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 micromound)

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® (PERC-RITE micromound) drip irrigation system for use as an alternate onlot sewage treatment system in the Commonwealth of Pennsylvania. This classification permits the use of the PERC-RITE micromound as components used for the specific purposes of distributing sewage for discharge to a micromound absorption area.

I. Technology Description

This treatment system configuration consists of using PERC-RITE micromound drip irrigation components in conjunction with initial treatment component(s), a pump tank(s), a hydraulic unit(s), and a final discharge to a drip irrigation micromound 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 initial treatment component(s), drip tubing, specialized field fittings, pump or 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, other 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:

(1) For systems designed to treat primary effluent, 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.

(2) If an aerobic treatment unit or any other secondary treatment technology is proposed as an initial treatment, the application must include a letter from the drip system manufacturer recommending both its use and as a component compatible with PERC-RITE drip micromound.

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 unit fitted with a minimum of two in-line disk filters to remove suspended solids to prevent clogging of the emitters. The filters shall achieve the drip tubing manufacturer's minimum specified filtration at a rate equal to or greater than the peak discharge rate, typically during network forward flushing.
   (2) The filters are to be independently back washed automatically on a routine basis normally at the beginning of each dose event. The filters are to be backwashed at the manufacturer specified minimum psi requirement.
   (3) Filter flush residuals are to return to the head of the pretreatment train or if the site design requires, a separate settling tank to allow for primary settling prior to a dosing station. The filter flush return volume is not to exceed the hydraulic capacity of the pretreatment unit.
   (4) 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 minimum soils drainage class morphology must be at minimum somewhat poorly 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 horizontal linear load consistent with Table 1 shall be signed by the qualified soil scientist and be attached to the permit application. The soil scientist who signs the soils report must 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 this section. The report should offer recommendations to address site specific conditions (i.e. soil quality, slope, stoniness, vegetation, surface drainage, site preparation, depth of installation, etc.) that may effect 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 irrigation zone must be between 0 percent and 15 percent. Table 1 details slope limitations for specific USDA texture groups.
   (6) This system may be used on sites where soils range between greater than or equal to 10 inches to evidence of high water table and greater than or equal to 16 inches to rock.
   (7) The site must meet the requirements described in Section 73.12.

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) The system shall be capable of forward flushing each drip field or zone at a minimum fluid velocity, as required by the listed manufacturer. The velocity is to be no less that 2 feet per second. The residuals are to be returned back to the head of the pre-treatment train as or if the specific design requires, to a separate settling tank to allow for primary settling prior to a dosing station. Field flushing velocity shall be designed at the distal end of each lateral connection. Each zone must be automatically flushed a minimum of 25 cycles. The flush return volume is not to exceed the hydraulic capacity of the pretreatment unit.

g. Micromound Absorption Area:
   (1) The micromound must follow the contour of the land.
   (2) A minimum of 2 inches of sand must be placed over the tubing.
   (3) The minimum sand depth below the tubing is 12 inches for primary pretreatment and 8 inches with secondary pretreatment tapered or incorporated into toe of berm (basal) area.
   (4) The tubing must have continuous self cleaning pressure-compensating emitters spaced every 2 feet with spacing between tubing between 0.5 and 0.75 feet over the sand bed. All emitters within the zone shall provide equal distribution between plus or minus 10 percent. Only tubing manufactured by Netafim has been shown to meet these requirements. No substitutions of other drip tubing is permitted.
   (5) The maximum possible sand bed tubing area loading rate is 0.75 gpd/ft^2.
   (6) Sand used must meet the requirements specified by Section 73.55(c). Material passing through #200 sieve should be <5%. Cement Concrete Sand TYPE “A” or ASTM C-33 concrete sand preferred.
   (7) The basal loading rate must be consistent with Table 1. The basal area is the scarified absorption area interface. Peak flows in accordance with Section 73.17 shall be used in the design.
   (8) All mounds must be constructed with a minimum of 3:1 berm.
   (9) All accepted mound site protection and construction practices must be adhered.
   (10) The sewage enforcement officer may require additional information from the soil scientist and/or require the site plan for the micromound to be developed by or in

consultation with the manufacturer or a representative of the manufacturer of the drip distribution system being installed.

h. Construction:
   (1) Soil moisture conditions during constructions of the absorption area shall be such that a sample of natural mineral soil taken from the level of the proposed installation will crumble if compressed into a ball.
   (2) The system manufacturer's representative must be present to oversee the installation of the system. Contractors who have completed a training course provided by the manufacturer and have successfully installed a sufficient volume of drip systems under the direct supervision of the manufacturers 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 representative.
   (3) Installation of the drip distribution system shall meet the specifications provided by the manufacturer.
   (4) The sand bed tubing area is to be located in the upslope portion of the basal area.
   (5) The area surrounding the tanks and the absorption areas shall be constructed to divert surface water.

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 to 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 irrigation 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 assure 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) A manufacturer's authorized service provider may make operation 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

USDA Texture Group	Texture	Basal Loading (gal/ ft^2/day)[a]	Limitation Depth (inches)[b]	Horizontal Linear Load in gal/linear ft./day (g/lf/d)[c] SLOPES
I Sands	Sand, Loamy Sand	≤ .6	≥ 10" to seasonal high water table ≥16" to rock	<5 g/lf/d Slope ≤ 15%
II Coarse Loams	IIa Sandy Loam			
	IIb Loam			
III Fine Loams	IIIa Sandy Clay Loam, Silt Loam	≤ .4		≤ 4 g/lf/d Slope ≤ 15%
	IIIb Clay Loam, Silty Clay Loam			
IV Clays	IVa Sandy Clay, Silty Clay, Clay	≤ .2		≤ 3 g/lf/d Slope ≤ 15%
	IVb	Special Considerations [d]		≤ 2 - 3 g/lf/d Slope ≤ 15% Slope ≥ 5%

NOTES:

[a] Based on most limiting condition from ground surface to limitation. Basal area to be protected from all activity.

[b] Evaluate conditions 12 inches below limitations if possible.

[c] Based on peak daily design flow. Maximize Horizontal Linear Load at all times. May vary with slope, texture and depth to limitation. Based on site/soil determination (estimation) of vertical and horizontal subsurface water movement over limitation. Multi-zoned systems allow for staggering and separation of uneven sized mounds if necessary, with justification to obtain the landscape linear loading rate.

[d] IVb soils may have other infiltration considerations other than texture including density, consistence, plasticity, structure and mixed clay mineralogy.

(1) Basal Loading determines the sand/soil interface absorption area

$$Basal\ Loading,\ ft^2 = \frac{Peak\ gpd}{\left(Basal\ Loading\ value \frac{gal}{ft^2\ day} \right)}$$

(2) Horizontal Linear Load determines the minimum system length.

$$Horizontal\ Linear\ Load,\ ft = \frac{peak\ gpd}{\left(Horizontal\ Linear\ Load\ value \frac{gal}{lf\ d} \right)}$$

(3) Sand Bed loading determines the sand area where the tubing will be placed.

$$Sand\ Bed\ Loading,\ ft^2 = \frac{peak\ gpd}{\left(Sand\ Bed\ Tubing\ Loading\ Rate \frac{gal}{ft^2} \right)}$$