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**Part 1            General**

**1.1                RELATED REQUIREMENTS**

- .1            Section 23 05 00 - Common work results for HVAC.

**1.2                REFERENCES**

- .1            ASME
  - .1            ASME Boiler and Pressure Vessel Code (BPVC), Section VII.
- .2            Health Canada/Workplace Hazardous Materials Information System (WHMIS)
  - .1            Material Safety Data Sheets (MSDS).

**1.3                ACTION AND INFORMATIONAL SUBMITTALS**

- .1            Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2            Product Data:
  - .1            Submit manufacturer's instructions, printed product literature and data sheets for HVAC water treatment systems and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2            Submit two (2) copies of WHMIS MSDS in accordance with Section 01 35 29.06 - Health and Safety Requirements. Indicate VOC's for adhesive and solvents during application and curing.
- .3            Shop Drawings:
  - .1            Submit drawings stamped and signed by a professional engineer registered or licensed in Canada, member of OIQ.
- .4            Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

**1.4                CLOSEOUT SUBMITTALS**

- .1            Submit in accordance with Section 01 78 00 - Closeout Submittals.
- .2            Operation and Maintenance Data: submit operation and maintenance data for HVAC water treatment systems for incorporation into manual.
- .3            Include following:
  - .1            Log sheets as recommended by Departmental Representative.

**1.5                DELIVERY, STORAGE AND HANDLING**

- .1            Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements and with manufacturer's written instructions.
- .2            Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

- .3 Storage and Handling Requirements:
  - .1 Store materials off ground, indoors, in dry location or in a clean, dry and well-ventilated area, in accordance with manufacturer's recommendations.
  - .2 Store and protect HVAC water treatment systems from nicks, scratches, and blemishes.
  - .3 Replace defective or damaged materials with new.

## **Part 2 Products**

### **2.1 MANUFACTURER**

- .1 Equipment, chemicals, and service provided by one supplier.

### **2.2 POT FEEDER**

- .1 Welded steel. Temperature rating: 90 degrees C.

### **2.3 CHEMICAL FEED PIPING**

- .1 Resistant to chemicals employed.

### **2.4 CHEMICAL FEED PUMPS**

- .1 Electronic metering diaphragm type: flow range 0-100%, adjustable, plus or minus 1.0% accuracy (repetitive), on-off operation, with pressure relief valve, check valve, foot valve, injection fitting.
- .2 Piston type: flow range 0-100%, adjustable, plus or minus 1.0% accuracy (repetitive), on-off operation, with stainless steel piston, pressure relief valve, double ball and check valves.

### **2.5 CHEMICAL TREATMENT FOR CHILLED WATER, HOT WATER AND GLYCOL WATER NETWORKS**

- .1 English translation to follow. See French version for reference.

### **2.6 CHEMICAL TREATMENT FOR COOLING TOWER NETWORKS (TR1 & TR2)**

- .1 English translation to follow. See French version for reference.

### **2.7 CHEMICALS**

- .1 Provide one (1) years supply.
- .2 Obtain chemicals from manufacturer with existing valid contract with DND.

### **2.8 TEST EQUIPMENT**

- .1 Provide one set of test equipment for each system to verify performance.
- .2 Complete with carrying case, reagents for chemicals, specialized or supplementary equipment.

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**Part 3 Execution**

**3.1 EXAMINATION**

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for HVAC water treatment systems installation in accordance with manufacturer's written instructions.
  - .1 Visually inspect substrate in presence of Departmental Representative.
  - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.
  - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

**3.2 MANUFACTURER'S INSTRUCTIONS**

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

**3.3 INSTALLATION**

- .1 Install HVAC water treatment systems in accordance with ASME Boiler and Pressure Code Section VII, and requirements and standards of authorities having jurisdiction, except where specified otherwise.
- .2 Ensure adequate clearances to permit performance of servicing and maintenance of equipment.

**3.4 CHEMICAL FEED PIPING**

- .1 Install crosses at changes in direction. Install plugs in unused connections.

**3.5 CLEANING OF MECHANICAL SYSTEM**

- .1 Provide copy of recommended cleaning procedures and chemicals for approval by Departmental Representative.
- .2 Flush mechanical systems and equipment with approved cleaning chemicals designed to remove deposition from construction such as pipe dope, oils, loose mill scale and other extraneous materials. Use chemicals to inhibit corrosion of various system materials that are safe to handle and use.
- .3 Examine and clean filters and screens, periodically during circulation of cleaning solution, and monitor changes in pressure drop across equipment.
- .4 Drain and flush systems until alkalinity of rinse water is equal to make-up water. Refill with clean water treated to prevent scale and corrosion during system operation.
- .5 Disposal of cleaning solutions approved by authority having jurisdiction.

