**Section 370.940 Intermittent Sand Filtration for Secondary Treatment**

a) Applicability

Use of the intermittent sand filter for secondary treatment is generally limited to weak to normal strength wastewaters which are amenable to biological treatment. Cold weather operational problems may preclude the use of this process unless the influent temperature to the filter is adequate to allow efficient filter operation necessary to meet the applicable effluent standards.

b) Pretreatment Requirements

Wastewaters applied to intermittent sand filters must be substantially free of grit, debris, oil and grease, floating and suspended materials, and components which inhibit biological processes and cause rapid clogging of the filter. Special consideration shall be given to the design of preceding treatment units, including dosing facilities, to limit heat loss during winter operation.

c) Multiple Units

Intermittent sand filters shall be provided in multiple units, designed for independent operation and maintenance.

d) Location

Intermittent sand filters treating septic tank or primary effluent should be restricted to relatively isolated locations or otherwise modified in order to minimize odor nuisances.

e) Recirculation

Recirculation of filter effluent may be practiced in order to attenuate and equalize organic and hydraulic loads to the filter, and improve unit process efficiency, control odors, and improve day-to-day reliability.

1) Rate

A recirculation rate of up to 300% of the settled sewage load to the filter may be provided.

2) Variability

The capability of varying the recirculation rate allows greater process control and optimization of process efficiency. This feature shall be included where recirculation is provided.

f) Dosing

1) Dosing Volumes

The dosing facilities shall be designed for a capacity of 2,500 gallons per 1,000 sq. ft. of filter bed to be dosed at any given time.

2) Dosing Rates for Siphons or Pumps

Siphons (at minimum head) or pumps shall have a discharge capacity at least 100% in excess of the maximum rate of inflow to the dosing tank, including recirculation, and at average head, at least 90 gallons per minute per 1,000 square feet.

3) Discharge Line Capacity

The discharge lines to the beds shall have sufficient capacity to permit the full rated discharge of the siphons or pumps.

g) Construction Details

1) Earth Base

The earth base of the filters shall be sloped to the underdrains.

2) Underdrains

The sand filter shall be provided with open-joint or perforated pipe underdrains. They should be sloped to the outlet and spaced not to exceed 10 foot centers. Vertical riser vents shall be provided at both ends of each underdrain pipe and shall be located as not to be overtopped at maximum dosing depth.

3) Media

A) Gravel Base

Clean graded gravel, preferably placed in at least three layers, should be placed around the underdrains and to a depth of at least 6 inches over the top of the underdrains. Crushed stone may not be used in lieu of gravel. Suggested gradings for the three layers are:

1½" to ¾", ¾" to ¼", ¼" to ⅛".

B) Sand

At least 24 inches of clean washed sand shall be provided. Sand shall be durable and relatively insoluble in sewage. Clay content shall be less than 1% by weight. The effective size shall be 0.3 to 1.0 millimeter (mm). The uniformity coefficient shall not be greater than 3.5.

4) Splash Slabs

Splash slabs shall be provided at each point of discharge to the filter. A means of dissipating the energy of the discharge velocity shall be provided around the periphery of the splash slab.

5) Curbs

Provision shall be made to prevent soil and surface runoff from entering the filter area. Curbs should be high enough to hold the maximum dose and provide adequate freeboard.

6) Distribution System

A) Arrangement

Provision shall be made for even distribution of the flow on the filter surface. If troughs or piping are used, they shall be so located that the maximum lateral travel of the flow on the media surface is not more than 20 feet.

B) Drains

Troughs, discharge piping or other distribution equipment shall be sloped to drain to prevent freezing.

h) Loading Rates

The loading rates shall be based on the raw sewage flow and organic strength. The following loading rates shall not be exceeded:

|  |  |  |
| --- | --- | --- |
| Raw Waste Strength  (Bod5 mg/l) |  | Dose Rate  (gals./ft.2/day |
| 100 to 200 |  | 3 |
| 200 to 300 |  | 2 |
| above 300 |  | 1 |

(Source: Amended at 21 Ill. Reg. 12444, effective August 28, 1997)