

SUBCHAPTER D: DESIGN CRITERIA
§§222.111, 222.113, 222.115, 222.117, 222.119,
222.121, 222.123, 222.125, 222.127
Effective July 5, 2006

§222.111. General Provisions.

(a) This subchapter applies to any person who proposes to design and construct a facility that will treat or dispose of domestic or municipal wastewater and who uses a subsurface area drip dispersal system. This subchapter is not applicable to treatment facilities constructed for the purposes of complying with a commission-issued industrial wastewater permit, but is applicable to a subsurface area drip dispersal system if it is associated with an industrial wastewater treatment facility.

(b) This subchapter establishes the minimum design criteria pertaining to effluent quality necessary to meet state water quality standards. Plans, specifications, and reports for a proposed domestic wastewater project must conform to the requirements of this subchapter.

(c) The applicant for a permit for a domestic wastewater treatment facility with a subsurface area drip dispersal system shall submit to the executive director an engineering report, including the plans and specifications, that meets the requirements found in this subchapter. Construction must not begin on a facility with approved plans and specifications until the executive director issues a wastewater permit, unless the commission authorizes the applicant to construct before permit issuance, under Texas Water Code, §26.027(c).

(d) The executive director may approve a variance from any of the design criteria in this subchapter. In accordance with §222.113 of this title (relating to Engineering Report), the applicant shall submit with the engineering report the variance request, and the technical justification for the design change and the way in which the change is at least as protective of human health and the environment as the required design criteria.

(e) Approval of the submitted engineering report, plans, or specifications by the executive director does not relieve the permittee of any liabilities or responsibilities associated with designing, constructing, and operating the subsurface area drip dispersal system and the associated treatment facility in accordance with applicable commission rules and in a manner that protects human health and the environment.

Adopted June 14, 2006

Effective July 5, 2006

§222.113. Engineering Report.

The applicant shall submit an engineering report that includes the plans and specifications that:

- (1) has been prepared by a licensed professional engineer;

(2) addresses the proposed design, hydraulic and organic loadings, and the basis for the design for the subsurface area drip dispersal system and the treatment system;

(3) a scale drawing of all land that is to be part of the subsurface area drip dispersal system showing the location of all existing and proposed facilities to include the following:

(A) buildings;

(B) dispersal zones;

(C) treatment facilities;

(D) effluent storage; and

(E) the buffer zones that demonstrate compliance with §222.81 of this title (relating to Buffer Zone Requirements);

(4) includes the site topography;

(5) includes storm water run-on prevention and storm water runoff accommodation;
and

(6) includes any variance requests with supporting documentation.

Adopted June 14, 2006

Effective July 5, 2006

§222.115. Treatment System.

(a) For the systems and processes used to provide treatment of domestic wastewater prior to the wastewater entering the subsurface area drip dispersal system the applicant shall use the design criteria in Chapter 317 of this title (relating to Design Criteria for Sewerage Systems).

(b) If using septic tanks as the treatment system, the applicant shall design, construct, and install the tanks in accordance with Chapter 285, Subchapter D of this title (relating to Planning, Construction, and Installation of OSSFs).

(c) If using anaerobic biological reactors (ABRs) as the treatment system, the permittee must comply with the following criteria.

(1) The ABR must have a container that is a structural unit such as a concrete tank, or an earthen berm with a membrane liner that may be used for larger installations.

(A) The container must be designed for the internal and external stresses that may be placed on the container during fabrication and use.

(B) Materials used to construct an ABR structural container must meet the requirements for septic tanks in §285.32 of this title (relating to Criteria for Sewage Treatment Systems).

(C) Containers using compacted earthen berms must use a membrane of vinyl or other plastic with a minimum thickness of 40 mils as the waterproofing component.

(D) A cover is required unless a covering layer of gravel or other media is placed above the liquid level to present a dry surface.

(2) The ABR must have media that is inert, stable, of uniform size, and free of fines.

(A) Clean washed gravel, crushed rock, or plastic filter media made for trickling filter use is acceptable.

