

HVAC WATER TREATMENT

DESIGN & INSTALLATION

1. General

- a. See Cleaning of Piping Systems for smaller, renovation projects.
- b. This section is not a published standard at this time and is not needed for smaller renovation projects.
- c. This section should be added for the water treatment on larger projects as determined by WUSM Project manager.
- d. WUSM's HVAC service provider is Chemtron, Inc.
 - Prime bidder shall engage the services of Chemtron, Inc. for water treatment services as part of this project for analyzing water qualities and applying water treatment as specified in this Section.
 - Contact Tom Thompson 636-288-1939.

2. Summary

- a. This Section includes the following HVAC water-treatment systems:
 - Bypass chemical-feed equipment.
 - Inhibitor chemical-feed equipment and controls.
 - Biocide chemical-feed equipment and controls.
 - HVAC water-treatment chemicals.

3. Design

- a. All new piping systems shall:
 - Have 1 ½" taps for maintenance flushing of system.
 - Installed taps shall be no higher than 6 feet above finished floor.
 - Provide floor drain and water source nearby(within 20 feet maximum) for flushing capability.
 - Provide 1 ½" domestic water supply with reduced pressure backflow preventor and shutoff valve.
- b. Provide eyewash stations near chemicals as required by code.

4. 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. RO: Reverse osmosis.
- d. TDS: Total dissolved solids.
- e. UV: Ultraviolet.

5. Related sections
 - a. Hydronic Piping and valves
 - b. Domestic Water Piping and Specialties
 - c. Grounding and Bonding for Electrical Systems
 - d. Low-Voltage Electrical Power Conductors and Cables
 - e. Demonstration and Training/Commissioning
6. 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.
7. Action Submittals
 - a. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for the following products:
 - Bypass feeders.
 - Water meters.
 - TDS controllers with inhibitor and biocide feeder control.
 - Biocide feeder timers.
 - Chemical solution tanks.
 - Injection pumps.
 - Chemical material safety data sheets.
 - 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.
 - Wiring Diagrams: Power and control wiring.
8. Informational Submittals
 - a. Field quality-control test reports.
 - b. Other Informational Submittals:
 - 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.
 - Water Analysis: Illustrate water quality available at Project site.
9. Closeout Submittals
 - a. Operation and Maintenance Data: For sensors, injection pumps and controllers to include in emergency, operation, and maintenance manuals.

10. Quality Assurance: 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.
11. 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 chilled- water piping and condenser-water piping and equipment. Services and chemicals shall be provided for systems cleaning and testing, system start-ups and systems operations up to the execution of project substantial completion certificate. At that time, chemical tanks for the condenser water system shall be filled. Services shall include the following:
 - Initial water analysis and HVAC water-treatment recommendations.
 - Startup assistance for Contractor to flush the systems, clean with detergents, and initially fill systems with required chemical treatment prior to operation.
 - Laboratory technical analysis where required.
 - Analyses and reports of all chemical items concerning safety and compliance with government regulations.

EQUIPMENT AND PRODUCT REQUIREMENTS

1. Approved Manufacturers
 - a. Chemtron, Inc.
2. Manual Chemical-Feed Equipment
 - a. Bypass Feeders:
 - Any specific requirements included here. Possibly move bypass feeders from Cleaning of piping systems to this guideline.
3. Automatic Chemical-Feed Equipment
 - a. Water Meter:
 - AWWA C701, turbine-type, totalization meter.
 - Body: Bronze.
 - Minimum Working-Pressure Rating: 100 psig.
 - Maximum Pressure Loss at Design Flow: 3 psig.
 - Registration: Gallons or cubic feet.
 - End Connections: Threaded.
 - Control: Low-voltage signal capable of transmitting 1000 feet.
 - b. TDS Controller:
 - Manufacturer: Subject to compliance with requirements, provide product by the following:
 1. Walchem WCT410 Series Cooling Tower Conductivity Controller

