Table B:
12 GPM QM w/ HYDRO SEQ DISTRIBUTING VALVE

1	Supply/ Return Line (feet)	2-Lat 300'	3-Lat 300'	4-Lat 250'	5-Lat 150'
2					
3	100	61	61	61	61
4	150	58	58	58	58
5	200	56	56	56	56
6	250	53	53	53	53
7	300	50	50	50	50
8	350	47	47	47	47
9	400	44	44	44	44
10	450	42	42	36	42
11	500	39	39	31	39
12	550	36	36	25	
13	600	33	33	20	
14	650	30	30	15	
15	700	28	28	10	
16	750	25	25	4	
17	800	22	22	**Note:**	
18	850	19	19	**Use this table**	
19	900	16	16	**when using**	
20	950	14	14	**Hydro Seq**	
21	1000	11	11	**Valve**	

RUN TIME TABLES: 15 GPM AUTOMATIC PERC-RITE® DRIP SYSTEMS

The run time tables are based on the gallons per day the system is designed for. The run time numbers are based on the **average daily flow rate.** Selecting the run time is the last design step that is performed. Based on the number of zones and the number of laterals per zone, the run time is selected based on the average gallons per day. For even distribution and minimizing draindown events, the run time is calculated to provide from **3 to 5 times the volume of drip tubing** plus the top feed manifolds. Therefore, the number of doses per day per zone will vary in order to maintain optimum dispersal.

American Manufacturing 2-Zone								3-Zone							4-Zone						
Laterals/Zone:		2-Lat	3-Lat	4-Lat	5-Lat	6-Lat	7-Lat	2-Lat	3-Lat	4-Lat	5-Lat	6-Lat	7-Lat		2-Lat	3-Lat	4-Lat	5-Lat	6-Lat	7-Lat
Lateral Length:		300'	300'	300'	240'	165'	100'	300'	300'	300'	240'	165'	100'		300'	300'	300'	240'	165'	100'
Design GPD	Avg. GPD	3.25 Min/ Dose	4.875 Min/ Dose	6.5 Min/ Dose	6.5 Min/ Dose	5.4 Min/ Dose	3.8 Min/ Dose	3.25 Min/ Dose	4.875 Min/ Dose	6.5 Min/ Dose	6.5 Min/ Dose	5.4 Min/ Dose	3.8 Min/ Dose		3.25 Min/ Dose	4.875 Min/ Dose	6.5 Min/ Dose	6.5 Min/ Dose	5.4 Min/ Dose	3.8 Min/ Dose
300	**180**	7.48	7.69	5.53	5.41	6.51	5.35	7.48	10.76	7.84	7.72	9.30	5.35		12.10	7.69	5.53	5.41	6.51	9.31
320	**192**	5.64	8.30	6.00	5.87	7.07	5.88	8.10	11.58	8.46	8.33	10.05	5.88		5.64	8.30	6.00	5.87	7.07	10.10
340	**204**	6.10	8.92	6.46	6.33	7.63	6.41	8.71	12.40	9.07	8.95	10.80	6.41		6.10	8.92	6.46	6.33	7.63	10.89
360	**216**	6.56	5.84	6.92	6.79	8.18	4.56	5.64	5.84	9.69	9.56	11.54	6.93		6.56	9.53	6.92	6.79	8.18	4.56
380	**228**	7.02	6.25	7.38	7.25	5.20	4.96	6.05	6.25	10.30	10.18	5.20	7.46		7.02	10.15	7.38	7.25	8.74	4.96
400	**240**	7.48	6.66	7.84	7.72	5.57	5.35	6.46	6.66	10.92	10.79	5.57	7.99		7.48	10.76	7.84	7.72	9.30	5.35
420	**252**	7.95	7.07	8.30	8.18	5.95	5.75	6.87	7.07	11.53	11.41	5.95	4.82		7.95	11.38	8.30	8.18	9.86	5.75
440	**264**	8.41	7.48	8.76	8.64	6.32	6.14	7.28	7.48	12.15	12.02	6.32	5.18		8.41	11.99	8.76	8.64	10.42	6.14
450	**270**	8.64	7.69	9.00	8.87	6.51	6.34	7.48	7.69	12.46	12.33	6.51	5.35		8.64	12.30	9.00	8.87	10.70	6.34
460	**276**	8.87	7.89	5.69	9.10	6.69	6.54	7.69	7.89	12.76	12.64	6.69	5.53		8.87	12.61	9.23	9.10	10.98	6.54
480	**288**	9.33	5.84	6.00	5.87	7.07	6.93	5.64	8.30	6.00	5.87	7.07	5.88		5.64	5.84	9.69	9.56	11.54	6.93
500	**300**	9.79	6.15	6.30	6.18	7.44	7.33	5.95	8.71	6.30	6.18	7.44	6.23		5.95	6.15	10.15	10.02	12.10	7.33
520	**312**	10.25	6.46	6.61	6.48	5.39	7.73	6.25	5.57	6.61	6.48	7.81	6.58		6.25	6.46	10.61	10.48	5.39	7.73
540	**324**	10.71	6.76	6.92	6.79	5.67	8.12	6.56	5.84	6.92	6.79	8.18	4.56		6.56	6.76	11.07	10.95	5.67	4.56
560	**336**	11.18	7.07	7.23	7.10	5.95	8.52	6.87	6.11	7.23	7.10	8.56	4.82		6.87	7.07	11.53	11.41	5.95	4.82
580	**348**	11.64	7.38	7.53	7.41	6.23	8.91	7.18	6.39	7.53	7.41	5.33	5.09		7.18	7.38	12.00	11.87	6.23	5.09
600	**360**	12.10	7.69	7.84	7.72	6.51	9.31	7.48	6.66	7.84	7.72	5.57	5.35		7.48	7.69	12.46	12.33	6.51	5.35
620	**372**	12.56	7.99	5.76	5.64	6.79	9.70	7.79	6.93	8.15	8.02	5.82	5.62		5.41	7.99	5.76	5.64	6.79	5.62
640	**384**	13.02	8.30	6.00	5.87	7.07	10.10	8.10	7.21	8.46	8.33	6.07	5.88		5.64	8.30	6.00	5.87	7.07	5.88
660	**396**	13.48	8.61	6.23	6.10	7.35	10.49	8.41	7.48	8.76	8.64	6.32	6.14		5.87	8.61	6.23	6.10	7.35	6.14
680	**408**	13.95	8.92	6.46	6.33	7.63	10.89	8.71	7.75	9.07	8.95	6.57	6.41		6.10	8.92	6.46	6.33	7.63	6.41
700	**420**	14.41	9.22	6.69	6.56	7.90	11.29	9.02	5.63	5.79	5.66	6.82	6.67		6.33	5.63	6.69	6.56	7.90	6.67
720	**432**	14.87	9.53	6.92	6.79	8.18	11.68	9.33	5.84	6.00	5.87	7.07	6.93		6.56	5.84	6.92	6.79	8.18	4.56
750	**450**	15.56	9.99	7.26	7.14	8.60	12.28	9.79	6.15	6.30	6.18	7.44	7.33		6.91	6.15	7.26	7.14	8.60	4.86
Total LF in		1200	1200	1200	1200	990	700	1200	1200	1200	1200	990	700		1200	1200	1200	1200	1200	990

STANDARD & PEAK REST TIMES TO BE SET AT SYSTEM START-UP

		2 ZONE Rest Time Standard (min)	2 ZONE Rest Time Peak (min)	3 ZONES Rest Time Standard (min)	3 ZONES Rest Time Peak (min)	4 ZONES Rest Time Standard (min)	4 ZONES Rest Time Peak (min)
4	Doses/day/zone	180	108	120	72	90	54
3	Doses/day/zone	240	144	160	96	120	72
2	Doses/day/zone	360	216	240	144	180	108
1	Doses/day/zone	720	432	480	288	360	216

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PERC-RITE® LIFT AND DISTANCE TABLE

12 GPM SEMI-AUTOMATIC DRIP SYSTEMS: 24" EMITTER SPACING

LIFT & DISTANCE TABLE INSTRUCTIONS

1. The vertical lift is the elevation difference between the "Off Level Float" and the highest point in any drip zone.
2. The supply/return line column is the distance from the filter to the farthest drip zone.
3. The diameter of the pipe from the pump tank to the filter unit is 1-1/2" minimum.
4. All zone supply and return pipes are 1".
5. The flush return pipe from the filter box to the pretreatment tank is 1-1/2" gravity.
6. The maximum distance from the pump tank to the filter valve box is 30' and the vertical lift from the pump chamber to the filter valve box is 8'.
7. These tables may be used with the appropriate Perc-Rite® zone detail table only. An engineering calculation sheet (not included herein) must be filled out for any other configuration.
8. Top feed manifolds must be used when any discernible slope is encountered.
9. Remote zone valves are needed when pumping downhill from the filter. For aid in this aplication call American Manufacturing.
10. Return pressure assembly is needed when lift from filters to zones is greater than 10'.

LIFT AND DISTANCE TABLE
12 GPM SEMI-AUTOMATIC PERC-RITE® DRIP SYSTEMS: 24" EMITTER SPACING
Maximum Static Lift ("Off Level Float" to Drip Field)

Table A:
STANDARD 12 GPM QM LIFT & DISTANCE TABLE

1	Supply/ Return Line (feet)	2-Lat 300'	3-Lat 300'	4-Lat 250'	5-Lat 150'
2					
3	100	100	83	78	86
4	150	98	80	73	80
5	200	96	76	68	74
6	250	94	72	62	68
7	300	92	69	57	63
8	350	90	65	52	57
9	400	88	62	46	51
10	450	86	58	41	45
11	500	84	54	36	39
12	550	82	51	30	
13	600	80	57	25	
14	650	78	44	20	
15	700	76	40	15	
16	750	74	36	9	
17	800	72	33	**Note:**	
18	850	70	29	**Use Table B**	
19	900	68	26	**when using**	
20	950	66	22	**Hydro Seq**	
21	1000	64	18	**Valve**	

Table B:
12 GPM QM w/ HYDRO SEQ DISTRIBUTING VALVE

1	Supply/ Return Line (feet)	2-Lat 300'	3-Lat 300'	4-Lat 250'	5-Lat 150'
2					
3	100	61	61	61	61
4	150	58	58	58	58
5	200	56	56	56	56
6	250	53	53	53	53
7	300	50	50	50	50
8	350	47	47	47	47
9	400	44	44	44	44
10	450	42	42	36	42
11	500	39	39	31	39
12	550	36	36	25	
13	600	33	33	20	
14	650	30	30	15	
15	700	28	28	10	
16	750	25	25	4	
17	800	22	22	**Note:**	
18	850	19	19	**Use this table**	
19	900	16	16	**when using**	
20	950	14	14	**Hydro Seq**	
21	1000	11	11	**Valve**	

RUN TIME TABLES: 15 GPM AUTOMATIC PERC-RITE® DRIP SYSTEMS

The run time tables are based on the gallons per day the system is designed for. The run time numbers are based on the **average daily flow rate.** Selecting the run time is the last design step that is performed. Based on the number of zones and the number of laterals per zone, the run time is selected based on the average gallons per day. For even distribution and minimizing draindown events, the run time is calculated to provide from **3 to 5 times the volume of drip tubing** plus the top feed manifolds. Therefore, the number of doses per day per zone will vary in order to maintain optimum dispersal.

American Manufacturing 2-Zone								3-Zone								4-Zone							
Laterals/Zone:		2-Lat	3-Lat	4-Lat	5-Lat	6-Lat	7-Lat		2-Lat	3-Lat	4-Lat	5-Lat	6-Lat	7-Lat		2-Lat	3-Lat	4-Lat	5-Lat	6-Lat	7-Lat		
Lateral Length:		300'	300'	300'	240'	165'	100'		300'	300'	300'	240'	165'	100'		300'	300'	300'	240'	165'	100'		
Design GPD	Avg. GPD	3.25 Min/ Dose	4.875 Min/ Dose	6.5 Min/ Dose	6.5 Min/ Dose	5.4 Min/ Dose	3.8 Min/ Dose		3.25 Min/ Dose	4.875 Min/ Dose	6.5 Min/ Dose	6.5 Min/ Dose	5.4 Min/ Dose	3.8 Min/ Dose		3.25 Min/ Dose	4.875 Min/ Dose	6.5 Min/ Dose	6.5 Min/ Dose	5.4 Min/ Dose	3.8 Min/ Dose		
300	**180**	7.48	7.69	5.53	5.41	6.51	5.35		7.48	10.76	7.84	7.72	9.30	5.35		12.10	7.69	5.53	5.41	6.51	9.31		
320	**192**	5.64	8.30	6.00	5.87	7.07	5.88		8.10	11.58	8.46	8.33	10.05	5.88		5.64	8.30	6.00	5.87	7.07	10.10		
340	**204**	6.10	8.92	6.46	6.33	7.63	6.41		8.71	12.40	9.07	8.95	10.80	6.41		6.10	8.92	6.46	6.33	7.63	10.89		
360	**216**	6.56	5.84	6.92	6.79	8.18	4.56		5.64	5.84	9.69	9.56	11.54	6.93		6.56	9.53	6.92	6.79	8.18	4.56		
380	**228**	7.02	6.25	7.38	7.25	5.20	4.96		6.05	6.25	10.30	10.18	5.20	7.46		7.02	10.15	7.38	7.25	8.74	4.96		
400	**240**	7.48	6.66	7.84	7.72	5.57	5.35		6.46	6.66	10.92	10.79	5.57	7.99		7.48	10.76	7.84	7.72	9.30	5.35		
420	**252**	7.95	7.07	8.30	8.18	5.95	5.75		6.87	7.07	11.53	11.41	5.95	4.82		7.95	11.38	8.30	8.18	9.86	5.75		
440	**264**	8.41	7.48	8.76	8.64	6.32	6.14		7.28	7.48	12.15	12.02	6.32	5.18		8.41	11.99	8.76	8.64	10.42	6.14		
450	**270**	8.64	7.69	9.00	8.87	6.51	6.34		7.48	7.69	12.46	12.33	6.51	5.35		8.64	12.30	9.00	8.87	10.70	6.34		
460	**276**	8.87	7.89	5.69	9.10	6.69	6.54		7.69	7.89	12.76	12.64	6.69	5.53		8.87	12.61	9.23	9.10	10.98	6.54		
480	**288**	9.33	5.84	6.00	5.87	7.07	6.93		5.64	8.30	6.00	5.87	7.07	5.88		5.64	5.84	9.69	9.56	11.54	6.93		
500	**300**	9.79	6.15	6.30	6.18	7.44	7.33		5.95	8.71	6.30	6.18	7.44	6.23		5.95	6.15	10.15	10.02	12.10	7.33		
520	**312**	10.25	6.46	6.61	6.48	5.39	7.73		6.25	5.57	6.61	6.48	7.81	6.58		6.25	6.46	10.61	10.48	5.39	7.73		
540	**324**	10.71	6.76	6.92	6.79	5.67	8.12		6.56	5.84	6.92	6.79	8.18	4.56		6.56	6.76	11.07	10.95	5.67	4.56		
560	**336**	11.18	7.07	7.23	7.10	5.95	8.52		6.87	6.11	7.23	7.10	8.56	4.82		6.87	7.07	11.53	11.41	5.95	4.82		
580	**348**	11.64	7.38	7.53	7.41	6.23	8.91		7.18	6.39	7.53	7.41	5.33	5.09		7.18	7.38	12.00	11.87	6.23	5.09		
600	**360**	12.10	7.69	7.84	7.72	6.51	9.31		7.48	6.66	7.84	7.72	5.57	5.35		7.48	7.69	12.46	12.33	6.51	5.35		
620	**372**	12.56	7.99	5.76	5.64	6.79	9.70		7.79	6.93	8.15	8.02	5.82	5.62		5.41	7.99	5.76	5.64	6.79	5.62		
640	**384**	13.02	8.30	6.00	5.87	7.07	10.10		8.10	7.21	8.46	8.33	6.07	5.88		5.64	8.30	6.00	5.87	7.07	5.88		
660	**396**	13.48	8.61	6.23	6.10	7.35	10.49		8.41	7.48	8.76	8.64	6.32	6.14		5.87	8.61	6.23	6.10	7.35	6.14		
680	**408**	13.95	8.92	6.46	6.33	7.63	10.89		8.71	7.75	9.07	8.95	6.57	6.41		6.10	8.92	6.46	6.33	7.63	6.41		
700	**42**	14.41	9.22	6.69	6.56	7.90	11.29		9.02	5.63	5.79	5.66	6.82	6.67		6.33	5.63	6.69	6.56	7.90	6.67		
720	**43**	14.87	9.53	6.92	6.79	8.18	11.68		9.33	5.84	6.00	5.87	7.07	6.93		6.56	5.84	6.92	6.79	8.18	4.56		
750	**45**	15.56	9.99	7.26	7.14	8.60	12.28		9.79	6.15	6.30	6.18	7.44	7.33		6.91	6.15	7.26	7.14	8.60	4.86		
Total LF in		1200	1200	1200	1200	990	700		1200	1200	1200	1200	990	700		1200	1200	1200	1200	1200	990		

STANDARD & PEAK REST TIMES TO BE SET AT SYSTEM START-UP

		2 ZONE Rest Time Standard (min)	2 ZONE Rest Time Peak (min)	3 ZONES Rest Time Standard (min)	3 ZONES Rest Time Peak (min)	4 ZONES Rest Time Standard (min)	4 ZONES Rest Time Peak (min)
4	Doses/day/zone	180	108	120	72	90	54
3	Doses/day/zone	240	144	160	96	120	72
2	Doses/day/zone	360	216	240	144	180	108
1	Doses/day/zone	720	432	480	288	360	216

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DESIGN SUBMITTAL PROCEDURES

Design and submittal of a Perc-Rite® system is very simple using the following procedures;

1. Fill out design submittal form for jurisdiction. The form may be generic, state adjusted, or locally required.
2. Provide a separate site plan or sketch.
3. Print out determined zone detail.
4. Submit the proper number of copies to the jurisdiction of authority.

AMERICAN MANUFACTURING COMPANY - DATA CENTER

ONLINE WARRANTY REGISTRATION

American provides online warranty tracking and regulatory reporting. You must be an authorized user to access this feature. Go to *www.americanonsite.com*, then click on Data Center at the bottom of the menu on the left. The Data Center can be used by service providers to keep up-to-date information on all systems. It is user friendly and easily accessible anywhere an internet connection is available.

REQUIRED FIELDS FOR WARRANTY REGISTRATION

1. COUNTY
2. SYSTEM TRACKING NUMBER (SAME AS SERIAL NUMBER)
3. NAME
4. PHONE NUMBER
5. ADDRESS
6. CITY
7. STATE
8. ZIP CODE
9. LOCALE
10. TYPE OF PERMIT
11. SYSTEM COMPONENTS
12. FINAL INSPECTION DATE
13. SERVICE PROVIDER
14. FLOW METER READING

WARRANTY

AMERICAN MANUFACTURING LIMITED WARRANTY For one year (12 months) after the date of purchase, American Manufacturing Company, Inc. will repair or replace any product or portion thereof which proves to be defective due to materials or workmanship of American Manufacturing. We reserve the right to repair or replace defective materials at our discretion. This warranty does not cover the following conditions:

1. Defects or problems caused by improper installation or maintenance of materials.

2. Abuse, neglect or accidental damage of products.

3. Normal maintenance or upkeep of products.

4. Lightning, war, floods, or other acts beyond our control.

5. Misapplication of our products for their designed purpose, or misapplication according to local, state or national codes when in effect.

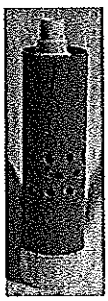
Defective or warranted materials must be returned to us or a place designated by American Manufacturing. All returns must be accompanied by a return authorization number supplied by American Manufacturing.

American Manufacturing will in no way be responsible for any losses or damages incurred by failure of equipment, parts or service. NOTE: Some states do not allow exclusion of damages so this may not apply to you. There are no other warranties written or implied.

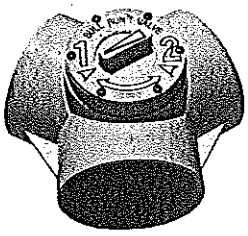
AMERICAN MANUFACTURING Company, Inc.

www.americanonsite.com

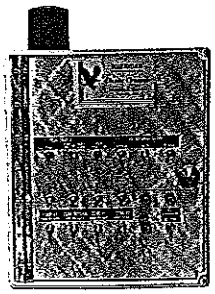
American Manufacturing Company, Inc. manufactures many specialty Onsite Wastewater products including the **Cool Guide™, Bull Run® Valve, Dial-A-Flow™, Distribution Boxes, Perc-Rite® drip equipment, Timer Controls, Accessories, etc.** American also supplies as an Original Equipment Manufacturer (OEM) with many other products unique to the Onsite Industry.



