

SECTION 23 25 00

HVAC WATER TREATMENT

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. This Section includes the following HVAC water-treatment systems:

1. Bypass chemical-feed equipment and controls.
2. Biocide chemical-feed equipment and controls.
3. Chemical treatment test equipment.
4. HVAC water-treatment chemicals.

1.3 DEFINITIONS

- A. EEPROM: Electrically erasable, programmable read-only memory.
- B. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.
- C. TDS: Total dissolved solids.

1.4 PERFORMANCE REQUIREMENTS

- A. Water quality for HVAC systems shall minimize corrosion, scale buildup, and biological growth for optimum efficiency of HVAC equipment without creating a hazard to operating personnel or the environment.
- B. Base HVAC water treatment on quality of water available at Project site, HVAC system equipment material characteristics and functional performance characteristics, operating personnel capabilities, and requirements and guidelines of authorities having jurisdiction.
- C. Closed hydronic systems, including hot-water heating, chilled water shall have the following water qualities:
 1. PH: Maintain a value within 7.8 – 8.4.
 2. "P" Alkalinity: Maintain a value within 100 to 500 ppm.
 3. Boron: Maintain a value within 100 to 200 ppm.
 4. Chemical Oxygen Demand: Maintain a maximum value of 100 ppm.
 5. Soluble Copper: Maintain a maximum value of 0.20 ppm.
 6. TDS: Maintain a maximum value of 10 ppm.
 7. Ammonia: Maintain a maximum value of 20 ppm.
 8. Free Caustic Alkalinity: Maintain a maximum value of 20 ppm.
 9. Microbiological Limits:
 - a. Total Aerobic Plate Count: Maintain a maximum value of 1000 organisms/ml.
 - b. Total Anaerobic Plate Count: Maintain a maximum value of 100 organisms/ml.
 - c. Nitrate Reducers: Maintain a maximum value of 100 organisms/ml.
 - d. Sulfate Reducers: Maintain a maximum value of 0 organisms/ml.
 - e. Iron Bacteria: Maintain a maximum value of 0 organisms/ml.

1.5 SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for the following products:
 - 1. Bypass feeders.
 - 2. Water meters.
 - 3. Inhibitor injection timers.
 - 4. pH controllers.
 - 5. TDS controllers.
 - 6. Biocide feeder timers.
 - 7. Chemical solution tanks.
 - 8. Injection pumps.
 - 9. Chemical test equipment.
 - 10. Chemical material safety data sheets.
 - 11. Water softeners.
 - 12. Multimedia filters.
 - 13. Self-cleaning strainers.
 - 14. Bag- or cartridge-type filters.
 - 15. Centrifugal separators.
- B. Shop Drawings: Pretreatment and chemical treatment equipment showing tanks, maintenance space required, and piping connections to HVAC systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Wiring Diagrams: Power and control wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For sensors, injection pumps, and controllers to include in emergency, operation, and maintenance manuals.
- E. Other Informational Submittals:
 - 1. Water-Treatment Program: Written sequence of operation on an annual basis for the application equipment required to achieve water quality defined in the "Performance Requirements" Article above.
 - 2. Water Analysis: Illustrate water quality available at Project site.
 - 3. Passivation Confirmation Report: Verify passivation of galvanized-steel surfaces, and confirm this observation in a letter to Architect.

1.6 QUALITY ASSURANCE

- A. HVAC Water-Treatment Service Provider Qualifications: An experienced HVAC water-treatment service provider capable of analyzing water qualities, installing water-treatment equipment, and applying water treatment as specified in this Section.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.7 MAINTENANCE SERVICE

- A. Scope of Maintenance Service: Provide chemicals and service program to maintain water conditions required above to inhibit corrosion, scale formation, and biological growth for cooling, chilled-water piping heating, hot-water piping, condenser-water piping and equipment. Services and chemicals shall be provided for a period of one year from date of Substantial Completion, and shall include the following:
 - 1. Initial water analysis and HVAC water-treatment recommendations.

