PART 1 - GENERAL

1.1 APPLICABLE REQUIREMENTS

A. All work to be furnished and installed under this section shall comply with all the requirements of General Conditions, Supplemental Conditions, Division 01 - General Requirements, Section 230500 - Basic HVAC Materials and Methods, and other Sections in Division 23 specified herein.

1.2 DESCRIPTION OF SCOPE

A. Provide complete water treatment work required by this section as indicated on drawings and schedules and by requirements of this section, and includes necessary equipment, chemicals, and service for the following systems:
1. Cleaning solution for HVAC Piping Systems
2. Treatment of Chilled Water Systems
3. Treatment of Heating Water Systems

B. Provide chemicals and service program for a period of one year from start-up date of equipment, including the following:
1. Initial water analysis and recommendations.
2. Systems start-up assistance and supporting documentation.
3. Training of operating personnel.
4. Periodic field service and consultation for first year of operation.
5. Customer report charts and log sheets.
6. Laboratory technical assistance.

1.3 GENERAL PERFORMANCE REQUIREMENTS

A. Water treatment systems for chilled water and heating water systems shall inhibit corrosion and scale to maximize efficiency and operating life of hvac equipment.

B. Water treatment shall be based on existing water quality, HVAC system materials and performance, and any local jurisdictional requirements.

C. Water treatment services shall include water analysis; water quality goal definition; solid or liquid chemical products designed to treat specific water conditions; effective dosage calculations; equipment adjustment and maintenance. Services shall be provided by qualified water treatment professionals trained in solid chemical application.

D. Water treatment equipment for delivery of solid or liquid chemicals shall deliver accurate dosages per professional water treatment service recommendations, and use equivalent or less energy than liquid chemical systems.

1.4 QUALITY ASSURANCE

A. Manufacturers and Representative Qualifications. Firms regularly engaged in manufacture of water treatment equipment, chemical and service shall have been active in the field of industrial water treatment and whose products have been in satisfactory use in similar service for not less than 5 years, and shall have full-time service personnel located within 150 miles of the project site.

B. Codes and Standards:
   1. ASME Compliance: Construct pressure service tanks in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, provide stamp and certification.
   2. UL Labels: Provide water conditioners ancillary electrical components that have been listed and labeled by UL.
   3. NEMA Standards: Provide electrical controls and enclosures conforming to applicable standards of NEMA for environment where water conditioners are indicated.
   4. Chemical Standards: Provide only chemical products that are acceptable under state and local public health and pollution control regulations. All products shall have the necessary registrations and approvals. All biocides shall be registered with the company performing the service in the State where the project is located and the company shall have all necessary licenses.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's technical product including rated capacities of selected equipment clearly indicating water pressure drops, weights, installation and start-up instructions, and furnished specialties and accessories.

B. Shop Drawings: Submit manufacturer's assembly-type shop drawings indicating dimensions, weight loadings, required clearances, and methods of assembly of components.

C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to water treatment equipment. Submit manufacturer's ladder-type wiring diagrams for interlock and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.

D. Record Drawings: At project closeout, submit record drawings of installed systems and products.

E. Maintenance Data: Submit maintenance data and parts list for each item of equipment, control, and accessory; including "trouble-shooting" maintenance guide. Include this data, product data, shop drawings, and wiring diagrams in maintenance manual.

1.6 DELIVERY, STORAGE AND HANDLING

A. Handle water treatment materials and components carefully to prevent damage, breaking, denting and scoring to materials and equipment. Deliver packaged units in original crates. Do not install damaged water treatment materials and components; remove from site and replace with new.

B. Store water treatment materials and components in an environment satisfactory to prevent their damage by the elements.

1.7 EXTENDED MAINTENANCE SERVICES

A. Agreement to Maintain: Prior to time of final acceptance, submit four copies of "Agreement for Continued Service and Maintenance" for water treatment system, for

Owner's possible acceptance. Offer terms and conditions for furnishing chemicals and providing continued testing and servicing, and including replacement of materials and equipment, for one-year period with option for renewal of Agreement by Owner. For the purposes of this section, the date of substantial completion shall begin on the date regular chemical treatment has commenced for the water systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide products by US Water Services, San Joaquin Chemicals, Garratt-Callahan, Chemcoa Nalco, Ecolab or approved equal.

2.2 CHEMICAL POT FEEDER

A. Provide pot feeder with removable cover, control valve, shut-off valves, drain valve, balancing valve and check valve.

B. Pot feeder to be mounted on floor and provided with legs. The unit to be five gallon capacity (minimum) or as scheduled and shall be piped as detailed on plans or as recommended by the manufacturer.

C. Manufacturer: Neptune, J.L.Wingert, or approved equal.

PART 3 - EXECUTION

3.1 CHEMICAL COMPATIBILITY

A. The Water Treatment Contractor is responsible for determining the system material content and submitting chemicals compatible with each system's content. In the case of systems equipped with aluminum heat exchangers, non-Borate Nitrite inhibitors must be submitted. For closed chilled water systems in excess of 10,000 gallons, non-Nitrate inhibitors must be submitted.

