

## **Air Conditioning Systems ~ Chiller Start-up** by Roy Bitz

As Spring approaches, our attention has to focus on chiller preparation for start-up.

Large chillers usually require the services of a qualified service technician to prepare chiller for startup. There are, however, several things the engineer should provide prior to the arrival of the service technician.

The chiller itself should have been serviced and inspected during the shut-down period to ensure chiller is ready for operation.

Although you may have a contract with a service company for chiller start-up, the water side of the system is very important and is usually the responsibility of the building engineer.

In order to prevent delays of chiller start up and eliminate frustration, the following services should be performed: Condenser tubes should be inspected to determine condition of tubes such as mud, silt or scaling condition. Tubes may require brushing or, if tubes appear scaled, may require acid cleaning. In either case, your chiller or chemical representative should be contacted.

Cooling tower should also be inspected and if there is a problem with calcium deposit, your chemical representative should be contacted. Cooling tower should be cleaned by hosing down the fill media and basin area. Depending on the type of fill media, care should be taken not to damage by using solid objects or high-pressure water spray.

Tower sump should be brushed, scraped and flushed out to remove any solids or pigeon poop. Sump strainer should be removed and cleaned.

Fan bearings and motor should be inspected and lubricated where applicable.

On cooling towers with dampers, all damper linkages and dampers should be inspected for free movement. On squirrel cage fans, inspect fan blade scoops and clean if necessary. Inspect belts, adjust or replace as required. Clean strainer ahead of condenser pump.

Fill tower and allow to circulate for 2 or 3 hours to allow stable operation of condenser pump. Depending on contamination of the individual towers, more deposits may come loose, and both the tower strainer and condenser pump strainer may have to be cleaned several times until system is clean.

### **Chiller Unit**

**Check oil temperature on oil sump and make certain power is on in order to maintain oil at 120 - 130F. Oil must be heated in order to force the refrigerant out of oil sump before chiller can be started. Chiller cannot be started if oil temperature is below 100F.**

If unit had the new style purge system, purge should be turned to adaptive or automatic mode to remove any non-condensable that may have accumulated during the shut-down period.

On York or some Carrier chillers, purge can only operate when chiller is operational. Purging will have to be done on start-up by soft loading chiller until non-condensable are removed.

## **Chilled Water System**

**If chilled water system has been drained for the winter to prevent possible freezing, drain valves should be closed, isolation valves opened, as required, and system filled.**

On systems with automatic air vents, vents should be inspected to ensure they are operational. Manually vent air from highest location, if required, to speed up processes or to ensure air is being expelled from system.

Allow chilled water pump to circulate for 1 to 2 days to ensure all air is removed and a stable operation is maintained. Add water treatment as required.

## **Water Flows**

**One of the most common chiller failures, particularly at start-up, is due to inadequate water flow caused by air locks in the system, dirty strainers or valve closure somewhere in the system. When checking for proper water flows, the pressure at pump or in system can be at any pressure, depending on the static lift or pressure regulating valve setting at the expansion tank on chilled water system.**

Two ways to determine correct water flow is by a flow meter or the pressure drop through the tube bundles. By using the same gauge, measure the pressure entering the tube bundle and then measure the pressure leaving the tube bundle. The pressure difference will determine if correct water flows have been established. As a rule, a two-pass tube bundle will have a 10 PSI pressure difference, a one pass tube bundle a 5 PSI pressure difference, a three-pass tube bundle a 15 PSI pressure difference. The above is a general rule, however, each chiller is manufactured with a certain number of tubes for its specific capacity and the actual pressure drop can be obtained from the manufacturer or service representative.

With stable and correct waterflows, there should be no delays when Spring start-up rushes hit on the first warm day. The Service Technician cannot start chiller when auxiliary equipment is not functioning properly or if oil sump temperature on chiller is below 100°F.