YORK®
ES Service Information

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New 7-07

Equipment Affected: Centrifugal Chillers

Single Stage Centrifugal Compressor Maintenance

General

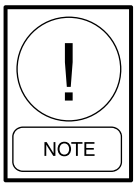
The high and low speed shaft bearings on YORK single stage centrifugal compressors are aluminum, hydrodynamic fluid film journal bearings. This bearing journal design allows the rotating shafts to ride on an oil film and bearing wear is therefore minimal. The impeller eye and balance piston seals rings are made of a bearing grade aluminum. The thrust bearings are of the hydrodynamic tilting pad design. Here again the thrust collar rides on a cushion of oil and there is no metal to metal contact. On systems with ideal operating conditions there is no need to disassemble compressors for inspection purposes. Analytical tools are available that will identify potential mechanical problems developing prior to a failure occurring, or identify or indicate less than ideal conditions that may warrant an internal inspection. These tools should be used to ensure proper compressor operation and reliability.

Vibration Analysis

Vibration analysis is valuable in identifying abnormal wear of rotating parts and is particularly helpful when performed on a periodic basis. Having a baseline vibration report to compare vibration signature changes over time can pinpoint potential internal compressor problems. Systematic data collection will identify potential gear wear or excessive vibration that would indicate a need for internal compressor inspection. Vibration data is also helpful in identifying potential motor bearing wear so corrective action can be scheduled prior to failure.

Thrust Endplay

To check for low speed thrust bearing wear, one must measure and record the low speed axial thrust endplay and compare the results to design tolerances. The compressor shaft seal will have to be removed to perform the low speed axial thrust reading. To inspect the high speed thrust bearings and thrust collar, the high speed thrust cover plate and thrust collar must be removed. When performing the low and high-speed thrust inspections, the corresponding rear low and high-speed shaft bearings may be removed from the compressor to check for unusual wear. Corrective action should be taken if inspection shows excessive wear of the thrust or journal bearing surfaces.



To perform these inspections the refrigerant charge must be removed.

Compressor Oil

The compressor oil filter and oil should be replaced on a yearly basis. A yearly oil sample should be collected and analyzed prior to changing. The key points of the oil analysis report are moisture content and acidity. Spectrographic data supplied on oil analysis reports are not generally a true indicator of wear metals. However, a spectrographic analysis may help to indicate other undesireable contaminants.

As noted YORK uses aluminum bearings and labyrinth seals. If a bearing or seal starts to wear, this metal is collected in the oil filter. Aluminum that appears in oil sample analysis is almost always an aluminum oxide that is caused by moisture in the oil. The oil filter should be inspected for actual aluminum particles. It is normal on new machines to see some aluminum collected in the filter. This alumimum comes from the eye and balance piston seals as they come into contact with the impeller. Over time only minute amounts of metal should be seen in the oil filter. If there is a sudden increase in metal collection on the filter then an inspection of the internal impeller seals or shaft bearings may be warranted.

Refrigerant

Refrigerant analysis should be performed on a yearly basis, again looking for excessive moisture and acidity. Excessive moisture content in the refrigerant (or oil) can cause corrosion of internal parts of the compressor that could in turn lead to failure of the shaft bearings, shaft seal, impeller labyrinth seals or to binding of the pre-rotation vanes.

By following the above listed maintenance procedures compressor health can be determined and ensured. If the compressor is exposed to less then ideal operating conditions (i.e. excessive surging, excessive refrigerant moisture, poor oil quality, or other unusual conditions), then the end user may want to perform an internal compressor inspection for verification that internal components are not damaged.