EDDY CURRENT TUBE TESTING ANALYSIS

INTRODUCTION:

Eddy Current Tube testing analysis is an electronic diagnostic service which can reveal tube conditions within a chiller not normally visible. The Eddy Current Sell Sheet presents four-color representations of the possible chiller tube defects.

The test is non-destructive; tubes are not removed from the chiller for analysis. Eddy Current testing is performed as an on-location, in-place service. This saves time and expense, while still accurately revealing chiller tube condition.

This service has gained popularity over the last ten years and has become accepted as a valid preventive maintenance tool. Testing companies abound which include Eddy Current tube analysis as a service offer. This offer presents vendors who can be sub-contracted by YORK District Service. You may wish to obtain quotes from the vendors presented or use the Eddy Current testing outfit of your choice.

PROFILE:

Condenser-side corrosion typically accelerates because of the air-washing characteristics of the cooling tower and high operating temperatures within the condenser, which encourage sludge, slime, acid, minerals, and rust formation. In addition to the destructive corrosion potential, heat transfer characteristics are reduced, increasing energy consumption.

The most costly failure in a heat exchanger is the failure of the tubes. This can lead to the mixing of water and refrigerant, and the creation of hydrofluoric and hydrochloric acids. Extensive and costly damage to the tubes, tube supports, and hermetic motors can result. Repair costs can range from up to $50,000 to $100,000.

THE CONCEPT OF EDDY CURRENT:

Eddy Current involves the introduction of an AC current through the coils of a specially designed test probe to induce an electrical current in a chiller tube. The probe is run through he entire length of each individually tested tube in this manner. Electrical currents change as the probe reaches defective areas or non-conformances along the length of the tube. An analyzer processes the signal variations, and the outputs are interpreted by a qualified analyst on an oscilloscope screen. A strip chart recorder makes a permanent copy of the signals.

EDDY CURRENT TUBE TESTING, cont'd

ART OR SCIENCE:

Eddy Current testing is both an art and a science. Proper analysis relies on the electronic equipment used and the interpretative abilities of the analyst. Test standards are entered for the particular tube being analyzed to establish reference comparisons. The analyst evaluates the conditions read out on an oscilloscope display as he runs the probe through the tube. His interpretation of the probe readings establish whether there is reason to suspect a defect. The exact location and the type of defect suspected are recorded and presented in the final report.

The analyst should be certified in Eddy Current Testing. There are three levels of expertise in this non-destructive test as recognized by the American Society for Non-Destructive Testing. The analyst can be certified as ASNT-TC-1A Level I, II, or III. It is highly recommended that YORK Service contract only Level II or III Eddy Current practitioners.

LIMITATIONS:

Eddy Current can be performed on the vast majority of non-ferro-magnetic heat exchanger tubes. Reference standards can allow the examiner to inspect smooth bore, turbo (internally rifled tubes), and tubes with fins and rifling.

Coated tubes present more of a problem to the examiner. Tubes such as Korochill, Korotex, and UCC coated tubes represent modifications to the original heat exchanger tube. In one type of enhancement, the bore tube is wrapped with a special plastic sheeting. Copper is then plated over, and the tube is annealed. During the annealing, the sheeting decomposes, evolving gases, and creating a porous surface. This enhancement now provides more heat exchanger surface area.

The enhanced tube surface has a non-standard finish, making Eddy current analysis very difficult. Coated tube standards can be entered for reference, but evaluation is very difficult. Eddy Current testing services admit that the coated tube interpret-ation will err on the side of suspecting a defect where one does not exist, rather than to miss a tube non-conformance.

EDDY CURRENT TUBE TESTING
LIMITATIONS, cont'd

While it may be possible to recognize coated tube defects and correct the problem, the possibility exists that a good tube may be pulled as a result of a coating inconsistency rather than an actual tube defect.

YORK OPPORTUNITIES:

Eddy Current testing provides YORK with a vast range of S and R opportunities. Directly, head removal and replacement, tube brushing, tube plugging, and tube replacement can be quoted as incremental business. Indirectly, corrective action can be recommended for a part of, or the entire water loop. Water treatment, cooling tower, and other service opportunities abound.

SCOPE:

YORK Service will be responsible for removing the heads, brush-cleaning the tubes, and replacing the heads upon completion of the eddy current testing. THIS SERVICE IS NOT INCLUDED ON THE PROPOSAL. YORK should perform this service separately on a time and material basis, or it can be quoted.

Eddy Current testing services will not handle head removal and replacement. If the Eddy Current testing service arrives at the site, and the chiller is not ready for inspection, high stand-by charges may result.