SECTION 23 25 00

HVAC WATER TREATMENT

PART 1 - DESIGN DIRECTIVES

1.1 RELATED WORK

A. Section 232113 – Pipe and Pipe Fittings

1.2 DESIGN CRITIERIA

A. This section applies to the following building systems (Central systems serving multiple buildings may require additional equipment and testing spaces):

1. Condenser water systems
2. Chilled water systems
3. Heating systems
4. Glycol Loops

B. Consultant shall confer with the college's water treatment contractor via FOM to determine the spatial requirements necessary for the water treatment contractor to perform their work. The area and location shall be indicated on the contract documents.

C. Mechanical Consultant is responsible to coordinate the following items:

1. With the electrical consultant to ensure there is one duplex receptacle (110 volt, 20 amp circuit) dedicated for use by the water treatment contractor.
2. With the plumbing consultant to insure there is a floor drain to sanitary in the immediate area of the water treatment devices.
3. With the architect to insure there is a plywood panel (3/4″ ACX) installed for the mounting of the various devices. Mechanical consultant to confer with the water treatment contractor via FOM to determine the board size.
4. Indicate on the drawings the following appurtenances (in order of flow):

    a. A 1″ valved line on the condenser water return located in the mechanical room near the floor drain. The water treatment contractor shall furnish & install a normally closed solenoid valve.
    b. A valved 1″ line from both the suction and discharge sides of the condenser water pumps terminating at the water treatment panel. The first line shall be copper terminating at the board with a bronze ball valve. The second line shall be schedule 80 PVC with a PVC ball valve at the mounting board.

1.3 SUBMITTALS

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

B. Submit manufacturer's electrical requirements for power supply wiring to water treatment equipment.

C. Submit Safety Data Sheets (SDS) for all chemicals used in chemical treatment systems. Include with SDS written notice of Owner's responsibility to notify its employees of the use of those chemicals.

D. Provide operation and maintenance data on chemical feed pumps, meters, and other equipment including spare parts list procedures, and treatment programs.

1.4 PERFORMANCE OF EQUIPMENT AND PRODUCTS

A. Provide suitable chemicals and equipment to treat Hanover raw water. The water treatment contractor shall obtain the necessary data from the Hanover Water Company. This contractor is responsible for insuring that all chemicals used are compatible for use with all components in the piping system.

B. Provide site inspection of equipment during scheduled shutdown to evaluate success of treatment program. Make recommendations in writing based on these inspections.

C. Molybdate is not permitted in Hanover, seek alternative products.

1.5 SYSTEM TYPES

A. Closed systems (Chilled water, hot water, & glycol):

1. Provide a five-micron filter feeder for installation of chemicals into the system.
2. When system flow is ≥ 400 gpm, the mechanical contractor shall provide a side stream filter. Refer to DC Standard, “Basic Piping Materials and Methods”.

B. Open condenser water systems:

1. System shall be a feed & bleed type system.

1.6 WATER QUALITY ANALYSIS

A. Submit complete water analysis and results of performance test of each system signed by manufacturer's service representative.

B. Water analysis shall include the following:

1. Hot and/or Chilled Water:

a. Hardness
b. pH
c. M" alkalinity
d. Inhibitor level
e. Total dissolved solids
f. Temperature
g. Iron (mg/l)
h. Copper (mg/l)

C. Minimum water quality requirements for closed hot and/or chilled water systems shall be as follows:

1. Hardness as CaCO3 20 – 120 ppm

2. pH 8.0 to 9.8TDS <500 ppm
3. Chlorides <100 ppm
4. Sulphates <100 ppm
5. Iron <2.0
6. Ammonia <2.0 ppm
7. Manganese <0.4 ppm
8. Nitrate <10 ppm
9. Suspended Solids ≤10 micron
10. Bacteria Counts

    a. Total Aerobic Bacteria Counts ≤1000 cfu per mL
    b. Total Anaerobic Bacteria Counts ≤10 cfu per Ml

1.7 PRODUCT RESPONSIBILITY

A. It is the owner's intent to clearly differentiate the various responsibilities for the proper installation of a water treatment system. Simply stated, it is the intent of this document to direct the various parties to perform the work that makes the most sense for each trade. Items that need to be installed by the contractor during construction shall be installed by the contractor. Ultimately, the contractor responsibility for the water treatment system terminates upon acceptance of a satisfactorily treated system accepted by the college's water treatment contractor.