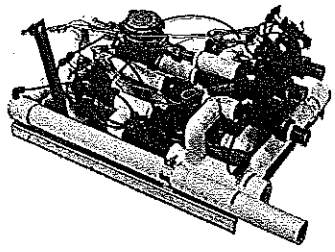
Cool Guide™



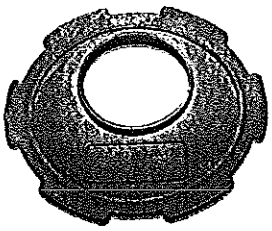
Bull Run™ Valve



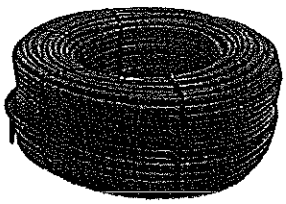
Control Panels



Hydraulic Unit



Dial-A-Flow™



Drip Tubing

Toll Free: *1-800-345-3132*

P.O. Box 97, Elkwood, VA 22718

Dealer Manual

Installation Supplement

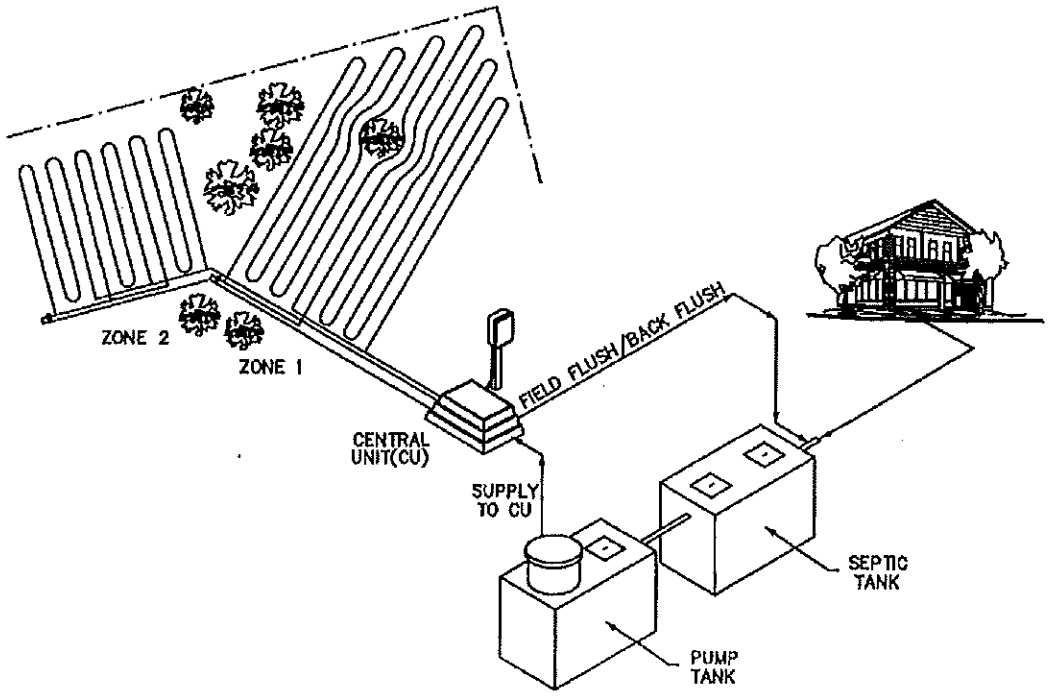
AMERICAN "PERC-RITE®"

WASTEWATER DRIP SYSTEMS

2 ZONE or 4 ZONE

SIMPLEX or DUPLEX

PATENT NO. 5,200,065



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AMERICAN MANUFACTURING COMPANY INC.
5517 WELLINGTON ROAD, GAINESVILLE, VA. 20155
1-800-345-3132

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IMPORTANT NOTICE

This Dealer Manual is intended to give general information and guidance to authorized dealers and other qualified installers. The installer must determine the suitability of an American Manufacturing Company Septic Drip Disposal System for sewage disposal regarding basic design and layout and how the system functions in a specific site. The final decision as to the suitability of a system must be made by the designer. Suitability should be based on consideration of the general standards and information contained herein as well as other applicable waste disposal reference materials, specific topography, soil characteristics, space limitations, and other factors associated with a particular project. Consequently, American Manufacturing Company, Inc., a Virginia corporation, shall not be held liable in any manner to design engineers and other designers or installers of sewage disposal systems for claims arising from the use of the information contained herein nor actions arising from the reliance upon the accuracy of such information.

Additionally, unless American Manufacturing Company, Inc. or its employees are primarily responsible for a particular project, American Manufacturing Company, Inc. assumes no responsibility regarding, and shall not be liable to, any purchaser of a System in any manner for any of the following:

a. any decision regarding the suitability of a Drip Disposal System
b. the design and/or installation of a Drip Disposal System for any particular project, nor
c. the utility or functioning of a Drip Disposal System for the project.

Purchaser's rights are set forth in the limited warranty and the Equipment Purchase Contract (invoice) in the event that the equipment itself is defective.

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DEALER RESPONSIBILITY

PURPOSE

The purpose of this section is to outline the responsibilities of the Dealer regarding the installation, monitoring, maintenance and warranty of the drip dispersal system as part of an on-site sewage treatment system.

INSTALLERS SCHEDULE OF DUTIES

1. The Dealer shall be responsible for the entire installation and shall only sell and install systems according to approved plans and permits.
2. The Dealer shall be responsible for insuring proper electrical installation and startup including recording startup date and initial meter readings.
3. The Dealer will meet standards for operation and maintenance per the jurisdictional health department.
4. The Dealer shall assure that all employees who work on the American Drip System are trained, understand and can perform operation and maintenance per the Drip System manufacturer manuals.
5. The Dealer is responsible for informing the owner within the first month of operation of the type of system installed and the owners responsibilities.
6. The Dealer is responsible for the first annual inspection after the 3rd month of operation.
7. The Dealer is responsible for one visit after first year of operation. The visit to include the following;
    - Sludge Judge the septic tank blanket
    - Inspect the drip system hardware for operation
    - Inspect system with operational checklist
    - Check landscaping for interference with system
    - Check water usage and evaluate usage compared to design

    The inspection frequency should be set based on the first year's evaluation. Future inspections should be at a minimum once per year. If high strength waste is suspect, take sample for BOD,SS, and FOG.
8. Removal, replacement or alteration to this system must be in compliance with all applicable current county health department requirements, governing sewage treatment regulations and the manufacturer.

OWNER'S RESPONSIBILITIES

1. Acknowledge receipt and comply with instructions of the owner's manual provided. Reference owner's responsibilities in manual.
2. Notifying the Dealer or the designated agent immediately of any problems with the sewage treatment system.
3. Keeping the monitoring / access covers free of obstructions at all times.
4. Granting Installer / Operator and health department personnel access to the owner's property to service or inspect the sewage treatment system at any time during warranty period.
5. If system fails, owner will notify operator, manufacturer, and local health department.
6. Pumping the septic tank or other costs associated with the treatment system is not covered under any warranty. Pumping is required from time to time (frequency) varies by jurisdiction just like in conventional systems due to the production of solids during the treatment process.
7. Failure to make any payments when due shall be considered a breach of warranty and the operator may terminate warranty work without notice.

Specifications

DISC FILTERS - Disc Filters shall be an oblique filter, entirely of plastic, with two 3/4" male end connections to NPT schedule 40 pressure PVC. The filter elements shall consist of grooved rings, mounted on a spine, forming a cylindrical filter body. The rings are to be kept together by a spring seated at the bottom of the filter cover. The out-in filter shall be of the screw in type with nitrilic rubber o-ring seal. The body materials shall be polyester, the spine and rings shall be polypropylene, and the spring shall be stainless steel. The nominal filtration capacity of the filter shall be 115 microns.

DRIPPER TUBING - The dripper tubing shall be Netafim Bioline pressure compensating dripperline for wastewater. The tubing shall be nominal 0.61 gallons per hour (+/- 5% flow rate from 7 to 60 psi). The tubing shall function as a turbulent flow emitter between 0 and 7 psi, ensuring that the nominal design flow is not exceeded at system start-up. The tubing shall be polyethylene 120 psi rating. Tubing end connections and splice connections shall be manufactured specifically for the tubing and for connection to standard schedule 40 NPT adapters.

AUTOMATIC CONTROL VALVES - The automatic control valves shall be solenoid activated diaphragm valves by Bermad. The body and cover shall be reinforced nylon. The metal parts shall be stainless steel, the diaphragm shall be nylon-fabric reinforced poly isoprene. The seals shall be Buna-N. These valves shall operate electrically using hydraulic pressure to open and to close.

RETURN PRESSURE ASSEMBLY FOR ZONE RETURN CONTROL VALVE - The automatic zone return valve shall, in the event the drip zones are over 8 feet in vertical elevation above the hydraulic unit, have installed a "return pressure assembly". The assembly is to be used to prevent the line from draining after or during each dose. See standard detail.

GRAVITY PIPING - All gravity piping shall be schedule 40 PVC DWV as a minimum. Fittings shall be Schedule 40 PVC suitable for underground installation. All joints shall be solvent welded with the use of primer and PVC Glue.

NON-DRIPPER LINE PRESSURE PIPING - All non-dripper line pressure piping shall be PVC schedule 40 pressure rated. Rigid piping shall be standard ASTM 1120 for use with solvent welded Schedule 40 fittings. Flex piping shall be schedule 40 PVC flex pipe for use with pressure fittings.

FLOAT SWITCHES - Float switches for level indication and control shall be encapsulated mercury or mechanical differential switches. The switches shall be provided by American Manufacturing, or equal.

GENERAL VALVES - All gate, ball, globe and check valves shall be Schedule 40. Check valves shall be of the swing check design of metallic bronze with corrosion resistant metal hinge pin for use in wastewater.

PIPING DISCONNECTS - Piping disconnects shall be PVC schedule 80 unions.

AIR RELEASE VALVES - Air release valves shall be resilient seat "pop-up" type air release valves for use with filtered effluent (nominal filtration size of 115 microns.)

WIRE SPLICES - Field wire splices shall be installed in suitable wire splice pull boxes with waterproof connections for access to splice connections. The boxes shall have structural capacity for in ground installation and light vehicle yard care traffic.

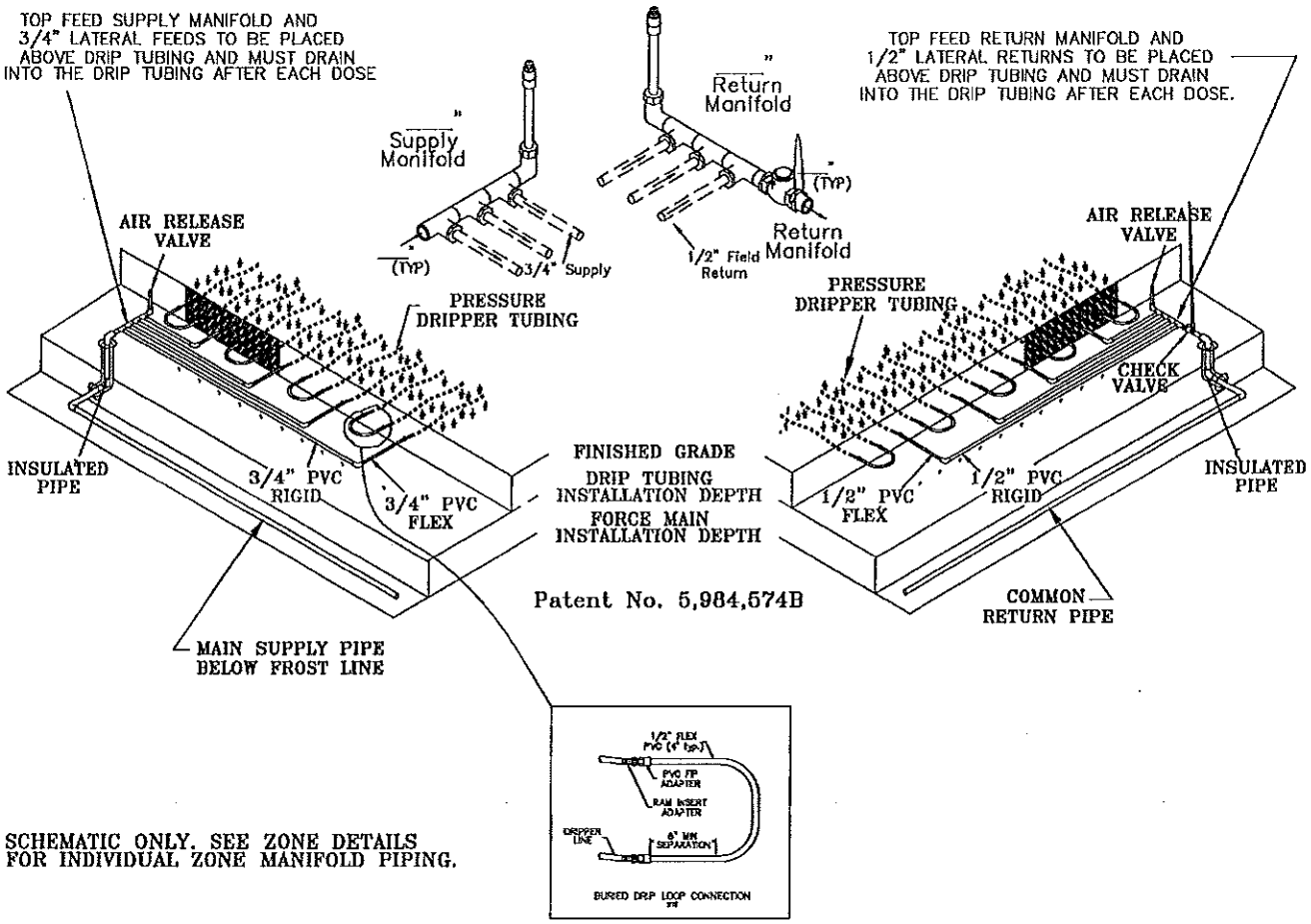
SPECIAL DRIP EQUIPMENT - All non-specified drip equipment shall be as supplied by American Manufacturing Company, Inc. including the controls, drip hydraulic unit, pumps, and specialty fittings.

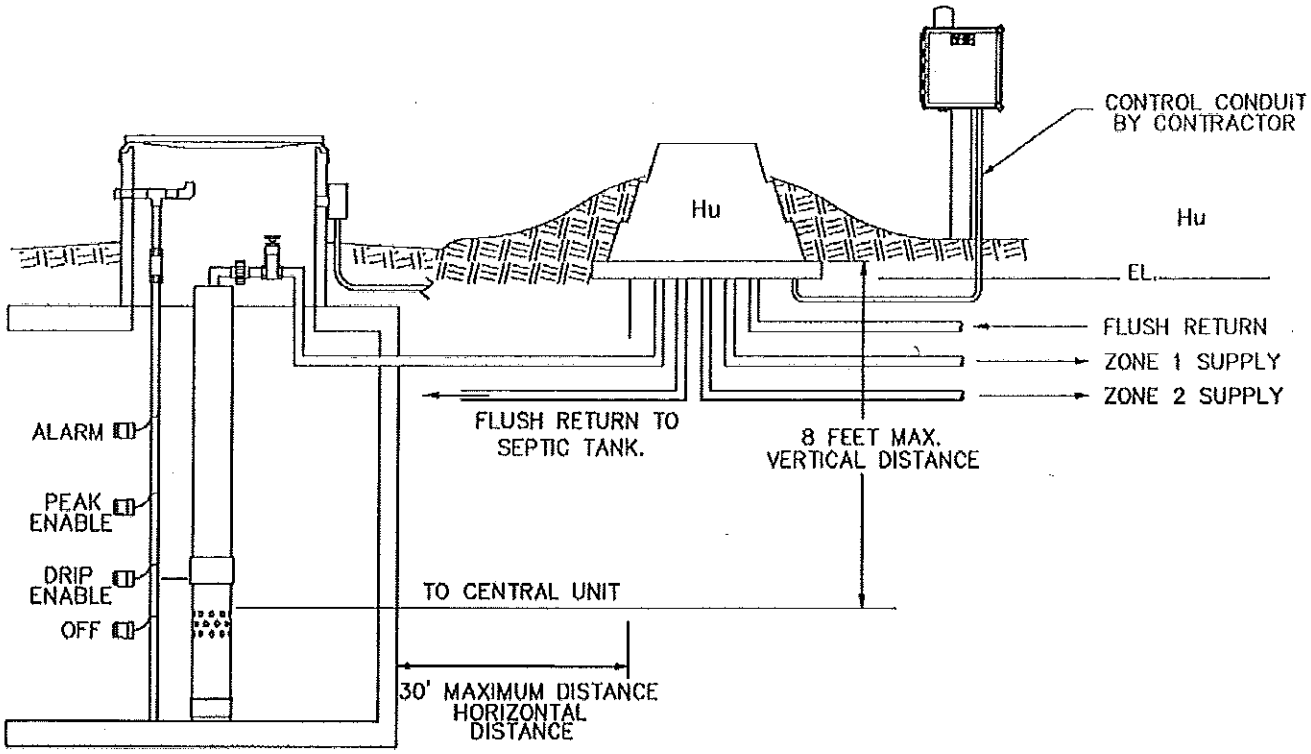
PIPE BEDDING - In ground piping shall be installed according to local codes. Piping shall be installed on original soil or suitably compacted fill or gravel bedded excavations on original soil. Free standing piping shall be schedule 40 PVC and assembled with restrained joints.

STANDARD DETAILS

REMOTE ZONE VALVE

The remote zone valves are typically used on larger systems with more than four zones or when the zones are below the elevation of the pump chamber. On slopes greater than 5% a bentonite clay plug should be installed three feet up contour from the valve box to prevent effluent from piping down the manifold and filling the valve box.





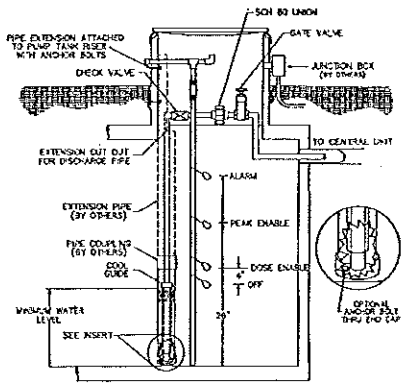
PUMP CHAMBER AND HYDRAULIC UNIT REQUIREMENTS

The hydraulic unit (HU) must be close to the pump chamber as shown. The limiting factor is the backflushing sequence for the disc filters. The (HU) must be within 30 feet horizontal and 8 feet vertical distance for the pump to have enough TDH to complete backflushing.

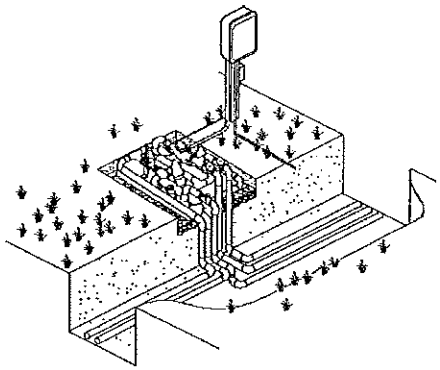
The return line to the septic tank must have gravity flow back to the septic tank. The 1-1/2" line must have a 2% slope to drain back or a check valve should be placed at the (HU) to prevent backpressure on the backflush valves. If longer distances are used, the line size should be increased to 2".

The pump should be placed as shown, secured on the floor of the pump. The pump discharge pipe must have **NO WEEP HOLE** . The pump is to be hard wired into a junction box.

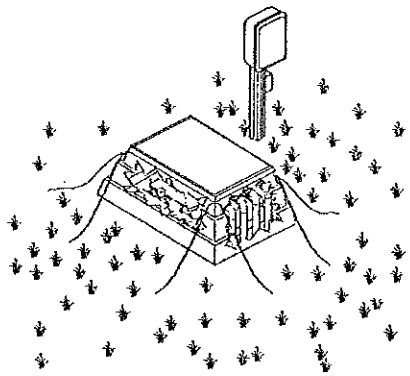
1. Recommend half to full day storage between drip enable and high level alarm.
2. Recommend al least one-quater day storage between alarm and inlet of tank.
3. Peak selector switch is located on circuit card and should initially be left in "Pump & Alarm" to educate owner on water management.



STEP 1



STEP 2



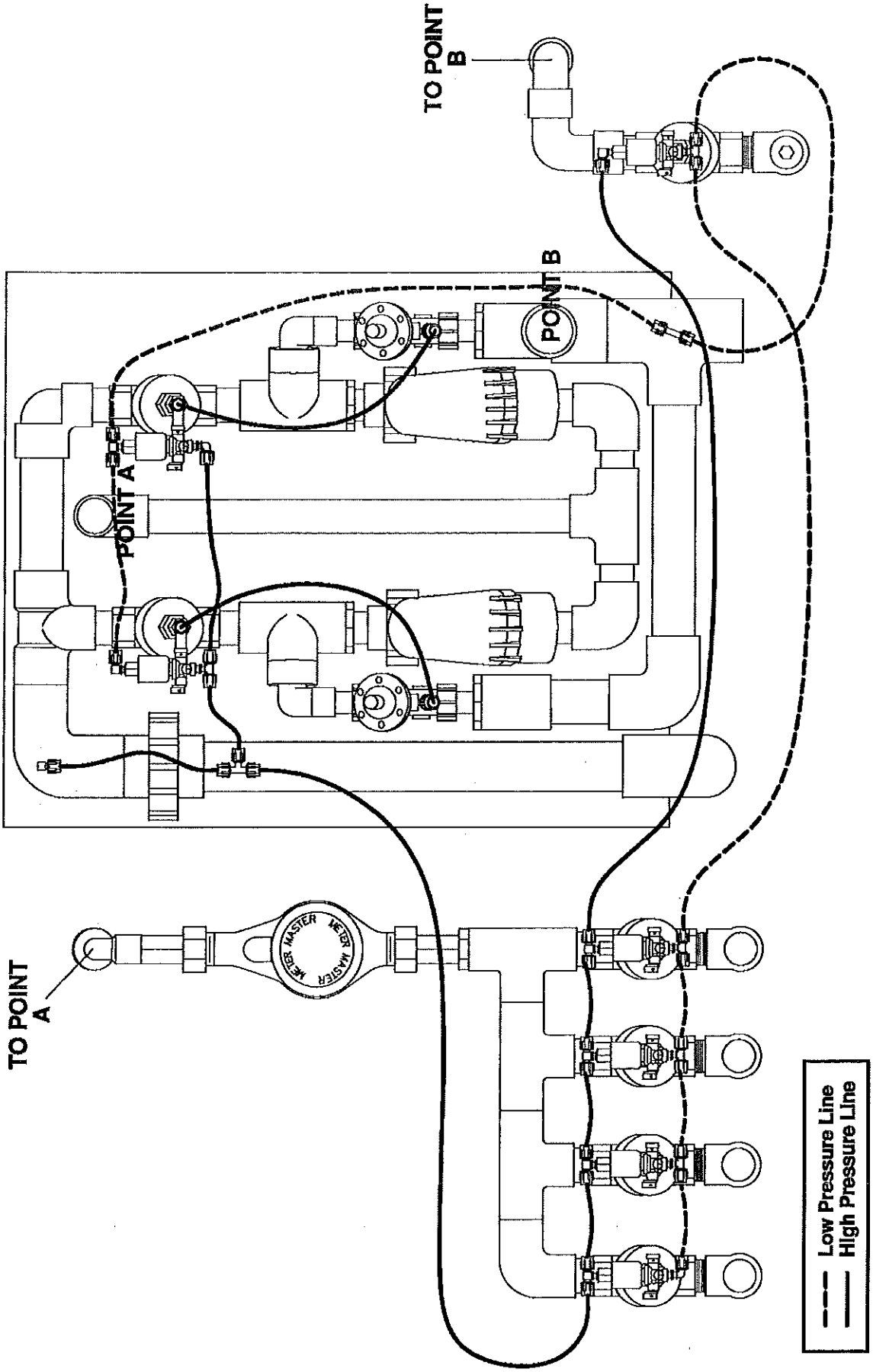
STEP 3

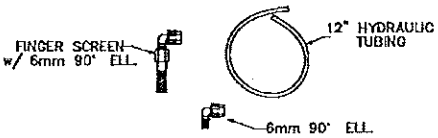
HYDRAULIC UNIT INSTALLATION STEPS

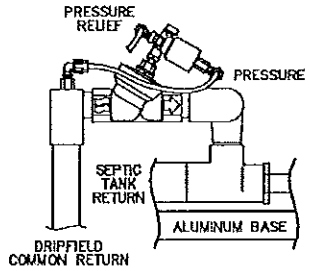
1. Install pump and floats as shown. The pump must NOT be installed with a weep hole due to the high pressure. Pump must be "hard wired" to maintain warranty. A disconnect should be provided next to a suitable outdoor rated junction box.

