

**SECTION 23 25 00
HVAC WATER TREATMENT**

PART 1 GENERAL

1.1 REFERENCE

- A. The provisions of Part 1 - General Documents and Division 1 - General Requirements apply to this section.

1.2 SECTION INCLUDES

- A. Furnish and install as indicated by drawings a complete chemical treatment system as specified herein.
 - 1. This system to include a pot feeder system, and other components as required for a complete system.
- B. The mechanical contractor under the supervision of the water treatment specialist shall install the treatment system.
- C. Provide chemicals for initial charging of system.
- D. Initial cleanout prior to water treatment:
 - 1. Fill and thoroughly flush out the system with Mitco 7100 (or equal) at the rate of 5 to 10 gallons per 100 gallons of system volume.
 - 2. Maintain a concentration of 1,000 ppm of PO₄ during the clean up period.
 - 3. Drain and flush system until all compounds are removed.
 - 4. Clean strainer baskets.
- E. Upon completion of any additions or modifications to a hydronic system Contractor shall complete cleaning, and flushing of the system, and basket strainers cleaning or replacement as specified in this section.
 - 1. Contractor shall refill the hydronic system and replenish chemical treatment agents to the specified strengths and concentrations.

PART 2 PRODUCTS

2.1 MATERIALS

- A. System Cleaner:
 - 1. Provide liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodium tripoly phosphate and sodium molybdate.
 - 2. Algaecide; chlorine release agents such as sodium hypochlorite or calcium hypochlorite, or microbiocides such as quarternary ammonia compounds, tributyl tin oxide, methylene bis (thiocyanate), or isothiazolones.
- B. Closed System Treatment (Water):
 - 1. Provide sequestering agent to reduce deposits and adjust PH, polyphosphate.
 - 2. Corrosion inhibitors; liquid boron-nitrite, sodium nitrite and borax, sodium tolyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulphites.
 - 3. Provide conductivity enhancer's phosphates or phosphonates.
- C. Condenser Water System Treatment (Cooling Towers):
 - 1. Provide sequestering agent to inhibit scaling, phosphonates, sodium polyphosphates, lignin derivatives, synthetic polymer polyelectrolytes, or organite phosphates.
 - 2. Provide acid to reduce alkalinity and pH, sulphuric acid.
 - 3. Corrosion inhibitor; zinc-phosphate, phosphonate-phosphate, phosphonate-molybdate and phosphonate-silicate, sodium tolytriazole, or low molecular weight polymers.

4. Algaecide; chlorine release agents such as sodium hypochlorite or calcium hypochlorite, or microbiocides such as quaternary ammonia compounds, tributyl tin oxide, methylene bis (thiocyanate), or isothiazolones.
 - D. Open System Treatment (Humidifiers, Air Washers, Evaporative Condensers, Small Cooling Towers):
 1. Sequestering agent to inhibit scaling and corrosion inhibitor
 2. Algaecide
- 2.2 EQUIPMENT
- A. Bypass (Pot) Feeder: 5.0-gal quick opening cap for working pressure of 175 psig.
 - B. Drip Feeder: Plastic reservoir with coil of capillary tubing with probe, weight, charging syringe, and clip.
 - C. Solution Metering Pump: Positive displacement, diaphragm pump with adjustable flow rate, thermoplastic construction, continuous-duty fully enclosed electric motor and drive, and built-in relief valve.
 - D. Liquid Level Switch: Polypropylene housing with integrally mounted PVC air trap, receptacles for connection to metering pump, and low-level alarm.
 - E. Conductivity Controller: Packaged monitor controller with solid-state circuiting, five percent accuracy, linear dial adjustment, built-in calibration switch, on-off switch and light, control function light, output to control circuit.
 - F. Water Meter: Displacement type cold-water meter with sealed, tamperproof magnetic drive, impulse contact register, single pole, double throw dry contact switch.
 - G. Solenoid Valves: Forged brass body globe pattern, normally open or closed as required, watertight solenoid enclosure, and continuous duty coil.
 - H. Timers: Electronic timers, infinitely adjustable over full range, 150 second, and five-minute range, mounted together in cabinet with hands-off-automatic switches and status lights.
- 2.3 TEST EQUIPMENT
- A. Provide white enamel test cabinet with local and fluorescent light, capable of accommodating 4 – 10 ml zeroing titrating burettes and associated reagents.
 - B. Provide the following test kits:
 1. Alkalinity titration test kit
 2. Chloride titration test kit
 3. Sulphite titration test kit
 4. Total hardness titration test kit
 5. Low phosphate test kit
 6. Conductivity bridge, range 0 – 10,000 microhms
 7. Creosol red pH slide complete with reagent
 8. Portable electronic conductivity meter
 9. High nitrite test kit

PART 3 EXECUTION

3.1 PREPARATION

- A. Systems shall be operational, filled, started, and vented prior to cleaning.
 1. Use water meter to record capacity in each system.
- B. Place terminal control valves in open position during cleaning.

3.2 CLEANING SEQUENCE

- A. Add cleaner to closed systems at concentration as recommended by manufacturer.