(B) Minimum media effective size must be one inch and the uniformity coefficient must be less than 3.0.

(3) The ABR must have a distribution system over the bottom of the ABR and a collection system near the top of the ABR.

(A) The piping for the distribution system must be constructed of pipe that:

(i) is class 200 or schedule 40 polyvinyl chloride (PVC);

(ii) meets American Standard Testing Material (ASTM) standards D-2241 or D-1785; and

(iii) has a one inch nominal diameter.

(B) The ABR must incorporate a sight well that allows monitoring the liquid level in the unit.

(C) The ABR must have a means to flush and remove excessive biomat buildup from the media.

(d) If using sand filters as the treatment system, the permittee shall use sand filters that have the following components and meet the following requirements.

(1) Sand filters must be contained in a structural unit designed for all internal and external stresses that may be placed on the containment device during fabrication and use such as:

(A) a septic tank unit that meets the requirements in Chapter 285, Subchapter D of this title;

(B) a poured in place concrete structure; or

(C) an earthen berm with an impermeable membrane liner that has a minimum thickness of 40 mils and an under-drain leak detection system.

(2) The permittee shall use a detention time of at least 24 hours for dosing to a sand filter at rates up to ten gallons per day per square foot.

(3) All sand filter containment devices shall provide sufficient freeboard above the filter surface to hold four dosing volumes.

(4) A sand filter must have a collection pipe system to collect the filtered effluent that meets the following requirements.

(A) The piping shall be arranged so that the maximum horizontal travel distance of water through the under-drain media is less than four feet.

(B) The collection piping and the drain pipe from the filter shall be sized to remove a filter dose volume from the filter within a ten-minute period.

(C) The ends of the collection lines shall be extended above the surface of the filter to allow aeration of the drained filter.

(D) The collection piping system shall be constructed of pipe that:

(i) is class 200 or schedule 40 PVC;

(ii) meets ASTM standards D-2241 or D-1785; and

(iii) has a two-inch nominal diameter.

(E) The sand filter media must:

(i) be an inert clean washed material that is free of fines, dirt, and organic material;

(ii) have an effective size and uniformity coefficient suitable for the design loading rate;

(iii) have a depth based on the effective grain size and the design effluent quality with coarse media requiring a greater media depth; and

(iv) be placed on top of a bottom drain media.

(F) The sand filter bottom media must:

- (i) cover the effluent collection piping;
- (ii) have an effective grain size from two to four times the effective grain size of the filter media; and
- (iii) support the filter media, prevent washout, and hydraulic removal of the filter media.

(5) The surface distribution mechanism must distribute the liquid to be filtered over the surface of the filter in a uniform manner.

(A) If a filter receives the liquid by gravity, distribution shall be accomplished by troughs or channels using splash pads to reduce surface erosion.

(B) Pressure-dosed sand filters must have a distribution system that:

- (i) provides even distribution of the liquid;
- (ii) consists of a pipe network with discharge holes or spray nozzles; and
- (iii) provides a uniform pressure at the discharge outlets.

(6) Loading rates and filter sizing must be designed to treat the specific characteristics of the incoming wastewater and the effluent quality.

(7) The loading rate shall be designed based on the influent qualities, the selected media, and the acceptable run time between filter media cleaning or replacement.

(e) The permittee must submit a design that specifies the minimum frequency for solids removal from the treatment system and the justification of the frequency based on the type of system and good engineering practice.

(f) The permittee shall design the treatment system with the capacity to process the peak flow from the wastewater producer. The following criteria shall be the basis to determine peak flow:

- (1) wastewater design values will be determined in accordance with §317.4(a)(1) or (2) of this title (relating to Wastewater Treatment Facilities); or
- (2) the peak flows of the particular waste generator when the waste generator has unusually high peak flows.

§222.117. Subsurface Area Drip Dispersal System Design.