2. Dig a side trench to set the hydraulic unit. The area must be free from groundwater or rainwater infiltration. (If below original grade more than 4" the unit enclosure must have a positive drain.) Center the unit on a gravel bed with the pipes slightly over the edge. Connect the supply and return piping. Install the control panel on a 4"x4" (minimum) pressure treated post with at least 3 feet of clearance from the bottom of the control panel to the ground. The electrician shall provide three sources of power to the control panel per the schematic enclosed in the control enclosure. The control wire shall be run through conduit to the control with no splices and connected to the terminal strip provided. Connect the heater, floats and pump(s) to the control panel.

3. Install the insulated enclosure and backfill the area making sure not to damage any piping or electrical components. Provide positive drainage from around the central unit to insure no excessive rainwater will enter and rainwater which does enter will drain out. Provide a minimum of 4" of backfill above the bottom edge of the enclosure to help enclosure heater maintain temperatures above freezing. Additional mounding is preferred for freeze protection and aesthetics.

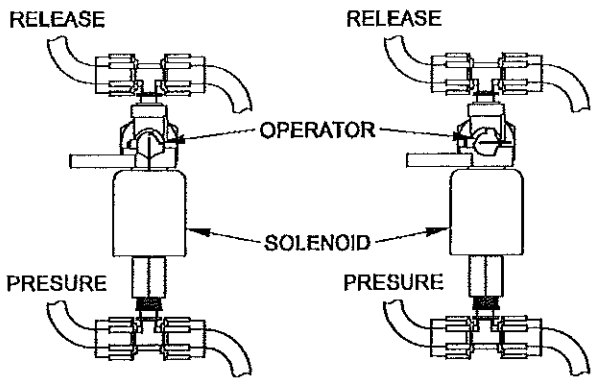

TO POINT B
POINT B
POINT A
TO POINT A
METER MASTER
Low Pressure Line
High Pressure Line



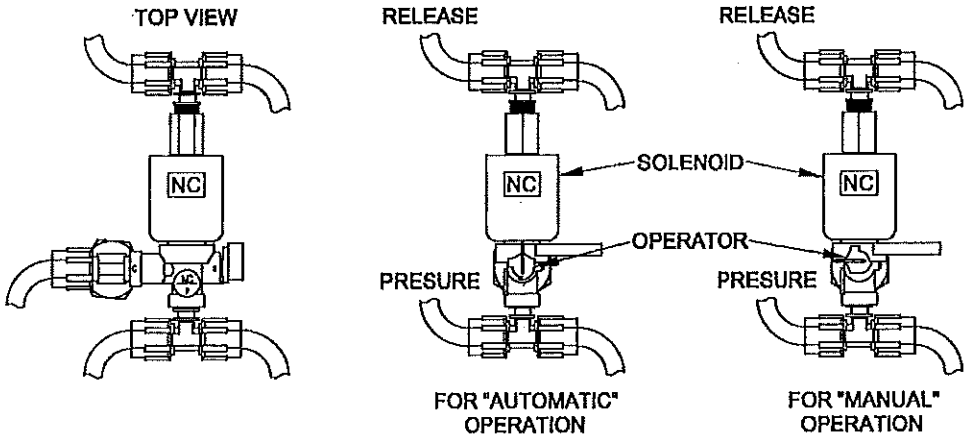


RETURN PRESSURE ASSEMBLY
NTS

SOLENOID FOR NORMALLY CLOSED DIAPHRAGM VALVE



SOLENOID FOR NORMALLY OPEN DIAPHRAGM VALVE



NOTES:

1. The hydraulic unit above is shown in an explosion view on the next page.

2. The "normally closed" zone valves and zone return valves have "normally open" solenoids (typically unmarked). These valves are supplied pressure through the solenoid which, when not activated, places pressure on the diaphragm.

3. The "normally open" supply valves have "normally closed" solenoids. The pressure is supplied through the operator and the connection. With the solenoid not activated, pressure bleeds off the diaphragm.

4. **OPTIONAL - RETURN PRESSURE ASSEMBLY FOR ZONE RETURN CONTROL VALVE:** In the event the drip zones are over 10 feet in vertical elevation above the hydraulic unit, install a "return pressure assembly". The assembly is to be used to prevent the return line from draining after or during each dose. Remove the zone return connection and reinstall a short 1" nipple in the return valve. Install assembly as shown to the right. The hydraulic tubing providing pressure for the rest of the unit must be plugged and the new tubing from the assembly connected to the pressure side of the solenoid.

Installation Procedure Summary

1. Prepare field location for installation.
2. Set septic and pump tanks.
3. Dig header ditch for field manifold.
4. Install dripper tubing.
5. Install loops (flex tubing).
6. Dig ditches for conveyance lines.
7. Place Central Unit and mount control panel.
8. Dry fit pressure lines and field manifolds.
9. Set switch tree in pump tank.
10. Glue all fittings and place valve boxes.
11. Install electrical (and phone line if applicable).
12. Check power supply and power up unit.
13. Provide one day volume of clean water for startup.
14. Pressure check all fittings and lines.
15. Inspection of field and loops.
16. Flush all fields through the air release valves.
17. Set run time for Central Unit.
18. Check setup values against calculated values.
19. Find leaks and repair.
20. Backfill once lines and fields are determined to have no leaks. Back filling is to be controlled to prevent the damaging of pipes or fittings.
21. Grade and seed site.

Log data registers and startup values.

BLOWER FAIL OPTION

In normal operation, power is supplied from a blower panel to the specified terminals in the Perc-Rite® control panel. The American Perc-Rite® controller is dependent on that power from the blower for dosing operations. If the blower fails, or is turned off the central unit will stop all automatic dosing functions.

Wires shall run from power terminals of the blower (115V Standard in Perc-Rite® Control) to the terminals of the central unit labeled "DVC" (Direct Voltage Cutout). Polarity is not a factor during this operation but voltage of blower and voltage of cutout relay (115V Supply & Neutral) must match.

Startup Procedures - *AMERICAN SEPTIC DRIP*

This procedure outlines the startup procedures for the drip dispersal field tubing system. The process includes flushing dirt, pipe shavings and other possible construction debris out of the tubing and checking dosing rates in a three step process. First, flush through air release valves, second flush through normal flushing process (while checking flow rate), and finally checking final dose flow rate.

I. System Flushing Air Release Valves Off

a. Be sure pump chamber is full of clean water. Check lights on controller for float activation. The "Off" float and "Standard Enable" float should be in the up position before starting field flush. Continue to fill tank to "alarm" float. It should take one days' flow of clean water to flush tubing.
b. Place all toggle switches, on the inner door, in the "Off" position and place filter backflush switch in the "Auto" position.
c. Remove air release valves, attach piece of 1/2" black flex PVC (5' maximum) to 1/2" white PVC with dry coupling (do not glue) and place end to direct discharge away from excavation.
d. Switch pump to "Hand" position. Pump should dead head with no flow meter movement.
e. Place filter backflush to filter #1 position. Note blue valve opening. Backflush for 15 seconds, Place filter backflush switch to the "Auto" position.
f. Place disc filter backflush to filter #2 position. Note blue valve opening. Backflush for 15 seconds, Place filter backflush switch to the "Auto" position.
g. Turn zone #1 to hand position to allow a manual field flush. After water starts discharging from flex PVC, continue to flush for at least three (3) minutes or until no debris (dirt, PVC shavings, etc.) is noted, whichever is greater.
h. Repeat item "e" & "f".
i. Repeat "g" & "h" for each additional zone.
j. Place all toggle switches, on the inner door, in the "Off" position and place filter backflush switch in the "Auto" position.
k. Remove black PVC hose, dry, and glue coupling with air release valves.

II. Field Flush Flow Test

a. Determine each zone flushing GPM by multiplying the number of lateral connections by 1.6 and adding to the dosing GPM. (see "a" in step III) Resultant should not exceed 15 GPM for the two disc filter rack.
b. Switch pump to "Hand" position. Pump should dead head with no flow meter movement.
c. Place filter backflush switch to filter #1 position. Note blue valve opening. Backflush for 15 seconds. Place filter backflush switch to the "Auto" position.
d. Place filter backflush switch to filter #2 position. Note blue valve opening. Backflush for 15 seconds. Place filter backflush switch to the "Auto" position.
e. Turn switch for "Zone #1" and the "Zone Return Valve" to "Hand" position to allow a manual flush. After water starts flowing through zone return valve, flush for three (3) minutes, check flow rate and compare with design flushing flow rate.
f. Place all toggle switches, on the inner door, in the "Off" position and place filter backflush switch in the "Auto" position.
g. Repeat item "b", "c", "d" & "e" for each additional zone.
h. After flushing the last zone leave the pump and zone valve in the "Hand" position and close the zone return valve "Off". After the flow rate stabilizes and compares to design flow rate, see next section.

III. Field Dose Flow Test

a. Determine each design zone dosing Gallons Per Minute (GPM) by the following formula: (If installed as designed refer to calculation sheet.)

$$\frac{\left(\frac{\text{Length of Tubing}}{2}\right) x .65 \text{ Gallons per Hour}}{60 \text{ Minutes per Hour}} = \text{Gallons per Minute Dosing}$$

b. Determine dosing flow rate in the last zone flush tested. The rate should be close to value calculated in "a" above. Check for leaks and repair as necessary.

c. With all toggle switches in the "off" position, backflush filters as described above instep II's "b", "c", & "d".

d. Move the next zone switch to the "Hand" position and make sure the Zone Return switch is in the "off" position, watch flow meter slow as system fills. When pressurized, measure flow rate with watch. The rate should be close to value calculated in "a" above. Check for leaks and repair as necessary.

e. Repeat for each additional zone.

f. Place all switches in the "Auto" position.

IV. Zone Return Pressure Assembly Flow Test

a. In some cases when the drip field is around 10' in elevation above the hydraulic unit or when it is significantly above the unit the valve will not close properly and continue to recycle wastewater back to the septic tank. If this condition occurs, follow the following steps.

b. Remove the zone return connection and reinstall a short 1" nipple in the return valve.

c. Place the "return pressure assembly" in the return line as per standard detail on page 19.

V. Timer Adjustment / Automatic Mode

(Note: Timer Enable float must be up for automatic operation)

a. Write down gallons from flow meter and target total gallons dose for all Zones.

b. Place pump and Zone #1 in auto position, all other zones "off". Adjust timer screw setting to the approximate calculated value for total gallons per zone. Press "reset" button and hold for 5 seconds. System will automatically backflush filters and dose next zone. Start stop watch when meter begins flow. Record the time it takes to deliver calculated volume. Adjust timer to that actual time (not the calculated time).

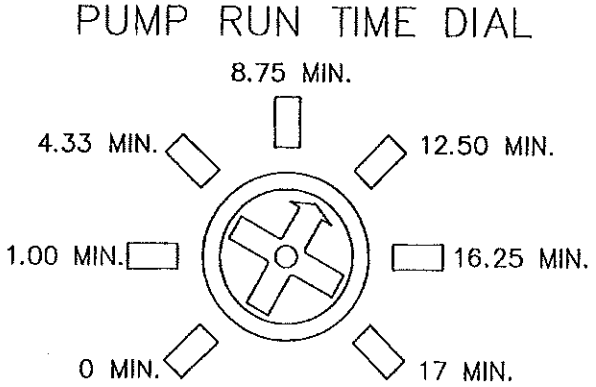
c. Repeat for each additional zone, no adjustment should be necessary even if zone is of a different size. High or Low volume values indicate a possible leak or obstruction.

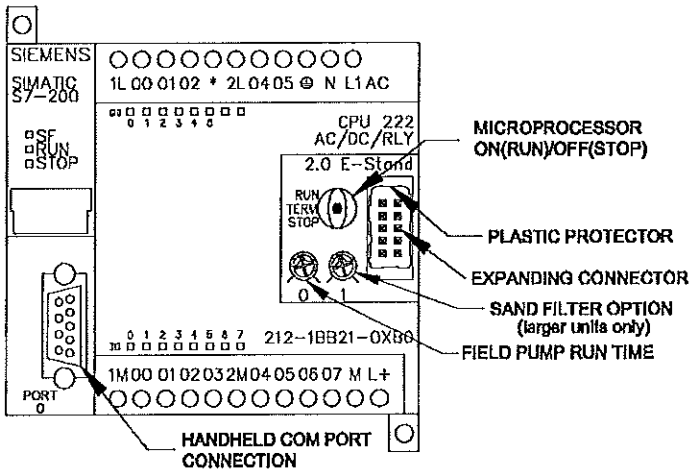
d. Leave all zones in use switched to automatic.

The "pump run time dial" will adjust the pump run time from zero minutes to 17 minutes. This run time, when two 900 linear feet zones are in use, will dispose of 270 gpd whendosed with the "Standard Dose Enable" float switch up and 450 gpd when dosed with the "Peak Enable Float" switch up.

Use a small phillips screw driver to adjust the "pump run time dial". After adjustment, press and hold the reset button until a pump event is initiated (approx. 5 seconds). Time the pump run time after backflush to determine if the setting is adjusted where wanted. Readjust if necessary. The gallons per day can be set by first determining the gallons per minute in each zone, then the rest time between doses and then adjusting the pump run time as necessary.

NOTE: THE HOMEOWNER ASSUMES FULL RESPONSIBILITY FOR CONDITIONS OR MALFUNCTIONS DUE TO CHANGES IN PUMP RUN TIME BY ANYONE OTHER THAN A QUALIFIED SERVICE REPRESENTATIVE.





TIMER SETTING

The timer may be easily set with the use of a hand held control adapter. Customers that purchase an optional hand held unit will have the ability to view exact run timer settings as the dial is manually turned. See page 9 of this manual for instructions. The only other way to set the timer is by trial and error. Start an automatic cycle, time the field dose, then adjust up or down to get close to desired time.

DEALER NOTES;

DATA REGISTERS AND THE HAND HELD PROGRAMMING & MONITORING UNIT

Dealers may purchase the optional hand held programming & monitoring unit (hand held unit) in order to see the timer settings and counter values as listed on the Data Monitoring Table on the next page. The device is the size of a hand held calculator and will easily fit into the standard installers service kit. The table may be copied to log in data from a specific site for a specific date and time.

The hand held unit may be plugged into or removed from the microprocessor at any time. Even in the middle of and operation the control will only divert back to automatic operation. The use of the hand held is not necessary to operate the unit. It only makes setting of the run time easier and proportioning of the run time possible. In most cases however the proportioning is not necessary and the timer settings can be tested with a stop watch.

Data Registers - *AMERICAN PERC-RITE® DRIP*
Counters are used to provide delay time for doses and flushing sequences. Counters may be adjust to start cycles. Different dose times for each zones may be set. Registers are field adjustable with a hand held unit only. The following table shows which registers can be viewed and adjusted.

Data Registers - *AMERICAN SINGLE TANK SANDFILTER DRIP*
There are registers available for use with a ***SINGLE TANK SANDFILTER DRIP*** system. Detailed information for this system is available from American at our web site.
TO START HAND HELD

- Plug hand held unit with matching plug shape to socket
- Press "F1" for main menu (main menu should already be on screen)

Note: If you press "esc" another menu may be seen, do not operate from this menu. Press "esc" again to return to the main menu.

"Main Menu"

MAIN	DATA	VIEW	EDIT
F1	F2	F3	F4

TO CHECK TIMER AND COUNTER REGISTERS

- Press "F2" to view data - Pump and Zone Counters & ETM's
- Press "F3" to view timers and counters - Run & Rest times during operation
- Press "F4" to edit timers and counters - Operational setup values

TO EDIT (CHANGE) REGISTER VALUES

- Press "F4" to edit timers and counters
- Use small phillips screwdriver (on field pump run time screw) to adjust pump run times
- Use arrows to move left flashing cursor on register that you want to change
- Press "ENTER", cursor will highlight the number of that register you want to change
- Use arrows to change value to desired number, then press "ENTER". For screens with multiple values, press "ENTER" repeatedly until screen changes.

Note: After thirty seconds of inactive viewing of a register, the hand held will return to the top of the function register in use. After four minutes of inactivity, the hand held will return to the main menu.

DATA MONITORING TABLE

NAME: _____ DATE: ___ /___ /___

Address: _____ Time: ___ : ___ AM PM

_____

Press (F1) to return to main menu at any time. Press the noted (F2,F3) to review and (F4) to edit the referenced registers. After thirty seconds of inactive viewing of a register, the hand held will return to the top of the function register in use. After another four minutes of inactivity, the hand held will return to the main menu.

Legend: (m) minutes, (h) hours, (t) tenths of a second. All rest times are in minutes

Scr. No.	(F2) DATA RECORD	VALUE
1	Zone 1 Dose Counter	
	Zone 1 Dose ETM (m)	
2	Zone 2 Dose Counter	
	Zone 2 Dose ETM (m)	
3	Zone 3 Dose Counter	
	Zone 3 Dose ETM (m)	
4	Zone 4 Dose Counter	
	Zone 4 Dose ETM (m)	
5	Pump 1 Counter	
	Pump 1 ETM (m)	
6	Pump 2 Counter	
	Pump 2 ETM (m)	
7	Peak Dose Counter	
	Peak Enable ETM (m)	
8	High Lvl Counter [opt.]	
	High Lvl ETM (m) [opt.]	
9	Peak Zone ETM (m)	
	Peak SF ETM (m)	
10	Zone 1 Field Flush Ctr.	
	Zone 2 Field Flush Ctr.	
	Zone 3 Field Flush Ctr.	
	Zone 4 Field Flush Ctr.	

