**Section 604.1005 Anion Exchange**

a) Pre-treatment Requirements. Pre-treatment under Section 604.1010 is required when a combination of iron and manganese exceeds 0.5 mg/L.

b) Anion Exchange Treatment Design

1) Automatic regeneration based on volume of water treated must be used unless manual regeneration is justified and is approved by the Agency.

2) If a portion of the water is bypassed around the units and blended with treated water, the following requirements must be met:

A) the maximum blend ratio allowable must be determined based on the highest anticipated raw water nitrate level; and

B) a totalizing meter and a proportioning or regulating device or flow regulating valves must be provided on the bypass line.

3) A manual override must be provided on all automatic controls.

4) Adequate freeboard must be provided to accommodate the backwash flow rate of the unit, ensuring the resin will not overflow. The freeboard must be calculated based on the size and specific gravity of the resin.

5) The system must be designed to include an adequate under drain and supporting gravel system and brine distribution equipment.

6) Sampling Taps

A) Smooth-nosed sampling taps must be provided for the collection of representative samples.

B) The taps must be located to provide for sampling of the softener influent, effluent, and blended water.

C) The sampling taps for the blended water must be at least 20 feet downstream from the point of blending.

D) Petcocks are not acceptable as sampling taps.

7) Brine and Salt Storage Tanks

A) Salt dissolving or brine tanks and wet salt storage tanks must be covered and must be corrosion-resistant.

B) The make-up water inlet must be protected from back-siphonage. Water for filling the tank must be distributed over the entire surface by pipes above the maximum brine level in the tank. An automatic declining level control system on the make-up water line is recommended.

C) Wet salt storage basins must be equipped with manholes or hatchways for access and for direct dumping of salt from truck or railcar. Openings must be provided with raised curbs and watertight covers having overlapping edges similar to those required for finished water reservoirs.

D) Overflows, where provided, must be protected with corrosion-resistant screens and must terminate with either a turned downward bend having a proper free fall discharge or a self-closing flap valve.

E) The salt must be supported on graduated layers of gravel placed over a brine collection system.

F) Alternative designs that are conducive to frequent cleaning of the wet salt storage tank may be approved by the Agency.

G) Total salt storage must provide for at least 30 days of operation.

c) Exchange Capacity. The design capacity for nitrate removal must not exceed 10,000 grains per cubic foot when the resin is regenerated at 15 pounds of salt per cubic foot of resin.

d) Number of Units. At least two units must be provided. The treatment capacity must be capable of producing the maximum average daily demand at a level below the nitrate/nitrite MCL, with one exchange unit out of service.

e) Type of Media. The anion exchange media must be of the nitrate selective type.

f) Flow Rates. Unless otherwise approved by the Agency under Section 604.145(b), the following flow rates apply:

1) The treatment flow rate must not exceed 5 gal/min/ft2 of bed area.

2) The backwash flow rate must be between 4.0 and 6.0 gal/min/ft2 of bed area.

3) The regeneration rate must be approximately 1.0 gal/min/ft2 of bed area with a fast rinse approximately equal to the service flow rate.

g) Cross-Connection Control. Backwash, rinse, and air relief discharge pipes must be installed to prevent any possibility of back-siphonage.

h) Construction Materials. Pipes and contact materials must be resistant to the aggressiveness of salt. Plastic and red brass are acceptable materials. Steel and concrete must be coated with a non-leaching protective coating that is compatible with salt and brine.

i) Housing. Dry bulk salt storage must be enclosed and separated from other operating areas to prevent damage to equipment.

j) Preconditioning of the Media. Prior to startup of the equipment, the media must be regenerated with no less than two bed volumes of water containing sodium chloride followed by an adequate rinse.

(Source: Amended at 47 Ill. Reg. 7503, effective May 16, 2023)