(a) The permittee shall use the following design components for subsurface area drip dispersal systems:

(1) a minimum of dual 100-micron wastewater effluent filters prior to the effluent entering the subsurface area drip dispersal system. These filters must:

(A) effectively filter the peak hydraulic flows; and

(B) include control valves and piping that provide filtered effluent to flush the filters;

(2) the dosing tank(s) designed to hold at least the following volume:

(A) the daily design capacity required by the permit;

(B) effluent equal to six times the minimum dose cycle capacity of the drip lines plus the capacity of the supply and return manifold; and

(C) the following storage capacities as part of the dosing tank(s) or included in the plant design at another location:

(i) flow equalization storage;

(ii) emergency storage; and

(iii) return flows from flushing and system drainage;

(3) a duplex alternating pumping system designed:

(A) to dose and flush the dispersal zones and flush the filtration system; and

(B) with pumps sized in accordance with the hydraulic design calculations in §222.83 of this title (relating to Hydraulic Calculations);

(4) control system components that are capable of performing the following functions:

(A) flushing of the filter units;

(B) delivering a specified preprogrammed volume of effluent to each dispersal zone;

(C) flushing of each drip lateral with filtered effluent;

(D) dosing of chemicals intended to reduce emitter clogging, such as chlorine or oxidizing chemicals;

(E) monitoring alarm conditions;

(F) regulating the flow volume to each dispersal zone and to a sand filter, when applicable;

(G) indicating a flow variance when flow varies more than 10% of the actual average daily flow;

(H) regulating pump run times;

(I) regulating the number and time of filter backwash and field flushing cycles; and

(J) regulating the flows to the drip irrigation field system;

(5) supply lines and manifolds;

(6) zones of drip irrigation tubing;

(7) effluent manifolds;

(8) chemical dosing equipment; and

(9) flush return lines that return flushing water to the pre-application system, with provisions made to minimize disturbance of any solids in the settling chamber.

(b) The permittee shall submit the hydraulic calculations for the pump and distribution system with the engineering report. The report must address the following.

(1) Field pressure and flow variation due to friction loss and changes in static head must not exceed plus or minus 10% of the design emitter pressure or flow. The 10% difference must be the difference between any two emitters in the entire system after the start-up process is complete.

(2) The system must be equipped an alarm system for high and low flow conditions and an automatic mechanism to shut down the dispersal system for pressure and flow conditions that would indicate abnormal fluid dynamics were occurring.

(c) The permittee shall design the subsurface area drip dispersal system to supply the effluent uniformly throughout each of the dispersal zones in the system.

(d) The permittee shall design the subsurface area drip dispersal system to be self-draining to prevent freezing if there is a potential for the soil to freeze to the depth that the pipes and lines of the subsurface area drip dispersal system are located.

(e) The permittee shall ensure that the velocity of the flush water shall be at least two feet per second at the end of each dispersal zone or return line during the flushing operation.

(f) The permittee shall equip the system with a backflow prevention device to prevent the siphoning of soil and water into the emitters.

(g) The permittee must establish stormwater run-on controls to minimize infiltration of precipitation into the dispersal zones.

Adopted June 14, 2006

Effective July 5, 2006

§222.119. Delivery Systems.

(a) The permittee shall ensure that piping materials used in delivering treated effluent from the treatment facility to the dispersal zones is suitable for effluent and conforms to regulations as required by Chapter 317 of this title (relating to Design Criteria for Sewerage Systems).

(b) The permittee shall identify the piping materials by referring to the appropriate American Standard Testing Material, American National Standard Institute, or American Water Works Association specification numbers.

(c) A permittee shall use a multiple pump system for all systems requiring pumping of effluent to the dispersal zones.

(1) The permittee shall use pumps rated by the manufacturer for effluent disposal.

(2) The permittee shall use pumps that are each rated for at least 100% of the design flow.

(3) The permittee shall include the pumping capacity and pump head calculations in the plans and specifications.

(d) The permittee shall ensure that the pump discharge piping includes a check valve, union, and gate valve for each submersible pump installed.

(e) The permittee shall use piping and valves made of corrosion-resistant materials for applications subject to corrosive gases.