Scr. No.	(F3) VIEW STATUS	VALUE
1	Current Zone	
	Target Run Time (t)	
	Elapsed Run Time (t)	
2	Zone Rest Target	
	Elapsed Rest Time	
3	SF Target Rest Time	
	SF Elapsed Time (m)	
4	Z1 FF Dose Cnt	
	Z2 FF Dose Cnt	
	Z3 FF Dose Cnt	
	Z4 FF Dose Cnt	
5	Next Zone to Dose	
	Backflush Timer (t)	
6	S.F.	
	Peak	
	Duplex	
	0=Off / 1=On	

Scr. No.	(F4) EDIT SETTINGS	VALUE
1	Zone 1 Run Time (t)	1,500-11,700
	Zone 2 Run Time (t)	1,500-11,700
	Zone 3 Run Time (t)	1,500-11,700
	Zone 4 Run Time (t)	1,500-11,700
2	Zone 1 Dose %	100
	Zone 2 Dose %	100
	Zone 3 Dose %	100
	Zone 4 Dose %	100
3	2Z STD Enable Rest	180
	2Z Peak Enable Rest	108
4	3Z STD Enable Rest	120
	3Z Peak Enable Rest	72
5	4Z STD Enable Rest	90
	4Z Peak Enable Rest	54
6	SF OFF Rest Time	190
	SF STD Enable Rest	90
	SF Peak Enable Rest	45
7	Peak Dose Allow (h)	72
	Auto FF Time Int. (h)	336
8	Z1 FF Count Interval	25
	Z2 FF Count Interval	25
	Z3 FF Count Interval	25
	Z4 FF Count Interval	25
9	Back Wash Frequency (t)	3,000

Note: All SF Registers are Optional features

DEALER NOTES;

INSPECTION AND OPERATION PROCEDURE
ONSITE DRIP DISPERSAL SYSTEM

NAME: _____ DATE: ___/___/___

Address: _____ Time: ____ : ____ AM PM

_____

I. Monitoring Schedule Frequency

A. Periodic Inspection _____

B. Compile and review (submit) data _____

II. Periodic Inspection

A. Field Conditions

1. Walk the field and record any visible wet spots from the drip system.
2. O.K.____ Repair____ Comments and remedial action _____

B. Controller

1. Lights and manual switch positions.
   a. Open the control panel and open the lid to the hydraulic unit and pump tank. . Make sure all manual switches are in the automatic position. With Microprocessor on, verify power light and run light are on.
   b. O.K.____ Comments and remedial action _____
2. Microprocessor input: See table in owners manual.
   a. O.K.____ Comments and remedial action _____
3. Microprocessor output: Verify there is output only when in automatic operation. You may start automatic cycle with "Reset/Stop" button.
   a. O.K.____ Comments and remedial action _____

C. Pump Tank Liquid Level Float Switches

1. Check liquid level in the pump tank to confirm switch operation.
   a. If a float is down, its light should be off. Note; High level alarm float requires optional relay installed in control.
2. O.K.____ Comments and remedial action _____

D. Pump and Valve Operation

1. Place pump "Hand-Off-Auto" switch in the "Hand" position to dead head pump against valves. Then open (optional) master valve. Flow meter should not turn indicating there are no leaks.
2. O.K.____ Comments and remedial action _____
3. With the pump running, place each zone valve in the "Hand" (open) position one at a time to check operation. With one zone valve open, flow should register on the flow meter. When the zone valve closes (off position), the flow should stop.
4. O.K.____ Comments and remedial action _____
5. With one zone valve open and flowing, close and reopen (optional) master valve to check operation.
6. O.K.____ Comments and remedial action _____
7. With the pump in the "Hand" position open the filter backwash valve for filter one and two for ten seconds then close. There should be no flow registering in the flow meter and you should hear the valves open and close. The backwash return valve diaphragm will rise then lower during backflush.
8. O.K.____ Comments and remedial action _____
9. Return all switches to the automatic position

E. Hydraulic Unit
1. Examine one filter and clean all filters as needed.
2. Examine all hydraulic components for leaks, tubing crimps and other problems.
3. O.K.___ Comments and remedial action _____

III. Annual Inspections (Includes Periodic Inspection)

A. Extended Check - Zone Dose Rates
1. Open the air release valve boxes and inspect. Make sure they close during the dose with no water leak after air is evacuated.
2. O.K.___ Comments and remedial action _____
3. Determine how many zones are in operation and the installed flow rates from the installation records.
4. O.K.___ Comments and remedial action _____
5. With the pump in the "Hand" position, select the first zone by placing the zone valve switch in the "Hand" position. After pressurization time, check flow rates by reading the flow meter for a timed minute. Repeat for all zones. If flow varies by more than 10% from original flow rates, reset flow rates.
6. O.K.___ Comments and remedial action _____
7. After the final zone is checked, place the "Zone Return" valve in the "Hand" position while the "Zone Valve" is still in the "Hand" position and verify that the flow rate increased to provide field flushing.
8. O.K.___ Comments and remedial action _____
9. Return appropriate switches to the automatic position.
10. O.K.___ Comments and remedial action _____
11. Press reset button for 5 seconds and check automatic zone dosing time.
12. O.K.___ Comments and remedial action _____

B. Tanks & Pumps
1. Examine and clean effluent screens, filters, and floats as needed.
2. O.K.___ Comments and remedial action _____

C. Measure solids level in all tanks
1. Septic tank Tank Depth _____ Sludge Depth _____
2. Settling Tank Tank Depth _____ Sludge Depth _____
3. Dose Tank Tank Depth _____ Sludge Depth _____
   a. Sludge pumping required Yes ___ No ___

IV. Reporting

A. Provide summary report to customer showing gallon flow to each field along with pertinent operating information and suggestions.

B. Provide signed and dated inspection report to customer file and regulatory agency as needed.

C. Have records available and be prepared to discuss operation and maintenance specifics with customer personnel.

V. Operator Signature _____ Date: _____

Perc Rite® Dealers are authorized to reproduce forms in this manual as needed for each site.
Additional comments (use back of copy if necessary):

Order Information

AMERICAN MANUFACTURING COMPANY INC.
P.O. Box 97, Elkwood, VA 22718
1-800-345-3132 Fax: 1-703-754-0058
e-mail: sales@americanonsite.com web: www.americanonsite.com

US MAIL: P.O. BOX 549
MANASSAS, VA. 20108-0549

FREIGHT TERMS

All materials shipped f.o.b. Gainesville, Virginia, via UPS or common carrier. Please consult factory for freight allowances.

TERMS OF PAYMENT

With an approved credit account, terms are 2% 10 days, net 30 days from date of invoice. A 2% service charge will be applied to all past due invoices. Customer agrees to pay all reasonable collection fees incurred by American Manufacturing. All other orders will be shipped C.O.D. Deposits on some special orders may be required.

PRODUCT CHANGES

American reserves the right to change prices and modify or redesign any product without notice.

ERRORS AND CLAIMS

All shipping errors must reported within 10 days. American Manufacturing will not be responsible for damages, shortages or delays caused by shipping delays. Claims which are the responsibility of American will be expedited immediately, but are limited to credit on or replacement of merchandise involved.

AMERICAN MANUFACTURING LIMITED WARRANTY

For one year (12 months) after date of purchase, American Manufacturing will repair or replace any product or portion thereof which proves to be defective due to materials or workmanship of American Manufacturing. We reserve the right to repair or replace defective materials at our discretion.

This warranty does not cover the following conditions:

1. Defects or problems caused by improper installation or maintenance of materials.
2. Abuse, neglect or accidental damage of products.
3. Normal maintenance or upkeep of products.
4. Lightning, war, floods, or other acts beyond our control.
5. Misapplication of our products for their designed purpose, or misapplication according to local, state or national codes when in effect.
6. American Manufacturing Company or its representatives are not responsible for labor for replacement of defective parts.

Defective or warranted items must be returned to American or a location designated by AMC. All returns must be accompanied by a return goods authorization number (RGA) supplied by American.

Manufacturing will in no way be responsible for any losses or damages incurred by failure of equipment, parts or service. NOTE: Some states do not allow exclusion of damages, so this may not apply to you.

There are no other warranties written or implied.

DEALER NOTES;

AMERICAN MANUFACTURING COMPANY, INC.

INNOVATIVE TECHNOLOGY FOR THE ENVIRONMENTAL AGE

CATALOG PRODUCTS

American Manufacturing Company, Inc. manufactures many specialty On-Site Wastewater products including the Bull Run^{R} Valve, Dial-A-Flow^{TM}, Distribution Boxes, accessories and Controls. American also supplies as an Original Equipment Manufacturer (OEM) many other products unique to the On-Site Industry.

The American On-Site Products Catalog is used throughout the industry not only for purchasing but for reference and education. If an individual desires a product not shown in the catalog, a toll free call to our 800 number will normally result in getting information about the desired product.

CONTROLS

American Manufacturing becomes involved with the entire operation of the system whether potable water, process water, or wastewater. American has staff Professional Engineers, designers, soil scientists, and trained sales people with state-of-the-art experience in control systems.

Our objective is to provide the most practical, economical, and efficient control device for fluid handling. We inventory many standard application controls and are able to manufacture special application panels in a very timely manner due to our modular design and manufacturing methods.

PACKAGES

American Manufacturing Company, Inc. manufactures many specialty On-Site Wastewater system packages including Recirculation Sand Filter components, pump station equipment, and State-Of-The-Art ***American "PERC-RITE®" Drip*** units incorporating automatic field flushing, disc filter backflushing, and pressure compensating emitters.

1-800-345-3132

www.americanonsite.com

American Manufacturing Company, Inc.
P.O. Box 97, Elkwood, VA 22718 1-800-345-3132

AMERICAN "PERC-RITE®" DRIP DISPERSAL SYSTEMS

ENGINEERING DESIGN GUIDELINES

FOR

COMMUNITY AND COMMERCIAL SIZED DISPERSAL SYSTEMS

American Manufacturing Company, Inc.
P.O. Box 549, Manassas, VA 20108-0549
1-800-345-3132 www.americanonsite.com

Seasonal Equalization Design Guidance

SCOPE This design guidance is intended to detail the treatment and dispersal solution for a facility with weekly and annually variable flows. The proposal provides a brief background, understandings achieved regarding seasonal flow variances and a proposed "Instrumentation and Flow Schematic" with "Sequence of Operation" detailing an operational plan with design calculations for sizing. Included is the proposed Operation and Maintenance Plan Summary with contingency options.

BACKGROUND A preliminary investigation of the facility should be performed in order to estimate required capacity and to provide for economic sustainability. For existing facilities, a "draw down test" should be performed to determine the pump system capacity and dose volumes. Pump system counters and elapsed time meter (ETM) records should be kept for a sufficient time (up to a year) to determine usage.

A preliminary engineering proposal should be submitted to the owner and health department. The understanding with the Health Department should be to work toward obtaining a design that upgrades necessary components which do not fit prescriptive solutions in the typical Regulation.

DESIGN PROPOSAL The design criteria of the treatment and dispersal facility is to include the following;

1. Flow Equalization
2. Secondary Treatment
3. Management of system through alternating gravity drainfields or drip dispersal systems.
4. Monitoring system monthly through peak summer season and quarterly during non-peak.
5. Maximum weekly flow not to exceed stipulated gallons per week.
6. Maximum daily flow not to exceed stipulated gallons per week.
7. Third party maintenance, monitoring and reporting.
8. A contingency plan.
9. Other considerations which may be negotiated during the pre-design meetings.

SEQUENCE OF OPERATION FOR TREATMENT Wastewater will flow through the primary treatment septic tanks and into the time dosed pump chamber. The "Large Flow Equalization" pump tank will hold several days of peak flow and meter wastewater to the treatment unit at the most appropriate average rate. In the event of a peak flow condition as sensed by the "Peak float" in the Large Flow Equalization pump tank, the control will reduce the rest time to enable the design flow or "Peak" rate to be discharged to the treatment unit. In no event will more than the "Peak Design" flow be allowed to be discharged to the treatment unit.

OPTIONAL ENHANCED CONTROL - This "Large Flow Equalization" pump tank will have "restricted peak capacity". There will be a routine in the PLC (Programmable Logic Controller) controlled pump system that will interrupt the peak flow capacity if the peak float has been enabled for more than two days in any 7 day period (adjustable). This control feature will prevent more than stipulated gallons per week from being discharged. In the event that the Peak Float has been enabled for more than 2 days in any 7-day period, then the controller will operate as in the standard enable mode and dose at the reduced rate to prevent excess flow from being discharged to the drain field.

In the event of excess wastewater being generated and delivered to the Large Flow Equalization pump tank, a high level alarm will sound to notify the owner. The operator should be called to manage this excess flow. There will be however a minimum amount of additional flow equalization capacity above the high level alarm for peak flow management.

GRAVITY DISCHARGE SYSTEMS - Wastewater will discharge from the secondary treatment unit by gravity to the top of the drainfield where it will pass through a flow diversion valve and be directed and either the upper or lower half of the drainfield. (See "Gravity Seasonal Equalization Schematic"). Observation wells will be placed in the uppermost and lower most trench bottoms of each drainfield half to monitor ponding. The operator will monitor ponding depths in the sections under use and determine the appropriate alternating schedule. The resting sequence may be as short as alternating each visit or as long as annually for enhanced rejuvenation. In the event of ponding being viewed during an operational visit, the diversion valve shall direct flow to the other section.

DRIP DISPERSAL DISCHARGE SYSTEMS - Wastewater is discharged from the secondary treatment unit by gravity to the top of the Drip Dispersal pump tank (See "Gravity Seasonal Equalization Schematic"). The Treatment Unit effluent drains into the final dose tank where the drip disposal pump periodically doses the drip field for a preset time at a preset interval. The pump control panel is equipped with eight float switches, which control the timed doses to pretreatment and drip dispersal. If the design flow is exceeded for any extended period a high water alarm will sound. If the high water alarm in the final pump tank is activated the treatment unit feed pump will become disabled. This is to prevent the liquid level in the final pump tank from rising due to accumulation excess effluent. If flows are less than designed, the control will halt the pretreatment dose and drip dosing cycles until enough effluent has accumulated for a treatment and/or final disposal dose. This provides resting for the both the absorption area and treatment unit. The dosing time may be altered to accommodate observed variance of historic water use as obtained from the flow meter. The system can be "tuned" for sewage flows at the site to insure that the absorption area is dosed at the proper interval.

SEASONAL FLOW VARIANCES The Secondary Treatment system shall be constructed using pre manufactured treatment units in two halves (see Instrumentation and flow schematic). The discharge of the "Large Flow Equalization" pump tank shall be delivered through an "H" connection which will allow each pump to deliver to only one treatment unit or to the other. This will allow the operator to take one treatment stream out of service during the very slow winter season and maintain the duplex pump operation.

The discharge of the Treatment units shall have a bypass valve configuration such that during the seasonal startup of the unused treatment unit, the entire effluent stream can be recirculated back to the pump tank until sufficient water quality is achieved for discharge.

DESIGN CALCULATION EXAMPLE Data collected shows a wide range of usage annually. The peak season is in the summer from Memorial Day to Labor Day, with holiday spikes such as Easter. The organic loadings tested from 320 mg/L BOD to 739 mg/L BOD. The average BOD sample value was 550 mg/L. Fats Oils and Grease tested Less than 50 mg/L. If the wastewater is sized to treat to a level of 30 mg/L BOD and SS then the treatment process will accommodate the FOG (<30mg/L). The Treatment system is proposed to be sized for 10 pounds of BOD per day maximum design.

DESIGN LOADING EXAMPLE

1750 gpd X 700 mg/L X 8.34 #/gal / 1,000,000 = 10.21 use 10 #/day max BOD

The estimated minimum usage could be as low as 300 gpd at 320 ppm BOD. The design shall provide for the splitting of the flow in half and operate only half the treatment system for winter operation. This will allow the treatment process to still operate at an acceptable capacity. The design capacity of each side would then be 5# BOD. The minimum loading would then be:

MINIMUM LOADING EXAMPLE

300 gpd X 320 mg/L X 8.34 #/gal / 1,000,000 = 0.8 use #/day min BOD

Onsite wastewater treatment systems need to operate over a range of capacity demands. The treatment system for this facility should be specified to handle flows as low as (.8#/5# = 16%). The dual line capacity will provide for the treatment system to operate one side at 16% of daily design capacity over the winter months. Typically treatment systems operating at somewhat less than this percent of rated capacity will loose substantial water quality.

FLOAT SETTINGS The tables below show float switch settings and a typical summer peak flow week period. The maximum weekly discharge is 8400 gallons. Using a typical 5000-gallon pump tank (13' long X 6' wide X 9' deep inside dimensions) the overall depth is 108 inches. Setting the max water height at 8.5 feet provides 102 inches of working Depth.

This example shows that with an empty flow equalization tank on Saturday, the tank can receive in excess of a 6500-gallon weekend event plus a cleanup day and still not exceed the maximum daily flow to the drainfield or the average weekly flow. This is achieved while pumping less than the average daily flow proposed to be permitted (1200 gpd).

FLOAT SETTING FOR EQUALIZATION

*Note: Units are inches above bottom of tank.

Storage		1069 gallons above alarm
Alarm	80	
Peak	50	
Enable	22	(disable @ 18)
Off	16	
Bottom	0	

ONE WEEK FLOW EQUALIZATION (Example)

	day	Gallons Influent	Gallons Effluent	Gallons Storage	18 in min water level
1	sat	3050	1000	2050	60
2	sun	1950	1750	2250	64
3	mon	1550	1750	2050	60
4	tue	750	1000	1800	55
5	wed	0	1000	800	34
6	thu	500	1000	300	24
7	fri	600	1000	-100	18
	Weekly Gal.	8400	8400		

OPERATION AND MAINTENANCE SCHEDULE EXAMPLE

The peak season is from Memorial Day to Labor Day. The O&M frequency should be monthly from the middle of May (a time to prepare system for peak season) through the first of September. During this four-month period the operator should visit the site monthly to check operation, usage and the condition of the trenches.

Starting in May the operator can startup the resting treatment system and recirculate 100% of its' effluent in order to acclimate the process. Then after Memorial Day, place it on line for the season. Then through August perform monthly visits, one in December and one in late February. The Operator in consultation with the Restaurant owner can determine when to reduce capacity for the winter. This plan would give 4 monthly visits in a row for summer and two quarterly visits after that.

The third party operator should inspect system for being in good repair, check trenches for ponding, inspect water quality for clarity, color and suspended solids content. If the water quality looks and smells like secondary, then there should be no need to test. The operator should report to the Department the calculated flows based on counters and ETMs, and the status of the trenches and general condition. Annual BOD tests may be required for reporting the treatment system's ability to achieve secondary quality.

The pretreatment septic tanks in series will perform as grease traps in addition to primary settling and septic tank pre treatment. These tanks should still be pumped on a regular basis in order to prevent kitchen FOGs from degrading the performance of the selected treatment system.

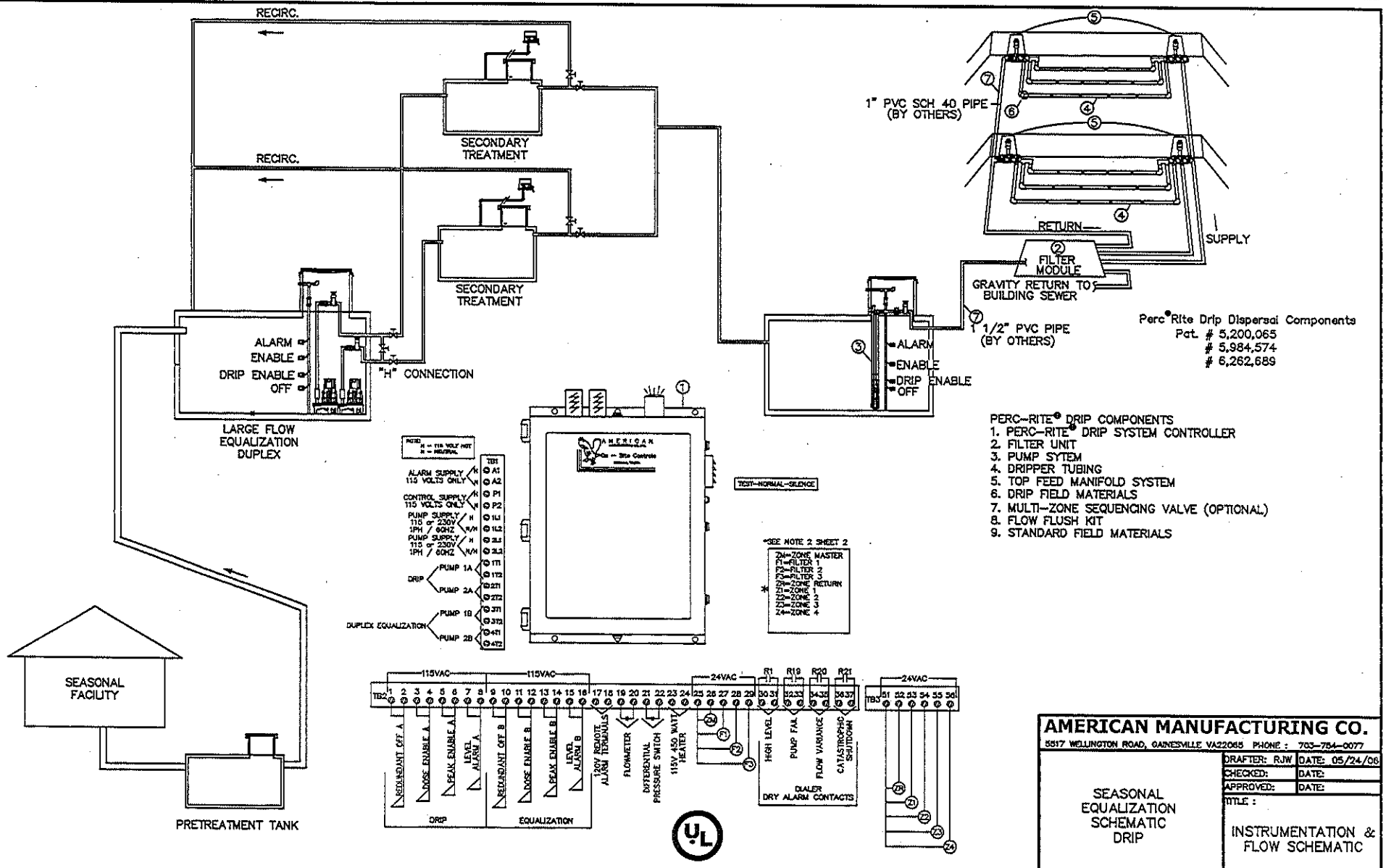
Pumping of these tanks should be coordinated with the operator and done in consideration of the peak flow weekends. This will also help minimize peak flow events.

CONTINGENCY PLAN

This facility could be a commercial restaurant, convenience store or bingo parlor which is servicing the local or tourist population for convenience and recreation. In the event of a catastrophic surface failure the facility can be shut down to address the situation. This proposed design should be inherently stable and a catastrophic failure is highly unlikely.

With regular operational monitoring and maintenance, typical wastewater treatment system situations can easily be dealt with. In the event of a pump failure, the controls may be operated as simplex systems giving time to repair the pump. There is storage for excess peak flows. In the event of a serious malfunction, which will take time to repair, pumping of the tanks will allow the facility to temporarily remain in operation. Regular pumping of the "grease traps" is still necessary.

In the event of excessive ponding of the trenches, the owner should be informed and reduced flows should be achieved by changing operation or adjusting the days closed plus an increase in monitoring frequency. Further, if a major malfunction occurs such as extreme ponding of the trenches or catastrophic mechanical failure and if continued temporary pump and haul is required, the owner should apply for a temporary pump and haul permit from the Department. The duration of this permit should be evaluated at that time in consultation with an engineer.



