Commonwealth of Pennsylvania
Department of Environmental Protection (DEP)
Bureau of Water Standards and Facility Regulation
Harrisburg, PA

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Technology: American PERC-RITE® (PERC-RITE primary effluent)

Classification Type: Alternate technology

Classification Date: January 4, 2010

In accordance with Title 25, Chapter 73, Section 73.72, DEP has classified the American PERC-RITE primary effluent drip irrigation system for use as an alternate onlot sewage treatment system in the Commonwealth of Pennsylvania. This classification permits the use of the American PERC-RITE primary effluent drip irrigation as components used for the specific purposes of distributing primary effluent septic wastewater for discharge to an absorption area.

I. Technology Description

This treatment system configuration consists of using PERC-RITE primary effluent drip irrigation components in conjunction with initial treatment component(s), a pump tank(s), a hydraulic unit(s), and a final discharge to an absorption area.

II. Design Requirements: The minimum specifications in this Section may not be sufficient to design a complete system for all applications.

a. General System Requirements:

(1) The system is to be configured as a complete package from a single source consisting of drip tubing, specialized field fittings, pump and pump chamber components, filtration units (headworks), and control panels at a minimum. All components shall be designed and manufactured to resist the corrosive effects of wastewater and common household chemicals.

(2) The system manufacturer shall make available head loss charts, tables, formulas for various drip tubing lateral lengths during a dosing and flushing cycle, and pertinent information such as minimum/maximum zone size, and filter flushing requirements.

(3) Pump selection shall take account of the operating volume and pressure for the drip dispersal field when calculating the total dynamic head required for filter flushing and/or back flushing, field dosing, and dripline flushing. All disposal and flushing parameters must meet the listed manufacturer's requirements and fall within the operational range of the pump selected.

(4) The approved system shall provide the means, at minimum, to accurately calculate flows, pump cycle counter, pump elapsed time, counts of automated flushing events

and alarm events. This requirement is to be accomplished by having a flow meter and a control unit that performs these functions. These functions are necessary to provide proper operation and maintenance and to verify and monitor emitter performance, scouring or flushing performance, and water use.

(5) A programmable timer control panel shall be employed to regulate dosing frequency, volume, and other pertinent information. The control panel is to provide manual capability to operationally verify filter flushing, dosing, and flushing.

(6) Components shall be UL Listed. Schematic and manual to be provided with control. The panel is to provide accommodation for optional remote alarm. Installation is to be according to all local codes. The electrical control equipment shall be mounted within a NEMA 4X rated enclosure with a rigid latching door. All switches shall be clearly identified, and all internal wiring shall be factory installed.

(7) The system must be equipped with a dosing tank alarm to alert the operator of problems with the system.

b. Treatment Tank Requirements:

Concrete septic tanks used must be either two-compartment rectangular tanks or two rectangular tanks in series, and /or otherwise conform to meet the requirements of Section 73.31. Cylindrical tanks meeting the requirements of Section 73.31 may also be used. Vertically aligned circular (round) tanks are not permitted.

c. Dosing Chamber Requirements:

(1) A dosing chamber shall be employed after the treatment tank and before the drip dispersal system, and shall be sized and equipped so as to permit timed dosing of the daily sewage flow with adequate reserve storage capacity for those times when the system is inoperable.

(2) The dosing chamber working volume (surge storage) shall be at a minimum 60% of the peak design flow volume. This volume may be calculated from the timer enable to the high water alarm floats. The pump inlet is to be a minimum of 10” above the tank bottom. In no case shall a pump tank volume be less than what is typically required for a standard septic tank for the system. Flow equalization volume utilized to time dose an upstream pretreatment component, may be used as a portion of the drip dose equalization volume requirements.

(3) The dosing chamber shall be equipped with an audible and visual high-water alarm set to provide reserve capacity to allow for the prompt repair of the system. The minimum amount of reserve volume above the high water alarm is 25% of the peak daily flow. A low-water separate cutoff device (float) shall be provided to prevent damage to the pump during low-water conditions and shall be separate from the timer enable device (float).

(4) The dosing chamber shall be fitted with watertight access risers to grade to secure against unauthorized entry.

d. Hydraulic Unit Filtration Requirements:

(1) Final filtration must be provided by a hydraulic headworks unit fitted with in-line screen or disc filters, as appropriate to effluent quality, to remove suspended solids.

A minimum of two disc filters are required in systems designed for primary initial treatment. Automatic filter backwashing is required.

(2) The in-line filters shall achieve the drip tubing manufacturer's minimum specified filtration at a rate equal to or greater than the peak discharge rate during forward flushing.

(3) The filters must include a mechanism to automatically wash or backflush the filters before each dose.

(4) Filter wash residuals must be returned to the head of the pretreatment train or, if the design requires, to a settling tank, to allow for primary settling prior to entering the drip dose pump chamber. The flush return volume shall not exceed the hydraulic capacity of the treatment unit.

