SECTION 22 31 00

DOMESTIC WATER CONDITIONING SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes:

1. Water Softeners

B. Related Sections:

1. Division 22 - Facility Water Distribution: Supply connections to domestic water conditioning equipment.
2. Division 26 - Equipment Wiring Connections: Execution requirements for electric connections specified by this section.

C. Equipment, flow rate, tank, sizing, manufacturer and location to be as indicated.

1.02 SUBMITTALS

A. Division 01 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit capacity, flow rate, pressure drop, metering, electrical characteristics and connection requirements. Indicate dimensions of tanks, weights (shipping, installed and operating) tank lining methods, anchors, attachments, lifting points, taps, drains, furnished specialties, accessories, controls and operating sequence.

C. Shop Drawings: Submit drawing showing layout, connections, templates, directions for installation and wiring diagrams differentiating between manufacturer wiring and field installed wiring.

D. Monitoring: Equipment shall be capable of being monitored by the Building Management System.

E. Manufacturer shall provide special seismic certification per OSHPD CAN 2-1708A.5 with submittal. Submittals without certification will be returned and not reviewed.

1.03 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit operation, maintenance, and inspection data, replacement part numbers and availability.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with County of Los Angeles standard.

B. Maintain one copy of each document on site.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience, and with service facilities near the Project.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Product storage and handling requirements.

B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

C. Store: Provide protective coatings and covers in a dry location.

1.07 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.08 WARRANTY

A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Include replace/repair, failure to perform and labor.

1.09 MAINTENANCE SERVICE

A. Division 01 - Execution and Closeout Requirements: Requirements for maintenance service.

B. Furnish service and maintenance of water softener for one year from Date of Substantial Completion.

C. Examine unit components monthly. Clean, adjust, and lubricate equipment.

D. Include systematic examination, adjustment, and lubrication of unit, and controls checkout and adjustments. Repair or replace parts in accordance with manufacturer's operating and maintenance data as part of the warranty. Use parts produced by manufacturer of original equipment.

E. Perform work during occupancy off hours and without removing units from service during building normal occupied hours.

F. Provide emergency call back service at all hours for this maintenance period.

G. Maintain locally, near Place of the Work, adequate stock of parts for replacement or emergency purposes. Have personnel available to ensure fulfillment of this maintenance service, without unreasonable loss of time.

H. Perform maintenance work using competent and qualified personnel under supervision of manufacturer or original installer.

I. Do not assign or transfer maintenance service to agent or subcontractor without prior written consent of the County.

1.10 MAINTENANCE MATERIALS

A. Division 01 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish of water softener salt equal to four regenerations.

PART 2 PRODUCTS

2.01 WATER SOFTENERS

A. Provide either regeneration type or exchange type as approved by authority having jurisdiction.

B. General:

1. Automatic water softening system of approved design, complete from inlet to outlet.
2. The completed installation of the system shall be inspected by factory representative, who shall place the equipment in service and instruct the County's personnel in its care, maintenance and operation.
3. The softener system shall have as an integral part of the unit, tank controls and water flow-meters. The unit shall be complete with face piping, valves and automatic controls to operate on the sodium cycle. The influent and effluent face piping and valves on each tank shall be full size. The softener system shall be capable of delivering soft water continuously with a pressure drop not to exceed 15 psig at a peak flow rate. The softener system shall be skid mounted, the skid material shall be mild steel, epoxy coated. The softener skid shall be manufactured to hold softening vessels. The system shall be pre-piped and wired for a complete system.