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- B. Hot Water Heating Systems:
 - 1. Apply heat while circulating, slowly raising temperature to 160°F and maintain for 12 hours minimum.
 - 2. Remove heat and circulate to 100°F or less; drain systems as quickly as possible and refill with clean water.
 - 3. Circulate for 6 hours at design temperatures, then drain.
 - 4. Refill with clean water and repeat until all system cleaner is removed.
 - C. Chilled Water System:
 - 1. Circulate for 48 hours, and then drain systems as quickly as possible.
 - 2. Refill with clean water, circulate for 24 hours, then drain.
 - 3. Refill with clean water and repeat until all system cleaner is removed.
 - D. Use neutralizer agents on recommendation of system cleaner supplier and approval of Architect/Engineer.
 - E. Flush open systems with clean water for one-hour minimum.
 - 1. Drain completely and refill.
 - F. Remove, clean and replace strainer screens.
 - G. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed.
 - 1. Include disassembly of components as required.
 - H. Meet cleaning requirements of other building phases prior to tie-in of existing operating system.
 - 1. Flush each section before connecting to main system.
 - 2. Remove all sand and debris and verify with District Representative prior to tie-in.
- 3.3 INSTALLATION
- A. Install in accordance with manufacturer's instructions.
- 3.4 CLOSED SYSTEM TREATMENT
- A. Provide one bypass feeder on each system.
 - 1. Install isolating and drain valves and necessary piping.
 - 2. Install around globe valve downstream of circulating pumps unless indicated otherwise.
 - B. Introduce closed system treatment through bypass feeder when required or indicated by test.
 - C. Provide ¾-inch water coupon rack around circulating pumps with space for four test specimens.
 - D. Insulate all water treatment connections to chilled water piping.
 - E. Maintain water treatment throughout all phases of construction.
 - 1. Test concentration of chemical after each tie-in and restore as necessary to proper levels.
- 3.5 CONDENSER WATER SYSTEM (COOLING TOWERS)
- A. Provide automatic condenser water control-systems for inhibitor feed, blowdown and biocide feeds.
 - 1. Inhibitor application shall be meter activated, blow down shall be conductivity activated, and biocide shall be meter fed with blow down locked out to ensure biocide retention time.
 - B. Control system shall incorporate solid-state integrated circuits and digital LED displays, in NEMA-12 steel enclosures.
 - 1. Provide gasketed and lockable door.
 - C. Base dissolved solids and control on conductivity and include:
 - 1. LED digital readout display

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2. Temperature compensated sensor probe adaptable to sample stream manifold.
 3. High, low, normal conductance indicator lights (LED).
 4. High or low conductance alarm light (flash or steady switch), trip points field adjustable.
 - a. Flash or steady switch shall have silence position.
 5. Illuminated legend shall indicate "ALARM" whenever alarm condition exists.
 6. Hand-off-automatic switch for solenoid bleed valve.
 7. Illuminated legend shall indicate, "BLEED" when valve is operated.
 8. Adjustable hysteresis or deadband (internal)
- D. Base inhibitor feed control on makeup volume and include:
1. Solid-state counter (1-15 field selectable).
 2. Solid-state timer (adjustable ¼ to 5 minutes)
 3. Test switch
 4. Hand-off-automatic switch for chemical pump
 5. Illuminated legend shall indicate, "FEED" when pump is activated.
 6. Solid-state lockout timer (adjustable ¼ to 3 hours) and indicator light, with lockout timer that deactivates the pump and activate alarm circuits.
 7. Provide panel totalizer (amount of makeup) electro-mechanical type.
- E. Biocide programmer to include:
1. Provide a 24-hour timer with 14-day skip feature to permit manual activation at any hour of the day.
 2. Precision solid-state bleed lockout timer (0-9 hours) and biocide pump timer (0-2¼ hours), clock controlled.
 3. Provide with a solid-state alternator to enable the use of two different formulations.
 4. Provide with a digital display of the time of day (24 hours).
 5. LED display of day of week (14 days)
 6. Fast and slow cook set controls (internal)
 7. Battery backup for clock and quartz timekeeping accuracy
 8. Hand-off-automatic switches for biocide pumps.
 9. Illuminated legend shall indicate "BIOCIDE A" or "BIOCIDE B" when pump is activated.
- F. Provide water meter on system makeup, wired to control system.
- G. Provide solution pumps to feed sequestering agent and corrosion inhibitor from solution tank into condenser water supply to tower. Provide agitator as required.
- H. Provide conductivity controller to sample condenser water and operate 2" solenoid bleed valve and piping to blowdown controller sampler wired to pen when condensing water pump is operating.
- I. Introduce algacide to tower by continuous feed with solution pump or solenoid valve on tank (chlorine).
- J. Provide liquid level switch in each solution tank to deactivate solution pump and agitator, and sound local alarm bell.
- K. Provide ¾" water coupon rack around circulating pumps with space for 8 test specimens.
- 3.6 WATER TREATMENT REPORT
- A. Provide copies to:
1. Director of Facility Services or representative
 2. School District's Test and Balance Contractor
 3. The Commissioning agent

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3.7 DEMONSTRATION AND TRAINING

- A. Training of the Owner's operation and maintenance personnel is required in cooperation with the Owner's Representative.
- B. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems.
- C. Schedule the instruction in coordination with the Owner's Representative after submission and approval of formal training plans.
- D. Refer to Section 01 91 00, Commissioning, for further contractor training requirements.

END OF SECTION