

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