

## **SECTION 22 31 00**

### **DOMESTIC WATER SOFTENERS**

#### **PART 1 - GENERAL**

##### 1.1 RELATED DOCUMENTS:

- A. The Conditions of the Contract and applicable requirements of Division 1, "General Requirements", and Section 23 01 00, "Mechanical General Provisions", govern this Section.

##### 1.2 DESCRIPTION OF WORK:

- A. Work Included: Provide domestic water softeners as specified, scheduled, and indicated.

##### 1.3 QUALITY ASSURANCE:

- A. Manufacturers: Provide products complying with these specifications and produced by Bruner or Rain Soft.

##### 1.4 SUBMITTALS:

- A. Shop drawing submittals shall include, but not be limited to, the following:
  1. Cut sheets on all equipment showing features, characteristics, and capacities.
  2. Water analysis results.
  3. Floor plan layout showing equipment layout in floor space which is available.
  4. Manufacturers recommended installation instructions for system.
  5. Additional information as required in Section 23 01 00.

##### 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver water softeners and accessories in factory-fabricated water-resistant wrapping.
- B. Handle water softeners and accessories carefully to avoid damage to material component, enclosure, and finish.
- C. Store water softeners and accessories in a clean, dry space and protect from the weather.

#### **PART 2 - PRODUCTS**

##### 2.1 DOMESTIC WATER SOFTENER:

- A. General: Provide domestic water softening systems as shown on the drawings and as specified herein.
- B. Type/Capacity: The water softener shall be a twin, parallel softener tank unit with each tank capable of removing [ ] grains (per regeneration) of hardness from water as available at the site to not more than 0.3 grain per gallon of hardness as determined by an ASTM standard soap test method when operated at an intermittent capacity of [ ] **gpm** and a peak capacity of [ ] **gpm**. Pressure drop shall not exceed 15 psi at a flow rate of [ ] **gpm** and 25 psi at a flow rate of [ ] **gpm**. The system shall be capable of operating with inlet water temperatures from 40°F to 120°F and at inlet pressures from 30 psi to 120 psi.
- C. Water Analysis: The water softener supplier shall perform a water analysis on a water sample from the site water service to confirm the capacity of the selected equipment. If a significant variation in required equipment is found, notify the Architect/Engineer in writing prior to fabrication or ordering of equipment.
- D. Softener Tanks:
  1. The softener tanks shall be designed for a working pressure of [120 psig] [ ] **psig**, ASME Code construction of [125 psig] [ ] **psig** and hydrostatically tested at 50% excess of the working pressure. Sidesheet height shall be designed to allow a minimum freeboard space at 50% of the mineral bed depth for adequate expansion during backwashing. Tanks shall be equipped with a port on the top of the tank for filling.

2. The softener tank shall be black steel, nominal [ ] inch diameter by [ ] inch sideshell. Softener tanks shall be blasted to bare metal and then the tank interior shall be coated with Plasite 7133 epoxy and the tank exterior shall be prime coated and finish painted in a "Safety Blue" enamel. The tank shall be provided with a 5 year extended tank warranty.
- E. Distribution System: Upper and lower distribution systems shall be provided. The upper distribution system shall be of the single point baffle type, constructed of Schedule 40 galvanized steel and fittings. The lower distribution system shall be a PVC hub and radial arm type, constructed with individual fine slotted non-clogging polyethylene strainers arranged for even flow distribution through the resin bed. The lower distribution system shall be embedded in a single layer subfill of washed 1/8" x 1/16" gravel to support the resin bed.
- F. Brining System:
1. The brining system shall be a [ ] diameter x [ ] high, [ ] pound capacity brine tank. The brine tank and cover shall be molded of corrosion-free fiberglass reinforced phenolic resin with a minimum thickness capable of containing the brine and salt.
  2. A brine regeneration system shall be provided which shall automatically introduce brine into the softeners, close to prevent the entrance of air and refill the brine tank with the proper amount of make-up water. The brine tank shall be equipped with a float operated shut-off to measure the proper amount of make-up water into the brine tank and prevent brine tank overflow.
- G. Valves and Piping:
1. The main operating valves shall be industrial automatic multipoint diaphragm type, slow opening and closing and free of water hammer. The diaphragm assembly shall be fully guided on its perimeter when pressure activated from one position to another to assure a smooth reliable shut-off without sticking. There shall be no contact of dissimilar metals within the valve and no special tools shall be required to service the valve.
  2. The main operating valves shall be manufactured by the manufacturer of the water treatment equipment. Valve shall be equipped with an internal automatic self-adjusting brine injector to draw brine and rinse at a constant rate regardless of water pressure in the range of 30 to 100 psi. Valves shall have a soft water sampling cock.
  3. Inlet and outlet service valves shall provide full flow with minimum pressure drop. All piping shall be galvanized steel or copper. Dielectric couplings shall be provided for all dissimilar metal connections.