2. Startup assistance for Contractor to flush the systems, clean with detergents, and initially fill systems with required chemical treatment prior to operation.
3. Periodic field service and consultation.
4. Customer report charts and log sheets.
5. Laboratory technical analysis.
6. Analyses and reports of all chemical items concerning safety and compliance with government regulations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Ecolab Water Care Services.
 2. Or equal.

2.2 ~~MANUAL CHEMICAL FEED EQUIPMENT~~

- A. ~~Bypass Feeders: Steel, with corrosion-resistant exterior coating, minimum 3-1/2-inch fill opening in the top, and NPS 3/4 bottom inlet and top side outlet. Quarter turn or threaded fill cap with gasket seal and diaphragm to lock the top on the feeder when exposed to system pressure in the vessel.~~
 1. ~~Capacity: 6 Gallon.~~
 2. ~~Minimum Working Pressure: 125 psig.~~

2.3 ~~AUTOMATIC CHEMICAL FEED EQUIPMENT~~

- A. ~~Water Meter:~~
 1. ~~AWWA C700, oscillating-piston, magnetic drive.~~
 2. ~~Body: Bronze.~~
 3. ~~Minimum Working Pressure Rating: 150 psig.~~
 4. ~~Maximum Pressure Loss at Design Flow: 3 psig.~~
 5. ~~Registration: Gallons or cubic feet.~~
 6. ~~End Connections: Threaded.~~
 7. ~~Controls: Flow control switch with normally open contacts; rated for maximum 10 A, 250 V ac; and that will close at adjustable increments of total flow.~~
- B. ~~Water Meter:~~
 1. ~~AWWA C701, turbine type, totalization meter.~~
 2. ~~Body: Bronze.~~
 3. ~~Minimum Working Pressure Rating: 100 psig.~~
 4. ~~Maximum Pressure Loss at Design Flow: 3 psig.~~
 5. ~~Registration: Gallons or cubic feet.~~
 6. ~~End Connections: Threaded.~~
 7. ~~Control: Low voltage signal capable of transmitting 1000 feet.~~
- C. ~~Water Meter:~~
 1. ~~AWWA C701, turbine type, totalization meter.~~
 2. ~~Body: Bronze.~~
 3. ~~Minimum Working Pressure Rating: 150 psig.~~
 4. ~~Maximum Pressure Loss at Design Flow: 3 psig.~~

5. Registration: Gallons or cubic feet.
6. ~~End Connections: Flanged.~~
7. ~~Controls: Flow control switch with normally open contacts, rated for maximum 10 A, 250-V ac, and that will close at adjustable increments of total flow.~~

~~D. Inhibitor Injection Timers:~~

1. ~~Microprocessor-based controller with LCD display in NEMA 250, Type 12 enclosure with gasketed and lockable door. Interface for start/stop and status indication at central workstation as described in Division 23 Section "Instrumentation and Control for HVAC."~~
2. ~~Programmable timers with infinite adjustment over full range, and mounted in cabinet with hand-off auto switches and status lights.~~
3. ~~Test switch.~~
4. ~~Hand-off auto switch for chemical pump.~~
5. ~~Illuminated legend to indicate feed when pump is activated.~~
6. ~~Programmable lockout timer with indicator light. Lockout timer to deactivate the pump and activate alarm circuits.~~
7. ~~LCD makeup totalizer to measure amount of makeup and bleed-off water from two water meter inputs.~~

~~E. pH Controller:~~

1. ~~Microprocessor-based controller, 1 percent accuracy in a range from zero to 14 units. Incorporate solid-state integrated circuits and digital LCD display in NEMA 250, Type 12 enclosure with gasketed and lockable door. Interface for start/stop and status indication at central workstation as described in Division 23 Section "Instrumentation and Control for HVAC."~~
2. ~~Digital display and touch pad for input.~~
3. ~~Sensor probe adaptable to sample stream manifold.~~
4. ~~High, low, and normal pH indication.~~
5. ~~High or low pH alarm light, trip points field adjustable; with silence switch.~~
6. ~~Hand-off auto switch for acid pump.~~
7. ~~Internal adjustable hysteresis or deadband.~~

