



PROJECT HIGHLIGHTS

- » uses oil-free Danfoss Turbocor compressors, allowing for completely upside-down chiller start
- » quiet chillers are ideal for office setting
- » contributed to LEED Gold certification

# NEVER JUDGE A BOOK—OR A BUILDING—BY ITS COVER

40-year-old commercial structure features cutting-edge, energy-efficient technology

925 L STREET IS A 40-YEAR-OLD COMMERCIAL OFFICE BUILDING located in the center of downtown Sacramento, Calif., directly across from the State Capitol. Leased and managed by Jones Lang LaSalle, a financial and professional service firm specializing in real estate services and investment management, the building reveals little on the outside that would suggest the cutting-edge systems inside that make 925 L Street a model of energy efficiency and sustainability – a United States Green Building Council Leadership in Energy and Environmental Design (LEED®) Gold certified building that has earned an ENERGY STAR® label every year since 2007.

“The cost of electricity in California is extremely high, forcing our company to look closely at ways to improve energy efficiency and reduce energy consumption,” explained Mike Ryder, chief engineer for Jones Lang LaSalle. “In the process, we have made a number of changes to building systems

since the building was constructed, which have contributed to these important LEED and ENERGY STAR certifications.”

One of the more recent changes includes the installation of a 300-ton Multistack® MagLev™ chiller that features two Danfoss Turbocor compressors and replaces a 300-ton chiller that was original to the building. A second chiller installed in 1998 now serves as the backup to the newer Multistack unit.

According to Ryder, the older chiller was not efficient at low loads, making it difficult to meet efficiency goals. “Because of our proximity to the capitol building, our tenant mix includes a number of state agencies and lobbyists that tend to work late hours and weekends when the California State Legislature is in session. As a result, it’s not unusual for us to provide HVAC services until midnight to four of the building’s 14 floors through the week and to one floor on weekends.

“With the old chiller, and its inability to unload down to minimal tonnages, we had to start the entire building to keep enough load on the chiller to support the reduced number of tenants working at night,” Ryder continued. “And every time the chiller started, we experienced a large spike. So, to improve energy efficiency and reduce energy costs, we began looking for a chiller with the ability to unload down to 35 tons, providing cooling to just one floor when necessary. The chiller also needed to stop and then restart without experiencing the huge spikes we were accustomed to.”

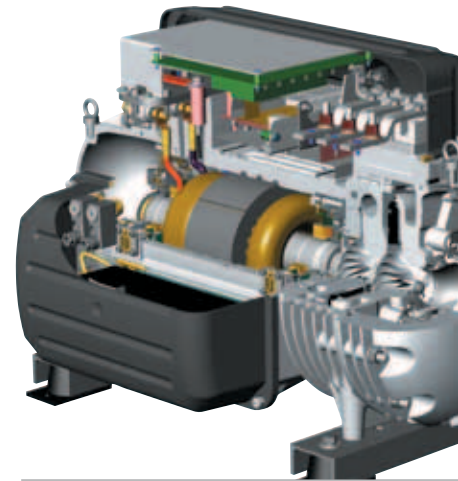
Ryder eventually selected the Multistack chiller, attracted to the unit’s two Danfoss Turbocor compressors and their unloading capabilities. According to Ryder, the unit provided the only option available to Jones Lang LaSalle short of installing supplemental HVAC for those floors that required after-hours cooling.

Airco Commercial Services, a full-service commercial heating, ventilation and air-conditioning (HVAC) company, installed the new chiller one year ago. The Sacramento-based company has maintained the HVAC system at 925 L Street for a number of years, making recommendations when appropriate to contribute to improved efficiencies within the system.

According to Airco Sales Manager Steve Ghilardi, the company installed a heat exchanger five years ago, providing free cooling to the building for the first time and enabling Jones Lang LaSalle to shut down their chiller between October and March. The system also contributed to the building’s LEED Gold certification in 2010.

Following that success, building owners turned their attention to the facility’s chillers, eventually electing to replace the oldest chiller with the Multistack chiller and positioning it as the lead chiller. In addition, Airco installed new chilled water pumps, reconfigured the chilled water plant to run either chiller with either pump and retrofitted the central plant controls with Automated Logic Controls.

“The new chiller requires just 0.5 kW/ton to operate at full load, compared to 0.95 kW/ton required by the old unit, thanks in large part to the variable-speed drives (VSDs) that are built into the two Danfoss Turbocor compressors. In effect we doubled the efficiency of the HVAC system,” noted Jay Hunter, project engineer at Airco. “As a result, in certain »



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JONES LANG LASALLE PROJECT  
**the numbers**

**11.6%**

Reduction in gas and electric costs since the new chiller was installed in 2009 and 2010

**17.8%**

Reduction in electrical consumption since the new chiller was installed in 2009 and 2010

**97 out of 100**

The building's Energy Star score after completion of the project; they plan to apply for LEED Platinum status

**90%**

Occupancy rate of the building, even as newer LEED certified buildings are going up in the area

circumstances, the Multistack chiller is even more cost effective to run than the free cooling plate and frame heat exchanger. And it has the ability to unload to a minimal amount of tons to satisfy the cooling requirements within the building – in this case cooling just one floor."

