

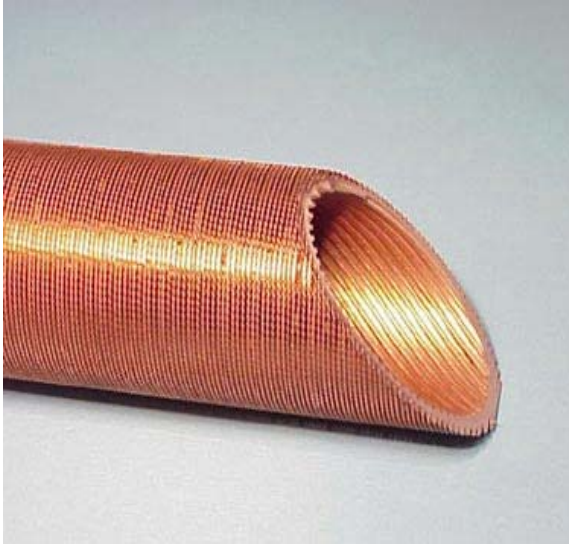


Ambient Water Treatment Consulting, Inc.

Water Treatment Monitoring
Cooling and Boiler Water Analyses
Water Treatment Bid Evaluations
Equipment Inspections
Pipe Analyses

50 Jericho Turnpike
Suite 108
Jericho, New York 11753
Tel: (516) 342-1964
Fax: (516) 908-6470

ENHANCED CONDENSER TUBE MAINTENANCE



Enhanced tubes are becoming more common in commercial and institutional properties.

The consequences of ignoring the special needs of these tubes can be dramatic including premature tube failure.

Special attention needs to be given to the maintenance of these tubes in order to extend their useful service life

WHAT MEASURES SHOULD BE TAKEN TO EXTEND THE LIFE OF ENHANCED TUBES?

REDUCE THE LEVEL OF SUSPENDED SOLIDS

- Reduce the amount of suspended solids in the bulk water through the effective use of sand filters. Effective filters should be able to filter sub-micron particles
- Perform particle analyses periodically in order to ensure their optimum efficiency.
- Inspect the tower basin regularly. Maintain the cleanliness of the basin with periodic cleanings (quarterly or as needed)

CONTROL THE LEVEL OF DISSOLVED SOLIDS

- Install, maintain and calibrate regularly feed and control equipment
- Set appropriate blow down limits—to take into account acceptable levels of calcium and phosphate
- Insure sufficient dispersant levels in order to prevent precipitation of calcium and phosphate



PROTECT THE COPPER WITH SUFFICIENT CORROSION INHIBITOR

- Insure sufficient azole (a minimum of 2 PPM available) to compensate for dissolved copper in the system as well as for the oxidant demand.

MAINTAIN AN EFFECTIVE BACTERIAL CONTROL PROGRAM

- Planktonic (floating) bacteria should be kept below 10,000 cfu/ml
- Sessile (affixed) bacteria and anaerobes should be <1 cfu/ml
- Utilize both oxidizing and non- oxidizing biocides
 - ❖ Glutaraldehyde or isothiazolin are among the better known non-oxidizing biocides
 - ❖ Oxidizing biocides are halogens such as bromine and chlorine
- Avoid tablets or powders
- Choose between intermittent and continuous feed
- Tightly control the free chlorine (bromine) level
 - ❖ 0.1ppm to 0.3ppm as free chlorine for continuous feed:
 - ❖ 0.5ppm to 1.0ppm as free chlorine for slug feed
- Utilize feed and control equipment to maintain stability
- Disinfect the system semi-annually or as needed

MAINTAIN CONSTANT FLOW

- Avoid extended periods of stagnation
- Periodically circulate water through any off-line chillers
- Balance the run time of the machines

INSURE PROPER LAY UP

- Develop a seasonal lay-up procedure for your system that includes:
 - ❖ Chemical cleaning
 - ❖ Cleaning of the tower basin
 - ❖ Brushing of the tubes
 - ❖ Borescopic inspections of the tubes



BRUSH THE TUBES PROPERLY

- Use the proper brushes
- Determine the proper number of passes and the speed required to effectively clean each tube via borescopic inspections before, during and after each pass with the brush

MONITOR THE TREATMENT PROGRAM

- Borescope the tubes after each seasonal cleaning
- Utilize corrosion coupons
- Examine spool pieces regularly
- Stay on top of the water treatment program

REMEMBER...ENHANCED TUBES REQUIRE SPECIAL ATTENTION. ONCE CORROSION BEGINS, THE DAMAGE IS PERMANENT AND IRREVERSIBLE.

Ambient Water Treatment Consulting, Inc. is a full-service consulting firm staffed with water treatment professionals who are dedicated to providing you with **unbiased, independent information** on the state of your critical heat-transfer equipment. **We do not sell treatment products.** We perform a variety of testing and inspection services that determine the effectiveness of your existing water treatment program.

Since 1998, we have provided essential services to some of the best-known property management firms in the country, as well as health care facilities, data centers, museums and industrial complexes.

For more information on this subject and for answers to all of your water treatment questions, please visit our website www.awtconsulting.com and/or contact us at:

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Email: info@awtconsulting.com