~~F. TDS Controller:~~

1. ~~Microprocessor-based controller, 1 percent accuracy in a range from zero to 5000 micromhos. Incorporate solid-state integrated circuits and digital LCD display in NEMA 250, Type 12 enclosure with gasketed and lockable door. Interface for start/stop and status indication at central workstation as described in Division 23 Section "Instrumentation and Control for HVAC."~~
2. ~~Digital display and touch pad for input.~~
3. ~~Sensor probe adaptable to sample stream manifold.~~
4. ~~High, low, and normal conductance indication.~~
5. ~~High or low conductance alarm light, trip points field adjustable; with silence switch.~~
6. ~~Hand-off auto switch for solenoid bleed-off valve.~~
7. ~~Bleed-off valve activated indication.~~
8. ~~Internal adjustable hysteresis or deadband.~~
9. ~~Bleed Valves:~~
 - a. ~~Cooling Systems: Forged brass body, globe pattern, general-purpose solenoid with continuous duty coil, or motorized valve.~~
 - b. ~~Steam Boilers: Motorized ball valve, steel body, and TFE seats and seals.~~

~~G. Biocide Feeder Timer:~~

1. ~~Microprocessor-based controller with digital LCD display in NEMA 250, Type 12 enclosure with gasketed and lockable door. Interface for start/stop and status indication at central workstation as described in Division 23 Section "Instrumentation and Control for HVAC."~~
2. ~~24-hour timer with 14-day skip feature to permit activation any hour of day.~~

- ~~3. Precision, solid-state, bleed-off lockout timer and clock-controlled biocide pump timer. Prebleed and bleed lockout timers.~~
- ~~4. Solid-state alternator to enable use of two different formulations.~~
- ~~5. 24-hour display of time of day.~~
- ~~6. 14-day display of day of week.~~
- ~~7. Battery backup so clock is not disturbed by power outages.~~
- ~~8. Hand-off auto switches for biocide pumps.~~
- ~~9. Biocide A and Biocide B pump running indication.~~

H. ~~Chemical Solution Tanks:~~

- ~~1. Chemical-resistant reservoirs fabricated from high-density opaque polyethylene with minimum 110 percent containment vessel.~~
- ~~2. Molded cover with recess for mounting pump.~~
- ~~3. Capacity: 50 gal.~~

I. ~~Chemical Solution Injection Pumps:~~

- ~~1. Self-priming, positive displacement; rated for intended chemical with minimum 25 percent safety factor for design pressure and temperature.~~
- ~~2. Adjustable flow rate.~~
- ~~3. Metal and thermoplastic construction.~~
- ~~4. Built-in relief valve.~~
- ~~5. Fully enclosed, continuous duty, single phase motor. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."~~

J. ~~Injection Assembly:~~

- ~~1. Quill: Minimum NPS 1/2 with insertion length sufficient to discharge into at least 25 percent of pipe diameter.~~
- ~~2. Ball Valve: Three-piece, stainless steel as described in "Stainless Steel Pipes and Fittings" Article below; and selected to fit quill.~~
- ~~3. Packing Gland: Mechanical seal on quill of sufficient length to allow quill removal during system operation.~~
- ~~4. Assembly Pressure/Temperature Rating: Minimum 600 psig at 200 deg F.~~

