

4720.3950 DIATOMACEOUS EARTH FILTRATION.

Subpart 1. **Applicability.** The use of diatomaceous earth filters may be considered for application to surface water with low turbidity and low bacterial contamination. Diatomaceous earth filters must not be used for bacterial removal, color removal, or turbidity removal where either the gross quantity of turbidity exceeds 40 turbidity units or the turbidity exhibits poor filterability characteristics.

Subp. 2. **Pilot plant study.** Installation of a diatomaceous earth filtration system must be preceded by a pilot plant study on the water to be treated.

A. Conditions of the study such as duration, filter rates, head loss accumulation, slurry feed rates, turbidity removal, and bacteria removal, must be approved by the commissioner before the study.

B. The pilot plant study must demonstrate the ability of the system to meet the requirements of Code of Federal Regulations, title 40, part 141.73(c).

Subp. 3. **Treated water storage capacity.** Treated water storage capacity in excess of normal requirements must be provided to allow operation of the filters at a uniform rate during all conditions of system demand at or below the approved filtration rate, and to guarantee continuity of service during adverse raw water conditions without bypassing the system.

Subp. 4. **Number of filters.** There must be at least two filters provided. Where only two filters are provided, they must each be capable of meeting the plant's design capacity at the approved filtration rate.

Subp. 5. **Precoat.** A uniform precoat of diatomaceous earth must be applied hydraulically to each septum by introducing a slurry to the tank influent line and employing a filter-to-waste or recirculation system. Diatomaceous earth in the amount of 0.1 pound per square foot of filter area or an amount sufficient to apply a 1/16 inch coating must be used with recirculation. When precoating is accomplished with a filter-to-waste system, 0.15 to 0.2 of a pound per square foot of filter area must be provided.

Subp. 6. **Body feed.** A body feed system must apply additional amounts of diatomaceous earth slurry during the filter run to avoid short filter runs or excessive head loss.

A. The rate of body feed shall depend on raw water quality and characteristics and must be determined in the pilot plant study in subpart 2.

B. The feed systems and slurry lines must be accessible.

C. The body feed slurry must be continuously mixed.

Subp. 7. **Rate of filtration.** The minimum rate of filtration is 1.0 gallon a minute per square foot of filter area with a maximum of 1.5 gallons a minute per square foot. The filtration rate must be mechanically controlled.

Subp. 8. **Recirculation.** A recirculation or holding pump must be used to maintain differential pressure across the filter when the unit is not in operation to prevent the filter cake from dropping off the filter elements. A minimum recirculation rate of 0.1 gallon a minute per square foot of filter area must be provided.

Subp. 9. **Septum or filter element.** The filter elements must be structurally capable of withstanding maximum pressure and velocity variations during filtration and backwash cycles, and must be spaced so no less than one inch is provided between elements or between any element and a wall.

Subp. 10. **Inlet design.** The filter influent must be designed to prevent scour of the diatomaceous earth from the filter element.

Subp. 11. **Backwash.** A satisfactory method to thoroughly remove and dispose of spent filter cake must be provided.

Subp. 12. **Appurtenances.** The following must be provided for every filter:

- A. sampling taps for raw and filtered water;
- B. a loss of head or differential pressure gauge;
- C. rate-of-flow indicator, preferable with totalizer; and
- D. a throttling valve to reduce rates below normal during adverse raw water conditions.

Subp. 13. **Monitoring turbidimeter.** A continuous monitoring turbidimeter with recorder is required on the filter effluent for plants treating surface water.

Statutory Authority: *MS s 144.383*

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