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Case Study – North Carolina Central University

EDUCATION / HEALTH CARE / LODGING / MANUFACTURING / OFFICE BUILDING / RETAIL / SPECIAL



J. West Productions

Carrier Chillers and Fan Coil Units Help Outpace Energy Mandate at North Carolina Central University

OBJECTIVES:

North Carolina Central University (NCCU) serves more than 8,300 undergraduate and graduate students at their 135-acre campus in Durham, NC. Faced with a growing student body and a pressing need for more on-campus housing, NCCU planned to build a new residence hall to complement the historic Chidley Main Hall complex. The building had to be a safe and comfortable learning environment for students, and as North Carolina state law now stipulates that any new construction on state university campuses must be designed to operate with 30 percent greater energy efficiency over the baseline set in ASHRAE 90.1-2004, the university sought heating, ventilation and air conditioning (HVAC) equipment that provided superior efficiency and reliable performance. The university hoped to attain LEED® (Leadership in Energy and Environmental Design) certification for the new hall.

SOLUTION:

North Carolina Central University selected two 200-ton Carrier AquaForce® 30XW water-cooled screw chillers to provide cooling to the new 110,489 square foot residence, Chidley North. With 528 beds, the four-story facility provides 241 double-occupancy rooms with private bath, eleven single rooms for resident advisors, six ADA (Americans With Disabilities Act) accessible suites, a computer lab, multimedia classroom, two-story atrium and multiple laundry, kitchen and study facilities for residents. Suites feature Carrier AirStream™ 42C horizontal fan coil units, which students can adjust +/- 4°F for their comfort. Thanks to efficiency-focused design in envelope, lighting and HVAC parameters, Chidley North has exceeded its projected energy savings of 35 percent to return a 68 percent savings, for a total of 11,135 kBtu saved annually, or \$185,123 saved in energy costs per year. The residence obtained LEED Gold certification.

The Chidley North Residence Hall at North Carolina Central University, with two Carrier AquaForce® 30XW chillers and numerous Carrier AirStream™ 42C fan coil units, delivers 68 percent greater energy efficiency over the ASHRAE 90.1-2004 baseline, saving the university \$185,123 in energy costs per year.

Carrier Chillers Deliver Greater Efficiency and Energy Cost Savings





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"We will be saving money on energy costs at Chidley North for the rest of this century."

Walter Lennon, Project Manager, Department of Design and Construction, North Carolina Central University

SYNOPSIS:

North Carolina Central University (NCCU) serves more than 8,300 undergraduate and graduate students at a 135-acre campus in Durham, NC. Faced with a growing student body and a pressing need for more on-campus housing, NCCU planned to build a new residence hall to complement the historic Chidley Main Hall complex. The new building had to be a safe, comfortable living and learning environment for students, and as North Carolina state law now stipulates that any new construction on state university campuses must be designed to operate with a minimum 30 percent greater energy efficiency above the baseline set in ASHRAE 90.1-2004, the university sought heating, ventilation and air conditioning (HVAC) equipment that provided superior efficiency and reliable performance. With sustainable envelope, lighting, HVAC and water-management features in the plan, the university hoped to attain LEED® (Leadership in Energy and Environmental Design) certification for the proposed hall.

With 528 beds, the four-story, 110,489 square foot Chidley North Residence Hall provides 241 double-occupancy rooms with private bath, eleven single rooms for resident advisors, six ADA (Americans With Disabilities Act) accessible suites, a computer lab, multimedia classroom, two-story atrium and multiple laundry, kitchen and study facilities for residents.

NCCU selected two 200-ton Carrier AquaForce® 30XW water-cooled screw chillers to provide cooling to the new hall. The Aquaforce 30XW chiller is a quiet, reliable, high-efficiency unit that excels at the part-load performance that characterizes the majority of chiller run-time. It uses the non-ozone-depleting refrigerant HFC-134a.

Chidley North suites feature Carrier AirStream™ 42C horizontal fan coil units, which students can adjust +/- 4°F for their individual comfort. These four-pipe cabinet-style units have a minimal footprint and offer quiet operation, perfect for residence life. They require little maintenance, and are easily serviced between terms when the residence hall is emptied of students.

Thanks to efficiency-focused design in envelope, lighting and HVAC parameters, Chidley North has exceeded its projected energy savings of 35 percent to return a 68 percent savings, for a total of 11,135 kBtu saved annually, or \$185,123 saved in energy costs per year. Putting the true impact of these savings in perspective, Walter Lennon, Project Manager, Department of Design and Construction, NCCU, said, "We will be saving money on energy costs at Chidley North for the rest of this century."

The residence also exceeded the university's goal of simply obtaining LEED certification — in fact, Chidley North achieved LEED Gold status. The implied environmental, energy and design values implicit in this distinction are echoed by Walter Lennon. "Research indicates that living on campus improves retention and graduation rates, and increases students' social integration. Each project I undertake [at the university], I keep the thought in mind that I am striving to provide a space that will lift the students' spirits and encourage their learning." With its sustainable, comfortable design, Chidley North is just such a space.

Project Summary

Project Type: New construction

Building Size: 110,489 ft²

Building Usage: Student residence, classroom space, computer lab.

Objectives: Increase safe, comfortable on-campus housing; meet state-mandated energy efficiency marks; obtain LEED® (Leadership in Energy and Environmental Design) certification.

Equipment: Two 200-ton Carrier AquaForce® 30XW water-cooled screw chillers; numerous Carrier AirStream™ 42C horizontal fan coil units.

Major Decision Drivers: Energy efficiency and reliability of Carrier AquaForce 30XW chillers; small footprint, quiet operation and easy between-terms maintenance of Carrier AirStream 42C fan coil units.

Unique Features: Heating and cooling design contributed to LEED Gold certification, delivered 68 percent savings in energy costs above ASHRAE 90.1-2204 baseline.

Installation Date: 2011

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