Perc•Rite Drip Dispersal Components
Pat. # 5,200,065
5,984,574
6,262,689

PERC–RITE® DRIP COMPONENTS
1. PERC–RITE® DRIP SYSTEM CONTROLLER
2. FILTER UNIT
3. PUMP SYTEM
4. DRIPPER TUBING
5. TOP FEED MANIFOLD SYSTEM
6. DRIP FIELD MATERIALS
7. MULTI–ZONE SEQUENCING VALVE (OPTIONAL)
8. FLOW FLUSH KIT
9. STANDARD FIELD MATERIALS

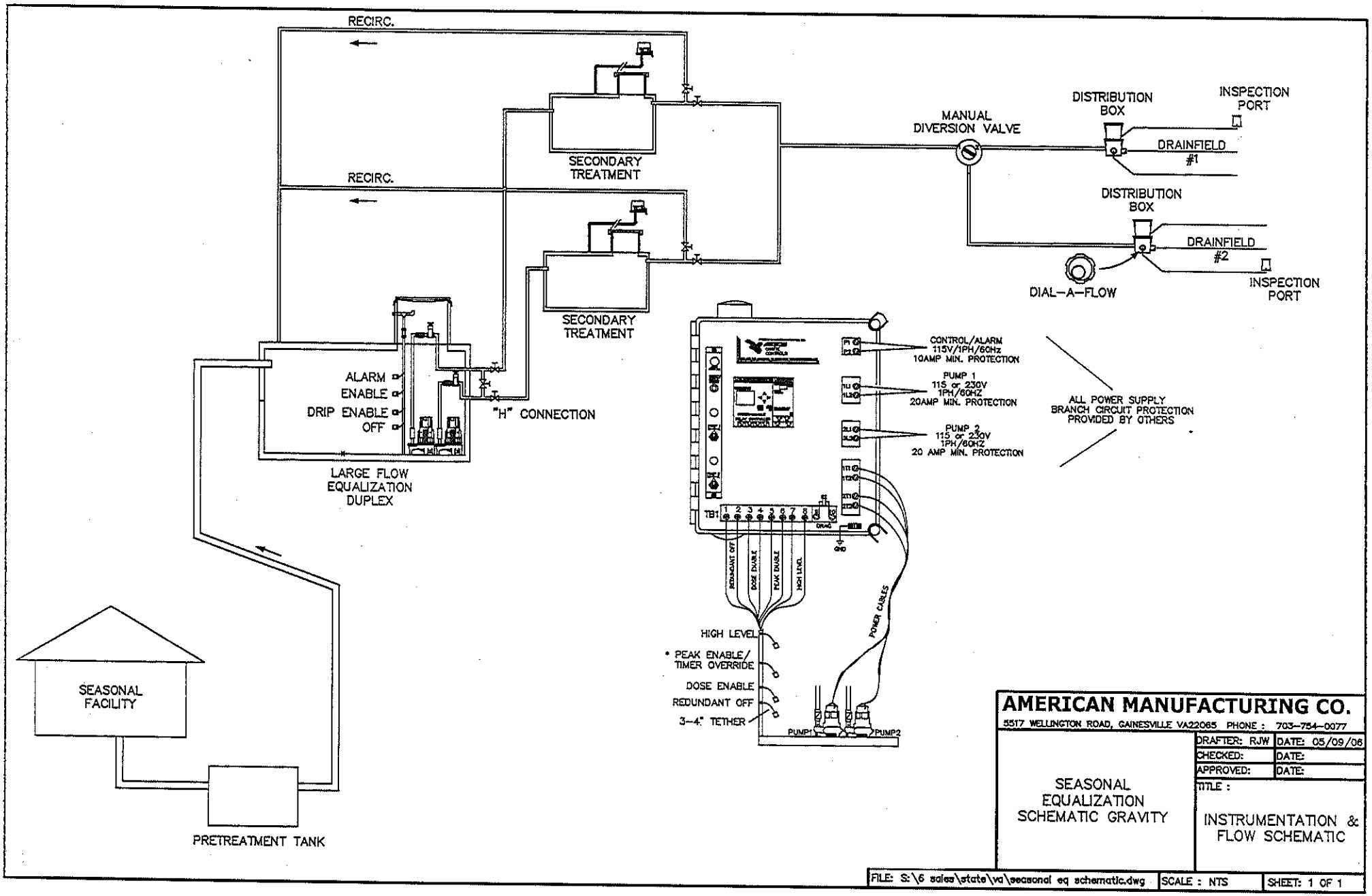
AMERICAN MANUFACTURING CO.
5517 WELLINGTON ROAD, GAINESVILLE VA22065 PHONE : 703–754–0077

DRAFTER: RJW	DATE: 05/24/06
CHECKED:	DATE:
APPROVED:	DATE:

SEASONAL EQUALIZATION SCHEMATIC DRIP

TITLE :
INSTRUMENTATION & FLOW SCHEMATIC

FILE: S:\4 sales\state\va\seasonal eq schematic drip.dwg | SCALE : NTS | SHEET: 1 OF 1



AMERICAN MANUFACTURING CO.

5517 WELLINGTON ROAD, GAINESVILLE VA22065 PHONE : 703-754-0077

DRAFTER: RJW	DATE: 05/09/06
CHECKED:	DATE:
APPROVED:	DATE:

SEASONAL EQUALIZATION SCHEMATIC GRAVITY

TITLE :

INSTRUMENTATION & FLOW SCHEMATIC

FILE: S:\6 sales\state\va\seasonal eq schematic.dwg | SCALE : NTS | SHEET: 1 OF 1

AMERICAN "PERC-RITE®" DRIP DISPERSAL

ENGINEERING & DESIGN GUIDELINES

Table of Contents

AMERICAN MANUFACTURING COMPANY, INC.
5517 WELLINGTON ROAD, GAINESVILLE, VA 20155
1-800-345-3132

SECTION I

INTRODUCTION:

The *AMERICAN "PERC-RITE®" DRIP DISPERSAL SYSTEM* is a unique fluid handling system for dispersal of wastewater effluent into the soil. The system incorporates filtration, time, and level controlled application with ultra low rate drip distribution. Decentralized subsurface effluent dispersal system via Drip Distribution utilizing the patented American "Perc-Rite®" Drip Technology is ideal for communities, schools, churches, state parks and other commercial and large flow applications.

NOWRA DRIP STANDARD

NOWRA, the National Onsite Wastewater Recycling Association has developed a guidance that has the following scope. The entire document may be found in the Specification Material section of the American Engineering Catalog.

Recommended Guidance for Design of Wastewater Drip Dispersal Systems

1. SCOPE

1.1 Drip dispersal is a method used to distribute wastewater, which has received at least primary treatment, over an area of land for final polishing, reuse or recharge of groundwater. This method of dispersal is capable of uniformly distributing the wastewater effluent over large areas. It has been used in the U.S. for dispersal of preconditioned wastewater onto soil infiltrative surfaces since the late 1980's. Drip dispersal is frequently, but inappropriately, referred to as drip irrigation. Drip dispersal is seldom designed to meet the agronomic water requirements of a crop. Instead, it is usually designed to maximize infiltration of water into the soil throughout the year. Some of the dispersed water will evaporate or be transpired by vegetation during the growing season, but most will percolate into the soil and recharge the underlying groundwater. However, plant irrigation or other water reuse applications can be incorporated into the design.

1.2 This guidance describes the appropriate design, installation, operation, monitoring and maintenance practices that are necessary to assure the long-term performance of drip dispersal.

1.3 Site-specific engineered designs must be used. The owner may choose to specify a "pre-engineered" package that is appropriate for the site requirements; however using a pre-engineered package does not preclude the need for proper site-specific design.

SECTION II

PROCESS DESCRIPTION:

Following a minimum of the settling process in the treatment tanks, the wastewater is to collect in a final disposal pump chamber sized to hold a minimum storage for emergency and flow equalization, typically one half to three full days of working volume. The effluent will be time dosed via a four-float operating system. Two multi-stage submersible high head pumps or skid mounted centrifugal pumps are controlled by a "state of the art" "Siemens" PLC or "OPTO 22" controller. The effluent will undergo 115 micron disc filtration prior to final dispersal through pressure compensating emitters located every two feet on-center inside the ½ inch tubing, Netafim Bioline polyethylene pressure compensating dripper tubing.

The *"PERC-RITE®" Drip System* will accommodate almost any type of pretreatment process provided. Only primary treatment (the removal of large settleable solids) of sewage is necessary for the operation of this equipment. Additional treatment may be necessary to protect the receiving environment. The installation of the system will have minimal site impact and after installation there should be virtually no visible indications that the installation site is being used for disposal purposes.

SEQUENCE OF OPERATION:

The *AMERICAN "PERC-RITE®" DRIP DISPERSAL SYSTEM* is operated via a "state of the art" controller. Level sensing devices (standard mechanical differential float switches) located in a dosing tank downstream from the pretreatment process sense the rising level of effluent in the dosing tank, the controller will enable the timed disposal cycle and pump the effluent through 115 micron disc filters and then to final drip dispersal.

The pump control panel is equipped with four float switches to control the timed doses to be discharged. The four float switches, "Redundant Off", "Standard Dose Enable", "Peak/Level Indicator" and "High Level" function as follows:

- Redundant Off - The water level must be high enough to overcome the "Redundant Off" (first & bottom) float in order for the pump to be permitted to run.
- Standard Dose Enable - When the water level rises high enough to overcome the "Standard Dose Enable" (second) float and the time clock has timed out the preset time delay (rest time between dosing cycles), the pump will activate and the lead zone(s) is dosed. The pump will continue to run for the length of time required to disperse of the specified dose volume and then shut off. The pump will remain off until the internal time clock again times out the preset time delay which the pump will activate (as long as the "Standard Dose Enable" float is still up) and will run again until the specified volume is pumped. This process will repeat until the water level drops below the "Standard Dose Enable" float and the pump run timer has timed out.

- Peak / Level Indicator - Used to indicate level of effluent in final pump tank. This float may be used to increase the pumping frequency to design flow.
- High Level - If the water level rises enough to overcome the "High Level" (fourth) float, the audiovisual alarm will activate (if applicable). The audio portion of the alarm may be silenced by pressing the Test-Normal-Silence switch (located on the outside of the control panel) to the silence position. The alarm circuit will latch until manually reset after the "High Level" float returns to its normal (down) position. The alarm circuit is manually reset by switching the High Level Reset/Off-Normal switch (located inside the control panel on the inner door) to the Reset position and then back to Normal position.

DISC FILTRATION:

The pumps deliver unfiltered effluent to each of the 115-micron Arkal Disc filters during the normal forward filtration process. Per program, each system goes through a backflush cycle to clean the filters. The filter backflushing schedule is automatically triggered after a specified volume passes forward through the flow meter, or after a specified differential pressure reading is detected between the upstream and downstream gauges, or based on time. One filter valve closes, thus blocking the flow of unfiltered effluent to that filter. The filtered effluent from the operating filter(s) is directed to the outlet manifold to clean the backwashing filter. Filtered water from the outlet manifold flows in reverse direction through the spine of the filter and into the backflush nozzles, spinning the loosened discs and flushing the captured debris out the drain manifold. The accumulated impurities discharge back into the pretreatment unit. The backflush procedure lasts approximately fifteen to thirty seconds then the back flushing valve closes. Only after the first filter has completed its backflushing cycle, will

the next filter begin its cycle of backflushing in the same manner as the first. The sequence repeats until all the filters have been backflushed. Effluent will then again be pumped through clean disc filters, then through the flow meter and finally through the outlet manifold to the drip field supply line.

DRIP TUBING:

The American "Perc-Rite®" Drip system utilizes Netafim Bioline pressure compensating dripperline for wastewater. The tubing is nominal 0.61 gallons per hour (+/- 5% flow rate from 7 to 70 psi). The tubing functions as a turbulent flow emitter between 0 and 7 psi, ensuring that the nominal design flow is not exceeded at system startup. Tubing end connections and splice connections are manufactured specifically for the tubing and for connection to standard schedule 40 NPT adapters. Emitters are typically spaced every 2.0 ft on center inside the drip tubing.

ZONE DOSING & FORWARD FLUSHING:

Each system will be divided into isolated drip zones and automatically alternate zone doses after the preset rest times are timed out (provided enough effluent is in the pump chamber). Each drip zone will automatically undergo a periodic "Forward Field Flush" every 25 cycles or 15 days (adjustable), whichever occurs first, to scour the inside of the dripper tubing. Forward field flushing is accomplished by automatically opening a 24v automatic zone return valve to allow effluent to return to the head of the system after passing through the drip field. Zones are flushed individually. American Manufacturing follows generally accepted standard engineering requirements for scouring velocity of 2.0 ft/sec. 1.6 gpm per distal lateral connection is provided to achieve minimum scouring velocity of two (2.0) feet per second at the distal end of each lateral. Flushing volume is to be a minimum of three and one half times the volume of the drip tubing plus the volume of any shallow manifolds that may be designed to drain after each. Please note that emitters continue dripping during "forward field flush" events therefore pump and filtration unit sizing will must take into consideration both the zone dose flow and zone flushing flow.

Zones are dosed either individually or two at a time (dual zone dosing). Dual zone dosing systems are typically designed with an even number of zones. Dual zone dosing cuts pump run time in half reducing energy requirements, increasing pump life and it allows the pumps to operate more efficiently as the pumps are sized at nearly the same operating point for individual zone forward field flushing and dual zone dosing. Dose volumes may be as low as three and one half times the volume of dripper tubing volume of the zone being dosed. This is to insure adequate dose time under complete pressurization. Dose volumes too large (greater than 10x volume of drip tubing) may defeat the concept of "low volume, timed dosing" and increase the instantaneous loading. Smaller frequent doses promote unsaturated conditions but if too short (or low of volume) may result in unequal distribution and excess overloading of portions of the dispersal fields. Pump selection must take into consideration the system curve requirements for disc filter backflushing, zone dosing, and forward field flushing of the emitters making sure no hardware pressure ratings are exceeded. If the dosing residual pressure is greater than 40-50 psi, a pressure regulator will be required after the filtration unit but prior to the drip fields.

GENERAL DRIP DESIGN CRITERIA & SYSTEM STANDARDS

	CRITERIA	STANDARD
I.	PRETREATMENT OF EFFLUENT	
	1. Domestic	septic effluent or better
	2. BOD	no clogging of downstream (components or soil)
	3. Grease	no clogging of downstream (components or soil)
	4. Solids	no clogging of downstream (components or soil)
	5. Flow Rate	do not exceed capacity of downstream (components or soil)
II.	MECHANICAL FILTRATION (downstream filters)	
	1. Solid size allowed	4 :1 emitter orifice size to filtrate particle size
	2. Automatic self flushing	return backflush to treatment tank with provision made to minimize disturbance of solids pretreatment process ,operate filters to manufacturers specification.
III.	FIELD FLUSHING	
	1. Supply pipe velocity	maintain 2 feet per second scouring velocity in supply line.
	2. Periodically forward flushing drip line	operation at 2 feet per second at distal to scour tubing handled in public safe manner.
	3. Frequency	per manufacturer, biweekly to semi annual with regard to water quality.
IV.	DRIPPER TUBING LOADING RATES	
	1. Grease	no clogging of soil
	2. Solids	no clogging of emitters
	3. Flow Rate	no clogging of soil
	4. BOD	no clogging of soil
	5. emitter flow variation	max 10% variation in flow between any two emitters in any separately dosed zone.
	6. Draindown limits	loading rate not to exceed soil recommended rates including total daily dosing.
V.	STAND OFF	
	1. Ground Surface septic	covered
	2. Ground surface treated	uncovered
	3. Water table septic	12"
	4. Water table treated	none
	5. Restrictive layer	12" or special design
	6. Separation	tubing installed is typically 24" O.C. minimum (no maximum)
* Note all standoffs to meet applicable state code criteria for conventional drainfields.		
VI.	INSTALLATION AND TESTING	
	1. Tubing	Trenched, plowed, or excavated or special procedure for ultra shallow.
	2. Clean tubing	flushed clean of construction debris, w/ clean water
	3. Leaks	no non-emitter leaks tubing, fittings or supply piping
	4. Flow rate	Normal dosing and flushing flow rates and flushing pressure at the ends of each zone supply and return manifold shall be measured and determined to be in accordance with design criteria.
	5. Equipment	All mechanical components, pumps, pump cycling, filters, filter flushing, high water alarm, and other systems, must be demonstrated to be fully operable in accordance with their design.
	6. Air Release	Air release shall be provided for each drip zone for drainage of normally open emitters after each dose.
VII.	OPERATION	
	1. Automatic dosing	automatic if no operator on site
	2. Flow equalization required	timer enable float and time dosed
	3. Alarms	high water and other as needed for specific site
	4. Monitoring	a) periodic if active process failure causes system damage or high risk to health or environment. b) for repair only if passive and low risk to health & environment.
	5. Optional remote monitoring	a) remote if nonresidential and no operator on site. b) remote if restrictive site & high risk of surfacing
	6. Storage	½ day to 1 day storage between enable & alarm

SECTION III

SITE EVALUATION

SOIL AND SITING CONSIDERATIONS

The size of the required dispersal area will be determined by the design peak daily flow and the soils application rate provided by a qualified soils scientist and / or hydrogeologist. Typically systems greater than 10,000 gpd may be required to undergo in-depth groundwater mounding analysis and / or mass nutrient loading calculations as well as additional infiltration testing. States may have extensive, limited, or no guidance in the siting and design of large flow land based systems.

Loading rates should not be assigned based on textural classes alone. The characterization of a soil based receiver site involves a systematic evaluation by trained individuals. Factors to consider consist of a variety of topographic and soil conditions such as regional hydrology and landscape position, slope, soil depth, soil texture / structure, depth to water table, depth to restriction, soil consistence, clay mineralogy, compaction, density, and site uniformity. At minimum, characterization of the soils should consider features 2-4' + below the point of infiltration.

Infiltration rate estimates based on texture essentially are an indicator of the general status of the total amount of macro pores that would allow water to freely pass through the soil. The macro pores also provide conduits for gas exchange with the surface. The amount, depth, and distribution of macro pores within a soil matrix is very important for performance of any on site system for the soil to efficiently treat and dispose of effluent.

Secondary factors in texture status such as void reduction (increase in density) by compaction, or enhancement by natural soil ped structure development need consideration.

Caution should be exercised when depending upon soil structure to increase loading rates beyond those that may be estimated by texture. The influence of the secondary voids may not extend deep enough to provide the reaeration necessary for efficient biological treatment of the residual organic constituent of the wastewater.

Compaction by even minimum construction activity will always impact or could severely destroy soil structure. These considerations are very important in the case of the find sands and clayey textures and the characteristics shallow installations.

The loading rate and system configuration should consider a site / soil assessment and be based on an estimate of vertical and horizontal subsurface water movement over / through a limitation.

Typical prescriptive loading rates are maximum values addressing infiltrative capacity. **Landscape linear load** determination and application mitigates the hydraulics of dispersal over shallow limitations in small flows. Large flow systems present similar hydrologic conditions that need to be considered. Application of typical landscape linear loading guidelines is difficult (if not impossible) to achieve in large flows.

An effort should be made to avoid concentration of the adsorption fields in one area. Stretching the system along contour as much as possible (avoid zone stacking) to reduce landscape linear loading as well as placement of "pods" of zones in differing landforms will enhance the hydraulic dispersal of the effluent on the landscape. Typically, begin the loading rate determination process by sizing the foot print of a conventional in ground system and adjust accordingly with justification. **For sizing, the footprint is the trench bottom loading rate (gal. / ft^2 / day) divided by three (if 3 trenches are used).**

Generally, deep soils with sandy and loamy textures should not be loaded at any greater than 2" per week or .18 gal/ft^2/day. The clay loams or shallow to limitation sites should not be loaded at any greater than 1" per week or .09 gal/ft^2/day. Loading rates of 1/2" per week or .05 gal/ft$_2$/day are indicated in the most severe sites.

Very deep, coarse, freely draining soils, have been loaded at rates greater than 11" per week or 1 gal/ft$_2$/day after extensive evaluation, testing, and groundwater modeling.

Depth of soil, slope, site landscape linear load, hydraulic conductivity testing of restrictions below the point of infiltration, bedrock permeability, water mounding, and further subsurface geohydrologic investigation may allow for the increase (or reduction) of these loading rates.

When properly sited, drip disposal provides aerobic unsaturated flow conditions at the contact with the soil interface. Saturation of the soil voids should be for brief periods during or directly after dosing. In a typical situation, dose volumes per emitter per dose events are approximately .1 - .25 gallon per dose depending upon the instantaneous dose capacity of the soil and the zone dose volume necessary to provide equal distribution.

At these small volumes, water movement may be primarily influenced by matric (capillary or suction) forces within the soil in addition to, or preceding, downward (or lateral) gravity flow. The result is the retainment of the effluent from the point of distribution, outward and upward such that a drip disposal system can be considered a method of surface disposal within the upper soil horizons. Coupled with time dosing at regular intervals, aerobic conditions are maintained and a nearly static environment is created for the microbial population. The soil treatment system essentially functions as a trickling filter with a film flow condition over the surface of the soil aggregate as the effluent moves within the soil column.

SECTION IV

DISPERSAL AREA SIZING:

The size of the required dispersal area will be determined by the daily design flow and the soils application rate provided by a qualified soils scientist and / or hydrogeologist. Typically systems greater than 10,000 gpd may be required to undergo in-depth groundwater mounding analysis and / or mass nutrient loading calculations as well as additional infiltration testing.

An effort should be made to avoid concentration of the adsorption fields in one area. Stretching the system along contour as much as possible (avoid zone stacking) to reduce landscape linear loading as well as placement of "pods" of zones in differing landforms will enhance the hydraulic dispersal of the effluent on the landscape.

Please note that the American "Perc-Rite®" system claims no effluent treatment and suggests that any effluent quality requirements be addressed prior to final dispersal or in the soil after dispersal. The micron disc filtration on our hydraulic unit is for the sole purpose of protecting the drip tubing emitters and network.