C. Mineral Tank:

1. The mineral tanks shall be constructed of mild steel having an operating pressure of 125 psig and shall be built in accordance with the ASME Code, and bear the ASME stamp. Each tank shall be hydrostatically tested at a pressure of 50% in excess of the operating pressure. Side shell height shall allow a minimum freeboard space of 50% of the mineral bed depth to allow for adequate resin expansion during backwash.
2. Each tank shall also be provided with two lifting lugs to facilitate the handling and positioning of the equipment. Each tank shall be supported with structural steel angle legs and shall be equipped with a 12"x16" manhole for access into the tank.
3. Each tank shall be internally lined with epoxy, applied 8 to 12 mils thick; all tank areas having contact with water being so lined. All seams and fittings on each mineral tank shall be double welded inside and out to prevent open metal pockets inaccessible to the epoxy lining process, which in turn may cause rust and premature tank failure. Each tank shall be externally painted with a rust inhibiting primer and an enamel overcoat.

D. Upper Distribution System (inside tank): Each tank shall be equipped with a 6 inch, schedule 80 PVC upper distributor. The distributor design shall be a 4 point splash dome system, capable of distributing water evenly over the resin bed.

E. Lower Distribution System (inside tank): Each tank shall be equipped with a 6 inch, schedule 80 PVC hub and lateral lower distributor system. The equally spaced laterals shall have slot openings of 0.010". The distribution system shall be imbedded in a 6 inch layer of washed 1/8"x16 gravel to support the resin bed and aid in distribution of water over the resin bed.

F. Media: Each softener unit shall be provided with 65 ft3 of cation exchange resin having a minimum exchange capacity of 30,000 grains per cubic foot when regenerated with 15 lbs of salt per cubic foot. The media shall be solid, of proper particle size (not more than 4% through 40 mesh US standard screens, wet screening), and will contain no agglomerates, shells, plates, or other shapes which might interfere with the normal function of the water softeners.

G. Automatic System Controls

1. The system controls shall have adjustable duration of the various steps in regeneration and shall allow for pushbutton start which when initiated will automatically complete the regeneration cycles for the system. A programmable controller in conjunction with a pilot stager shall be provided to control the functioning of all automatic diaphragm valves for each tank. The automatic controls shall control opening and closing of all valves associated with regeneration of unit and flow of water

through the complete system. The stager shall be capable of automatically returning to the service position should it fail to stay in sequence with the timer.

2. The controller shall register flow in GPM, totalize water flow in GPM, totalize water through the system; time regeneration cycles and is programmable for individual operator's requirements. An end-of-run signal from a sensor shall be sent to the electronic controller which shall initiate regeneration of the unit. A manual regeneration override system shall be provided in the event of a power failure. The controller shall be provided with a battery backup to insure program integrity in the event of power failure. The softeners shall not bypass hard water when in regeneration.

H. Water Flow Meter: Provide a full flow size stainless steel turbine flow meter to monitor effluent flow from each softener. The signal from the water meter shall be sent to the electronic controller which shall read the signal and interpret gallons per minute and also totalize gallons flowing through the system.

I. Service and Regeneration Valves

1. Provide independent diaphragm valves for softener regeneration. The regeneration valves shall be constructed of cast bronze with a 125 psig rating. The valves shall be hydraulically powered, having an upper and lower chamber for power opening and closing.
2. The service inlet and outlet valves shall be constructed of cast bronze with a 125 psig rating. The valves shall be hydraulically powered, having an upper and lower chamber for power opening and closing.

J. Pressure Gauges and Sample Cocks: Pressure gauges and sample cocks shall be provided on each softener for the inlet and outlet.

K. Flow Control: Flow control for backwash, flush and brine shall be fully automatic, requiring no field adjustment and shall be constructed of brass.

L. Face Piping: All face piping and fittings shall be Type L copper with silver solder, 4 inch and larger shall be flange. Dielectric unions/flange kits shall be provided in all plumbing lines including pressure vessels connections and where dissimilar metals are joined.