3.2 FLUSHING AND CLEANING

A. The Water Treatment Contractor shall be responsible for furnishing the cleaning material and supervising the chemical cleaning of the chilled water piping, process cooling water system, condenser water piping, heating piping, and heat recovery loop piping. See 232113 for flushing and cleaning method for HVAC piping.

B. The system to be cleaned shall be filled with a solution of 10% by weight of a heavy duty alkaline liquid cleaner. The cleaner shall be capable of wetting and penetrating heavy soil deposits of oil or grease, and keeping these products in suspension, for removal through flushing the system to drain. Alkaline cleaners shall not be used for systems with galvanized components to assure no stripping of zinc coating.

C. The cleaning solution shall be circulated for a minimum of 8 to 24 hours depending on the system water volume. At the end of the circulation period the system shall be flushed to sanitary sewer drain for an additional 8 to 24 hours and then refilled with fresh water, taking care to remove any entrapped air from the system.

D. At the end of the cleaning period, the system shall be chemically treated as specified. In no case shall the system being cleaned be left in an untreated condition for more than 8 hours.

E. At the conclusion of the cleaning operation, the Water Treatment Contractor shall certify in writing that the system was cleaned as specified.

3.3 TESTING

A. Closed Systems:
1. Provide a Nitrite “Drop Test” kit or other inhibitor test kit for determining the level of Nitrite or other approved inhibitor in the closed system.

3.4 COUPON RACKS

A. Coupon Rack for Closed Systems:
1. Install two coupon holders between the low and high pressure of the circulating pump. The coupon holders shall be isolated with shut off valves for removing and inspecting the coupons. When the system is ready for startup, the Water Treatment Contractor shall install two pre-weighted coupons, one copper, and the other steel in the above coupon holders, noting time and date. At the end of each 180 day period, the coupons shall be removed, noting the time and date, re-weighed, and inspected, with a report being sent to the General Contractor/Mechanical Contractor, for distribution to the Owner’s Representative, showing the condition of the system being treated. Coupon racks shall be PVC Schedule 80 composition for all chilled water closed loop systems and black iron composition for a heating water closed loop systems.

3.5 INSTALLATION

A. Coordination where installation of Water Treatment equipment in piping systems is required with the other work (plumbing and heating piping) as necessary to interface components of water treatment equipment. Provide installation instructions to those firms providing installation.

B. Electrical Wiring: Install electrical devices furnished by manufacturer but not specified to be factory mounted. Furnish copy of manufacturer’s wiring diagram submittal to Electrical installer.
1. Verify that electrical wiring installation is in accordance with manufacturer’s submittal and installation requirements of Division 26 sections. Do not proceed with equipment start-up until wiring installation is acceptable to equipment installer.
2. Install pressure gauges, valves, and controls furnished by manufacturer, in accordance with manufacturer’s instructions.

C. Add corrosion inhibitor chemicals to each closed system. The type of inhibitor chemicals shall be as recommended by the Water Treatment Contractor for the intended system materials, operating temperatures and application. Non-Nitrate inhibitors must be used for all closed loop systems in excess of 10,000 gallons to eliminate the risk of microbiological consumption.

D. Provide full size shut-off ball valves and piping between sidestream filter and

inlet/discharge side of pump. Side-stream filters shall be of the multi-media sand filter type for all open systems and closed loop systems in excess of 10,000 gallons. The multi-media sand filters shall be capable of filtering down to a minimum of 0.5 micron and shall automatically perform unit backwashes based on a programmed pressure differential set-point. Side-stream filters for closed loop systems less than 10,000 gallons in capacity shall be of the cartridge filter type and shall be capable of filtering down to a minimum of 1 micron. Cyclone or other separator type filtration systems shall not be accepted

3.6 INSPECTION

A. Examine areas and conditions under which water treatment systems are to be installed. Do not proceed with work until unsatisfactory conditions have been corrected.

3.7 FIELD QUALITY CONTROL

A. Following start-up sample water at one-week intervals for period of three (3) weeks and provide a test report on the conditions of the water. Subsequent visits shall be at a monthly frequency.

3.8 SYSTEM START-UP

A. The Water Treatment Supplier shall put the system into operation, and make adjustments necessary for proper operation.

B. The Water Treatment Supplier shall provide a written report to the Division 23 Contractor indicating that the start-up has been completed and that all Water Treatment Equipment is operating properly.

3.9 TESTING AND CLEANING

A. Following start-up sample all treated water systems at one-week intervals for period of three (3) weeks and prepare certified test report for each system being treated. Subsequent visits shall be at a monthly frequency.

B. Start-up test, and adjust water conditioners in presence of manufacturer's authorized representative. Operate units including regeneration, back washing, rinsing and flushing. Adjust unit to maintain required steady state effluent water quality.

C. Cleaning: Clean factory-finished surfaces. Repair any marred or scratched surfaces with manufacturer's touch-up paint.

3.10 CLOSEOUT PROCEDURES

A. Provide services of manufacturer's technical representative to instruct Owner's personnel in operation and maintenance of water treatment systems.
   1. Schedule training with Owner, provide at least 7 day notice to Contractor and Engineer of training date.
   2. Submit certified test reports to Engineer.

END OF SECTION