- a. Any other equals
 - 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 4X enclosure with gasketed door.
 - Digital display and touch pad for input.
 - Sensor probe adaptable to sample stream manifold.
 - High, low, and normal conductance indication.
 - High or low conductance alarm light, trip points field adjustable; with silence switch.
 - Hand-off-auto switch for solenoid bleed-off valve.
 - Bleed-off valve activated indication.
 - Internal adjustable hysteresis or deadband.
 - Bleed Valves:
 1. Cooling Systems: Forged-brass body, globe pattern, general-purpose solenoid with continuous-duty coil, or motorized valve.
- c. Chemical Solution Tanks:
 - Chemical-resistant reservoirs fabricated from high-density opaque polyethylene with minimum 110 percent containment vessel.
 - Molded cover with recess for mounting pump.
 - Capacity: 50 gal. or as required for system. Provide containment capture around chemical tanks.
- d. Chemical Solution Injection Pumps:
 - Manufacturer: Subject to compliance with requirements, provide product by the following:
 1. Walchem EW Series Metering Pumps.
 - a. Any other equals.
 - Self-priming, positive-displacement; rated for intended chemical with minimum 25 percent safety factor for design pressure and temperature.
 - Adjustable flow rate. 1800 to 1 turn down
 - Thermoplastic construction.
 - Built-in relief valve.
 - Fully enclosed, continuous-duty, single-phase motor.
- e. Chemical Solution Tubing: Polyethylene tubing with compression fittings and joints. Polyethylene tubing not allowed near heat producing equipment or in Boiler rooms. Route stainless steel piping in these locations. Chemical treatment sampler at boilers shall be rated for high temperature applications.
- f. Injection Assembly:

- Quill: Minimum NPS 1/2 with insertion length sufficient to discharge into at least 25 percent of pipe diameter.
 - Ball Valve: Two-piece, stainless steel as described in "Stainless-Steel Pipes and Fittings" Article below; and selected to fit quill.
 - Packing Gland: Mechanical seal on quill of sufficient length to allow quill removal during system operation.
 - Assembly Pressure/Temperature Rating: Minimum 150 psig at 250 deg F.
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.
5. 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.
 - Any particular chemicals not allowable.

EXECUTION

1. Water Analysis
- a. Perform an analysis of supply water to determine quality of water available at Project site.
2. Installation
- a. Install chemical application equipment on existing concrete floor, 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 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 chilled water, and equipped with the following:
 - Install bypass feeder in a bypass circuit around circulating pumps, unless otherwise indicated on Drawings.
 - Install a full-port ball isolation valves on inlet, outlet, and drain below feeder inlet.
 - g. Install automatic chemical-feed equipment for condenser water and include the following:

- Install water meter in makeup water supply.
- Install inhibitor injection pump and solution tank.
 1. Pump shall operate as controlled by condenser water system controller. Injection pump shall discharge into common condenser return piping to cooling towers.
- Install condenser water system controller (TDS controller) with sensor and bleed valves.
 1. Bleed valves shall cycle to maintain maximum TDS concentration.
- Install biocide injection pump and solution tank.
 1. Pump shall operate as controlled by condenser water system controller. Injection pump shall discharge into common condenser return piping to cooling towers.

3. Connections

- a. Piping installation requirements are specified in other Sections.
- b. Drawings indicate general arrangement of piping, fittings, and specialties.
- c. Install piping adjacent to equipment to allow service and maintenance.
- d. Make piping connections between HVAC water-treatment equipment and dissimilar-metal piping with dielectric fittings. Dielectric fittings are specified in Section "Hydronic Piping."
- e. Install shutoff valves on HVAC water-treatment equipment inlet and outlet. Metal general-duty valves are specified in Section "General-Duty Valves for HVAC Piping."
- f. Refer to Section "Domestic Water Piping Specialties" for backflow preventers required in makeup water connections to potable-water systems.
- g. Confirm applicable electrical requirements in electrical Sections for connecting electrical equipment.
- h. Ground equipment according to Section "Grounding and Bonding for "Electrical Systems."
- i. Connect wiring according to Section "Low-Voltage Electrical Power Conductors and Cables."

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.
 - 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:
 - Inspect field-assembled components and equipment installation, including piping and electrical connections.

- 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.
 - Place HVAC water-treatment system into operation and calibrate controls during the preliminary phase of HVAC systems' startup procedures.
 - Do not enclose, cover, or put piping into operation until it is tested and satisfactory test results are achieved.
 - Test for leaks and defects.
 - 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.
5. Demonstration and Training
- a. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain HVAC water-treatment systems and equipment.

END OF SECTION

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