2.4 STAINLESS-STEEL PIPES AND FITTINGS

- A. Stainless-Steel Tubing: Comply with ASTM A 269, Type 316.
- B. Stainless-Steel Fittings: Complying with ASTM A 815/A 815M, Type 316, Grade WP-S.
- C. Two-Piece, Full-Port, Stainless-Steel Ball Valves: ASTM A 351, Type 316 stainless-steel body; ASTM A 276, Type 316 stainless-steel stem and vented ball, carbon-filled TFE seats, threaded body design with adjustable stem packing, threaded ends, and 250-psig SWP and 600-psig CWP ratings.
- D. Three-Piece, Full-Port, Stainless-Steel Ball Valves: ASTM A 351, Type 316 stainless-steel body; ASTM A 276, Type 316 stainless-steel stem and vented ball, threaded body design with adjustable stem packing, threaded ends, and 150-psig SWP and 600-psig CWP rating.

2.5 CHEMICAL TREATMENT TEST EQUIPMENT

- A. Test Kit: Manufacturer-recommended equipment and chemicals in a wall-mounting cabinet for testing pH, TDS, inhibitor, chloride, alkalinity, and hardness; sulfite and testable polymer tests for high-pressure boilers, and oxidizing biocide test for open cooling systems.
- B. Sample Cooler:

1. Tube: Sample.
 - a. Size: NPS 1/4 tubing.
 - b. Material: ASTM A 666, Type 316 stainless steel.
 - c. Pressure Rating: Minimum 2000 psig.
 - d. Temperature Rating: Minimum 850 deg F.
2. Shell: Cooling water.
 - a. Material: ASTM A 666, Type 304 stainless steel.
 - b. Pressure Rating: Minimum 250 psig.
 - c. Temperature Rating: Minimum 450 deg F.
3. Capacities and Characteristics:
 - a. Tube: Sample.
 - 1) Flow Rate: 0.25 gpm.
 - 2) Entering Temperature: 400 deg F.
 - 3) Leaving Temperature: 88 deg F.
 - 4) Pressure Loss: 6.5 psig.
 - b. Shell: Cooling water.
 - 1) Flow Rate: 3 gpm.
 - 2) Entering Temperature: 70 deg F.
 - 3) Pressure Loss: 1.0 psig.
- C. Corrosion Test-Coupon Assembly: Constructed of corrosive-resistant material, complete with piping, valves, and mild steel and copper coupons. Locate copper coupon downstream from mild steel coupon in the test-coupon assembly.
 1. Two-station rack for closed-loop systems.
 2. Four-station rack for open systems.

2.6 CHEMICALS

- A. Chemicals shall be as recommended by water-treatment system manufacturer that are compatible with piping system components and connected equipment, and that can attain water quality specified in Part 1 "Performance Requirements" Article.
- B. Water Softener Chemicals:
 1. Mineral: High-capacity, sulfonated-polystyrene ion-exchange resin that is stable over entire pH range with good resistance to bead fracture from attrition or shock. Resin exchange capacity minimum 30,000 grains/cu. ft. of calcium carbonate of resin when regenerated with 15 lb of salt.
 2. Salt for Brine Tanks: High-purity sodium chloride, free of dirt and foreign material. Rock and granulated forms are not acceptable.

~~2.7 FILTRATION EQUIPMENT~~

- A. ~~Multimedia Filters:~~
 1. ~~Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:~~
 2. ~~Manufacturers: Subject to compliance with requirements, provide products by one of the following:~~