(f) If self-priming pumps are used for subsurface area drip dispersal systems, the permittee shall use pumps that meet at least the minimum requirements listed under §317.3 of this title (relating to

Lift Station Pumps) with the exception that the pumps are not required to meet the solids-handling requirement.

(g) The permittee shall include a check and gate valve for each unit of the discharge piping for self-priming pumps.

Adopted June 14, 2006

Effective July 5, 2006

§222.121. Dispersal Zones.

(a) The permittee must place lines with emitters between six and 48 inches below the surface of the soil.

(b) The permittee shall divide the subsurface area drip dispersal system into a sufficient number of different dispersal zones (at least two dispersal zones) so that the system can operate with the greater of either one dispersal zone or 10% of the total number of dispersal zones out of service.

(c) The permittee shall design the dispersal zones so that the dispersal lines follow the contour of the site and shall not exceed 1% lateral slope.

(d) The permittee shall include the dispersal zone design in the engineering report, including the following elements:

- (1) the proposed line layout with:
 - (A) main line sizes and lengths; and
 - (B) individual dispersal line lengths;
- (2) flushing flows;
- (3) static head calculations;
- (4) the total proposed flow in gallons per day;
- (5) total length of emitter piping;
- (6) emitter spacing;
- (7) line spacing;
- (8) total number of lines; and
- (9) total number of lines to be included per flushing.

(e) The permittee shall ensure that emitter and tubing spacing is on not less than one foot centers and on not greater than three feet centers, unless an exception is approved by the executive director.

(f) The permittee shall disinfect the drip lines and emitters according to the degree and frequency determined by the design engineer and submitted in the engineering report along with the justification for the degree and frequency of disinfection.

(g) The permittee shall equip the subsurface area drip dispersal system with audible and visual alarms that will activate in case of a problem with the system.

(1) If the subsurface area drip dispersal system is not staffed on a daily basis, the permittee shall equip the system with a telemetry device that notifies the operator in case of a system malfunction.

(2) The telemetry system must include the following components:

(A) remote access;

(B) audio/visual alarms for:

(i) flow or pressure variances; or

(ii) system failure;

(C) automated filter;

(D) zone flushing; and

(E) integrated external monitoring devices if required, such as soil moisture monitors.

Adopted June 14, 2006

Effective July 5, 2006

§222.123. Controls.

(a) The permittee shall use a control system that includes a means of alternating the pumps on successive cycles.

(b) The permittee shall use a control system with the following features:

(1) high water alarm that activates prior to any "lag pump on" activation;

(2) pump failure alarm;

- (3) power outage alarm;
- (4) mechanisms for testing and silencing the alarm system; and
- (5) manual resetting after the alarm activates.

(c) The permittee shall ensure that all controls recommended by the manufacturer are present and in working order if using a proprietary control system.

(d) The permittee shall use telemetering of the alarms.

(e) The permittee shall house controls in a weatherproof and intruder-resistant enclosure.

(f) The permittee shall use controls that meet Underwriter's Laboratories requirements.

(g) The permittee shall ensure that installation, maintenance, and replacement of parts of the control system are performed in accordance with the National Electrical Code and all applicable federal, state, and local codes, regulations, and ordinances.

Adopted June 14, 2006

Effective July 5, 2006

§222.125. Vertical Separation.

The permittee must maintain the following vertical separation distances beneath the subsurface area drip dispersal system.

(1) There must be at least five feet of soil over any sand or gravel strata.

(2) There must be at least one foot of soil over any restrictive soil horizons.

(3) There must be at least two feet of soil over any permanent or seasonal saturated zone of groundwater.

(4) The executive director may impose alternate separation requirements if necessary to protect human health and the environment.

Adopted June 14, 2006

Effective July 5, 2006

§222.127. Storage.

(a) The applicant must design and install temporary storage that equals at least three days of the design flow of the facility for times when the subsurface area drip dispersal system is out of service due to an emergency or scheduled maintenance.

(b) In lieu of temporary storage, the executive director may approve an alternate method of disposing of effluent, if an alternate disposal plan is submitted by the applicant.

Adopted June 14, 2006

Effective July 5, 2006