

**SECTION 23 25 00
HVAC WATER TREATMENT**

SPEC WRITER NOTES:

1. Use this section only for NCA projects.
2. Delete between //-----// if not applicable to project. Also delete any other item or paragraph not applicable in the section and renumber the paragraphs.
3. References to pressure in this section are gage pressure unless otherwise noted.
4. Coordinate VA standard details with this spec Section and show details on H and P drawings as applicable:
 - a. 23 25 00-01 Water Filter-Closed Loop
5. Hydronic Systems
 - a. 23 25 00-02 Water Treatment-Closed Systems

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies cleaning and treatment of circulating HVAC water systems, including the following.

1. Cleaning compounds.
2. Chemical treatment for closed loop heat transfer systems.
3. Glycol-water heat transfer systems.

1.2 RELATED WORK

- A. Test requirements and instructions on use of equipment/system: Section 01 00 00, GENERAL REQUIREMENTS.
- B. General mechanical requirements and items, which are common to more than one section of Division 23: Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
- C. Piping and valves: Section 23 21 13, HYDRONIC PIPING.

1.3 QUALITY ASSURANCE

- A. Refer to paragraph, QUALITY ASSURANCE in Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data including:
 1. Cleaning compounds and recommended procedures for their use.

- 2. Chemical treatment for closed systems, including installation and operating instructions.
- 3. Glycol-water system materials, equipment, and installation.
- C. Materials Safety Data Sheet for all proposed chemical compounds, based on U.S. Department of Labor Occupational Safety and Health Administration 29 CFR 1910.1200.
- D. Maintenance and operating instructions in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

1.5 APPLICABLE PUBLICATIONS

- A. The publication listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. National Fire Protection Association (NFPA):
70-08 National Electric Code (NEC)

PART 2 - PRODUCTS

2.1 CLEANING COMPOUNDS

- A. Alkaline phosphate or non-phosphate detergent/surfactant/specific to remove organic soil, hydrocarbons, flux, pipe mill varnish, pipe compounds, iron oxide, and like deleterious substances, with or without inhibitor, suitable for system wetted metals without deleterious effects.
- B. All chemicals to be acceptable for discharge to sanitary sewer.
- C. Refer to Section 23 21 13, HYDRONIC PIPING for flushing and cleaning procedures.

2.2 CHEMICAL TREATMENT FOR CLOSED LOOP SYSTEMS

- A. Inhibitor: Provide sodium nitrite/borate, molybdate-based inhibitor or other approved proprietary compound suitable for make-up quality and make-up rate and which will cause or enhance bacteria/corrosion problems or mechanical seal failure due to excessive total dissolved solids. Shot feed manually. Maintain inhibitor residual as determined by water treatment laboratory, taking into consideration residual and temperature effect on pump mechanical seals.
- B. pH Control: Inhibitor formulation shall include adequate buffer to maintain pH range of 8.0 to 10.5.
- C. Performance: Protect various wetted, coupled, materials of construction including ferrous, and red and yellow metals. Maintain system essentially free of scale, corrosion, and fouling. Corrosion rate of following metals shall not exceed specified mills per year penetration;

ferrous, 0-2; brass, 0-1; copper, 0-1. Inhibitor shall be stable at equipment skin surface temperatures and bulk water temperatures of not less than 121 degrees C (250 degrees F) and 52 degrees C (125 degrees Fahrenheit) respectively. Heat capacity reduction shall not exceed that allowed by fouling factor 0.0005.

- D. Pot Feeder: By-pass type, complete with necessary shut off valves, drain and air release valves, and system connections, for introducing chemicals into system, cast iron or steel tank with funnel or large opening on top for easy chemical addition. Feeders shall be 18.9 L (five gallon) minimum capacity at 860 kPa (125 psig) minimum working pressure.

SPEC WRITER NOTES: Specify propylene glycol, except for chilled water systems. The purpose of the glycol is "burst" protection, not freeze protection. A 25 percent solution is usually sufficient and also provides sufficient inhibitor.