Typical designs call for drip tubing to be spaced 1.5 feet to 3.0 feet on center (2.0' o.c. is most common) although site conditions and applications may dictate closer or farther apart spacing. It is very important to keep the drip tubing along contour so spacing may change as contours change from manifolds to distal ends. When designing on sloping sites and treed sites 2.0 - 3.0 feet on center is more realistic so the system installer has adequate room to make field adjustments (i.e. maneuvering

around rocks, trees, etc.). Flatter sites may lend itself to closer spacing but the area requirement should not be compromised.

The typical design methodology for an single family home or other small flow system provides that the minimum amount of tubing required as being determined by the square footage of the adsorption area divided by two, indicating a two foot spacing.

This criterion is a good starting point. However, in the case of larger flows, as a fluid handling system applied as a subsurface or slow rate land application system, the amount of tubing maybe further determined by a variety of factors. These considerations include the actual flows, the loading rate, pump run times, instantaneous dose to the soil, the zone dosing regime, and other variables.

An example would be a large flow system installed in a soil with a very low loading rate. Tubing separations of 3' or more maybe indicated based on project analysis and considerations of the above outline factors. Conversely, a system in a deep, coarse soil material may indicate an increased amount of tubing.

COMPONENT SIZING:

Standard American "Perc-Rite®" skid mounted filtration units range from 25 gpm (ASD25) to 250 gpm (ASD250) with 25, 40, 60, 90, 120, 150, 200 and 250 gpm units readily available. This does not mean that for example the 250 gpm unit actually runs at 250 gpm continually, rather a total daily pump run time of 20-50% is targeted when utilizing "dual zone" dosing. This enables rest times for the soil, and maintenance time for pumps controls, etc. plus will allow the system to catch up in the event more than the normal flow has been stored for dispersal.

Example: 50,000 gpd daily peak flow. Check run time for 40 gpm unit (ASD40):
50,000 gpd / 40 gpm / 1440 min/day = 86% RUN TIME AT PEAK CAPACITY
This leaves little time for routine disc filter backwashing or general maintenance events. This flow rate relates to dosing from 2% to 13% of the total dispersal area at a time.

Check run time for 90 gpm unit (ASD90):
50,000 gpd / 90 gpm / 1440 min/day = 39% RUN TIME AT CAPACITY

This falls within the desired range of 20-50% run time and allows ample time for zone resting, routine disc filter backwashing and/or general maintenance events. This flow rate relates to dosing from 5% to 17% of the total dispersal area at a time. *Please note that the ASD120 (29% run time) and the ASD150 (23% run time) also fall within the desired range and are options to be considered. This does require siting larger zones.*

Most designs will have more than one appropriate ASD model filtration unit. Choosing between multiple options involves examining site layout, costs of each option and future expansion requirements (if applicable). American Manufacturing Company can assist in evaluating these many options.

The model number indicators for the ASD units also represent the filtering volume capacity of each filter battery. From this flow volume the amount of tubing and the number of laterals is calculated that can be properly flushed at a minimum of 2 ft/sec at the distal end of each lateral. Typical zone details for each ASD model along with typical component quantities are provided in a later section. A quick summary reference is as follows:

TYPICAL ZONE DYNAMICS
(assuming 300' laterals)

ASD Model No.	Linear Feet of Drip Tubing	Dose Flow (gpm)	No. of Lateral Connections	Flushing Flow (gpm)	Total Flow Required (gpm)
ASD25 - 25 gpm	2400	12.2	8	12.8	25.0
ASD40 - 40 gpm	3600	18.3	12	19.2	37.5
ASD60 - 60 gpm	5400	27.5	18	28.8	56.3
ASD90 - 90 gpm	8400	42.7	28	44.8	87.5
ASD120 - 120 gpm	11100	56.4	37	59.2	115.6
ASD150 - 150 gpm	13800	70.2	46	73.6	143.8
ASD200 - 200 gpm	18600	94.6	62	99.2	193.8
ASD250 - 250 gpm	23100	117.4	77	123.2	240.6

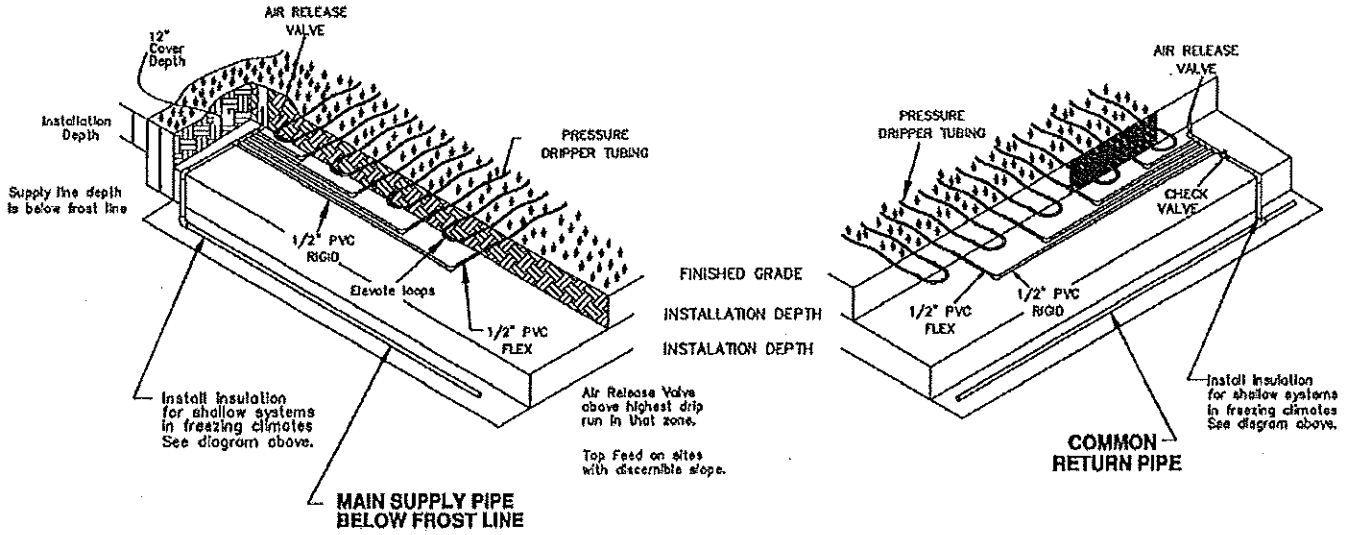
Larger models are available upon request. Please note that zones of all shapes and sizes are common and can be incorporated into each model provided it can be flushed properly with the specified ASD unit.

A length of drip tubing across the contour is identified as a **"run"**. A series of connected runs that start at the supply manifold and terminate into the return manifold is identified as a **"lateral"**. Lateral lengths of 300' are common. Longer laterals can be accommodated but should be discussed with American Manufacturing as head loss through the laterals during flushing increase exponentially. A group of laterals dosed at the same time are a **"Zone"**. It is encouraged that lateral lengths within a zone remain as close to each other in size as possible to ensure equal flushing. Zones within a system may be of different sizes but zones too large or with too many lateral connections may not be able to be flushed properly. Over pressurizing a zone too small must also be considered.

Top Feed Manifolds and Run Length:

Top feed manifolds are used whenever any discernable slope is encountered in any zone. The alternative is side feed manifolds which on sloping sites enable **"draindown"** which will overload the lower most laterals in a zone after the pump shuts off. Draindown in the draining of manifolds and upper zone laterals into the lower laterals after each dose.

TOP FEED MANIFOLD



RESIDENTIAL
Patent No. 5,984,574

The maximum number of laterals within a sub-zone may also be affected by the tubing spacing in that sub-zone. There are top-feed manifolds placed at the high point of each sub-zone that are connected to 3/4" lateral feeds or 1/2" lateral returns. The 3/4" dia. and 1/2" dia. SCH40 PVC lateral feeds and returns are positioned to drain into the drip tubing upon the completion of each dose (pump shut off) and to prevent the drain down of upper to lower laterals. It is recommended that the 3/4" and 1/2" lateral feeds and returns **not exceed 50 feet** length down the slope. Longer lengths may begin to defeat their original purpose.

Sub-Zones: Zones may be split into sub-zones. However, they are still part of the same zone and controlled by a single 24v zone Control Valve. Sub-zones within a zone are designed to minimize construction cost and have the ability to be manually isolated from the remainder of the zone for repair or maintenance without taking the entire zone out of service. Sub-zones within a zone may consist of various amounts of drip tubing, number of laterals, and number of runs. However, they still must maintain nearly the same run lengths and lateral constraints listed above.

SUPPLY & RETURN MANIFOLD LENGTHS (ft)
For tubing spacing 2' O.C.

MODELS	Maximum Zone (ft.)	150' Full Zone Manifold	Contour 1/2 Zone Manifold	100' Full Zone Manifold	Contour 1/2 Zone Manifold	75' Full Zone Manifold	Contour 1/2 Zone Manifold
ASD-25	*2,400*	*32*	*16*	*48*	*24*	*64*	*32*
ASD-40	*3,600*	*48*	*24*	*72*	*36*	*96*	*48*
ASD-60	*5,400*	*72*	*36*	*108*	*54*	*144*	*72*
ASD-90	*8,400*	*112*	*56*	*168*	*84*	*224*	*112*
ASD-120	*11,100*	*148*	*74*	*222*	*111*	*296*	*148*
ASD-150	*13,800*	*184*	*92*	*276*	*138*	*368*	*184*
ASD-200	*18,600*	*248*	*124*	*372*	*186*	*496*	*248*
ASD-250	*23,100*	*308*	*154*	*462*	*231*	*616*	*308*

DOSING & FORWARD FLUSH FLOW RATES:

Zone sizing and layout are critical design factors since pump sizing is based on dosing, flushing, and filter cleaning. The following example shows how to calculate zone flushing. The example illustrate how in large systems most designs provide for dosing two zones at a time and flushing one zone at a time.

Example: ASD60 - 60 gpm. Typical Zone has approximately 5400 l.f. and 18 - 300' laterals.

Dose Flow: (5400 l.f. / 2.0' o.c. emitter spacing) x (0.61 gph / 60 min/hr) = 27.5 gpm

Flush Flow: 18 lateral connections x 1.6 gpm/connection = 28.8 gpm

Total Flow Required: 27.5 gpm + 28.8 gpm = 56.3 gpm

** 1.6 gpm equals 2.0 ft/sec inside ½ drip tubing (0.57 actual inside dia.)*

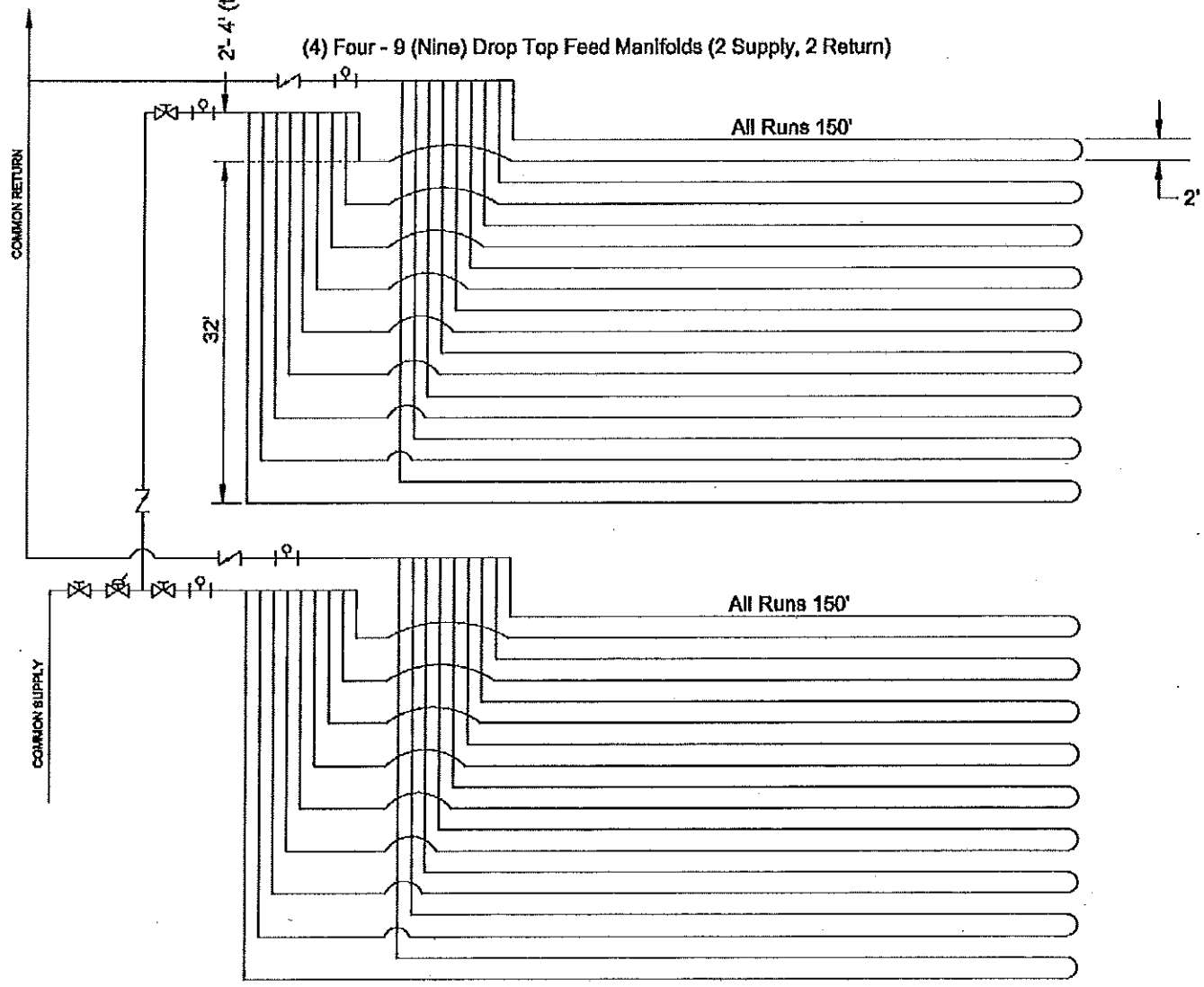
ZONE LAYOUT TECHNIQUES:

The results of the site and soil evaluation should be information to delineate suitable soil areas on contour for the project. Experienced site evaluators will layout areas on contour showing the width across contour, typically from 75' up to 300'. Long runs of 300 feet are not common but are possible in some landscapes. The available distance down slope will also be provided.

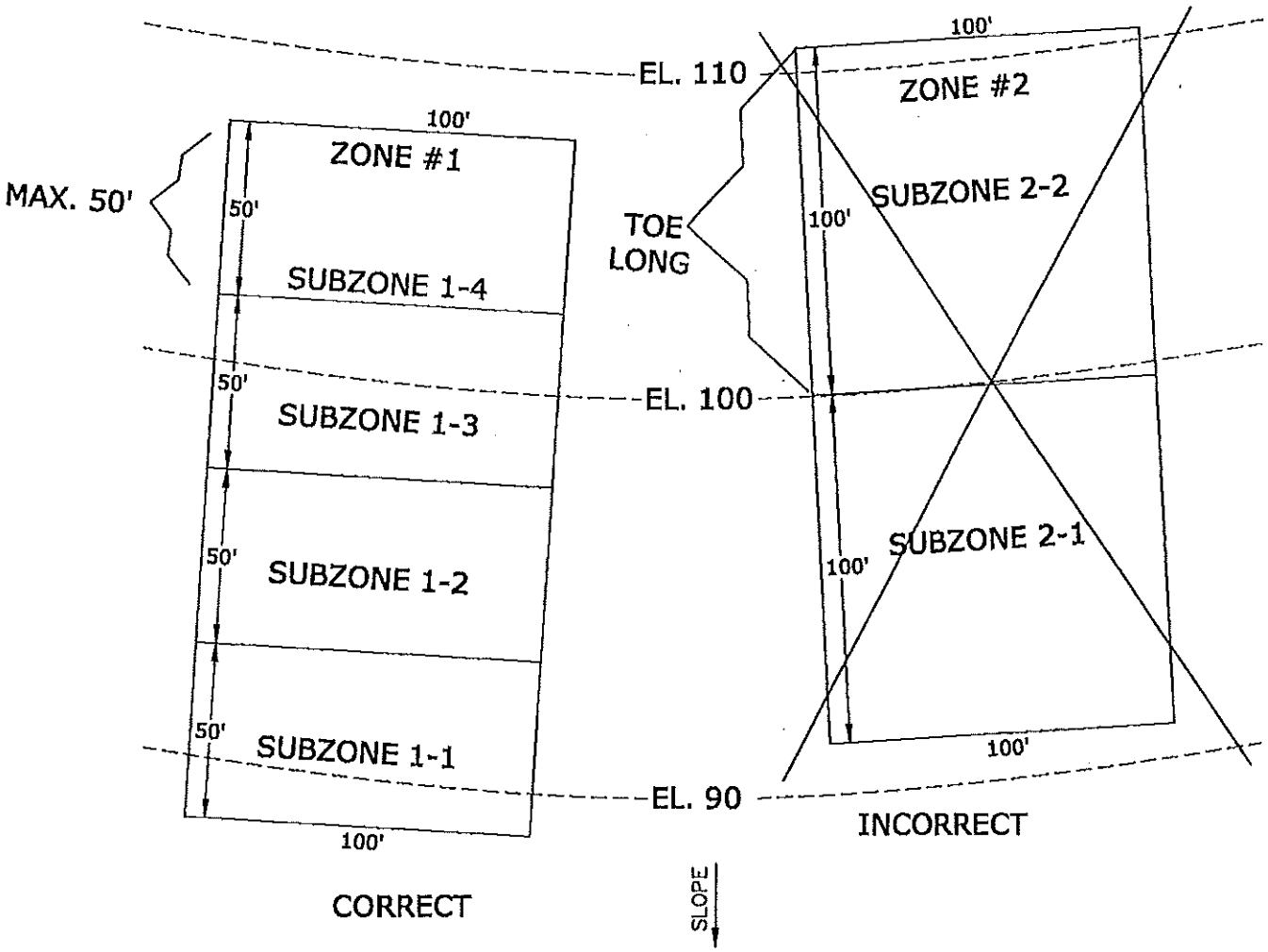
Based on the preliminary evaluation of the Perc-Rite system sizing, zone details need to be developed to fit into the landscape. For example, if it has been determined to use a 60 gallon per minute system, then zones must be developed for the landscape that do not exceed 5,400 linear feet. Reference the "Supply & Return manifold lengths" Table. This table shows the manifold lengths for 2 foot run spacing for the various typical contours and the available systems sizes. For a 60 gpm unit and 150 feet across contour, with two sub zones the manifold lengths are 36 Feet.

ASD 60 - 5400 Linear Feet

Legend	Each Subzone	Total	Dosing	Field Flush
- AIR RELEASE VALVE	36 Runs	56 Runs	27 GPM	56 GPM
- CHECK VALVE	9 Laterals	18 Lats		35' Flushing
- SHUTOFF VALVE	2 Runs/Lateral	5400 L.F.		Head Loss Tubing
- ZONE VALVE	2700 L.F.			
	Long Lat. 300'			



SUBZONES



"Top Feed Manifolds" should be utilized on all sites with discernable slope. When using "Top Feed Manifolds", zones should be broken into subzones with no subzone header being longer than 50'. The above schematics show zone #1 correctly being broken into multiple zubzones with headers no longer than 50'. The schematic also shows zone #2 incorrectly being broken into subzones with 100' header.

SCALE: 1′ = 50′ ±

SECTION V

DESIGN CALCULATIONS

OPERATING POINTS & SYSTEM HEADLOSS:

There are three operating points to consider:

I. Single zone forward field flush (typically every 15-25 cycles or every 15 days)
II. Single or dual zone dose flow (typically 3-5 doses/day/zone)
III. Disc Filter Backflush (at preset volumes, times, or pressure differential)

When calculating headloss American suggests taking the worst case scenarios to ensure proper flushing. For example 50' of equivalent length is added to most pipe lengths to more than compensate for minor losses. Velocity head is typically so small it is negligible.

I. Items to consider when calculating Forward Field Flushing requirements are as follows:

1. TDH from pump to Hydraulic Unit (or suction lift to pumps on H.U.).
2. Loss through the Hydraulic Unit.
3. Loss in supply force main to drip zones.
4. Loss through 24v zone valve assembly.
5. Loss through zone supply manifolds.
6. Loss through longest drip lateral in zone (from mfg. chart).
7. Static lift.
7. Loss through return manifolds.
8. Loss through common zone return line.

II. Items to consider when calculating Single or Dual Zone Dosing requirements are as follows:

1. TDH from pump to Hydraulic Unit (or suction lift to pumps on H.U.).
2. Loss through the Hydraulic Unit.
3. Loss in supply force main to drip zones.
4. Loss through 24v zone valve assembly.
5. Loss through zone supply manifolds.
6. Loss through longest drip lateral in zone (from mfg. chart).
7. Static lift.

Residual pressure at emitters must be calculated to verify it is within proper operating range (7-70 psi).

III. Items to consider when calculating Disc Filter Backflushing requirements are as follows:

1. TDH from pump to Hydraulic Unit (or suction lift to pumps on H.U.).
2. Backflush pressure at filter unit (typically 50 psi).
3. Loss in return line.

* Note: Loss in return is typically negligible since it is suggested to have a gravity return line from H.U. Back to head of system. If not gravity then TDH in return line must be considered.

An example headloss and system calculation sheet is included as an attachment. Please contact American Manufacturing for assistance in headloss calculations and proper pump sizing and specification.

Design Calculations

The designer must run design calculations in order to lay out the system in the field and after the system is laid out to determine if the hardware components of the system will function properly. These calculations are for the most part the same as typically performed during the design of wastewater treatment or pumping facilities.

Size of Absorption Area

The total amount of absorption area required generally depends on two factors, the daily wastewater load of the facility being serviced by the system and the absorption capacity and treatment ability of the soil.