(5) The hydraulic unit must be protected from temperatures below freezing in accordance with the manufacturer's specifications.

e. Use of the Component/System and Siting Requirements:

(1) The soils must be classified morphologically as either well drained or moderately well drained as determined by a soil scientist who is a professional member of the Pennsylvania Association of Professional Soil Scientists (PAPSS) or is a qualified soil scientist as defined in Section 73.1.

(2) A soils report regarding the soil drainage classification determination and assigning of the appropriate loading rate and the horizontal linear load consistent with Table 1 must be signed by the qualified soil scientist and must be attached to the permit application. The soil scientist who signs the soils report shall determine the number and placement of soil profile descriptions required to conduct the morphological evaluation of soils in the proposed drip zones. The profiles may be supplemented with the use of a hand auger to confirm soil conditions between profiles. Excessive disturbance of soils within the proposed drip zone must be avoided.

(3) The soils report must provide the designer with site-specific details of the delineated area, including a preliminary design (dimensions of the area, slope of site, etc.) meeting the specifications of Section II.e. The report should identify and offer recommendations to address site conditions (i.e. soil quality, slope, stoniness, vegetation, surface drainage, site preparation, depth of installation, etc.) that could affect the design and/or field installation.

(4) The site must meet the minimum horizontal isolation distances described in Section 73.13 plus an additional two (2) feet beyond the outermost drip tubing in a drip distribution zone.

(5) The slope in each drip distribution zone must be between 0 and 25%.

(6) Based on a maximum tubing installation depth of 12 inches, the minimum depth to limiting zone from the mineral soil surface must be greater than or equal to 24 inches. A minimum vertical isolation distance of 18 inches must be maintained between the depth of installation of the drip distribution tubing and the shallowest indication of any limiting zone.

f. Drip Distribution Requirements:

(1) Each drip dispersal field or zone shall be time-dosed at regular intervals throughout the day at an average design flow dose regime, as specified by the manufacturer and

designer. The absorption area is sized on peak daily design flow. The system controller shall provide for a zone to be rested or manually removed from service. The controller shall have the capability to bypass the zone(s) that have been taken out of service and dose the next available zone with normal sequence continuation. Mechanical indexing valves to control zone dosing shall not be used.

(2) To maintain uniform distribution, the minimum dose volume in a drip dispersal network is calculated using 80% of the dose being dispersed during times of equal distribution, accounting for pressurization time and redistribution of pump shut off and no less than three times the volume of pipe (plus the volume of supply, return lines, and field manifolds, where applicable).

(3) A minimum of two zones are required for each system, with adequate flow equalization provided to accommodate time dosing of the zones.

(4) The drip tubing must follow the contour of the land and maintain a uniform installation depth.

(5) Each zone must automatically flush a minimum of 25 cycles to clean the drip tubing, maintaining a scouring velocity of 2 feet per second at the distal end of each lateral connection. Field network flush residuals must be returned back to the head of the treatment train or, if the site design requires, to a separate settling tank prior to the dosing tank. The flush return volume is not to exceed the hydraulic capacity of the pretreatment unit.

(6) The sizing of the drip tubing network shall be based on the site evaluation, in accordance with Table 1. The maximum loading rate must be no more than 0.34 gallons per day per linear foot of tubing. The total linear feet of drip tubing required is the maximum design flow in gpd divided by this loading rate.

(7) The tubing must have continuous self-cleaning pressure-compensating emitters every 2 feet with spacing between tubing. All emitters within the zone shall provide equal distribution between plus or minus 10%, including network pressurization and redistribution at pump shut off. Only tubing manufactured by Netafim has been shown to meet these requirements. Tubing is to be installed between 1 and 3 feet unless justification for different spacing is provided due to site conditions (i.e. trees, irregular topography, etc.). Tubing separations less than 2 feet require recommendation of the soil scientist.

(8) The maximum horizontal linear load (the gallons per foot along the topographic contour) is 4.6 gallons per day as calculated on the average daily flow of the onlot system. The average daily flow is 50% of the maximum design flow as listed in 73.17 (relating to sewage flows). Where the vertical isolation distance is greater than 20 inches from the mineral soil surface, the horizontal linear load may be increased based on the evaluation of a combination of factors including, but not limited to, increased depth over limiting zone, permeability and slope.

(9) The horizontal linear load equals the average daily gallons per day divided by the length of the system.

(10) The minimum horizontal length required is the average daily flow divided by 4.6.

(11) The sewage enforcement officer may require the site plan for the drip distribution zones to be developed by or in consultation with the manufacturer or a

representative of the manufacturer of the drip distribution system being installed. All drip distribution systems with less than 20 inches vertical isolation distance shall be developed by or in consultation with the manufacturer or a representative of the manufacturer of the drip distribution system being installed.

