

**SUBCHAPTER E: PRELIMINARY TREATMENT UNITS**

**§§217.120 - 217.129**

**Effective December 4, 2015**

**§217.120. General Preliminary Treatment Requirements.**

(a) A wastewater treatment facility must be designed with the ability to add provisions for removing fats, oils, and grease (FOG) from the wastewater.

(b) If fats, oils, or grease have caused operational failures in a treatment unit that is being altered, then FOG removal must be provided to prevent future failures.

(c) The headworks of a wastewater treatment facility must have a screening device or a grinding device.

(1) Screening devices include coarse screens and fine screens.

(2) Grinding devices include grinder pumps, and other grinding devices approved in writing by the executive director.

(d) A screening device or grinding device must not be housed in the same structure as an office or any other work area unless the area housing the screening device or grinding device is separated from the rest of the structure by an air-tight partition.

(e) Each enclosure that houses a screening device or grinding device and is accessible to individuals must have a vent fan capable of providing at least 30 complete air exchanges per hour.

(f) Each screening device or grinding device must be readily accessible for maintenance and screenings removal.

(g) Any screening device located 4.0 feet or more below ground level must include mechanical equipment capable of lifting the screenings to ground level.

(h) Screenings must be collected, managed, and disposed of in accordance with §217.123 of this title (relating to Screenings and Debris Handling) at a frequency that prevents creation of a nuisance.

**§217.121. Coarse Screens.**

(a) A wastewater treatment facility must use a coarse screen, unless all flow entering a wastewater treatment facility is processed through a grinder pump or grinding device.

(b) A coarse screen must include an emergency overflow sized to handle the peak flow of the wastewater treatment facility.

(c) A coarse screen must include a way to divert flow to the emergency overflow.

(d) If the primary channel uses a mechanically cleaned coarse screen, the emergency overflow must also have a coarse screen.

(e) Coarse Screen Design.

(1) For a manually cleaned coarse screen, the clear openings between the bars must be at least 0.5 inch but not more than 1.0 inch.

(2) For a mechanically cleaned coarse screen, the clear openings between the bars must be at least 0.25 inch but not more than 1.0 inch.

(3) A manually cleaned coarse screen must use a bar rack sloped at least 30 degrees but not more than 60 degrees from horizontal.

(4) A manually cleaned coarse screen must be attached to a horizontal platform that allows draining and temporary screenings storage to prevent unauthorized discharge between cleanings.

(5) A mechanically cleaned coarse screen must be designed with equipment that automatically collects and disposes of screenings.

(f) Coarse Screen Hydraulics.

(1) The velocity of wastewater through a coarse screen must be at least 1.0 foot per second, but not more than 3.0 feet per second at design flow.

(2) The inlet channel for a coarse screen must be designed to minimize the deposition of solids.

(3) The flow line of the inlet channel must not exceed 6.0 inches below the invert elevation of the influent.

(g) Corrosion Resistance. A coarse screen and related structures must be designed to resist the effects of a corrosive environment, including long-term exposure to hydrogen sulfide.

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**§217.122. Fine Screens.**

(a) A fine screen may be used in lieu of a coarse screen.

(b) The clear openings in a fine screen must be less than 0.25 inch.

(c) Any five-day biochemical oxygen demand (BOD<sub>5</sub>) reduction percentage claimed for a fine screen must be developed through a study conducted on actual full-scale operation of the proposed fine screen. The BOD<sub>5</sub> reduction percentage claimed must not exceed 35%.

(d) The engineering report must justify any reduction in the size of a treatment unit that is based on removal of BOD<sub>5</sub> by a fine screen.

(e) An owner who claims a BOD<sub>5</sub> reduction credit must include a sufficient number of fine screen units so that any BOD<sub>5</sub> reduction claimed will be met with the largest fine screen unit out of service.

(f) A design may include a single fine screen unit only if the design includes an emergency overflow channel with a coarse screen to accept flow when the fine screen is out of service. No BOD<sub>5</sub> removal credit is allowed with a single fine screen design.

(g) A coarse screen must be provided ahead of a fine screen when the manufacturer of a fine screen recommends prescreening before the fine screen.

(h) A moving or rotating fine screen must use a continuous cleaning device, such as water jets or wiper blades.

(i) A fine screen unit must automatically convey the screenings to a storage area or processing unit that complies with §217.123 of this title (relating to Screenings and Debris Handling).

(j) A fine screen must meet the manufacturer's recommendations with respect to velocity and head loss through the fine screen.

(k) A fine screen must use either a bar rack or a perforated plate.

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**§217.123. Screenings and Debris Handling.**

(a) A screening device must have a minimum storage capacity of one day of screenings and debris.

(b) A container for screenings and debris must be fully covered with a tight-fitting cover designed to reduce vector attraction, or must use an alternative method of reducing vector attraction approved in writing by the executive director.

