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SUSTAINABLE DEVELOPMENT

# ROOM AIR CONDITIONER IMPROVES VENTILATION IN **EMORY UNIVERSITY DORM**

## ENEREF INSTITUTE EXAMINES THE BENEFITS OF VENTILATING AIR CONDITIONERS IN A DORMITORY.

**Emory University is the first campus in the United States to install a new energy-saving air conditioning technology in a dormitory.** The energy-efficient inverter-driven PTAC is unique in the way in which it circulates fresh air into each dorm room. Proper ventilation is critical to comfort and humidity control, as well as reducing risks from toxins and microorganisms.

Emory University strives to serve as

**WE WANTED SOMETHING OVER AND ABOVE THAT WOULD GIVE US BETTER AIR QUALITY AND BETTER HUMIDITY CONTROL.**

PETER MORLEY | *Emory University Program Manager*

a model for healthy living and sustainability by reducing the university's impact on the local environment, according to Elaine Justice, Director of Media Relations.

As Peter Morley added, "We normally go for a minimum of LEED Silver buildings." Morley is the Program Manager of Campus Services Planning Design and Construction.

The units installed in Emory's Clifton Tower dormitory have the unique capability to deliver fresh, cool, pre-filtered, non-humid air into the room at a brisk rate of up to 52 cubic feet per minute. And because the units employ inverter-driven technology with variable-speed refrigerant systems, fresh air is continually distributed into the space—without the need to cycle on and off like a traditional single-stage air conditioner.

"I'm a big fan of the inverter compressors," said Paul Kenney of Proficient Engineering, the firm that designed the HVAC system for Clifton Tower.

## ENERGY EFFICIENCY

High-performance buildings should specify variable refrigerant flow inverter-driven technology for their HVAC systems to minimize energy use, as Emory University has done in their Clifton Tower dormitory. Variable refrigerant flow systems use far less energy than single-stage units because the compressors run only at optimally reduced speeds to match the true cooling load of the room.

"Obviously we try to make our buildings as energy efficient as we can," declared Emory's Peter Morley.

Beyond the efficiencies yielded from the variable refrigerant flow technology, numerous studies have shown, conclusively, that the potential to switch off single-room PTACs when rooms are unoccupied results in additional energy savings over the life of the system.

"From a perspective of energy savings, PTACs are a very good thing," stated Lew Harriman, ASHRAE Fellow and Emeritus Director of Research and Consulting at Mason-Grant in Portsmouth, NH.

## THERMAL COMFORT

Along with efficiency, the variable refrigerant flow units (VRF) installed in the Clifton Tower dorm rooms also create significantly higher comfort levels for occupants than single-speed compressor air conditioners would have. They eliminate harsh temperature swings, run more smoothly and quietly, and control humidity more effectively. The same VRF units that provide cooling for the dormitory during the summer months provide winter heating.

"What I can tell you is that walking into every one of those dorm rooms, the cooling and ventilation worked really well," declared Joe Klein, project manager with Reeves Young, the engineering group overseeing the entire building renovation. "I would certainly use that unit again. It was favored by Emory, and it is working really well."

Reeves Young subcontracted the design for the HVAC system to Atlanta-based firm Proficient Engineering, with the goal of increasing fresh make-up air into each room while also reducing humidity.

"We brought all the necessary outdoor air ventilation

**INVERTER-DRIVEN PTAC**

*Emory University is the first campus in the United States to install a new energy-saving air conditioning technology in a dormitory.*

directly through the PTACs. They'll have better control for each room when they're occupied," explained Proficient Engineering's founder, Paul Kenney.

## DESIGNED FOR PORTABILITY

While a building-wide central air conditioning system would have saved dorm room space, the PTACs offered the university a greater advantage: they are inexpensive first-cost units with simple maintenance, where a malfunctioning unit disrupts only a single dorm room. Through-wall PTACs are designed for portability—a spare replacement can restore the dorm room to working order within minutes, while the faulty unit is repaired as time allows. Failure of a central system with multiple ducts, on the other hand, requires sophisticated maintenance, often resolved by an engineer. And the downtime affects the occupants of the entire facility.

"If I managed a building, I'd have a couple extra PTACs on the shelf in a storage area," said engineer, Paul Kenney.

## DOWNSIZED

By introducing ventilation make-up air directly into the dorm rooms through the PTACs, the dedicated outdoor system was downsized considerably to service only the common areas. This reduced the cost and complexity of the dormitory's HVAC design, mitigating the need for additional ductwork and improving the cost of ownership for the university.

## DESIGN-BUILD TEAM

With years of experience in green building development, Reeves Young was charged

**DESIGNED FOR PORTABILITY`**

*Through-wall PTACs are designed for portability. A spare replacement can restore the dorm room to working order within minutes.*

with refabricating, and successfully repurposing, a Howard Johnson hotel into a welcoming dormitory. Emory's team reviewed the drawings to assure they met the university's standards. According to Peter Morley, Emory's Program Manager, the University typically hires the architect and engineering firms separately; however, due to the short construction schedule, they delegated that function to Reeves Young.

