

Condenser Tube Failure

– A technical update –

Introduction

Condenser tube failure can occur for a number of reasons. However, we have been seeing an alarming number of new tubes coming in with manufacturing defects. Since the first two years of operation are critical, this turns an already difficult situation much worse. Most owners are not aware of the problem until a failure occurs, and at that point fingers are normally pointed at the water treatment company or the way that the equipment was maintained. The question becomes, “How many failures are due to tube defects?”

Recommendations

When a chiller is re-tubed or a new machine is installed, it is our commendation that the tubes be cleaned, passivated, and visually borescoped to establish a baseline condition of the tube surfaces. The borescope should have the capabilities to take pictures at a 90 degree angle in order to detect defects or reveal corrosion on the tube surfaces prior to putting the machine in service.

Borescoping is different than an Eddy Current study, which identifies metal thickness and metal loss. While we would recommend that a baseline Eddy Current study be done, the borescope study is strictly visual, and is crucial.

Photos

To the right are pictures of a new machine recently installed at a customer’s site. Please note the defects in the tube enhancements and the tube corrosion at the bottom. These tubes have been pre-cleaned, and the machine has not yet been placed in service. By identifying the tube defects early on, the client may address any warranty issues and adjust the treatment regime accordingly. The defects will create low-flow areas, making proper treatment extremely difficult, and making early failures a strong possibility.

Figure 1:



Row 30, Tube 41 – Manufacture defects of tube enhancements

Figure 2:



Row 15, Tube 24 – Manufacture defects of the tube enhancements

Figure 3:



Row 30, Tube 41 – Visible corrosion