(c) A storage area for screenings and debris must drain to the headworks of the wastewater treatment facility or the influent lift station and must include runoff control.

(d) All screenings and debris must be collected in containers described in subsection (b) of this section and be managed and disposed of in accordance with Chapter 330 of this title (relating to Municipal Solid Waste).

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**§217.124. Grit Removal Systems.**

(a) A wastewater treatment facility using anaerobic digestion must have a grit removal system. A grit removal system is optional for all other facilities.

(b) A grit removal system includes units and processes capable of removing inert, non-biodegradable particles.

(c) A grit removal system must include at least two units capable of operating at the peak flow of the wastewater treatment facility when grit removal is required by subsection (a) of this section.

(d) Each grit removal system must include:

(1) an emergency overflow to accept flow when a grit removal unit is off-line; and

(2) a means of diverting flow to the emergency overflow.

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**§217.125. Grit Chambers.**

**(a) Horizontal Flow Grit Chambers.**

(1) Velocity through a horizontal flow grit chamber must range from 0.8 feet per second to no more than 1.3 feet per second.

(2) A horizontal flow grit chamber channel must minimize turbulence and provide uniform velocity across the channel.

(3) The channel size of a horizontal flow grit chamber must accommodate the grit removal equipment capacity and grit storage.

**(b) Aerated Grit Chambers.**

(1) The air diffuser and baffle arrangement in an aerated grit chamber must not interfere with the removal of particles with the design particle size and density.

(2) The aeration equipment must be capable of varying air feed rates along the length of an aerated grit chamber from 3.0 standard cubic feet per minute (scfm) per linear foot to no more than 8.0 scfm per linear foot.

(3) An aerated grit chamber must have a hydraulic detention time of at least 3.0 minutes.

(4) An aerated grit chamber must include a grit hopper located under an air diffuser.

**(c) Mechanical Grit Chambers.**

(1) The velocity through mechanical grit chambers must be no greater than 1.0 foot per second at design flow.

(2) Each mechanical grit chamber channel must include a grit hopper at the side of a tank contiguous to a grit removal mechanism.

(3) An inlet must include baffles to prevent short-circuiting.

(4) Grit removal must be provided by one of the following mechanisms:

(A) reciprocating rake;

(B) screw conveyor; or

(C) air lift pump.

(d) Cyclonic Degritters.

(1) A cyclonic degritter must prevent an inlet-to-outlet short circuit.

(2) A cyclonic degritter must include an adjustable apex with a quick disconnect assembly to remove any oversized object.

(3) Detention time in a cyclonic degritter must be at least 1.0 minute at the design flow.

(4) The flow velocity in a cyclonic degritter must be at least 1.0 foot per second but not more than 2.0 feet per second at the design flow.

(5) A screening unit must be installed upstream of a cyclonic degritter.

(e) Vortex Grit Chamber.

(1) An inlet channel must include a straight length in order to deliver smooth flow into the vortex grit chamber.

(2) The inlet velocity must be at least 2.0 feet per second at peak flow.

(3) A vortex system must include rotating paddles in the center of the grit chamber, and must rotate at a maximum of 21 revolutions per minute.

(4) An outlet channel must maintain a constant elevation.

(5) Grit removal from a grit storage chamber must be achieved using pumps specifically designed to handle grit.

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**§217.126. Grit Handling.**

(a) A grit washing unit or grit storage area must be designed to return recycled water and drainage to the headworks of the wastewater treatment facility.

(b) A grit chamber located below ground level must include mechanical grit handling equipment.

(c) Grit must be stored in a container with a tight-fitting cover and must be managed and disposed of in accordance with §217.123 of this title (relating to Screenings and Debris Handling).

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**§217.127. Pre-aeration Units.**

(a) Pre-aeration units may be used at a wastewater treatment facility to:

- (1) control odor;
- (2) reduce septicity;
- (3) separate grease; or
- (4) promote uniform distribution of solids to clarifiers.

(b) The engineering report must include the basis for the design of a pre-aeration system.

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**§217.128. Flow Equalization Basins.**

(a) A wastewater treatment facility must be designed with a flow equalization basin if:

- (1) the total daily influent flow volume or total daily influent organic loading occurs during a period less than or equal to ten hours; or
- (2) the wastewater treatment facility receives an influent flow of less than 10% of its design flow or an influent organic loading less than 10% of its design organic loading during a period of time equal to or greater than 48 hours in any period of seven consecutive days.

(b) A flow equalization basin must have an upstream screening device or grinding device.

(c) A flow equalization basin must include an aeration system sized to maintain a dissolved oxygen level of at least 1.0 milligram per liter (mg/l) throughout the flow equalization basin.

(d) A flow equalization basin must include a mixing system sufficient to prevent solids from settling.