2.3 GLYCOL-WATER SYSTEM

- A. //Propylene//Ethylene// glycol shall be inhibited with 1.75 percent dipotassium phosphate. Do not use automotive anti-freeze because the inhibitors used are not needed and can cause sludge precipitate that interferes with heat transfer.
- B. Provide required amount of glycol to obtain the percent by volume for glycol-water systems as follows and to provide one-half tank reserve supply: // 25 // ___ // percent //propylene-glycol//ethylene-glycol// for // run-around coil systems // chilled water system.//

SPEC WRITER NOTES: For small glycol-water systems a pot feeder may be used for make-up rather than a tank/pump system.

- C. Pot Feeder Make-up Unit: By pass type for chemical treatment, schedule 3.5mm (10 gauge) heads, 20mm (3/4-inch) system connections and large neck opening for chemical addition. Feeders shall be five gallon minimum size.
- D. Glycol-Water Make-up System:
1. Glycol-Water storage tank: self supporting polyethylene tank, minimum 90 mil thickness, with removable cover or black steel with 90 mil polyethylene insert. Capacity shall be 213 L (55 gallons), with approximate diameter of 584 mm (23 inches) and height of 914 mm

(36 inches). Reinforced threaded pipe connections shall be provided for all connections. Provide identification for tank showing name of the contents.

2. Glycol-Water make-up pump: Bronze fitted, self-priming, high head type suitable for pumping a 33 percent to 50 percent glycol-water solution in intermittent service. The pump shall be provided with a mechanical shaft seal and be flange connected to a 1750 rpm NEMA type C motor. The pump capacity shall be // 11 L/m (3 gpm) // //, 345 kPa (50 psig) // discharge pressure with a suction lift capability of 127 mm (5 inches) of mercury, with a // 2.5 kW (1/3 horsepower) // _____ // drip-proof motor. The pump may be a "gear-within-a-gear" positive displacement type with built-in relief valve set for // 296 kPa (43 psig) // _____ //, or the pump may be a regenerative turbine type providing self-priming with built-in or external relief valve set for design head of the pump.
3. Back pressure regulating valve: Spring loaded, diaphragm actuated type with bronze or steel body, stainless steel trim with capacity to relieve 100 percent of pump flow with an allowable rise in the regulated pressure of 69 kPa (10 psig) above the set point. Set point shall be 103 kPa (15 psig) above system PRV setting.
4. Low water level control: Steel or plastic float housing, stainless steel or plastic float, positive snap-acting SPST switch mechanism, rated 10 amps-120 volt AC, in General Purpose (NEMA 1) enclosure. The control shall be rated for pressures to 1034 kPa (150 psig) and make alarm circuit on low water level. The alarm circuit shall be wired to an alarm light.// Provide remote output relay to indicate alarm condition at the Building Control System specified under Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC.//

2.4 EQUIPMENT AND MATERIALS IDENTIFICATION

- A. Refer to Section 23 05 11, COMMON WORK RESULTS FOR HVAC.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Delivery and Storage: Deliver all chemicals in manufacturer's sealed shipping containers. Store in designated space and protect from deleterious exposure and hazardous spills.
- B. Before adding cleaning chemical to the closed system, all air handling coils and fan coil units should be isolated by closing the inlet and

outlet valves and opening the bypass valves. This is done to prevent dirt and solids from lodging the coils.

- C. Do not valve in or operate system pumps until after system has been cleaned.
- D. After chemical cleaning is satisfactorily completed, open the inlet and outlet valves to each coil and close the by-pass valves. Also, clean all strainers.
- E. Perform tests and report results in accordance with Section 01 00 00, GENERAL REQUIREMENTS.
- F. After cleaning is complete, and water PH is acceptable to manufacturer of water treatment chemical, add manufacturer-recommended amount of chemicals to systems.
- G. Instruct VA personnel in system maintenance and operation in accordance with Section 01 00 00, GENERAL REQUIREMENTS.

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