PROTECTING

OUT-OF-SERVICE

COOLING WATER SYSTEMS

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by

G.F. Yuzwa, P.Eng.

H2O ENGINEERING LTD.
539 Edgemont Bay N.W.
Calgary, Alberta
T3A 2K7

INTRODUCTION

During out-of-service periods, the water-side surfaces of cooling water systems (i.e., condenser water & chilled water systems) are vulnerable to corrosion because of dissolved oxygen and/or bacteria in the system, and freeze damage because of exposure to reduced temperatures during the winter period. These problems may be minimised by:

- Draining the water from the system,
- Filling part of the system with properly treated water,
- Filling part of the system with glycol.

CONDENSER WATER SYSTEMS – DRY LAY-UP

Due to the inherent configuration of condenser water systems, the dry lay-up method is recommended for protection against corrosion and freeze damage of these systems. The following steps should be taken when using this method:

1. Maintain the control parameter concentrations within their respective control limits until the end of the operating period, then,

2. Drain the system completely, ensuring that the quality of the waste water that is discharged to the sanitary sewer system is in accordance with the Owner's Water Treatment Program Environmental Guideline;

3. Drain the fresh water make-up line to the cooling tower, if this line is located out-of-doors;

4. Remove the corrosion coupons and determine the iron & copper corrosion rates.

CHILLED WATER SYSTEMS – DRY LAY-UP

The following steps should be taken when using the dry lay-up method for chilled water systems:

1. Maintain the control parameter concentrations within their respective control limits until the end of the operating period, then,

2. Drain the system completely, ensuring that the quality of the waste water that is discharged to the sanitary sewer system is in accordance with the Owner's Water Treatment Program Environmental Guideline;

3. Remove the corrosion coupons and determine the iron & copper corrosion rates.

CHILLED WATER SYSTEMS – WET LAY-UP

The following steps should be taken when using the wet lay-up method for chilled water systems:

1. Maintain the control parameter concentrations within their respective control limits until the end of the operating period, then,

2. Add sodium sulphite such that a minimum sulphite concentration of 200 ppm as SO_3 is maintained in the system;

3. Isolate the cooling coils and drain them, ensuring that the quality of the waste water that is discharged to the sanitary sewer system is in accordance with the Owner's Water Treatment Program Environmental Guideline;

4. If the cooling coils can not be completely drained, fill them with inhibited industrial grade ethylene glycol, making sure that the glycol concentration is approximately 50 vol% (note: the glycol must be drained from the coils before the system is put back into operation);

5. Maintain a positive pressure at the top of the system by controlling the system static pressure in accordance with the following equation by the addition/deletion of air at the expansion tank:

   $P = (H/2.31) + 5$

   where: P: system static pressure at the circulating pumps, psig;

   H: elevation of the system above the circulating pumps, feet.

6. If the valve configuration at the cooling coils permits it, circulate the water in the system once per month using the system circulating pump;

7. Perform sulphite, pH & bacteria tests on a water sample of the system at least once per month, and add chemicals (i.e., sodium sulphite, caustic, Myacide biocide) as required in order to maintain a minimum sulphite concentration of 200 ppm as SO_3, a pH level of 8.5-9.5, and a maximum bacteria concentration of 10^3 cfu/ml;

8. If the system is equipped with a corrosion coupon rack, replace the corrosion coupons every 30-90 days with fresh coupons, and determine the iron & copper corrosion rates; the iron corrosion rate must be less than 0.50 mpy (i.e., mils per year), whereas the copper corrosion rate must be less than 0.20 mpy.