

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. Section includes the following HVAC water-treatment systems:
 - 1. Manual and automatic chemical-feed equipment and controls.
 - 2. Chemical-treatment test equipment.
 - 3. Chemicals.

1.3 DEFINITIONS

- A. EEPROM: Electrically erasable, programmable read-only memory.
- B. PPM: Parts per million.
- C. RO: Reverse osmosis.
- D. TDS: Total dissolved solids consist of salts and other materials that combine with water as a solution.
- E. TSS: Total suspended solids include both organic and inorganic solids that are suspended in the water. These solids may include silt, plankton, and industrial wastes.

1.4 ACTION SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, and furnished specialties and accessories for the following products:
 - 1. Bypass feeders.
 - 2. Water meters.
 - 3. Chemical solution tanks.
 - 4. Injection pumps.
 - 5. Chemical test equipment.
 - 6. Chemical material safety data sheets.
 - 7. Inhibited propylene glycol.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Water Analysis: Illustrate water quality available at Project site.
- C. Passivation Confirmation Report: Verify passivation of galvanized-steel surfaces, and confirm this observation in a letter to Architect.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For sensors, injection pumps, and controllers to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide all hardware, chemicals, and other material necessary to maintain HVAC water quality in all systems as indicated in this Specification. 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 to 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. Passivation for Galvanized Steel:
 - 1. Passivation of all galvanized-steel cooling towers and other system components must be conducted strictly in accordance with manufacturer's instructions in order to validate warranties. During the required passivation period, all water-quality parameters must be maintained in accordance with manufacturer's specifications, and all other requirements must be observed.

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. Provide quarter- turn or threaded fill cap with gasket seal and diaphragm arranged to lock the top onto the feeder when exposed to system pressure in the vessel. Provide a NPS 3/4 IN quarter-turn valve on inlet and outlet.
 - 1. Capacity: 5 gal. .

2. Minimum Working Pressure: 125 psig .

- B. Glycol Feed System: Fully assembled packaged system to include the following items. Polyethylene tank with hinged cover supported and restrained by carbon steel tank stand. Stand shall be painted with manufacturer's standard enamel paint. Include NEMA 4X control panel, 115VAC power cord, and main power On-Off switch, and low level LED indicator light / switch. Rotary vane brass pump. Packaged shall include a remote low level dry contact.

1. Tank Capacity: 50-gallons
2. Pump: 1/3-HP

2.3 CHEMICAL-TREATMENT TEST EQUIPMENT

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

2.4 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 "Performance Requirements" Article.

2.5 INHIBITED PROPYLENE GLYCOL

- A. Inhibited Propylene Glycol:
1. Propylene glycol with inhibitor additive, to provide freeze protection for heat-transfer fluid and corrosion protection for carbon-steel, brass, copper, stainless steel, and cast-iron piping and fittings.
 2. Inhibitor creates a passive layer on all surfaces that contact propylene glycol to prevent corrosion and stabilizes fluid pH, to compensate for acids formed from glycol degradation.
 3. Provide only propylene glycol that is specifically blended for HVAC application. Automotive-type antifreeze is unacceptable.

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. Install all chemical application equipment within a spill-containment area without floor drains.
- B. Install water-testing equipment on wall near water-chemical-application equipment.
- C. Install interconnecting control wiring for chemical-treatment controls and sensors.
- D. Mount sensors and injectors in piping circuits.
- E. Bypass Feeders: Install in closed hydronic systems, including condenser water , and equip 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.

3.3 PIPING CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to equipment, allow space for service and maintenance.
- C. Make piping connections between HVAC water-treatment equipment and dissimilar-metal piping with dielectric fittings. Dielectric fittings are specified in Section 23 21 13 "Hydronic Piping."
- D. Install shutoff valves on HVAC water-treatment equipment inlet and outlet. Metal general-duty valves are specified in Section 23 05 23.12 "Ball Valves for HVAC Piping," Section 23 05 23.13 "Butterfly Valves for HVAC Piping," and Section 23 05 23.15 "Gate Valves for HVAC Piping."

3.4 ELECTRICAL CONNECTIONS

- A. Confirm applicable electrical requirements in electrical Sections for connecting electrical equipment.
- B. Ground equipment in accordance with Section 26 05 26 "Grounding and Bonding for Electrical Systems."
- C. Connect wiring in accordance with Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. 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 system's 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.
- C. Equipment will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. 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 "Performance Requirements" Article.
- F. Comply with ASTM D3370 and with the following standards:
 - 1. Silica: ASTM D859.

2. Acidity and Alkalinity: ASTM D1067.
3. Iron: ASTM D1068.
4. Water Hardness: ASTM D1126.

3.6 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain HVAC water-treatment systems and equipment.
- B. Training: Provide a "how-to-use" self-contained breathing apparatus video that details exact operating procedures of equipment. When training is complete, turn over video to Owner for future use.

END OF SECTION 23 25 00