3. ~~Basis of Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:~~
- a. ~~LAKOS; a div. of Claude Laval Corporation.~~
 - b. ~~Miami Filter LLC.~~
 - c. ~~Puroflux Corporation.~~
4. ~~Description: Factory fabricated and tested, simplex, multimedia filter system of filter tank, media, strainer, circulating pump, piping, and controls for removing particles from water.~~
- a. ~~Filter Tank: Corrosion resistant with distribution system and media.~~
 - 1) ~~Fabricate and label steel filter tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.~~
 - 2) ~~Fabricate and label FRP filter tanks to comply with ASME Boiler and Pressure Vessel Code: Section X, if indicated.~~
 - 3) ~~Pipe Connections NPS 2 and Smaller: Threaded according to ASME B1.20.1.~~
 - 4) ~~Steel Tank Pipe Connections NPS 2 1/2 and Larger: Steel, Class 150 flanges according to ASME B16.5 or grooved according to AWWA C606.~~
 - 5) ~~FRP Tank Pipe Connections NPS 2 1/2 and Larger: Type A, integral; Designation E, 125 psig pressure category flanges of grade same as tank material according to ASTM D 5421.~~
 - b. ~~Motorized Valves: Flanged or grooved end, ductile iron butterfly type with EPDM valve seat and stem seal; with ASTM B 148 aluminum bronze disc.~~
 - c. ~~Strainer: Basket type mounted on pump suction.~~
 - d. ~~Piping: ASTM A 53/A 53M, Type S, F, or E; Grade B, Schedule 40 black steel, with flanged, grooved, or threaded joints and malleable, steel welding, or ductile iron fittings.~~
 - e. ~~Piping: ASTM B 88, Type L copper water tube, copper alloy solder joint fittings, and brazed, flanged, or grooved joints.~~
 - f. ~~Safety Valves: Automatic pressure relief.~~
 - g. ~~Circulating Pump: Overhung impeller, close coupled, single stage, end suction, centrifugal. Comply with UL 778 and with HI 1.1-1.2 and HI 1.3.~~
 - 1) ~~Casing: Radially split cast iron.~~
 - 2) ~~Pressure Rating: 125 psig minimum.~~
 - 3) ~~Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, closed, and keyed to shaft.~~
 - 4) ~~Shaft and Shaft Sleeve: Steel shaft, with copper alloy shaft sleeve.~~
 - 5) ~~Seal: Mechanical.~~
 - 6) ~~Motor: ODP motor supported on the pump bearing frame. General requirements for motors are specified in Division 23 Section "Common Motor Requirements for HVAC Equipment."~~
 - h. ~~Controls: Automatic control of circulating pump and tank backwash; factory wired for single electrical connection.~~
 - 1) ~~Panel: NEMA 250, Type 4 enclosure with time clock and pressure gages.~~
 - 2) ~~Pump: Automatic and manual switching; manual switch position bypasses safeties and controls.~~
 - 3) ~~Backwash: Automatic; with time clock and differential pressure switch.~~
 - 4) ~~Backwash Valve: Tank mounted with valves interlocked to single actuator.~~
 - i. ~~Support: Skid mounting. Fabricate supports and base and attachment to tank with reinforcement strong enough to resist filter movement during a seismic event when filter base is anchored to building structure.~~

B. Centrifugal Separators:

- ~~1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:~~
- ~~2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:~~

PART 3 - EXECUTION

3.1 WATER ANALYSIS

- A. Perform an analysis of supply water to determine quality of water available at Project site.

3.2 INSTALLATION

- ~~A. Install chemical application equipment on concrete bases, level and plumb. Maintain manufacturer's recommended clearances. Arrange units so controls and devices that require servicing are accessible. Anchor chemical tanks and floor mounting accessories to substrate.~~
- ~~B. Install seismic restraints for equipment and floor mounting accessories and anchor to building structure. Refer to Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment" for seismic restraints.~~
- ~~C. Install water testing equipment on wall near water chemical application equipment.~~
- ~~D. Install interconnecting control wiring for chemical treatment controls and sensors.~~
- ~~E. Mount sensors and injectors in piping circuits.~~
- ~~F. Bypass Feeders: Install in closed hydronic systems, including hot water heating, chilled water and equipped with the following:~~
 - ~~1. Install bypass feeder in a bypass circuit around circulating pumps, unless otherwise indicated on Drawings.~~
 - ~~2. Install water meter in makeup water supply.~~
 - ~~3. Install test coupon assembly in bypass circuit around circulating pumps, unless otherwise indicated on Drawings.~~
 - ~~4. Install a gate or full port ball isolation valves on inlet, outlet, and drain below feeder inlet.~~
 - ~~5. Install a swing check on inlet after the isolation valve.~~
- ~~G. Install automatic chemical feed equipment for steam boiler and steam condensate systems and include the following:~~
 - ~~1. Install water meter in makeup water supply.~~
 - ~~2. Install inhibitor injection pumps and solution tanks with injection timer sensing contacts in water meter.~~
 - ~~a. Pumps shall operate for timed interval when contacts close at water meter in makeup water supply connection. Injection pump shall discharge into boiler feedwater tank or feedwater supply connection at boiler.~~
 - ~~3. Install test equipment and furnish test kit to Owner.~~
 - ~~4. Install TDS controller with sensor and bleed valves.~~
 - ~~a. Bleed valves shall cycle to maintain maximum TDS concentration.~~
 - ~~5. Install inhibitor injection timer with injection pumps and solution tanks.~~