### **3.6 WATER TREATMENT SERVICES**

- .1 Provide water treatment monitoring and consulting services for period of one (1) year after system start-up. Service to include:
  - .1 Initial water analysis and treatment recommendations.
  - .2 System start-up assistance.
  - .3 Operating staff training.
  - .4 Visit plant every 90 days during period of operation and as required until system stabilizes, and advise on treatment system performance.
  - .5 Provide necessary recording charts and log sheets for one (1) year operation.
  - .6 Provide necessary laboratory and technical assistance.
  - .7 Provide clear, concise, written instructions and advice to operating staff.

### **3.7 WATER SOFTENER**

- .1 Install in accordance with manufacturer's instructions.
- .2 Install water metre in water softener inlet piping.

### **3.8 FIELD QUALITY CONTROL**

- .1 Start-up:
  - .1 Start up water treatment systems in accordance with manufacturer's instructions.
- .2 Commissioning:
  - .1 Commissioning Agency: treatment system supplier.
  - .2 Timing:
    - .1 After start-up deficiencies rectified.
    - .2 After start-up and before TAB of connected systems.
  - .3 Pre-commissioning Inspections: verify:
    - .1 Presence of test equipment, reagents, chemicals, details of specific tests performed, and operating instructions.
    - .2 Suitability of log book.
    - .3 Currency and accuracy of raw water analysis.
    - .4 Required quality of treated water.
  - .4 Commissioning procedures - applicable to Water Treatment Systems:
    - .1 Establish, adjust as necessary and record automatic controls and chemical feed rates.
    - .2 Monitor performance continuously during commissioning of connected systems and until acceptance of project.
    - .3 Establish test intervals, regeneration intervals.
    - .4 Record on approved report forms commissioning procedures, test procedures, dates, times, quantities of chemicals added, raw water analysis, treated water analysis, test results, instrument readings, adjustments made, results obtained.

- .5 Establish, monitor and adjust automatic controls and chemical feed rates as necessary.
- .6 Visit project at specified intervals after commissioning is satisfactorily completed to verify that performance remains as set during commissioning (more often as required until system stabilizes at required level of performance).
- .7 Advise Departmental Representative in writing on matters regarding installed water treatment systems.
- .5 Commissioning procedures - Water Softeners:
  - .1 Demonstrate compliance with specifications by chemical analyses of raw water and treated water.
  - .2 Determine, demonstrate actual softening capacity between regenerations.
  - .3 Establish regeneration intervals and procedures.
  - .4 Train O M personnel in regeneration procedures.
- .6 Commissioning procedures - Water side of closed circuit coolers, Cooling Tower Systems:
  - .1 Verify operation of bleed-off system.
  - .2 Establish bleed-off flow rate.
  - .3 Establish rate of chemical feed - continual and periodic.
  - .4 Test system water for chlorides, TDS, suspended solids, algae, slime, inhibitor level, pH, alkalinity, hardness, other impurities and microbiological organisms.
  - .5 Compare with readings of total dissolved and suspended solids metre.
  - .6 Read make-up water metre, compare with chiller load summation (ton-hours).
  - .7 Test make-up water for chlorides, hardness.
  - .8 Compare test results with readings from TDS metre.
  - .9 Record quantity of make-up water, compare with summation of chiller load (in ton-hours).
  - .10 Record types, quantities of chemicals applied.
- .7 Commissioning procedures - Closed Circuit Hydronic Systems:
  - .1 Analyze water in system.
  - .2 Based upon an assumed rate of loss approved by Departmental Representative, establish rate of chemical feed.
  - .3 Record types, quantities of chemicals applied.
- .8 Training:
  - .1 Commission systems, perform tests in presence of, and using assistance of, assigned O M personnel.
  - .2 Train O M personnel in softener regeneration procedures.
- .9 Certificates:
  - .1 Upon completion, furnish certificates confirming satisfactory installation and performance.

- .10 Commissioning Reports:
  - .1 To include system schematics, test results, test certificates, raw and treated water analyses, design criteria, other data required by Departmental Representative.
- .11 Commissioning activities during Warranty Period:
  - .1 Check out water treatment systems on regular basis and submit written report to Departmental Representative.

### **3.9 CLEANING**

- .1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.
  - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.
- .3 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.
  - .1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

**END OF SECTION**