

SECTION 223100 - DOMESTIC WATER SOFTENERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Commercial water softeners.

1.3 PERFORMANCE REQUIREMENTS

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water softeners.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
 - 3. Wiring Diagrams: For power, signal, and control wiring.
- B. Source quality-control reports.
- C. Field quality-control reports.
- D. Operation and Maintenance Data: For water softeners to include in emergency, operation, and maintenance manuals.
- E. Warranty: Sample of special warranty.
- F. Warranties: Submit written special warranty as specified in this Section. Include contact information, description of coverage, and start date for each special warranty.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended application.

- B. ASME Compliance for FRP Tanks: Fabricate and label mineral tanks to comply with ASME Boiler and Pressure Vessel Code: Section X, where indicated.
- C. UL Compliance: Fabricate and label water softeners to comply with UL 979, "Water Treatment Appliances."

1.6 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of water softeners that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures of mineral and brine tanks.
 - b. Faulty operation of controls.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - d. Attrition loss of resin exceeding 3 percent per year.
 - e. Mineral washed out of system during service run or backwashing period.
 - f. Effluent turbidity greater and color darker than incoming water.
 - g. Fouling of underdrain system, gravel, and resin with turbidity or by dirt, rust, or scale from water softener or soft water, while operating according to manufacturer's written operating instructions.
 - 2. Commercial Water Softeners, Warranty Period: From date of Substantial Completion.
 - a. Complete system: 2 years
 - b. Mineral Tanks: 5 years.
 - c. Brine Tanks: 5 years.

PART 2 - PRODUCTS

Buildings located on the North side of Mount Hope have in-fluent raw water supply from MSU Campus water. Buildings located on the South side of Mount Hope have very hard well water. Obtain current feed water sample prior to designing the system. Oversize the softeners by at least 20% for longevity.

2.1 COMMERCIAL WATER SOFTENERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Fleck.
 - 2. Structural Fiber.

- B. Description: Water softener system with Graduated Flow Technology shall be an automatic parallel twin (or triple) type, meeting the performance and design data requirement as specified, and consisting of softener tanks, internal distribution, main operating valve, control, exchange resin, and brine tanks. System shall be capable of softening a continuous flow from 30 grains initial hardness to zero grains with not greater than 12 psi pressure loss through the complete softener system at design service flow rate.
1. Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects."
 2. Softener tanks shall be constructed of high performance composite and fiberglass materials, and rated for 125 psi working pressure. Each tank with side-mounted valves shall have flanged top and bottom openings, flanged side openings. The tank inner shell shall be constructed of polypropylene. Tank shall be manufactured by Structural, or approved equal. Provide drain line and shut-off valve off the bottom of each tank, and air vent piping and bleeder valve off the top of each mineral tank. Top and bottom of side mounted softener head and tank adapter must be made of 5" thick PVC threaded socket. Provide mechanical fittings and test ports on softener head.
 3. Brine tanks and covers shall be constructed of fiberglass or rotation molded polypropylene with grid plate, brine well, PVC brine valve and no less than a 1" brine valve on softener larger than 36" in diameter.
 4. Lower distribution shall be a hub and radial arm type, high flow schedule 80 PVC constructed with fine slot area 1 ½ times the pipe diameter with a velocity of 5 fps and non-clogging strainers.
 5. Each softener shall be provided with high-capacity, neophenolic resin having a minimum exchange capacity of 30,000 grains per cubic foot when regenerated with 15 pounds of salt per cubic foot. The media shall be solid, of the proper particle size with 8% or greater cross linkage (not more than 4% through 40 mesh US standard screen, wet screening) and shall contain no plates, shells, or other shapes which might interfere with the normal function of the water softener. Bed depth shall be a minimum of 36".
 6. Each softener shall be provided with inlet and outlet pressure gauges. Each control shall contain a volumetric meter control, electrically coupled to the microprocessor control. Upon exhausting of any tank, its control shall immediately initiate regeneration. Controls shall contain electrical interlocks to prevent simultaneous regeneration of all softeners in the event a second tank exhausts while the first tank is in regeneration.
 - a. Features: Touch switches for programming and reprogramming water flow data display and interpretation solid state electronics rotating turbine to measure water consumption and a display feature that indicates treated water remaining, capacity of treated water, gallon consumption per minute and regeneration status.
 7. Main operating valves to be automatic, multiport, cam shaft or piston driven complete with microprocessor cycle controller with push button start. Provide automatic backwash control. Main operating valves shall be multiport with no hard water by-pass if a twin or greater configuration or equivalent by Sunshine. Must have manual by-pass of complete softening system external with approved ball type valves. All controls shall have provision for individual settings of all regeneration cycles (backwash, brine, rinse, fast rinse, brine refill, service). The controls shall operate by mechanical and hydraulic power.

2.2 SOURCE QUALITY CONTROL

- A. Hydrostatically test mineral tanks before shipment to a minimum of one and one-half times the pressure rating.
- B. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 WATER SOFTENER INSTALLATION

- A. Equipment Mounting: Install commercial water softeners on concrete base.
 - 1. Maintain manufacturer's recommended clearances.
 - 2. Arrange units so controls and devices that require servicing are accessible.
 - 3. Bolt tripod bases down to pad.
- B. Install brine lines and fittings furnished by equipment manufacturer but not specified to be factory installed.
- C. Prepare mineral-tank distribution system and underbed for minerals and place specified mineral into mineral tanks.
- D. Install water-testing sets mounted on wall, unless otherwise indicated, and near water softeners.

3.2 CONNECTIONS

- A. Comply with requirements for piping specified in Division 22 Section "Domestic Water Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where piping is installed adjacent to equipment, allow space for service and maintenance of equipment. Provide service access to floats and brine tanks.
- C. Support main operating valve and associated piping independently from the softener tank.
- D. Flexible pipe connectors shall be used to connect side mounted valves to the tank.
- E. Install shutoff valves on raw-water inlet and soft-water outlet piping of each mineral tank, and on inlet and outlet headers.
 - 1. Metal general-duty valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
 - 2. Locate main shutoff valves within 7' of finish floor.
- F. Install pressure gages on raw-water inlet and soft-water outlet piping of each mineral tank. Pressure gages are specified in Division 22 Section "Meters and Gages for Plumbing Piping."
- G. Install valved bypass in water piping around water softeners.

1. Metal general-duty valves are specified in Division 22 Section "General-Duty Valves for Plumbing Piping."
2. Water piping is specified in Division 22 Section "Domestic Water Piping."

- H. Provide individual main drain from each softener.
- I. Install drains as indirect wastes to spill into open drains or over floor drains.
- J. Pipe air bleed-offs from top of tanks to floor drain.
- K. All attachment devices such as unit-strut, hangers, nuts, bolts, washers, etc. must be stainless steel.

3.3 IDENTIFICATION

- A. Identify system components. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.
 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Water softeners will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.5 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 1. Complete installation and startup checks according to manufacturer's written instructions.
- B. Sample water softener effluent after startup and at three consecutive seven-day intervals (total of four samples), and prepare certified test reports for required water performance characteristics.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain water softeners.

END OF SECTION 223100