B. The following matrix is intended to provide clarity with regard to the responsibility of the various components necessary to provide a complete water treatment system. Where both the mechanical and water treatment contractors are indicated to 'Furnish', the mechanical contractor shall purchase the product from the water treatment contractor.

Mechanical Contractor		Water Treatment Contractor		Owner	Item
Furnish	Install	Furnish	Install	Purchase	
X	X				Filter Feeder [1]
X	X	X			Pipe cleaner
X	X	X			Water meter
	X	X		X	Four position coupon rack
	X	X		X	Feed & Bleed Control Board
X	X				Condenser water bleed
		X	X	X	Coupon Rack (dedicated bldg. chilled water system)
		X	X	X	Pulsafeeder or equal diaphragm pumps
		X	X	X	Strainer
		X	X	X	Inhibitor (liquid system)
		X	X	X	Spill pallet
X	X	X			Corrosion inhibitor
X	X				Sand filter
	X	X		X	Bleed line motorized valve[2]

Note 1: Filter feeder may be purchased through the water treatment contractor.
Note 2: Requires power (115v receptacle).

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Filter Feeder: Provide by-pass type batch combination sock filter and chemical feeder to receive chemicals in liquid or pellet form. Contractor shall supply Neptune model FTF-5HP and build support for it or Model FTF 5DB with bottom support brackets. Contractor shall also supply five (5) additional 5-micron filter socks Neptune PN 106453 Each independent hot water heating system shall have separate feeder. Chemical treatment shall control corrosion, bacteria and scale.

B. Feeder shall have capacity of 5 gal and shall be constructed of steel with minimum working pressure of 150 psig. Feeder shall be complete with air vent, drain valve, and inlet/outlet pipe connections with bypass across, (2) isolation valves and differential pressure gauge. Furnish feeders with screw type cover with replacement gaskets, with exterior prime coat finish.

C. Install in bypass arrangement at pump discharge as indicated. Install ball valve in inlet line, balancing valve and ball valve in outlet line and unions

D. Contractor shall also supply five (5) additional 5-micron filter socks Neptune PN 106453 Each independent hot water heating system shall have separate feeder. Chemical treatment shall control corrosion and scale.

E. Corrosion Coupon Rack: Similar to Fluid Control, Inc. Model CCR-01 consisting of Schedule 80 PVC pipe if used for chilled water, steel pipe shall be used for heating hot water, with 3/4" FNPT plumbing, 2 shut-off valves, flow restrictor to maintain 5 gpm flow rate, and coupon holders. Unit shall accommodate minimum 3 test coupons.

F. Corrosion coupons shall be provided by the water treatment company.

2.2 PIPING SYSTEM CLEANER

A. System shall be flushed and chemically cleaned before addition of inhibitor. System is to be flushed no more 48 hours after hydro test at a rate of no less than 3 feet per second. Once slag and solids are flushed, contractor is to use chemical cleaning compound approved for use by Town of Hanover Water Reclamation Plant to remove organic soil, hydrocarbons, flux, pipe mill varnish, pipe compounds, iron oxide, and like deleterious substances, with or without inhibitor, suitable for system metals without deleterious effects at neutral pH and with chemistry approved by the Town of Hanover Water Reclamation Facility. If existing HHW piping or CHW piping is to be re-used, contractor shall make provisions to increase temperature of the recirculating water for cleaning to 100 to 125 deg F. Contractor shall also make provisions to increase the time for recirculation of the cleaner if necessary to complete the cleaning. Once cleaning is complete, cleaning compound is to be completely flushed from the system until turbidity is under 5 NTU and iron levels are less than 3 mg/l.