(12) All drip distribution systems shall be equipped with devices or methods to prevent the gravity redistribution of effluent in the absorption area and minimize redistribution of the effluent remaining in the tubing after the end of a dose cycle to lower portions of the drip zone. On slopes greater than 5%, top-feed supply and return manifolds shall be used.

g. Construction:

(1) Drip lines are typically installed below the soil surface using a vibratory plow, a standard trencher 4 to 6 inches wide, or by manual or hand installation to a maximum depth of 12 inches from the soil surface, with 6 inches being the optimum installation depth. Cable pullers shall not be used where the tubing installation depth is within 3 inches of clay loam and clay texture or the soil is stoney. Tubing must not be installed into backhoe trenches. Other methods of installation may be considered in consultation with the manufacturer or a representative of the manufacturer of the drip distribution system being installed. Where installation depths less than 6 inches from the soil surface are necessary due to stoniness, additional cover shall be required to provide 6 to 12 inches of cover. Cover may be either clean mineral soil or native soil. Imported mulch or compost is permissible in wooded areas of passive activity with established forest litter. For installation less than 6 inches, the tubing may not be installed on the ground surface unless the surface is first scarified to create adequate soil and tubing interface.

(2) The manufacturer's representative must be present to oversee the installation of the system. The current list of representatives is available from the manufacturer. As an alternative, contractors who have completed a training course provided by the manufacturer and have successfully installed a sufficient number of drip systems under the direct supervision of the manufacturer's representative may install the system independently of oversight by the manufacturer only after receiving written verification of their status as a qualified installer by the manufacturer's representatives.

(3) Installation of the drip distribution system shall meet the specifications provided by the individual manufacturer.

(4) Drip tubing is susceptible to freezing when sufficient turf cover is not established in non-wooded areas prior to winter operation. When turf cover will not be established prior to winter operation, other measures, such as a temporary cover of mulch or straw, should be used to insulate over the tubing, manifolds, force mains, valve boxes, and other components of the drip installation subject to freezing.

III. Minimum Maintenance Standards:

a. The manufacturer's representative must meet with the property owner within one (1) month of system start-up and/or occupancy of the dwelling and with the local agency's

SEO upon request, to explain the operation and maintenance of the system and provide written instructions to the property owner that includes:

(1) Instructions on the operation and maintenance of the system;
(2) The locations of all parts of the system;
(3) A caution notice regarding disturbance of the drip zones that may cause system damage (i.e. excavation for trees, fencing, etc.);
(4) An explanation of the automatic alarm system;
(5) A statement requiring that the manufacturer's representative be contacted if the alarm system is activated.

b. Warranty:

The manufacturer of the drip distribution system must provide a minimum 2-year warranty on all defects due to materials or workmanship.

c. Inspection:

(1) Inspection of the absorption area by the owner at least annually for ponding of effluent over the absorption area or downgradient seepage.
(2) Inspection by the maintenance provider annually to ensure that:
    (i) The flows in each drip zone are consistent with the design;
    (ii) The system is flushing properly;
    (iii) The in-line filters are in good working order;
    (iv) The system is backwashing to remove debris as designed.
(3) The manufacturer's authorized service provider may make operational adjustments (i.e. dose volume, dose frequency) based on system performance, in consultation with the manufacturer and/or designer.

IV. Permitting Requirements

a. An SEO who has successfully completed an appropriate Department sponsored training course that included this specific technology or has received review delegation in writing from the Department may independently review the design and issue the permit for systems including components designed under this listing. All other system proposals under this listing must be submitted to the Department for review and comment.
b. The operation and maintenance conditions specified in Section III must be attached to the permit issued by the local agency.

V. Planning Requirements

Not Applicable

Table 1

Texture	Structure							
	Shape						Structureless	
	Platy			Prismatic/Blocky/Granular			Single Grain	Massive
	Strong	Moderate	Weak	Strong	Moderate	Weak		
Gravelly Coarse Sand	NOT APPLICABLE (N/A)							N/A
Coarse Sand							.34	
Sand								
Fine Sand							.34 -.25	
Very Fine Sand								
Loamy Coarse Sand							.34	
Loamy Sand								
Loamy Fine Sand							.34 -.25	
Loamy Very Fine Sand								
Coarse Sandy Loam			.34 -.25	.34		.34 -.25	N/A	≤.25
Sandy Loam			≤.25					
Fine Sandy Loam				.34 -.25		≤.25		
Very Fine Sandy Loam								
Loam				.34		.34-.25		
Silt Loam								
Sandy Clay Loam				.34 -,25		≤.25		
Clay Loam								
Silty Clay Loam								
Sandy Clay				.25 - ≤.15				
Silty Clay								
Clay								

Notes:
- All values in gallons per day per linear foot of tubing