FROM THE FIELD

Chiller dilemma

Over the years, we have used chilled water on many of our projects, both plan and spec as well as with our design/build projects. There are many advantages of this type of system. The chillers can be isolated from the house or building maintaining clean landscape architecture.

BY DAN FOLEY CONTRIBUTING WRITER

Last month, I wrote about service issues that occur with running no-cooling service calls. Before I get into this month's column, I want to share a brief update.

No sooner had I turned in my column on running AC service calls, I ran into a problem that had me second guessing myself. A longtime client called to say that he had condensate dripping out of his air handler. This one would be easy; a simple flush of a clogged drain would take care of it.

Technician No. 1 was dispatched and did a full service of the system: filter change, oil motors, check charge, etc. I told him to flush out the condensate drain with hot water and flush it out under pressure. He did this, collected the check, and was on his way.

That night, I received a message from the client indicating the unit as still leaking. I dispatched technician No. 2, who confirmed that the air handler was wet and the secondary pan was full of water. He vacuumed out the water and flushed out the line again. He must have poured ten gallons of water into the coil pan, and every drop drained out. He adjusted the slope of the drain and confirmed that the outlet in the gutter was open and flowing freely. He also confirmed that the gutter was not clogged.

After two-plus hours, he called to tell me that he thought he had it fixed. His only reservation was that he thought there might be a hairline crack in the pan causing a drip. This did not make sense to me, as gallons of water had been poured through the pan without a drop of water leaking.

Photo 1: A six-year-old air cooled chiller slated for replacement due to reliability and repair issues.

The next morning, the client called me at 7:00am to let me know it was still dripping. At this point, he was extremely frustrated; as was I. I let him know that I would meet my service manager at the site at 1:00pm sharp to get to the bottom of the problem. I had installed the system 12 years ago, and we have performed the maintenance annually since.

"What has changed?" I asked myself.

Sure enough, when we arrived, condensate was dripping out of the corner of the couterflow air handler. The insulation inside the air handler was wet and condensate had dripped down onto the blower housing. The filter was clean, drain line clear, charge correct, and the drain pan not overflowing. What could be causing this problem? Was this air handler possessed?

"Let's check the coil," I said to Mark Wilson, my service manager.

"Clean as a whistle," he answered.

I asked him to go ahead and remove the access panel so I could see. Sure enough, it was spotless. I had noticed a build-up of lint and dust on the return grille in the first floor hallway. When I ran my finger along the grille, the dust had an oily, greasy feel to it.

"Let's do a chemical clean of the evaporator coil," I said to Mark.

No sooner had Mark sprayed the coil with a solution of Nu-Calgon evaporator coil cleaner than what seemed like a gallon of water released from the coil immediately along with bits of oily black scale. The coil pan immediately filled up and drained.

I finally figured out the cause of the problem. My clients have a gourmet kitchen and like to cook. Twelve years of accumulated cooking grease and aerosols had worked its way between the evaporator coil fins. While the coil appeared clean on the face, it was actually clogged between the fins with oily, greasy lint and dust.

Turn to FOLEY on p 64

| FROM THE FIELD |

CONTINUED FROM PAGE 62

Photo 2: Standard chiller barrel heat exchanger installed in the basement with commercial-duty control package.

This was holding the condensate, causing it to drip off the face of the coil into the air handler. Once the coil was clean, the condensate ran down the coil and drained properly. Problem solved, lesson learned, happy client.

Chiller problems

Over the years, we have used chilled water on many of our projects, both plan and spec as well as with our design/build projects. There are many advantages of this type of system. The chillers can be isolated from the house or building maintaining clean landscape architecture. On one project, we set the chillers over 200 feet from the house connecting it to the system with buried Ecoflex insulated PEX pipe.

This type of design also allows for a bank of chillers that can be staged, just like boilers, to handle varying loads. The bank of chillers can be designed for diversity loads, rather than peak load for each zone, maximizing the design efficiency of the system. Peak load occurs in different zones, at different times of the day. A chilled water design takes advantage of this fact to allow for design improvement over a discrete, one condenser per zone design.

We have had good luck with the commercial duty chillers, such as Carrier, Daikin, Trane Aaon and Drake. We have also had good luck with the ClimateMaster water-to-water geo chillers. These are all high-quality, heavy-duty machines that come at a different price point as the residential products.

The problem has been with the air-cooled residential chillers. There is no point in naming names, as the ones we have used have all been proven to be unreliable to varying degrees and we have tried most of them. I have over 70 of one particular product with over 100 percent failure rate. How can you have over 100 percent failure rate you ask? Easy, all have failed at least once and most have failed multiple times. The manufacturer has tried to help, but you can't fix junk. They offered to help with their new and improved second-generation unit but it was just as bad. They now have a third generation unit just out that I have not yet installed.

These units were installed in multi-million dollar projects. My reputation among several architects, builders and clients has been heavily damaged by reliability issues with these chillers.

