

232500 HVAC WATER TREATMENT

Cornell’s Design and Construction Standards provide mandatory design constraints and acceptable or required products for all construction at Cornell University. These standards are provided to aid the design professional in the development of contract documents and are not intended to be used verbatim as a contract specification nor replace the work and best judgement of the design professional. Any deviation from the Design and Construction standards shall only be permitted with approval of the University Engineer.

PART 1 GENERAL

1.01 RELATED CORNELL DESIGN AND CONSTRUCTION STANDARDS

- A. Section 222500 – Plumbing (Potable) Water Treatment

1.02 RELATED STANDARD DETAILS

- A. Detail 3.2.5 – Heat Transfer Package Schematic

1.03 SUMMARY

- A. The Standard applies to the cleaning and treatment of hydronic heating and cooling systems. For source water treatment of facility mechanical and plumbing systems needing a potable water connection, see Section 222500 – Plumbing (Potable) Water Treatment.
- B. Cornell University’s continual approach of protecting its community and the environment must be adhered to in the application of chemicals pertinent to process water loops. In addition, University policy dictates that "under no circumstances should chemicals be disposed of by pouring into sinks or other drains leading to sanitary or storm sewers."
- C. The use of automatic glycol make-up systems with direct connection to domestic water is not allowed. Provide means for manual fill, along with a 55-gallon drum to receive relief valve discharge.
- D. Design specifications shall clearly identify proper execution of water treatment procedures and testing. As stated in Section 1.05, no water treatment shall be purchased, delivered or applied without approval by Cornell Environmental Health and Safety, Facilities Engineering and the Facilities Management Water Treatment Lab.

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1.04 WATER TREATMENT CRITERIA

- A. All chemicals and formulations prescribed for the cleaning and treatment of process water systems at the University must meet the following specified criteria:
 - 1. They must be ecologically compatible so that any discharge will not create an environmental impact. All chemicals and formulations must comply with NY State SPDES (State Pollution Discharge Elimination System) regulations and be free of compounds listed by the EPA on the Priority Pollutant List as defined by 40 CFR Part 423 Appendix A.
 - 2. They must be industrial and toxicologically safe so as to minimize personnel and equipment exposure to hazardous conditions.
 - 3. Every effort must be made to maintain a sense of uniformity in chemical formulation to insure a line of continuity. Deviation from existing formulations that are applied across the University are not allowed. This relieves the University of any burden that arises from trying to maintain adequate protection using numerous treatments.
 - 4. Ethylene Glycol (CAS 107-21-1): This material is considered a hazardous substance per the 6 NYCRR Part 598. Any release (defined as unauthorized pumping, pouring, emitting, emptying, overfilling, spilling, leaking, leaching or disposing, directly or indirectly into the environment) in the amount of 1 pound of ethylene glycol into the air, land or water must be reported to the New York State Department of Environmental Conservation. For this reason, Cornell prohibits the use of ethylene glycol.

1.05 APPROVAL PROCESS

- A. All materials proposed for application must have the prior approval of Environmental Health and Safety, Facilities Engineering and the Facilities Management Water Treatment Lab. In order to thoroughly evaluate the products performance, it is recommended that the following be submitted at the time of proposal:
 - 1. Safety Data Sheets (SDS) for all products that are to be applied, which shall contain the complete formulation. Further documentation of qualitative composition must be included if SDS's do not supply all product(s) components.
 - 2. Product Data Sheets specifying overall product description and application guidelines.

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- 3. Methods of analysis for determining product residuals. Proposals should specify specific qualitative and quantitative procedures of evaluating actual product levels. They should also include recommended parameters for all products, expressed in either terms of parts per million or milligrams per liter.
 - 4. Expected performance levels of products: this should include expected corrosion rates, expressed in mils per year. If the product is of a biostatic nature, what levels of biological growth should be acceptable if the product is applied at recommended dosages.
 - 5. Provisions should be submitted for the removal for any unused chemicals. In addition, provisions must be provided for the disposal of all empty containers.
- B. The above mentioned criteria will serve as a guide as to the minimum information required for approval of any chemical treatment applied at Cornell University. No water treatment shall be purchased, delivered or applied without consideration of the previously mentioned guidelines.