"The schedule for this project was really fast, so we let Reeves Young take the reins," explained Morley. "But we really pushed for Friedrich PTAC units because we knew we would get what we needed for the dorm." Morley's team stipulated they install Friedrich's FreshAire inverter compressor PTAC.

As Reeves Young's project manager, Joe Klein, explained, "It was our decision to start with Friedrich. Emory came back and said, 'Here is the Friedrich model we want you to use.' Then we then found out it works even better with moisture, so we said, yes, let's do it."

## HUMIDITY CONTROL WAS A KEY DECISION

With the installation of inverter-driven technology, Emory was anticipating improved humidity control.

"Our engineering services team pushed for the Friedrich units because, like other universities, we've had issues with humidity in our residence halls," noted Morley. "What normally happens with other through-wall units is they just pull in raw outside air that's untempered. Over time, you get humidity issues and, God forbid, mold issues."

Traditional single-stage air conditioners are designed in a way that brings unconditioned humid outdoor air into a space, and fans that run during the off cycle only increase the level of indoor humid air. The Clifton Tower PTACs, on the other hand, will keep the coils cold for long periods of time, thereby continually dehumidifying the room while also optimizing for the most comfortable temperature.

"At first, Emory was reluctant about using PTACs because of their past experiences," recounted Paul Kenney. "But when I explained how these Friedrich systems offer better humidity control and ventilation, they were convinced and then they really pushed for them."

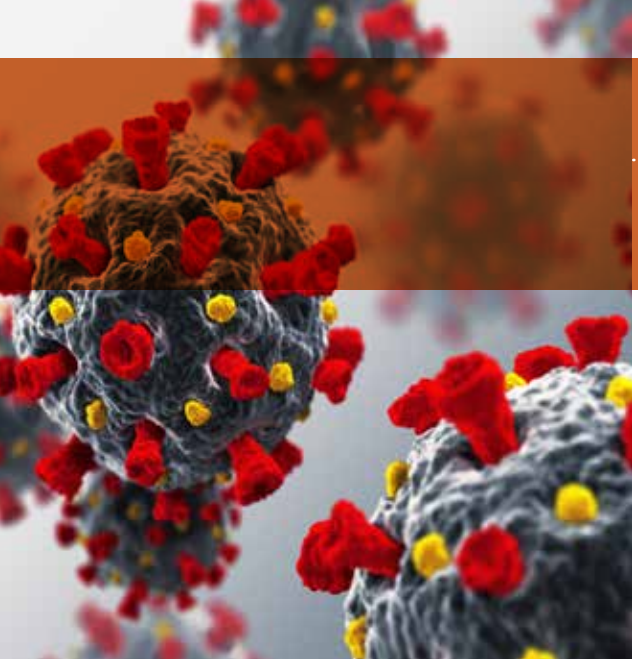
According to Joe Klein, Emory got the results they were looking for. "Pete Morley and I talked regularly throughout the semester and there was never a single complaint from a student," said Klein.

Morley concurred. "A standard PTAC unit meets code. But we wanted something over and above that would give us better air quality and better humidity control."

## ZONE ISOLATION

Zone isolation may offer an advantage of limiting viral spread. Unlike building-wide central systems that share circulated air throughout an entire building, PTACs create individual zones that isolate the envelope of air into a singular circulated air system within a specific room.

"In terms of avoiding the transfer



**ZONE ISOLATION**

*Zone isolation may offer an advantage of limiting viral spread.*

between spaces, you can't do better than PTAC. It's just a zone unit," ASHRAE Fellow Lew Harriman explained. "Certainly, a good thing from a point of view of preventing transfer between adjacent spaces."

The unit utilizes the main evaporator coil and an antimicrobial MERV 8 filter to condition and filter the outside ventilation air. The ventilation make-up air passes through the washable, reusable, and replaceable filter before it mixes with the return air.

Of course, no HVAC system is failsafe, but proper filtering and ventilation can reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air, according to ASHRAE's Environmental Health Committee. ASHRAE is a 125-year-old HVAC engineering society. The combination of zone isolation and better ventilation may offer the Clifton Tower system an edge.

While Lew Harriman was not involved in the Clifton Tower dormitory installation, he said, "I don't know of any individual room units, other than the ones made by Freidrich, that are designed to do a reasonable job of ventilating the space that they are controlling. Friedrich does a better job with ventilation air to dilute the concentration."

## THE *SciBox:*

# VENTILATION AND FILTRATION

***Proper ventilation is critical to reducing pathogen transmission.***

**THE NOVEL CORONAVIRUS THAT CAUSES COVID-19** *spreads via tiny suspended droplet particles, small enough to be inhaled. We naturally create these respiratory airborne aerosols whenever we speak, cough, or sneeze. Depending on the size and shape, these droplet particles can travel a long range from the source. A single cough releases thousands of droplets that can travel at up to 50 miles per hour. With regard to COVID-19 specifically, ASHRAE's Environmental Health Committee has stated that, "Ventilation and filtration provided by heating, ventilating, and air-conditioning systems can reduce the airborne concentration of SARS-CoV-2 and thus the risk of transmission through the air."*

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