Demand analysis: Calculate the design flow.

Example: Flow = 360 gpd per home x 60 Homes = 21,600 Gallons per Day Design Flow

Soil Loading Rate: Determine the soil loading rate.

A field evaluation of the soils at the site must be completed by a qualified person, such as a soil scientist as described in section II. The site evaluator should determine the soil loading rate and the depth of installation. The calculations are performed with the soil loading rate.

Example: Area = 21,000 gpd / 0.1 gpd per sq. ft. area = 216,000 square feet of required area.

Linear feet of tubing: Compute total tubing necessary for the absorption field.

Tubing necessary = Area / 2 = (Daily Flow / AREA Loading Rate) / 2 = Linear Feet
Tubing necessary = (21,000 GPD / 0.1 gal./day/ft^2) / 2 = 108,000 Linear Feet

Determine Layout: Determine layout of the dripper line absorption field.

It must be determined through the designer's system evaluation if larger or smaller zones are the best suited for the site. Zone control is typically incremented in groups of four (4). For example:

108,000 linear feet / 4 = 27,000 linear feet per zone (250 (+) gpm filtration unit)
108,000 linear feet / 16 = 6,750 linear feet per zone (90 (-) gpm filtration unit)

Keep each individual dripper line lateral length the same length in each zone. Attempt to provide 300 linear feet per lateral from its connection to the supply manifold to its connection to the return flush manifold. Always configure the system supply line to *feed using top feed manifolds* and supply and return *from the highest* elevations. When running a continuous dripper line, it may turn and make a loop or series of loops back to the return flush line before making a connection. Feed each lateral from the lower elevation from the top feed manifold. Call American for assistance in zone layout.

Determine Zone Operating Conditions: Calculate Dosing and Flushing flows

108,000 linear feet / 16 = 6,750 linear feet per zone
6750 linear feet per zone / 300 linear feet per lateral = 22.5 laterals,
(Use 24 laterals, 8 laterals per sub zone.)
24 laterals X 300 linear feet per lateral = 7200 linear feet per zone.
7200 feet / 2 = 3600 emitter
3600 X .61 gallons per hour per emitter / 60 minutes per hour = 36.6 Gallons per minute Dosing
24 laterals X 1.6 gpm per lateral flushing rate = 38.4 gpm for Flushing
Dosing + Flushing = 36.6 + 38.4 = 75 gpm total flow required.
Reference "Zone Dynamics Table" and select an ASD90, 90 gpm filtration unit.

Determine Pump Operating Conditions: Calculate Systems Head Curves

The pump must be able to properly operate under three conditions. First calculate the head loss during field flushing. Second determine pump requirements for backwashing the disc filters. Third, determine if pump will dose one or two zones at a time and in all cases it will not over pressurize the piping network and operate each process according to design. American Manufacturing can assist in this determination.

Size of Pump/Dosing Tanks

The pumping tank should provide flow equalization and emergency storage. The designer should determine the backup requirements for mechanical equipment and therefore how much storage is appropriate for a specific site. Typical demand pumping stations require an operating volume determined by pump run times and storage determined by the operators response time in case of mechanical failure. A drip dispersal system is a pump system with filtration. Typical storage requirements range from one half (1/2) to a full day storage for flow equalization. Emergency storage due to a catastrophic mechanical event varies and could be evaluated in the same manner as pump systems servicing similar facilities in the region.

Example: For a 21,600 GPD waste flow.
Volume of Pumping Tank = 21,600 Gallons x 1/2 = 10,800 Gallons operating volume.
Volume for emergency storage = ½ day X 21,600 = 10,800 Gallons Storage volume
Total Tank Volume = Operating Volume + Emergency Storage Volume = 21,600 Gallons

Equalization operating volume may be further enhanced in consideration of conveyance system storage and pretreatment process equalization.

SECTION VI

Drip Dispersal Installation & Construction Techniques

General Layout Requirements Drip System

The tanks, treatment units and distribution fields are subject to set back regulations to keep required distances from wells, property lines building foundations and bodies of water according to local regulations. Prevent damage to distribution areas by traffic and follow plans, which should be provided for all larger systems.

Site Preparation

On sites where a majority of the vegetation needs to be removed, care must be taken to minimize the impact on the soils natural permeability. Clearing and removal should be by hand, with minimal machine assistance, under optimum soil moisture conditions. Track machines are preferred to those with rubber tires. Soil moisture conditions need to be confirmed prior to beginning clearing and system installation by the soil scientist of record.

NOTE: *The preservation of the original structure of the soil in the absorption area is essential to maintaining the percolative capacity of the soil. No activity other than the construction of the system is permitted within the absorption area.*

The absorption system is not to be constructed during periods of wet weather when the soil is sufficiently wet at the depth of installation to exceed its plastic limit. The plastic limit is exceeded when the soil can be rolled between the palms of the hands to produce threads 1/8 inch in diameter without breaking and crumbling.

All trees and brush, as necessary, should be cut flush with the ground surface. Depending upon the density of the root zone, there maybe a need to grub out the smaller stumps. The grub tooth depth should not exceed 12".

Grubbing pulls and tears out the stumps, with digging and pushing being more detrimental to the soils infiltrative characteristics. Selective grubbing of the site coupled with chisel plowing, and raking is required prior to the establishment of turf. Once cleared, seed the area liberally with native grasses. The standard VDOT specification is acceptable consisting of perennial rye and fescue.

Larger stumps may remain or if there are many, ground out as necessary.

There is to be no cutting, filling, or storage of material on or within 20' of the adsorption areas

Topography

The dripper tubing should be placed on contour. Dripper tubing along any given lateral should not be off grade by more than 6" in 100 feet. Tubing installed on sloping sites should have Top Feed manifolds for supply and return and with sub zones per design to minimize draindown which may overload the down slope laterals. Since pressure compensating dripper emission rates are consistent at varying pressures, no special design requirements are needed to ensure proper soil loading rates.

The filtration unit must be positioned to allow the backflush and field flush water to be discharged back to the treatment tank with minimum backpressure. The waste line from the filter unit is recommended to be gravity. If this line needs to go up hill or is over 30' long a special design may be necessary. Call American for special design considerations.

Each zone should be fed from the lowest elevation top feed manifold of the zone and the air release should be placed at the highest elevation. Accumulate the return manifold piping to a common return line to save pipe costs.

General Installation Information Requirements Summary

The site layout will determine those items of information needed. The installation contractor should be familiar with the following information in order to prove proper installation and operation of the system after installation:

1. NUMBER OF ZONES
2. LATERAL CONNECTIONS IN EACH ZONE
3. GPM PER ZONE BOTH DOSING AND FLUSHING
4. FILTER BACKWASHING REQUIREMENTS

The above information is needed to perform the simple pump test to determine if the pump which is necessary to backflush the disc filters is also adequate for dosing and field flushing. Standard head loss tables are used to compare to the pump curve.

Filtration Unit

The self-contained units have a 25 gpm capacity. The capacity includes dosing and field flush flow rates. Skid mounted units need to be enclosed in a heated and floor drained building. They start at 40 gpm and increase in increments of twenty gpm or more. Each filtration series has unique operating conditions so the individual manual must be referenced for each installation.

REMEMBER: Always configure the layout to avoid draindown of the zones. On sloped sites zones are feed from the top and return to the top using the Top Feed supply and return manifolds.

Flow Rate during Absorption Field Dosing

The flow rate during absorption field dosing depends on the amount of dripper line required for any particular installation. The units of measure used are GPH = Gallons per Hour and GPM = Gallons per Minute. The flow rates are easily calculated as follows:

Note: Dripper Line Length in Absorption Field / 2 Foot Emitter Spacing = Number of Emitters
Number of Emitters x .61 GPH = Absorption Field Dosing Rate in GPH
GPH / 60 minutes = Absorption Field Dosing Rate in GPM

Field Flushing Flow Rates

Since automatic flushing of the dripper lines in the absorption field is an integral function of the total system, it should be considered as part of the overall flow rate generated by the system. It has been established that proper scouring and flushing of any pipe system will require at least **1.6 gallons per minute** flow at the outflow end (distal end) of any pipe. Therefore, we should design for a flow of at least 1.6 gallons per minute out of each dripper line connection that has been made to the return flush manifold pipe. Multiply each return manifold connection by 1.6 GPM to get the field flushing flow requirement.

Total Flow Requirement of System

The total flow used in calculating the operating flow requirement of the absorption field would be the combination of both the field dosing flow and the field flushing flow.

Field dosing flow + field flushing flow = total hydraulic design flow

SECTION VII

Cold Weather Installation

1. "Top feed" manifolds should be used on all sites with a discernible slope to allow for proper drainage of the manifolds and the 3/4" and 1/2" lateral connectors into the drip tubing.
2. The main supply and return lines shall be installed below the frost line and shall feed the shallow "top feed" manifolds with a single vertical section of insulated sch 40 PVC pipe. Insulation shall be minimum 1/2" thick foam insulation (or equivalent).
3. On flat sites where "top feed" manifolds will not drain therefore requiring the use of side feed manifolds, 12" cover is recommended between highest point of 1/2" black flexible PVC pipe (non loop connections) and final grade. On drip tubing installations less than 12" this would require additional cover over the header ditch area to create the 12" separation. Any additional cover is to be graded and tapered into landscape without compacting soil in tubing area. Please see note on loop connections below.
4. Dense vegetation turf cover to be established over supply trench, return trench and tubing prior to 1st exposure to cold weather. If vegetation cannot be established, then trenches and tubing to be covered with a thick layer (minimum 6") of mulch, straw/hay, etc. until such turf cover is established. Cover must be stabilized and maintained until dense vegetative turf is established. Amount of cover may need to be adjusted to account for settling.
5. All valve boxes that house "remote zone valves" shall be insulated by contractor. Insulation to consist of either blue board, bagged Styrofoam peanuts or equivalent. If fiberglass insulation is used it must be sealed to prevent it from becoming saturated. The "remote valves" shall be placed on a bed of gravel or screenings (4"-6"). Positive grade away from valve boxes is encouraged to reduce the volume of groundwater that may collect in valve box. Certain sites may require positive drains to daylight.
6. All loops connecting drip runs with 1/2" flexible PVC shall be slightly elevated (minimum 1"-2") so that they drain into the drip tubing after the pump shuts off. It is contractors responsibility to ensure these loops stay elevated during and after the loops are backfilled.
7. All main supply and return trenches to be installed below the local frost line. If this is not possible due to site restrictions then adequate soil must be added over the top of the trenches so that the effective depth remains below the frost line after settling occurs. The added soils must be prepared for turf cover and stabilized. If vegetation cannot be established then trenches are to be covered with an additional layer (minimum 6") of mulch, straw/hay, etc. until such turf cover is established.
8. Sufficient ground cover around the hydraulic unit is required to insulate the unit. All pipes entering and leaving the hydraulic unit shall elbow vertically down 90 degrees to a depth below the frost line prior to extending away from the unit horizontally. Additional insulation inside the hydraulic unit is encouraged. Insulation to consist of either blue board, bagged Styrofoam peanuts, or equivalent. If fiberglass insulation is used it must be sealed to prevent it from becoming saturated.
9. All conduit entering into the control panel shall be sealed to prevent condensation inside the panel.
10. Established vegetation height shall be minimum 4"-6" throughout winter months.
11. Air release valves shall be placed below the ground surface inside a valve box but at an elevation above the highest drip line in that particular zone.

SECTION VIII

DRIP DISPERSAL INSTALLATION & CONSTRUCTION NOTES

1. All installation and construction techniques shall conform to state and county codes pertaining to on site sewage systems and the permit for this site.
2. The installation of this system shall be in accordance with specifications and procedures as supplied by the Manufacturer of the equipment.
3. The drip tubing shall be installed using a vibratory plow or trencher.
4. All PVC pipe and fittings shall be PVC SCH 40 Type 1 rated for pressure applications. All glued joints shall be cleaned and primed with purple (dyed) PVC primer prior to being glued.
5. All cutting of PVC pipe, flexible PVC and dripper tubing of size 1 1/2" or smaller shall be accomplished with pipe cutters approved by American Manufacturing Company, Inc. No sawing of PVC, flexible PVC or dripper tubing of size 1 1/2" or smaller allowed.
6. All PVC pipe, flexible PVC and dripper tubing in the work area shall have the ends covered with duct tape to prevent construction debris from entering the pipe. Prior to gluing, all joints shall be inspected for and cleared of any construction debris.
7. All automatic valves (zone valves & field flush return valves) shall be installed with isolation valves, bypass valves, and disconnects (i.e. unions, flanges) for manual field operation during field maintenance events. All valves must be provided with at-grade access.
8. Drainfield supply and return lines and manifolds to be installed at adequate depth to prevent freezing. Horizontal spacing between the dripper lines and the installation depth are to be as specified.
9. No activity on drainfield area other than minimum is required to install system. Do not park equipment, drive large equipment over or store materials on drainfield area.
10. No wet weather installation is permitted.
11. The contractor shall be certified by American Manufacturing Company, Inc. to install this type of system and shall hold a pre construction meeting with the individuals responsible for soil evaluation, permitting and inspections prior to site work beginning to insure protection of the site conditions and to ensure the system is installed according to design.
12. If site conditions are determined to require the installation of the system to deviate from these plans, all work shall stop immediately and the designer shall be notified. Any ongoing work shall be at the sole responsibility of the contractor.
13. All force mains shall be tested for leaks prior to drip tubing installation and prior to system startup. Uncovered force mains shall be visibly inspected for leaks. If a leak is suspected in covered force mains then the force main shall be re-tested at a minimum pressure of at least 50 percent above the design operating pressure, for at least 30 minutes. There shall be no discernible leakage.

SYSTEM STARTUP

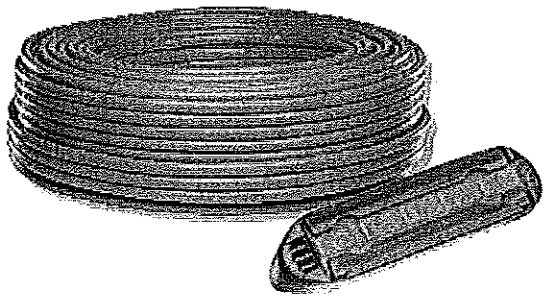
1. A representative from the manufacturer should be on hand for system startup.
2. ½ day of training should be provided by the factory-trained representative supplying the drip irrigation system equipment.

BIOLINE DRIPPERLINE

WASTEWATER DIVISION

NETAFIM™

The world's most advanced continuous self-cleaning, pressure-compensating dripperline for wastewater.



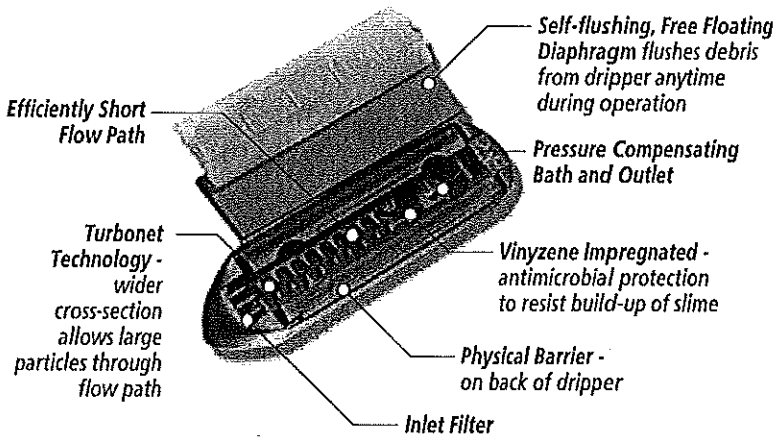
Applications

- Can be used with domestic septic tank effluent of 220/220 (ppm) BOD/TSS with proper design, filtration and operation
- Typically installed following a treatment process
- Reuse applications including municipally treated effluent designated for irrigation

Features/Benefits

- 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 - the complete tubing is purple,easily identifiying it as a non-potable, regardless of how the tubing is installed.
- Vinyzene-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.

EXPLODED VIEW OF BIOLINE DRIPPER



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 flow, spacings, and pipe sizes available by special order. Please contact Netafim USA Customer Service for details.

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NETAFIM USA
5470 E. Home Ave. • Fresno, CA 93727
888.638.2346 • 559.453.6800
FAX 800.695.4753
www.netafimusa.com

BIOLINE FITTINGS

TLCOUP
Insert Coupling

TLELL
Insert Elbow

TLTEE
Insert Tee

TLCROS
Insert Cross

TL050MA
½" Male Adapter

TL075MA
¾" Male Adapter

TL075FTEE
Combination Tee
Ins x Ins x ¾" FPT

TL2W075MA
2-Way Insert
¾" MPT x Insert

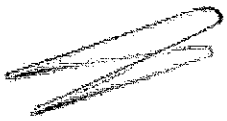
TLIAPE-B
Insert Adapter for 1" or Larger PE (Requires 11mm or 7/16" drill or punch)

TLIAPVC-B
Insert Adapter with Grommet
1½" or larger PVC Pipe

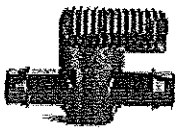
TDBIT16.5
Drill Bit for TLIAPVC Fitting (16.5mm or 21/32")

TLDPLUG
Dripper Plug Ring to Close Off Individual Dripper

TLFIG8
Figure 8 Line End



TLS6
6" Soil Staple



TLSOV
Shut-Off Valve
Ins x Ins

TLCV
Inline Check Valve

- Flow Range: 0.9 to 4.4 GPM
- Opening Pressure: 7.1 psi
- Closing Pressure: 5.7 psi

Fittings Definitions
FPT = Female Pipe Thread **MPT** = Male Pipe Thread **Ins x Ins** = Insert by Insert

Applications

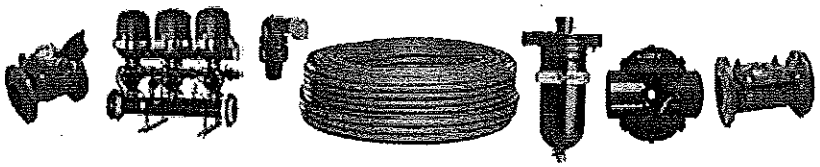
- Fits Bioline Dripperline

Features/Benefits

- Barbed fittings for secure fit
- Easy installation without glue or tools
- Maximum recommended system pressure without clamps - 50 psi
- Allows for easy on-site inspection of proper fitting installation

Netafim USA - Delivering Total System Solutions for Wastewater

• Dripperlines • Fillers • Valves • Air Vents • Flow Meters • Controllers



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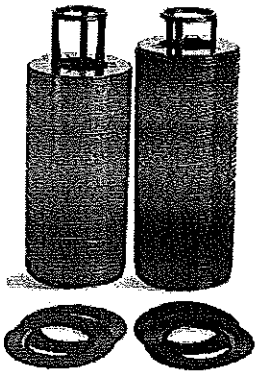
For more information call your Authorized Netafim USA Distributor or call Netafim USA Customer Service at (888) 638-2346.

W064 8/06

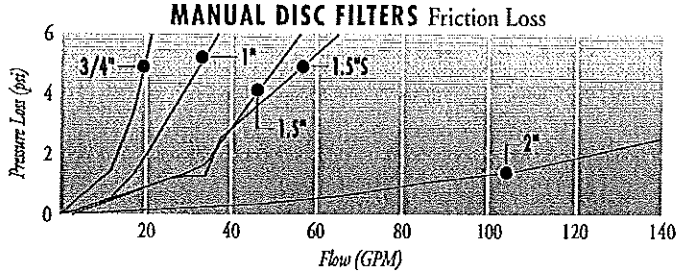
NETAFIM™

Manual Disc Filters

Reliable, Efficient Plastic Discs Create Superior Filtration

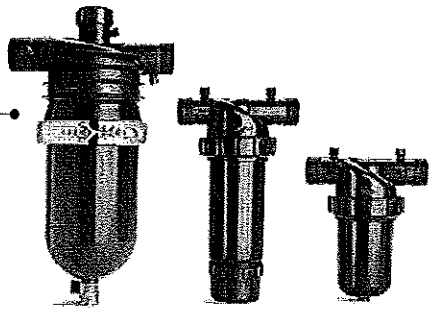


Disc Filter Technology was originally developed to keep the hydraulic lines on military aircraft clean. Each filter element is a stack of grooved rings, or discs. Clean water must pass through the grooves in the stack of discs from the outside to the inside of the disc stack. The grooves on adjacent discs run cross-ways to each other, so the effluent must pass through a labyrinthine passageway on its way through the filter element. The debris is deposited in the grooves as the effluent makes its way through the filter element. Because the grooves have depth (a 3-dimensional volume vs. a 2-dimensional surface like a screen filter), they are able to hold a larger amount of debris than screen filters.

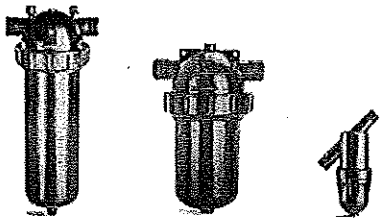


Product Advantages

- Extremely Reliable
  Unlike screen elements, the stack of discs that comprise the filter unit cannot tear or collapse. Organic material won't get pushed through as the filter loads.
- Higher Capacity for Holding Debris Means Less Frequent Cleaning
  The 3-dimensional nature of disc filtration enables the filter to safely hold more debris without clogging or 'sliming over' as can happen with screen filters used on water sources with organic loads.
- Simple, Easy and Thorough Filter Cleaning
- Low Friction Loss
- 100% Thermoplastic Discs Provide Extremely High Corrosion Resistance
- Color-coded Replacement Filter Rings Available



2" 1 1/2" Super 1 1/2"



1" Super 1" 3/4"

Applications

- All domestic wastewater applications

FILTER SIZE

Filter	GPM
3/4"	13
1"	22
1" Super	35
1 1/2"	35
1 1/2" Super	44
2"	132

Netafim USA offers filters up to 4000 GPM - please call for more information.

