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CASE STUDY

Condominiums

Facility at a glance

Name

One Crawford

Location

Portsmouth, VA USA

Facility size

19-story, 121-unit residential condominium

Issue

Replace twenty-plus year old chiller units

Solution

(2) 125-ton Daikin Magnitude®

Daikin Magnitude Chillers Help Virginia Condominium Reduce Electrical Costs by 50%

Peace of mind, reliable comfort and quiet operation were high on the requirements list of the Crawford Association, the owner's association for One Crawford, a 19-story residential condominium in Portsmouth, Virginia. The association needed to select chillers to replace the twenty-plus year old units previously installed in the building. They met both criteria with the Daikin Magnitude magnetic bearing compressor chiller.

One Crawford is situated along the Elizabeth River, a tributary to the Chesapeake Bay, overlooking downtown Norfolk. Originally built as apartments in the 1960s, the building was converted to condominiums in the early 1980s.

The Crawford Association needed to replace two chillers that used R-12 refrigerant, which has been phased out under the Montreal Protocol due to ozone depletion potential. According to Hoffman & Hoffman, Inc., the Daikin representative in Chesapeake, Virginia, the old chillers were loud and insufficiently cooled the brick building with its southern exposure along a waterway. The association sought quiet operation and energy efficiency in a "green" chiller that would serve the building for years to come with sustainable, high performance.

Meeting all the requirements

Two Daikin 125-ton Magnitude oil-free centrifugal chillers fit the requirements on many counts, says Brian Duncan, service sales representative at Professional Heating & Cooling, Inc. in Norfolk. With part load performance as low as 0.33 kW/ton IPLV, Hoffman and Hoffman representatives were confident that the Magnitude chiller would provide significant energy savings for the building. In addition, the Daikin chillers use R-134a refrigerant which has no ozonedepletion potential and no phase-out date under the Montreal Protocol. The chillers also feature Magnitude magnetic-bearing compressors that eliminate the metal-to-metal contact noise of conventional bearings. As a result, the Daikin Magnitude chiller is the quietest in the industry with sound power levels as low as 77 dBA per AHRI Standard 575.

Finally, the compressor technology eliminates the need for oil-handling equipment, offering savings on maintenance and repair costs compared to traditional centrifugal compressor chillers.



Tricky installation

The oil-free technology and the dimensions of the chillers were key during the installation process. The chillers had to be located in the building's mechanical room on the top floor of the 19-story building. Duncan credits Lockwood Brothers Crane and Rigging Company of Hampton, Virginia on the two-day job of removing the old chillers and lifting the new chillers into the building by crane. "The old chillers were physically smaller so we had to remove a wall in the mechanical room to accommodate the new chillers," Duncan adds.

A wall in the side of the One Crawford building was cut and each new chiller was lifted into the building on its side. "The chillers are about 78 inches tall, and we could only take out about 72 inches of wall due to a concrete support," Duncan says, noting the oil-free chillers made temporarily tipping the chillers feasible. In addition to the new chillers, two new cooling towers were installed on the rooftop, outside the mechanical room.

Duncan explains the 121-unit building uses an HVAC system with each condominium unit served by one or more fan coil units depending on its size. "We were able to reutilize the building's existing chilled water pumps and piping. The building is old enough that it uses copper piping."

Adding up the energy savings

The Daikin Magnitude chillers at One Crawford were commissioned in June 2007. To date, Duncan says more energy savings have resulted from the Magnitude chillers than initially planned. "One Crawford is saving more money than we had conservatively estimated. The new chillers dehumidify the building much better as well. We're running the chillers at 44 degrees—six degrees colder than the residents were used to with the old chillers—and we're still saving on energy."

Duncan notes water condenser pumps, installed in conjunction with the new chillers, also contribute to the energy savings. "The new water condenser pumps are small due to the fact the chillers don't require a large water pressure drop. So the smaller pumps also save a lot of money up front in initial capital cost and over the long run, they save electricity."

One Crawford resident Charles Twine, vice president of the Crawford Association, ran the numbers himself using four years of historical data including average daily kilowatt usage for the building and average daily temperature to determine monthly averages and savings. "Since the chillers have been installed, we are saving about \$3,000 a month on the electrical costs, approximately a 50 percent savings," he says.

Showcase results

The chillers are very quiet, Twine says, noting 18th-floor residents located directly underneath the mechanical room are no longer bothered by noise. Duncan agrees. Conversations in the mechanical room are now easily heard. "You can't hear the chillers at all until they're operating at about 25 percent capacity or higher. Even with both running at 100 percent, side by side, they are far quieter than the chilled water pumps next to them." Duncan says the two Daikin Magnitude chillers serve as a showcase for the new technology in the state of Virginia. The chillers also illustrate how the oil-free and compact design works well in retrofit situations, given installation restrictions found in older buildings. "Everyone is happy," concludes resident Twine.



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