M. Brine Level Control Panel (pre-wired skid mounted):

1. Level controls shall be provided for the brine maker and brine holding tank. Brine control panel shall include, as a minimum, the following features:

    a. Brine maker low level
    b. Brine makeup water refill control
    c. Brine holding tank refill pump control
    d. Pump lockout

2. Indicator lights and/or audible alarm:

    a. Brine maker low
    b. Brine makeup water refill
    c. Brine holding tank refill pump
    d. Pump failure

N. Level Controls/Housing: The brine holding tank level controls shall be the Warrick solid-state Series 2 electromechanical relays. It shall operate in the inverse mode to provide a failsafe operation in the event of a power failure or shutdown. The level control probe housings shall be Warrick Series 3G, designed for use in corrosive applications, and shall be constructed of PVC base and a polycarbonate housing material. The probes shall be 316L stainless steel.

O. Brine Maker:

1. Provide a filament wound reinforced thermoset plastic brine maker manufactured in accordance with Specification ASTM D-3299-00, with the inner surface and the interior layer included in the structural wall calculation, inner corrosion liner fabricated with isophthalic polyester resin, reinforced with a 10-20 mil "C" glass surface veil and backed with 90 mil chop strand fiberglass laminate. Balance of laminate fabricated to full wall thickness with same resin as above. Exterior surface finished with translucent protective coating with ultraviolet inhibitors.
2. The brine maker is to be flat bottom.
3. The brine maker is to have the following accessories:

    a. 6 tie down lugs, 304 stainless steel
    b. Lift channels, 304 stainless steel
    c. One 4 inch conically gusseted flanged nozzle with 4 inch diameter 304 stainless steel schedule 40 salt unloading pipes with 3/4 inch water injection port, 4 inch aluminum Kamlock coupling and cap. Fiberglass clips will be furnished to support the pipe off the vessel wall.
    d. One 1-1/2 inch conically gusseted flanged nozzle brine outlet with internal brine plenum with slotted PVC filter pipe.
    e. One 1 inch conically gusseted flanged nozzle with PVC water distribution ring.
    f. One 6 inch gooseneck vent with PVC vent extension, clips to attach to vessel wall, polyester dust bag, rubber connection boot.
    g. One 18 inch flanged manway with cover, neoprene gasket, and 304 stainless steel fasteners.
    h. Nameplate
    i. Brine level controller and indicator instrument with ASCO normally closed solenoid valve to be mounted in the water inlet line.

4. Service: The brine maker is designed for storage of sodium chloride, specific gravity 1.2, ambient temperature, atmospheric pressure, outdoor installation.

P. Brine Blending System: Supply a brine blending system to blend brine for the regeneration of the water softeners. The blending system shall include as a minimum the following components:

1. 1 inch stainless steel electric actuated ball valve with manual override.
2. 1 inch brass flow control (dilution water)
3. 1 inch brass flow control (brine)
4. Blending tee
5. Brine blending piping to be schedule 40 brass.

Q. Instructions and Start Up: A complete set of operating instructions covering the installation, maintenance and operation of the water softener system shall be furnished bound in booklet form. Inspect the completed installation, start the water softening system in operation and acquaint the operators with the proper operation and maintenance of the equipment.

R. Guaranties: Guarantee that any mechanical equipment proving defective in workmanship or materials within one year after installation shall be replaced FOB factory. Guarantee that under actual operating conditions, the effluent shall contain zero GPG hardness as determined by soap test, that the loss of ion exchange resin through attrition during the first 3 years of operation shall not exceed 3% per year, that the resin shall not be washed out of the system during the service run or backwashing period; that the turbidity and color of the effluent, by reason of passing through the softener system, shall not be greater than the incoming water.

PART 3 EXECUTION

3.01 INSTALLATION

A. Coordinate with plumbing piping and related and electrical Work to achieve operating system.

B. Install the following piping accessories on water conditioning equipment domestic water piping connections. Refer to Division 22.

1. On inlet:

a. Thermometer.
b. Strainer.
c. Pressure gage.
d. Shut-off valve.

2. On outlet: Shut-off valve.

C. Install drain piping from tanks to nearest floor drain.

END OF SECTION