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Manual Disc Filters Technical Information

PRESSURE LOSS (psi)

Filter Size	Filter Volume (cu. in.)	Filtration Area (sq. in.)	Flow Rate (GPM)												
			4.4	8.8	13	17	22	26	31	35	44	66	88	110	132
3/4"	6	25	0.40	1.46	3.40										
1"	27	48	0.14	0.54	1.34	2.10	3.24								
1 1/2"	27	48					1.10	1.30	1.70	2.30					
1 1/2" Super	34	61					1.10	1.20	1.20	2.50	3.60				
2"	74	146.5									0.30	0.63	1.03	1.47	2.13

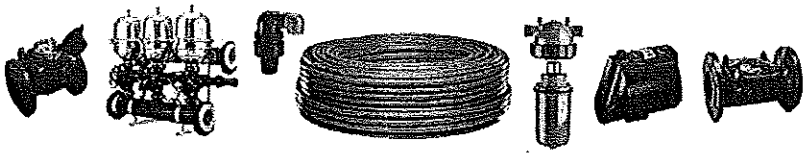
Ordering Information

MANUAL DISC FILTERS

Part Number	Description	Flow Range (GPM)
DF075-120	3/4" MPT x MPT-120 mesh	1 - 18
DF075-140	3/4" MPT x MPT-140 mesh	1 - 18
DF100-120	1" MPT x MPT-120 mesh	5 - 26
DF100-140	1" MPT x MPT-140 mesh	5 - 26
25A48-120	1" Super MPT x MPT-120 mesh	10 - 35
25A48-140	1" Super MPT x MPT-140 mesh	10 - 35
DF150-120	1 1/2" MPT x MPT-120 mesh	10 - 35
DF150-140	1 1/2" MPT x MPT-140 mesh	10 - 35
DF150S-120	1 1/2" Long MPT x MPT-120 mesh	10 - 52
DF150S-140	1 1/2" Long MPT x MPT-140 mesh	10 - 52
DF200-120	2" MPT x MPT-120 mesh	40 - 120
DF200-140	2" MPT x MPT-140 mesh	40 - 120

Netafim USA - Delivering Total System Solutions for Wastewater

• *Dripperlines* • *Filters* • *Valves* • *Air Vents* • *Flow Meters* • *Controllers*



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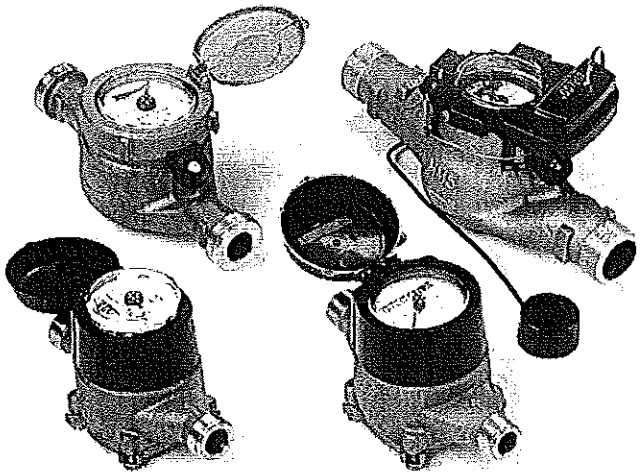
W0619/04

MASTER METER

Multi-Jet Water Meters

5/8", 3/4" and 1"

Our Multi-Jets quietly perform to a high standard. Yours.



Millions of our 5/8", 3/4", and 1" meters are in operation today. Using superior measurement technology, these meters represent the perfect balance between accuracy, cost, and longevity. With sensitivity to measure water flowing as low as 1/8 gallon per minute and accuracy unaffected by common particulates and build-up that would freeze other types, you can count on a Multi-Jet.

Our meters are designed with the future in mind as well. Choose from the many optional devices and you can create a modular reading system that has no equal. Remote Read? We can handle that. Wireless? We make it almost too easy. These meters are ready to work for you.

FEATURES & BENEFITS

- **Meets All AWWA Standards; NSF Certified**
- **Tamper Detection and Prevention**
- **Patented Frost Protection (option)**
- **High-Quality, Long-Life Parts**
- **Durable Basket Strainer Protects From Damage**

NSF

TECHNICAL SPECIFICATIONS:

AWWA/NSF Standards	Meets or exceeds all sections of AWWA Standard C-708, most recent revision; Certified by NSF to NSF/ANSI Standard 61.
Design/Operation	Velocity-type meter. Water, evenly distributed by multiple jet nozzles, flows past an impeller in the measuring chamber, creating an impeller velocity directly proportional to water flow rate. The meter's register integrates velocity into totalized flow.
Main Case	Choice of waterworks bronze case of 81% copper composition or EnviroBrass® II, 87% copper, low lead bronze. All main cases incorporates externally threaded ends and wrench pads to aid installation. Bronze register retaining rings are standard.
Measuring Chamber	The measuring chamber housing and measurement element are constructed of a durable synthetic polymer and can easily be removed from the main case without removal of the meter from the line. The chamber housing is constructed in two parts to allow access to the impeller. Measurement surfaces are not wear surfaces, providing sustained accuracy despite the presence of entrained solids in the water. A long-life, sapphire serves as a wear surface, with balanced water flows minimizing bearing wear.
Magnetic Drive	A reliable, direct magnetic drive provides linkage between measurement element and register. No intermediate gearing is required; no gearing is exposed to water.
Register	Standard direct read, DIALOG® Reading System and Electrical Output Registers are available. A six wheel odometer is standard.
Register Sealing	Direct read and DIALOG registers are permanently sealed, with a tempered glass lens, stainless steel base and wrap-around gasket to prevent intrusion of dirt or moisture.
Register Units	Registration available in U.S. gallons, cubic feet or cubic metres.
Test Circle	Large center sweep hand with ten clearly indicated gradations per minimum registration unit.
Low Flow/Leak Indicator	Center mounted indicator with high sensitivity resulting from direct one to one linkage to the measuring element.
Strainer	A rugged, 360-degree polymer basket strainer protects the critical measuring element from damage.
Frost Protection (option)	Patented, pressure-activated plug is expelled from the meter by expansion of freezing water. The frost plug can be replaced without meter removal or disassembly.
Adjusting Port	Sealed after factory calibration. Port is accessible for utility recalibration, to compensate for inaccuracy in older meters without parts replacement.
Tamper Detection	The Master Meter Multi-Jet adjusting port is sealed to prevent tampering and provides a visual indication of tampering attempts.

See reverse side for more specifications »

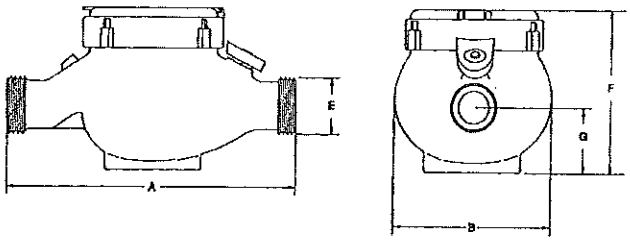
Multi-Jet Water Meters

5/8", 3/4" and 1"

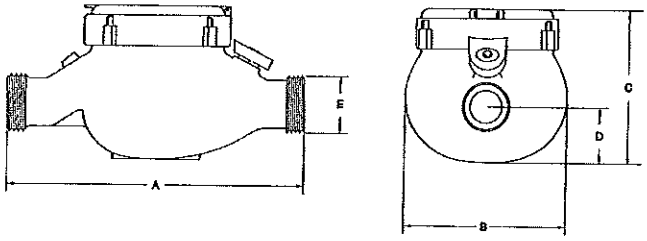
METER OPERATING CHARACTERISTIC/DIMENSION	5/8"	5/8" x 3/4"	3/4" SL	3/4" x 9"	3/4" x 9" x 1"	1"
Flow Rating (gpm)	20	20	30	30	30	50
Continuous Flow (gpm)	15	15	20	20	20	30
Normal Flow Range (gpm)	1-20	1-20	2-30	2-30	2-30	3-50
Low Flow (gpm)	1/4	1/4	1/2	1/2	1/2	3/4
Maximum Working Pressure (psi)	150	150	150	150	150	150
Maximum Working Temperature (°F)	122	122	122	122	122	122
Length (A below)	7-1/2"	7-1/2"	7-1/2"	9.0"	9.0"	10-3/4"
Width (B below)	3-3/4"	3-3/4"	3-3/4"	3-3/4"	3-3/4"	4-1/8"
Width, side-mounted DIALOG unit	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"
Height, standard register with lid (C below)	4-1/8"	4-1/8"	4-1/8"	4-1/8"	4-1/8"	3-7/8"
Height with DIALOG register	4-7/8"	4-7/8"	4-7/8"	4-7/8"	4-7/8"	4-5/8"
Height, Frost Proof, standard register with lid 4-3/8" (F below)	4-3/8"	4-3/8"	4-3/8"	N/A	N/A	4-3/8"
Height, bottom to center line (D below)	1-3/16"	1-3/16"	1-3/16"	1-3/16"	1-3/16"	1-3/16"
Height, Frost Proof, bottom to center line (G below)	1-3/4"	1-3/4"	1-3/4"	1-3/4"	1-3/4"	1-3/4"
Meter Casing Spuds, Nominal Thread Size* (E below)	3/4"	1"	1"	1"	1-1/4"	1-1/4"
Weight (pounds)	4	4	4	4-1/4	4-1/4	5
Packed To Carton	6	6	6	6	4	4
Carton Weight (pounds)	50	50	50	35	35	41

*External Straight Threads

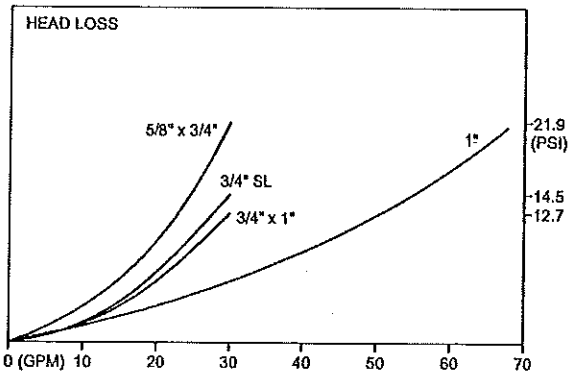
Frost Proof 5/8" to 1"



Standard 5/8" to 1"



Head Loss Curves



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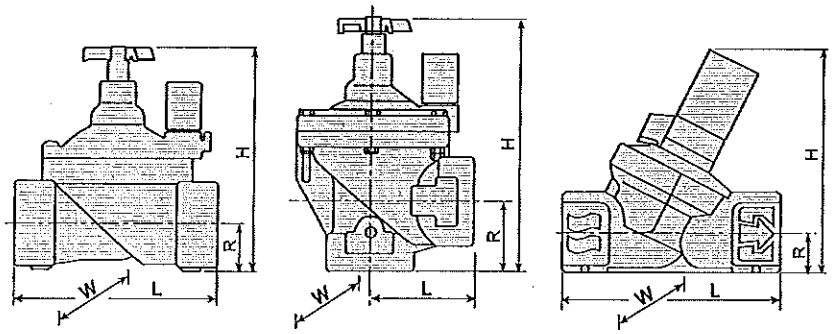
TECHNICAL DATA

Specifications

- **Valve Pattern:** globe, angle & Y-pattern (1" only)
- **Sizes:** 3/4", 1", 1 1/2" & 2"
- **End Connections:**
  – female threaded BSP, NPT
- **Pressure Rating:**
  ISO: PN 10
  ANSI: Class 125
- **Operating Pressure Range:**
  0.7-10 bar (10-150 psi)
- **Temperature Range:**
  Water up to 80°C (180°F)
- **Electrical Data:**
  – **Standard:**
  Voltage: 24V AC (50-60 Hz)
  Current: holding 0.20A,
  Inrush 0.40A
  – **Optional Voltages:** 6V DC, 12V DC, 24V DC, 12V AC, 24V AC
- **Materials:**
  Body and cover: Nylon Reinforced
  Metal parts: Stainless Steel
  Diaphragm: Natural Rubber
  Seals: Buna-N and NR

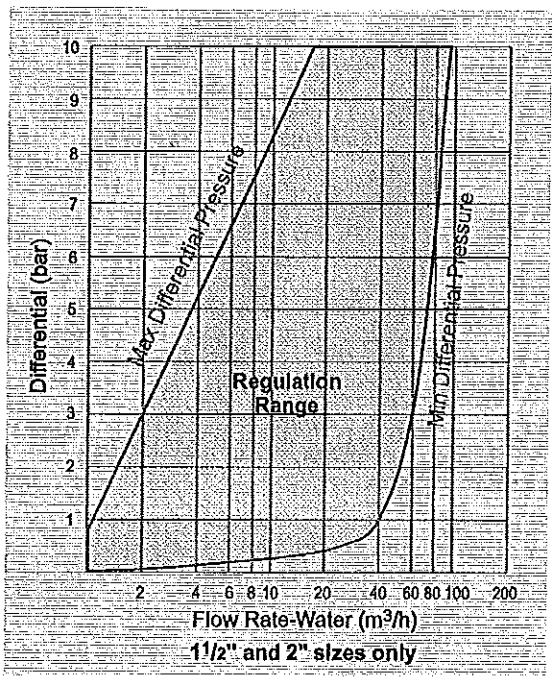
Dimensions and Weights



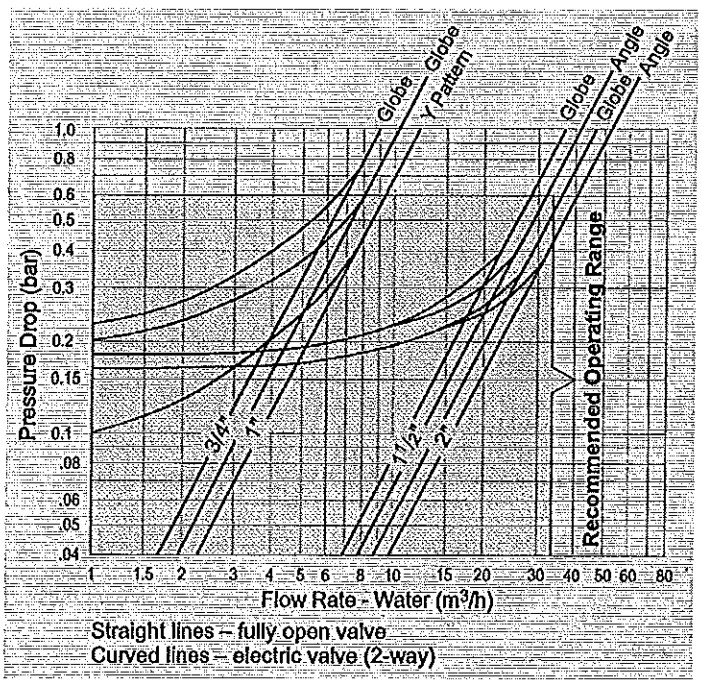
	Globe Pattern				Angle Pattern		Y Pattern
Size (mm)	3/4"	1"	1 1/2"	2"	1 1/2	2"	1"
L	110	110	160	170	80	85	114
H	115	115	180	190	190	210	115
R	22	22	35	38	40	60	21
W	78	78	125	125	125	125	68
Weight (kg)*	0.35	0.33	1.0	1.1	0.95	0.91	0.30

* Without flow control handle

Regulation Range



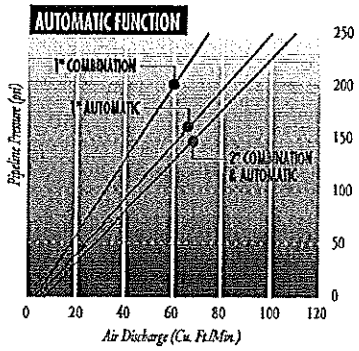
Flow Chart

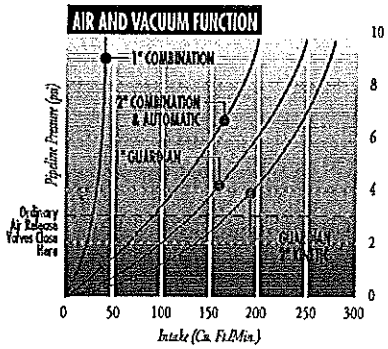


NETAFIM USA

Air Release and Vacuum Valves

Proven Design Provides More Air Release Capacity Than Other Valves of Similar Sizes





Applications

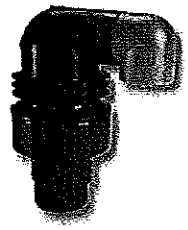
- 1" and 2" Combination Air/Vacuum Relief and Continuous Air Vent
  - For release of large volumes of air: pump and filtration stations, along mains, at the end of mainlines.
  - At high points in pipe network.
  - Every 1,000 feet along mainlines 6 inches and larger.
  - At upstream side of manifolds.
  - 1" Combination size ideal for submains with 2" to 4" diameter.
- 1" Automatic Continuous Acting Air Vent
  - For high spots where air accumulates.
- 1" & 2" Air Release and Vacuum Relief Vent
  - Commonly used at downstream of valves, primarily at manifolds, to break vacuum caused by system draining.
  - On sloping terrain to prevent collapsing of pipes caused by vacuum when pipe networks drain.

Specifications

- Maximum operating pressure:
  - 2" combination: 240 psi, 2" NPT Male Connector
  - 1" automatic: 240 psi, 1" NPT Male Connector
  - 1" & 2" Air and Vacuum Vent: 150 psi, 1" Male Connector, 2" Female Connector

Product Advantages

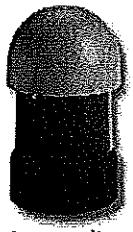
- Ensures maximum protection of pressurized wastewater piping systems with proper sizing and placement.
- Hydrodynamic float design ensures valve closure as water fills the system, remains open when air pressure reaches 12 psi (others quickly close when air pressure reaches 3 psi).
- Large capacity valves dampens water hammer (pipes and fittings from cracking or bursting).
- Unique rolling seal feature allows gradual opening and closing and self cleaning (available on 2" Combination and 1" Automatic).
- Made of corrosion-resistant fiberglass with reinforced UV protected nylon (no metal parts to rust or corrode, no need for spare parts).
- 5 year warranty.



2" Combination
Air/Vacuum and Continuous Acting Air Vent
Part Number 65ARIB2
Now Available in Polypropylene

1" Combination
Air/Vacuum and Continuous Acting Air Vent
Part Number 65ARIB1

1" Automatic
Continuous Acting Air Vent / Part Number 65ARI51



2" Guardian
Air & Vacuum Vent / Part Number 65ARIA2

3/4" & 1" Guardian
Air & Vacuum Vent / Part Number 65ARIA100

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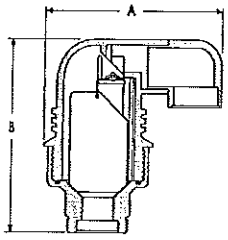
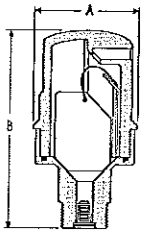
Air Release and Vacuum Valves Specifications



1" and 2" Combination Air/Vacuum Relief and Continuous Acting Air Vent

Stages of Operation

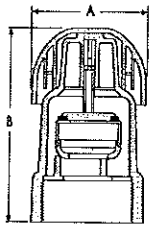
1. During start-up, the valve releases large volumes of air.
2. As the system builds pressure, the body fills with water, forcing the float upwards and closing the valve.
3. While the system is pressurized, the "automatic" function continuously expels accumulated air.
4. At shutdown, the valve's large opening allows air back into the system preventing the pipe and accessories from collapsing, and preventing suction of mud and debris.



1" Automatic Continuous Acting Air Vent

Stages of Operation

1. While the system is pressurized, air accumulates in the body, systematically dropping the rolling seal mechanism releasing the trapped air.
2. After air is expelled, water again enters the body and forces the float to close the valve.



3/4", 1" & 2" Guardian Air & Vacuum Vent

Stages of Operation

1. The Guardian releases large quantities of air through an opening equal to a large size standard vent. As water enters, the float rises and forces the valve to close.
2. During normal flow, while the line is under pressure, the valve remains closed.
3. As the line empties, or during a drop in pressure, the float drops down and opens the valve. Air is admitted, breaking the vacuum created by the withdrawing water and prevents the collapse of pipelines and suction of soil into dripperlines.

DIMENSIONS & WEIGHT

	Part Number	Nominal Size	Dimensions A	Dimensions B	Weight	Orifice Size (sq. in.)	Orifice Size (diameter)
2" Combo (Plastic Base)	65ARIB2	2"	7 3/8"	8 15/64"	2.2 lbs	1/64"	0.0613
1" Combination	65ARIB1	2"	3 11/16"	5 29/64"	0.66 lbs	1/64"	0.0336
2" Combo (Brass Base)	65ARIB2-B	2"	7 3/8"	8 15/64"	5 lbs.	1/64"	0.0867
1" Automatic	65ARIS1	1"	2 1/64"	5 29/64"	0.65 lbs	1/64"	0.0320
2" Guardian	65ARIA2	2"	2 7/64"	4 31/64"	0.44 lbs	1/64"	0.0761
3/4" & 1" Guardian	65ARIA100	3/4" or 1"	2 29/64"	4 31/64"	0.35 lbs	1/64"	0.0185

Air Release and Vacuum Valves Accessories

2" Air Release Valve - Rolling Seal	65ARIB2-RS
2" Air Release Valve - Base O-Ring	65ARIB2-OB

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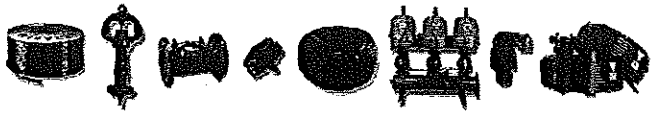

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