

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