

**4720.3940 SOLIDS CONTACT UNIT.**

Subpart 1. **General.** A unit designed for combined water softening and sedimentation shall be permitted only if the unit is:

- A. designed for the maximum uniform flow rate;
- B. adjustable to changes in flow which are less than the design rate; and
- C. designed for changes in water quality characteristics.

Subp. 2. **Installation supervision.** Supervision by a representative of the manufacturer must be provided whenever mechanical equipment is installed at the facility and, also, at the time of initial operation.

Subp. 3. **Sampling taps.** Sampling taps must be located to permit the collection of water samples from the solids contact unit.

Subp. 4. **Chemical feed.** Chemicals must be applied at points and by means which ensure satisfactory mixing of the chemicals with the water.

Subp. 5. **Mixing devices.** Mixing devices must be constructed to adequately mix raw water with previously formed sludge particles, and to prevent the deposit of solids in the mixing zone.

Subp. 6. **Flocculation.** Flocculation equipment must be adjustable so that coagulation occurs in a separate chamber or baffled zone within the unit and so that there is a flocculation and mixing period of not less than 30 minutes.

Subp. 7. **Sludge concentrators.** The solids contact unit must provide either internal or external concentrators which concentrate sludge and minimize wastewater.

Subp. 8. **Sludge removal.** Design of the sludge removal system must provide:

- A. sludge pipes not less than three inches in diameter, arranged to facilitate cleaning;
- B. an entrance to sludge withdrawal piping to prevent clogging;
- C. accessible valves located outside the tank; and
- D. a means for an operator to observe or sample sludge being withdrawn from the solids contact unit.

Subp. 9. **Cross connections.** Blow-off outlets and drains must terminate and discharge at places so backflow is prevented. Cross connection control must be included for all potable water lines including those used to backflush sludge lines and flush basins if potable water could become contaminated by nonpotable water.

Subp. 10. **Detention period.** The detention time must be established on the basis of the raw water characteristics and local conditions that affect the operation of the unit. Based

on design flow rates, the minimum detention time must be two hours for suspended solids contact clarifiers, and one hour for the suspended solids contact softeners.

Subp. 11. **Suspended slurry concentrate.** Softening units must be designed so continuous slurry concentrates of one percent or more, by weight, are maintained.

Subp. 12. **Weirs or orifices.** Units must be equipped with either overflow weirs or orifices. Weirs must be adjustable, must be at least equivalent in length to the perimeter of the tank, and must be constructed so surface water does not travel over ten feet horizontally to the collection trough.

Subp. 13. **Weir; orifice loading.** Weir loading must not exceed 20 gallons a minute per foot of weir length for units used for softeners, or ten gallons a minute per foot of weir length for units used for clarifiers. Orifices must produce uniform rising rates over the entire area of the tank.

Subp. 14. **Upflow rates.** The upflow rates in the solid contact unit must not exceed:

A. 1.75 gallons a minute per square foot of area at the slurry separation line if units are used for softeners; and

B. 1.0 gallon a minute per square foot of area at the sludge separation line if units are used for clarifiers.

**Statutory Authority:** *MS s 144.383*

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