2.3 PRODUCTS

A. Glycol: Systems containing glycol shall be classified into one of two categories. Category one are systems which, even by virtue of a leak, the glycol can come in contact with domestic water. A prime example of this category is an indirect fired domestic hot water heater heated via a glycol containing hot water system. Category two is all other systems. This category shall contain glycol with industrial corrosion inhibitors. Glycol shall be propylene based.

1. Category One Systems: Dowfrost, Dow Chemical
2. Category Two Systems: Dowfrost HD, Dow Chemical

PART 3 - EXECUTION

3.1 EQUIPMENT INSTALLATION

A. Filter feeders shall be accessible and solidly anchored to the floor system and be located within 20′ of a floor drain.

B. The system controller, inhibitor pump, biocide pump(s), and other appurtenances shall be located on a polyethylene backboard panel easily accessible within the mechanical room having a minimum 3′ working space.

C. In the make-up water feed serving the cooling tower the mechanical contractor shall install a 1″ Hayes water meter with provisions to capture water usage in the building automation system.

3.2 TYPICAL CONDENSER WATER INSTALLATION

A. The mechanical contractor shall provide three taps in the condenser water piping system.

1. Downstream of the condenser water pump, provide a 1" copper line to the inlet of the Feed & Bleed Control Board.
2. Install a 3/4" tap downstream of the above connection or to the tower sump piped from the discharge to the Feed & Bleed Control Panel. This pipe shall be schedule 80 PVC.
3. Install a 3/4" tap upstream of the Feed & Bleed Control Board tap and run to drain. The motorized bleed valve shall be installed in this line.

B. Coordinate with Water Treatment Contractor prior to installing system.

3.3 CLEANING, FLUSHING, AND FILLING SYSTEMS

A. The mechanical contractor shall flush, clean, and final fill systems installed or modified with products purchased from the Campus water treatment contractor. Final fill shall not occur until the water treatment contractor has confirmed that the water is suitable for permanent chemical treatment.

B. Piping systems shall be flushed to remove debris and slag 24 hours or less after hydro testing. If existing HHW piping or CHW piping is to be re-used, contractor shall make provisions to increase temperature of the recirculating water for cleaning to 100 to 125 deg F. Contractor shall also make provisions to increase the time for recirculation of the cleaner if necessary to complete the cleaning. Once flush is complete, the sstem is to be filled, vented and circulated employing chemical cleaner solution (Veolia Ferroquest FQ7101) for period of 8 to 72 hours or more in accordance with manufacturer's recommendations and job site chemical tests.

C. Once cleaning solution is completely flushed as per section 2.2, Bring final inhibitor concentration to proper level, which increases alkalinity and inhibitor level to manufacturer's recommended value. Conduct chemical tests to verify levels and submit results to Architect/Engineer. Flush detergent clear with continuous draining and make-up water fill for period of at least 12 hours or more until conditions stated in Section 2.2 are achieved. Conduct chemical tests to verify levels and submit results to Architect/Engineer. When the cleaning process is complete, replace strainers or filters and reconnect permanent pumping apparatus.

D. Prior to installing the cleaning agent in the system, isolate the expansion tank from the system. Add the cleaning agent and circulate the chemical per the manufacturer's written recommended procedure. Once the system is free of cleaning chemicals, open the expansion tank to the system, and add the permanent chemicals.

3.4 PERFORMANCE TESTING

A. Conduct performance test for each system to determine required capacity and performance of chemical treatment system. Refer to Part 1 for water analysis and water quality requirements.

B. Conduct water quality test in all systems weekly and submit test result reports to Mechanical Contractor and Owner until project is turned over to Owner.

C. Conduct water quality tests before and after new work tie-in to existing systems.

END OF SECTION 23 25 00