

**PART 1**      **GENERAL**

**1.1**      **SUMMARY**

- .1      Section Includes:
  - .1      Procedures and cleaning solutions for cleaning mechanical piping systems.

**1.2**      **RELATED SECTIONS**

- .1      Section 23 05 93 - Testing, Adjusting and Balancing of HVAC

**1.3**      **REFERENCES**

- .1      American Society for Testing and Materials International (ASTM)
  - .1      ASTM E202 – Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.
- .2      Health Canada / Workplace Hazardous Materials Information System (WHMIS).
  - .1      Material Safety Data Sheets (MSDS).

**1.4**      **SUBMITTALS**

- .1      Product Data:
  - .1      Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 33 00 – Submittal Procedures. Include product characteristics, performance criteria, and limitations.
  - .2      Quality assurance submittals: submit following in accordance with Section 01 33 00 – Submittal Procedures.
    - .1      Instructions: submit manufacturer's installation instructions.
      - .1      Departmental Representative will make available one (1) copy of systems supplier installation instructions.

**1.5**      **QUALITY ASSURANCE**

- .1      Health and Safety:
  - .1      Do construction occupational health and safety in accordance with Section 01 35 29.06 – Health and Safety Requirements.

**1.6**      **DELIVERY, STORAGE, AND HANDLING**

- .1      Packing, shipping, handling and unloading.
  - .1      Deliver, store and handle in accordance with manufacturer's written instructions and Section 01 61 00 – Common Product Requirements.
- .2      Waste Management and Disposal:

- .1 Construction/Demolition Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 02 41 13 Selective Site Demolition

## **PART 2** **PRODUCTS**

### **2.1** **CLEANING SOLUTIONS**

- .1 Low foaming detergent at all temperatures
- .2 No pH neutralization required
- .3 Designed for use on most metals including aluminium
- .4 Bio-degradable
- .5 Phosphate Free
- .6 Nitrite Free

## **PART 3** **EXECUTION**

### **3.1** **CLEANING HYDRONIC SYSTEMS**

- .1 Timing
  - .1 Systems to be operational, hydrostatically tested and with safety devices functional, before cleaning is carried out.
  - .2 Cleaning Agency:
    - .1 Retain qualified water treatment specialist to perform system cleaning.
  - .3 Install instrumentation such as flow meters, orifice plates, pitot tubes, flow metering valves only after cleaning is certified as complete by water treatment specialist.
  - .4 Cleaning procedures:
    - .1 Provide detailed report outlining proposed cleaning procedures at least 4 weeks prior to proposed starting date. Report to include:
      - .1 Cleaning procedures, flow rates, elapsed time.
      - .2 Chemicals and concentrations to be used.
      - .3 Inhibitors and concentrations.
      - .4 Specific requirements for completion of work.
      - .5 Special precautions for protecting piping system materials and components.
      - .6 Complete analysis of water to be used to ensure water will not damage systems or equipment.

- .5 Conditions at time of cleaning of systems
  - .1 Systems to be free from construction debris, dirt and other foreign material.
  - .2 Control valves to be operational, fully open to ensure that terminal units can be cleaned properly.
  - .3 Strainers to be clean prior to initial fill.
  - .4 Install temporary filters on pumps not equipped with permanent filters.
  - .5 Install pressure gauges on strainers to detect plugging.
- .6 Report on Completion of Cleaning
  - .1 When cleaning is completed, submit report, complete with certificate of compliance with specifications of cleaning component supplier.
- .7 Hydronic Systems:
  - .1 Flush system thoroughly with water, back flush pump, strainers, blow down drain valves and risers to remove all loose debris. Remove accumulated sludge in boilers if necessary.
  - .2 Then add 2% solution of low foaming detergent to the system through a by-pass feeder or another feeding device.
  - .3 Circulate for 36 hours at 82° C or use chemical designed for cold water use. For chilled systems, circulate at least 48 hours at ambient temperature.
  - .4 During recirculation, back flush strainers, drain valves and risers at their lowest point once every 8 hours.
  - .5 Drain cleaning water completely.
  - .6 Then fill and drain system several times. Circulate 30 minutes every time the system is refilled.
  - .7 Bleed system at several points until water is clear and non-foaming. Clean pump strainers.
  - .8 Draw a water sample from the system and send it to out laboratory for analysis.
  - .9 If the laboratory report is satisfactory, the system must then be treated with the appropriate formula.

### **3.2 START-UP OF HYDRONIC SYSTEMS**

- .1 After cleaning is completed and system is filled:
  - .1 Establish circulation and expansion tank level, set pressure controls.
  - .2 Ensure air is removed.
  - .3 Check pumps to be free from air, debris, possibility of cavitation when system is at design temperature.
  - .4 Dismantle system pumps used for cleaning, inspect, replace worn parts, install new gaskets and new set of seals.
  - .5 Clean out strainers repeatedly until system is clean.

- .6 Check water level in expansion tank with cold water with circulating pumps OFF and again with pumps ON.
- .7 Repeat with water at design temperature.
- .8 Check pressurization to ensure proper operation and to prevent water hammer, flashing, cavitation. Eliminate water hammer and other noises.
- .9 Bring system up to design temperature and pressure slowly over a 48 hour period.
- .10 Adjust pipe supports, hangers, springs as necessary.
- .11 Monitor pipe movement, performance of expansion joints, loops, guides, anchors.
- .12 If sliding type expansion joints bind or if bellows type expansion joints flex incorrectly, shut down system, re-align, repeat start-up procedures.
- .13 Re-tighten bolts, etc. using torque wrench, to compensate for heat-caused relaxation. Repeat several times during commissioning.
- .14 Check operation of drain valves.
- .15 Adjust valve stem packings as systems settle down.
- .16 Fully open all balancing valves (except those that are factory-set).
- .17 Check operation of over-temperature protection devices on circulating pumps.
- .18 Adjust alignment of piping at pumps to ensure flexibility, adequacy of pipe movement, absence of noise or vibration transmission.

### **3.3**

#### **CLEANING**

- .1 Provide in accordance with Section 01 74 11 – Cleaning.
- .2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

**END OF SECTION**