**[SELECT ONE OF THE FOLLOWING]**

- H. **[Regeneration Controls: Regeneration will be controlled by a 7-day time switch which permits regeneration at any time of day or night, any day or every day of the week. It will have provision for individual adjustment of the backwash and brine-rinse cycles and shall operate on 120 volt 60 Hz single phase. The time switch shall be set to allow regeneration to be activated only between midnight and 4 a.m. Regeneration shall be controlled by an electronic sensor so that regeneration shall occur only when required. It shall compensate for both variation of water usage and water hardness without any field adjustment and shall be unaffected by change of temperature of the water supply. An alternator shall be supplied to allow only one unit to be in regeneration or standby at the time while the other unit is in service. This system shall provide a continuous supply of soft water.]**

**[OR]**

- I. **[Regeneration Controls: Provide a fully integrated programmable microprocessor driven electronic softener controller. Integral multiported pilot valve operators shall be provided for softeners to initiate a backwash/regeneration sequence based on user programmed volume setpoints. The controller shall be provided by the water softener manufacturer.**
1. **The system shall consist of two softener (media) tanks each having a dedicated flow meter and configured for parallel flow.**

2. **One tank, designated as the primary, will remain on-line at all times. Variation of soft water flow demand shall automatically cause the second tank to change status from standby to on-line and back to standby as needed. When the primary media tank regenerates the second tank in sequence shall become the primary. As each media tank's user programmable volume is reached it shall immediately be taken off-line, regenerated and placed immediately back on-line or standby depending on soft water flow demand. The controls shall be capable of continuously determining the exhaustion rate of each media tank thus automatically avoiding the possibility of simultaneous regeneration. A cumulative volume totalization to eight digits shall be continuously displayed for each unit. This system shall provide a continuous supply of softened water.**
3. **The water meters shall be full chamber disc type having a flow range of [ \_\_ - \_\_ ] gpm with an accuracy of 1.5% over the entire flow range and shall maintain a separate permanent record of the total accumulated gallons passed. A dry electrical contact shall operate during periods of soft water flow to signal the controller which shall be capable of displaying both flow rate and totalization data.]**
- J. Mineral Resin: Each softener shall be provided with approximately [20] [ ] cubic feet of ion exchange resin, virgin high capacity sulfonated polystyrene type stable over the entire PH range and good resistance to bead fracture from attrition or osmotic shock. Each cubic foot of resin shall be capable of removing 30,000 grains of hardness as calcium carbonate when regenerated with 15 lbs of salt.
- K. Brine Salt: Brine salt for initial system start-up and operation for the first month of operation shall be provided by the equipment supplier.
- L. **[Salt Conservation System: A Bruner Salt-Master or equal salt management system shall be provided to recycle brine and electronically monitor the brine to accurately deliver the exact salt dosage required to soften the raw water entering the system.]**
- M. Water Testing Set: A water testing set shall be furnished to the Owner for conducting a soap hardness test, complete with metal container for wall mounting. Test kit shall have sufficient supplies for one year of test use.
- N. Guarantee: The manufacturer shall guarantee that under actual operating conditions that the following shall be met:
  1. The effluent shall contain no more than 0.3 GPG hardness as determined by soap test.
  2. That the loss of ion exchange resin through attrition during the first 3 years of operation shall not exceed 3% per year.
  3. That the resin shall not be washed out of the system during the service run or backwashing period.
  4. That the turbidity and color that by reason of passing through the softener system, shall not be greater than the incoming water.
  5. The entire water softening system shall be fully guaranteed for one year after substantial completion.
  6. The brine tank shall be guaranteed for 10 years.
  7. The softener tanks shall be prorata guaranteed for 4 years after the one year full warranty.

### **PART 3 - EXECUTION**

#### 3.1 INSPECTION:

- A. General: Installer shall examine the conditions under which the water softeners are to be installed and notify Contractor in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

#### 3.2 INSTALLATION:

- A. General: Pipe and install the water softeners as shown on the Drawings and in accordance with the manufacturer's written installation instructions.

- B. Housekeeping Pads: The water softener and adjacent salt storage shall be installed on a reinforced concrete housekeeping pad as specified in Section 23 03 00, "Basic Materials and Methods".

3.3 START-UP, ADJUSTMENTS AND TRAINING:

- A. Startup: System checkout, start-up and adjustment shall be performed by a representative of the equipment manufacturer. Refer to Section 23 05 93, "Operational Test-Adjust-Balance", for additional requirements.
- B. Training: Owner's Operator training in system operation and maintenance procedures shall be performed by a representative of the equipment manufacturer. System Operating and Maintenance Manuals shall be available to the Owner's Operator at the time of operator training. Refer to Section 15002 for additional requirements.
- C. Operating Instructions: A complete set of operation instructions covering the installation, maintenance and operation of the softener system shall be furnished bound in booklet form in the Operating and Maintenance Manuals. Refer to Section 23 01 00 for additional requirements.

3.4 IDENTIFICATION:

- A. Refer to Section 23 03 00, "Basic Materials and Methods", for applicable painting, nameplates, and labeling requirements.

**END OF SECTION 22 31 00**