PART 2 PROCEDURES

2.01 CLEANING

- A. Cleaning procedures for newly installed systems shall be as follows:
- 1. Step 1: Adjust all control valves and balancing valves to full open position during the cleaning and treatment process.
 - 2. Step 2: Fill system and add a general dispersant for iron, mud, silt, and microbiological matter at a concentration recommended by the chemical manufacturer. Pay particular attention to the type of material being cleaned. (steel, copper, aluminum, etc.) Test for concentration. Circulate solution for 4-8 hours or as specified by the cleaner manufacturers recommendations. Flush system until system water pH and iron levels are consistent with the feed domestic water levels. Clean strainers and dead end piping legs. Provide test results to the Facilities Management Water Treatment Lab.
 - 3. Step 3: Arrange for inspection by a representative from the Facilities Management Water Treatment Lab before proceeding to chemical treatment.

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- B. For extensions to existing building systems, the above cleaning procedures shall be followed. Provide temporary piping, valving, and pumping system isolated from the existing building system as needed to perform cleaning procedures prior to final connection to the existing building system.

2.02 TREATMENT CHEMICALS

- A. Chemicals shall not be used to treat chilled water systems connected to the campus chilled water loop.
- B. Chilled water systems connected to the campus chilled water loop shall be cleaned, inspected, and filled with potable water. Notify The Central Energy Plant (CEP) for permission to begin circulating water into the campus chilled water loop.
- C. Existing Systems – Field verify existing treatment chemical quantities to ensure the correct quantities are added back to the system following construction.
- D. Treatment chemicals for hydronic heating and chilled water cooling systems, not connected to the campus chilled water loop, shall be as follows:
 - 1. Non-Glycol Systems (non-potable): After cleaning and inspection, immediately add a molybdate based corrosion inhibitor. Acceptable corrosion inhibitors shall include a combination of sodium molybdate, sodium hydroxide, tolytriazole and organic polymers. Test for residual concentrations as follows:
 - a. Molybdate (M06): 150 ppm (hot water systems)
 - b. pH: 8.3-9
 - c. Tolytriazole (TTA): 10-20 ppm
 - 2. Non-Glycol System (potable): Refer to Section 223500 for acceptable treatment chemicals for potable water applications.
 - 3. Glycol Heating Systems: After cleaning and inspection, drain system then refill with glycol as specified below.
 - 4. Glycol Cooling Systems: After cleaning and inspection, drain system then refill with glycol solution at a concentration recommended by the manufacturer, with nitrate and tolytriazole corrosion inhibitors.
 - 5. The water to be added to glycol solutions shall meet manufacturer’s standards for quality.

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- E. Glycol for heating systems shall be specifically formulated to the following specifications:
 - 1. Propylene glycol: 400,000 ppm (40%)
 - 2. Nitrate: 1500 ppm
 - 3. Tolytriazole: 20 ppm
 - 4. Water: Balance
 - 5. Color: Olive Green
 - 6. Preferred Manf/Material: Metro PG#36

- F. Arrange for inspection by a representative from the Facilities Management Water Treatment Lab prior to final acceptance.

2.03 IDENTIFICATION

- A. Provide a three ring binder for each hydronic system treated with chemicals that include the following information:
 - 1. SDS, product data sheets, chemical type, test points, control limits and system volume.
 - 2. Direction to drain system to sanitary drain.

- B. System volume shall be stenciled on the system expansion tank in a visible location.

2.04 TREATMENT EQUIPMENT

- A. Bag filters shall be provided for system volumes exceeding 500 gallons.

- B. Bag filters or chemical pot feeders shall be utilized for system volumes below 500 gallons.

- C. Refer to Cornell Standard Detail 3.2.5 Heat Transfer Package Schematic for preferred location of treatment equipment.

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