- a. ~~Pumps shall operate for timed interval on contact closure at water meter in makeup water supply connection. Injection pump shall discharge into main steam supply header.~~

3.3 CONNECTIONS

- A. ~~Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.~~
- B. ~~Install piping adjacent to equipment to allow service and maintenance.~~
- C. ~~Make piping connections between HVAC water treatment equipment and dissimilar metal piping with dielectric fittings. Dielectric fittings are specified in Division 23 Section "Common Work Results for HVAC."~~
- D. ~~Install shutoff valves on HVAC water treatment equipment inlet and outlet. Metal general-duty valves are specified in Division 23 Section "General Duty Valves for HVAC Piping."~~
- E. ~~Refer to Division 22 Section "Domestic Water Piping Specialties" for backflow preventers required in makeup water connections to potable water systems.~~
- F. ~~Confirm applicable electrical requirements in Division 26 Sections for connecting electrical equipment.~~
- G. ~~Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."~~
- H. ~~Connect wiring according to Division 26 Section "Low Voltage Electrical Power Conductors and Cables."~~

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
 - 1. Inspect field-assembled components and equipment installation, including piping and electrical connections.
 - 2. Inspect piping and equipment to determine that systems and equipment have been cleaned, flushed, and filled with water, and are fully operational before introducing chemicals for water-treatment system.
 - 3. Place HVAC water-treatment system into operation and calibrate controls during the preliminary phase of HVAC systems' startup procedures.
 - 4. Do not enclose, cover, or put piping into operation until it is tested and satisfactory test results are achieved.
 - 5. Test for leaks and defects. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - 6. Leave uncovered and unconcealed new, altered, extended, and replaced water piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.

7. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow test pressure to stand for four hours. Leaks and loss in test pressure constitute defects.
8. Repair leaks and defects with new materials and retest piping until no leaks exist.

D. Remove and replace malfunctioning units and retest as specified above.

E. Sample boiler water at one-week intervals after boiler startup for a period of five weeks, and prepare test report advising Owner of changes necessary to adhere to Part 1 "Performance Requirements" Article for each required characteristic. Sample boiler water at four week intervals following the testing noted above to show that automatic chemical-feed systems are maintaining water quality within performance requirements specified in this Section.

F. At four week intervals following Substantial Completion, perform separate water analyses on hydronic systems to show that automatic chemical-feed systems are maintaining water quality within performance requirements specified in this Section. Submit written reports of water analysis advising Owner of changes necessary to adhere to Part 1 "Performance Requirements" Article.

G. Comply with ASTM D 3370 and with the following standards:

1. Silica: ASTM D 859.
2. Steam System: ASTM D 1066.
3. Acidity and Alkalinity: ASTM D 1067.
4. Iron: ASTM D 1068.
5. Water Hardness: ASTM D 1126.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC water-treatment systems and equipment. Refer to Division 01 Section "Demonstration and Training."

B. Training: Provide a "how-to-use" self-contained breathing apparatus video that details exact operating procedures of equipment.