(e) The size of a flow equalization basin must be based on diurnal flow variations and the size and capacity of downstream process units. The engineering report must include the calculations justifying the size of a flow equalization basin.

(f) For pumped flow to an equalization basin, the effluent from the basin must be controlled by a flow-regulating device capable of maintaining a flow rate that allows downstream process units to operate as designed.

(g) For pumped flow from an equalization basin, a variable-speed pump or multiple pumps are required to deliver a constant flow to downstream treatment units.

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**§217.129. Primary Clarifiers.**

(a) Inlets.

(1) A primary clarifier inlet must provide uniform flow and stilling.

(2) Vertical flow velocity through an inlet stilling well must not exceed 0.15 feet per second at peak flow.

(3) An inlet distribution channel must not have a dead-end corner and must prevent the settling of solids in the channel.

(4) An inlet structure must allow floating material to enter the clarifier.

(b) Scum removal.

(1) A primary clarifier must have scum baffles and a means of collecting and disposing of scum.

(2) A primary clarifier must discharge scum to a sludge digester, or must use an alternative method of disposal approved in writing by the executive director.

(3) The discharge of scum to any open drying area is prohibited.

(4) A primary clarifier with a design flow equal to or greater than 25,000 gallons per day must include a mechanical skimmer.



(5) A primary clarifier with a design flow less than 25,000 gallons per day must use a mechanical skimmer or hydraulic differential skimming. If hydraulic differential skimming is used, it must be capable of removing scum from the entire operating surface of the clarifier.

(6) A pump used for pumping scum must be specifically designed to pump scum.

(c) Effluent weirs.

(1) An effluent weir must not cause turbulence or a localized vertical flow velocity that would pull solids over the effluent weir in the primary clarifier.

(2) An effluent weir must be designed to prevent hydraulic short circuiting through a primary clarifier.

(3) An effluent weir must be level, and must be designed to be adjustable for re-leveling.

(4) Effluent weir loading must not exceed 20,000 gallons per day at peak flow per linear foot of weir length for a wastewater treatment facility with a design flow of 1.0 million gallons per day or less.

(5) Weir loading must not exceed 30,000 gallons per day at peak flow per linear foot of weir length for a wastewater treatment facility with a design flow greater than 1.0 million gallons per day.

(d) Primary clarifier basin sizing.

(1) The surface area of a primary clarifier must be used to determine the proper weir overflow rates.

(2) The actual primary clarifier size must be based on the larger of two surface area calculations: peak flow rate and design flow surface loading rate.

(3) Surface loading rates and detention times for a primary clarifier in subparagraphs (A) and (B) of this paragraph are based upon a minimum side water depth of 10.0 feet.

(A) Surface loading rates, excluding recirculation flow, must not exceed:

(i) 1,800 gallons per day per square foot at peak flow; and

(ii) 1,000 gallons per day per square foot at design flow.

(B) Detention Time.

(i) Detention time at peak flow must be at least 54 minutes (0.9 hour).

(ii) Detention time at design flow must be at least 108 minutes (1.8 hours).

(iii) Side water depth may be adjusted from a minimum of 10 feet to a maximum of 18 feet, as long as the detention time remains unchanged.

(iv) The detention time must be based on the effective volume and the weir overflow rate of a circular or rectangular clarifier.

(I) The effective volume includes all liquid above the sludge blanket.

(II) For a cone bottom tank, the top of the sludge blanket is considered to be at the top of the cone.

(III) The design of a flat bottom tank must include additional depth for a sludge blanket with a thickness of 3.0 feet.

(e) Side Water Depth. The minimum side water depth for primary clarifiers is 10.0 feet. For a primary clarifier, the side water depth is defined as:

(1) the water depth from the top of the cone in a cone bottom tank to the water surface; or

(2) the water depth from 3.0 feet above the bottom of a flat bottom tank to the water surface.

(f) Freeboard. The walls of a primary clarifier must extend at least 6.0 inches above the surrounding ground surface and must provide a minimum freeboard of 12.0 inches at peak flow.

(g) Drains.

(1) A primary clarifier must have the capability of draining completely without bypassing secondary treatment.

(2) A portable dewatering pump may be used for complete dewatering.

(h) Accessibility. A primary clarifier must be accessible for operation and maintenance.

(i) Five-day biochemical oxygen demand (BOD<sub>5</sub>) Removal. The design of a primary clarifier must be based on no greater than 35% BOD<sub>5</sub> reduction, unless a higher efficiency is justified by a pilot study or data from a similar full-scale operation.

(j) Sludge Transfer.

(1) A primary clarifier unit must include mechanical sludge collection equipment designed to remove sludge in a manner that will minimize odor development and transfer the sludge for subsequent processing.

(2) A gravity sludge transfer pipe must be at least 8.0 inches in diameter.

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