Although Hunter points to energy efficiency as the greatest benefit the new chiller and compressors offer, he also recognizes the advantages of oil-free compressors. "The fact that the chiller uses Danfoss Turbocor compressors means there is no oil in the system. The compressors work on magnetic levitation, eliminating friction and the need for oil. This, in turn, means less maintenance, because the system isn't pumping or heating oil."

Just as important to the building owner, the absence of oil ensures reliability. According to Ghilardi, the old chillers failed several years ago as a result of an oil-related problem. "The temperature reached 100 degrees Fahrenheit, so the building had to close for two days while the owner addressed the problem. With oil-free compressors, this type of problem is no longer a possibility."

Ryder adds, "The combination of VSDs and no oil means we can start the chiller in conditions in which a conventional chiller is unable to start – mostly in an upside down start where the temperature of the condensing water is cooler than the temperature of the chilled water. This was a huge issue with the old chiller. When you do an upside down start with a conventional chiller, you starve the chiller for oil, which leads to oil issues. Because the Danfoss Turbocor compressors are oil-free, we can start the chiller completely upside down and not experience any issues at all."

In addition, Ryder reports that the new chiller makes it possible to run higher condensing-water temperature, reducing the amount of work required of the cooling towers. "Our backup chiller likes condensing-water temperatures between 69 and 75 degrees Fahrenheit, while the new chiller actually prefers temperatures of 75 degrees Fahrenheit or higher. As a result, because they're on VSDs, our cooling towers are able to back off, even on very warm days, providing additional energy savings that can be linked to the chiller and its compressors."

Ryder echoes both Hunter's and Ghilardi's comments regarding maintenance benefits. "No oil means no filters and considerably less maintenance. In fact, the biggest maintenance we'll do in the foreseeable future is the annual tube cleaning, just to keep efficiencies as high as possible with the heat transfers."

And according to Ryder, the chiller is far quieter than its predecessor, thanks again to the Danfoss Turbocor compressors. Because the chiller is located on the roof of the building, the chiller's quiet



In 2010, the Jones Lang LaSalle property at 925 L Street was recognized by the Building Owners and Managers Association (BOMA) of Sacramento with a TOBY Award, recognizing the facility as an outstanding building of the year in the 100,000 to 249,999 square foot category.

operation was not a selling point for him. But Ryder is the first to admit that lower sound levels have proven beneficial to him.

“It’s a huge convenience when you’re working around the chiller,” he said. “I don’t have to wear ear protection anymore in the chiller room, and I’m able to talk to other people without shouting. In fact, the new pumps we installed are louder than the chiller. The Danfoss Turbocor compressors do not use mechanical bearings, so there is no metal-to-metal contact and the noise that goes with it anywhere in the chiller. That’s a benefit I didn’t anticipate but certainly appreciate.”

As pleased as Ryder is with many of the operating features of the chiller, he identifies the unit’s efficient operation and its impact on energy costs as the most important benefit it delivers to Jones Lang LaSalle. A review of the building’s ENERGY STAR statistics from 2009 and 2010 shows an 11.6 percent reduction in gas and electric costs and a 17.8 percent reduction in electrical consumption since the new chiller was installed. Additionally, the building’s ENERGY

STAR score rose from 94 to 97. In fact, so impressive are the improvements to efficiency since Jones Lang LaSalle installed the chiller that the company plans to apply for LEED Platinum certification.

In addition, Jones Lang Salle has been able to pass these savings along to its tenants by reducing its price per square foot. As a result, the building continues to remain competitive in a tight real estate market and experience an occupancy rate of 90 percent, even as newer, and in some cases, LEED buildings are going up around it.

Because the backup chiller operates efficiently at higher ranges, Ryder uses it when he can predict a stretch of 100-degree days, knowing the chiller will stay online and loaded up. But on variable days with cool mornings and hot afternoons that drop off quickly, he runs the new chiller. In those cases, at about 6 p.m. when at least half the building goes off-line and the fans shut down, the Multistack chiller takes up the load change and unloads rapidly enough to meet smaller cooling loads, without any surges or other mechanical issues.

“I just love this chiller!” declared Ryder. “We’re seeing substantial savings as a result of its installation, and it has changed my life completely. I don’t worry anymore about equipment tripping off through the night, which has removed a huge burden from me as far as babysitting the chiller, even when I’m at home.”

“Looking at the 1970s structure, it’s hard to believe, but in 925 L Street we have a 40-year-old building that is delivering the same efficiencies as buildings that have come online within the last three years. That’s pretty remarkable and makes this a story worth telling.”

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