I installed two 5-ton chillers in one client's vacation house about 1-½ hours from my shop. The first summer, we suffered multiple breakdowns. At least ½ dozen times, he would drive down to his vacation house on a Friday evening to enjoy a quiet weekend away from town. He would open the front door only to be greeted with a blast of hot air. I would receive the call at around 9:00pm and cancel my Saturday plans to drive down to his lake house and fix the problem. It would kill just about the entire day. One time, just as I was pulling into my driveway after making the round trip, my phone rang with my client angrily letting me know that the chillers had already shut down again.

This client had paid me over $400K for his mechanical system, and I had designed and specified the system. I had no choice but to remove the chillers and install the revision 2 chillers. To be fair, the manufacturer provided the chillers. But, I was out labor and materials, over a dozen service trips over two years, not to mention the trust of my client and the hit to my reputation. At this writing, after two years of operation, the new units are only marginally better than the units they replaced.

There has been no rhyme or reason to failure modes. The easy fixes have been failed capacitors, fan motors,

Turn to FOLEY on p 66

Photo 3: Reverse angle on the standard chiller barrel heat exchanger.

| FROM THE FIELD |

CONTINUED FROM PAGE 64

Photo 4: A 5-ton Trane XL16i condenser connected to a Standard Chiller barrel kit provides chilled water to cool this residential home located in Annandale, Va.

contactors and relays. The difficult, catastrophic failures have been compressor failures, heat exchanger failures, reversing valves that have blown out, cap tubes that have rubbed to together blowing the refrigerant charge, pump motor failures, condenser coil leaks, and factory brazed joints that have leaked. Fixing these failures takes an entire day and usually leaves the client without cooling for several days, as components are located and work is scheduled. It typically occurs during peak season, so paying clients are pushed back for us to care for non-revenue generating warrant repairs.

We had one 10-ton unit arrive flat – no refrigerant in the system. The manufacturer's response was that we must have damaged the unit during installation. My technician found a bad brazed joint, repaired it, and got the unit back online as time was of the essence on this job. I don't have time to fight my suppliers.

I found a common theme among the entire line of units we have installed: cheap components. I found light duty relays that would burn up, contactors not rated for the load and duty cycle they were operating under.

I tore apart some of the field-scrap units we removed to try to determine why we were having such bad luck with these units. The entire concept of these chillers is ease of installation. Connect electric and control wiring, and run the chilled water piping and you are done. No field refrigerant piping, no charging of systems. The pumps and relays and controls have already been installed. On paper, it made a lot of sense. In the field, it was a living hell.

I found a common theme among the entire line of units we have installed: cheap components. I found light duty relays that would burn up, contactors not rated for the load and duty cycle they were operating under. Capacitors the size of a thimble would blow out when the first heat wave would hit, condenser fan motors made out of pressed tin would only last a couple of seasons. I found paper thin copper refrigerant lines and Chinese made reversing valves that would not last a year without blowing out. The irony of this last one is not one of these units was installed in a heating application. I did not even need the reversing valves for Pete's sake! Changing a reversing valve in the field is one of the most challenging, difficult repairs you can make. Many of these units are on roofs or other difficult-to-access locations. By the time you factor in driving time, cutting, brazing, evacuation, charging, testing, clean-up and paperwork, an entire day is shot.

Another manufacturer stepped up with a solution. They indicated that they were aware of the problems of Manufacturers A, B, C and D and had resolved reliability issues with their unit. I used their unit to replace several of the failed units (at my expense), and installed six chillers on a new project. Two years in, we have had two compressor failures, a control board failure, and multiple sensor failures. I can't win. The manufacturer and local wholesaler have supplied replacement parts and components, but the damage is done.

I recently received a call from a client in Northern Virginia. We had installed a 5-ton package chiller in her home about six years ago for over $10K. See photo No. 1. Since that time, we have replaced contactors and capacitors, repaired refrigerant leaks in the cap tubes as well as the compressor piping, and changed the chilled water pump, hard start kit, condenser fan motor, and temperature control. Last June, we replaced a failed compressor. She calculated that she had paid for the unit twice!

What really got to her was having to plan her life around the reliability of her cooling system: when she could travel, have houseguests, plan parties, etc. She had a key made for my technicians so she would not have to wait around for their service calls.

She called me to let me know that she had enough and wanted the system replaced with a reliable cooling system. In doing some thinking, I thought back to some of the old residential chilled water systems I worked on back in the 1980s. These used a regular condenser outside connected with refrigerant lines to a chiller barrel in the basement.

I did some research and found that Standard Chiller still makes this type of system. My solution was to install a Trane XL16i condenser piped to a Standard Chiller barrel in the basement. All the controls and components are heavy-duty commercial duty (See photos No. 2, 3 and 4). My technicians have total control of the quality of the installation, components, brazing, control wiring, and power wiring. This way, the reliability and quality of the installation is entirely under our control.

This system was just installed in July, so I cannot report on the success and reliability of the system yet. But, I assure it cannot be worse than what we were doing previously. Based on the quality of the components and the proven reliability of the condenser we installed, I can predict good results. I will update my readers at the end of this cooling season. ●

Dan Foley *is president and owner of Foley Mechanical, Inc. based in Lorton, Va. FMI specializes in radiant, hydronic and steam systems, as well as mechanical systems for large custom homes. He can be reached at 703-339-8030, dfoley50@verizon.net, or www.foleymechanical.com.*