the NEWS

eBook

PUBLISHED MARCH 2018


# 2018 AHR EXPO

## PRODUCT EXCELLENCE SPOTLIGHT

A bnp media PUBLICATION

# Contents

# Maintain, Repair, or Replace?

From chemical explosions, sending employees home due to extreme heat, even surgical rooms becoming contaminated, commercial HVACR systems are crucial. They cool everything from occupied spaces to processes and materials. When their efficiency drops off, or the system stops altogether, the commercial contractor is called in to troubleshoot the problem. If there is an issue with the compressor, the situation can get complex quickly. During their more than 20 years in business, AC Component Specialists (ACCS) have seen most of the problems you can have with a screw compressor. As they have gained experience over the years, their products and services have developed to offer a full range of solutions.

The first step to keeping the system operating at peak performance and reducing downtime is maintenance, both inside and out. The key to knowing what is happening inside a system is through oil analysis. These lab tests do not just tell the condition of the oil, they can also indicate issues with contaminants, acid levels, copper degradation, or wear. Performing oil analysis at the end of the cooling season gives the technician time to plan for taking the system down, should any upkeep be required. When needed for periodic repair, parts are stocked at ACCS.


Tools of the trade: ACCS Oil Test Kit, ACCS Oil Change Kit, Copper Plate

"Maintenance is the best way to prevent problems with a system," said Don Day of ACCS. "Everybody knows to change the oil in their car, and a compressor is no different."

He recommends annual oil analysis to determine the system's condition. In addition, ACCS recommends service valves be installed if not already present. This will save time

and help protect the system during future maintenance.

Even the most well maintained system can experience compressor problems. Determining the best long-term solution sometimes means replacing the compressor. Lead time is usually less than a week, with most shipping out next day. In rare instances, there is a critical need for a compressor. In those cases, it may be possible for ACCS to get the compressor to the site in one day.

Troubleshooting, as a unique specialty, is offered. The contractor can call ACCS to get a handle on an issue. A HVACR compressor problem can be a challenge, and the decision to repair or replace a compressor can be the difference between thousands of dollars in cost. The experienced ACCS team can help provide the technician with options.

The most common issue to troubleshoot is a compressor loading problem. The compressor will either not be able to load or unload properly. The cause can be a bad solenoid or copper plating. Copper from the system migrates and adheres to the relatively hot components in the compressor. As the copper accumulates on the slide valve piston walls and rods, the O-ring degrades, resulting in loading problems.

Another compressor failure is due to power issues.

"One of the failures we see most is from contactors burning up or sticking, low voltage, or unbalanced lines." according to Day. "You will also see compressors fail because something else in the system failed, like a TXV not working. That can cause refrigerant slugging or starvation."

Mike Skidmore of ACCS agreed.

"A high amount of the compressors that come in have the motor burned up," he said. "The other reason we see them come in here is because the system is not maintained."

If the compressor is being replaced due to a motor failure, it is highly recommended that the technician check the system for contaminants, the contactor points, torque on the power lugs, supply voltage, and phase rotation before power is applied. Once the new or rebuilt compressor is installed, it should run trouble free with proper maintenance.

After performing repairs or installing a compressor, the most common fail on startup is related to the application of power. Connecting power with the correct phase rotation is critical to prevent the compressor from running backwards.

When troubleshooting indicates an internal compressor component failure, most of the time compressor replacement is presented as the only option. Depending on the type of issues, it may be possible to open the compressor and replace the failed component. Some technicians will elect to replace the part themselves, and some will rely on ACCS to send a skilled team to the site and assist with the repair.

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- ✓ Oil Analysis Program
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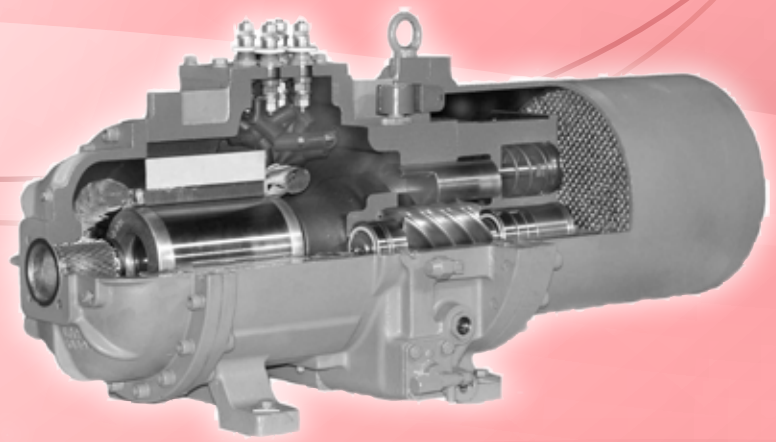

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**WWW.ACCSCOMPRESSOR.COM**

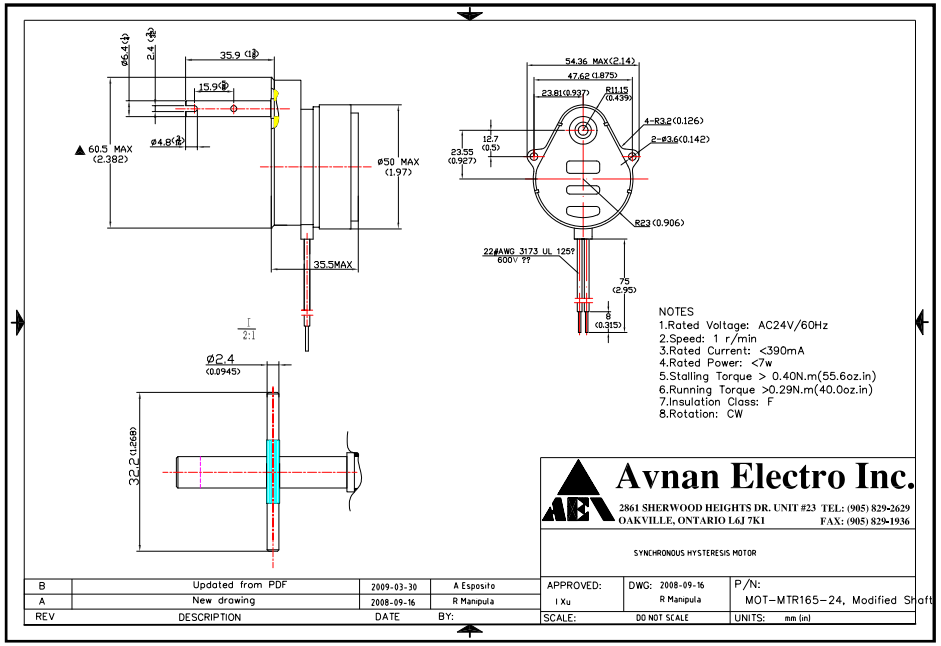
# Custom Built Motorized Radial Damper

Alan Manufacturing worked with a globally recognized HVAC manufacturer to develop a custom motorized radial damper. Although radial dampers are not uncommon, motorized units are, as well as the size requirements of this project. These factors combined presented a number of significant challenges and would put to the test the team's ability to deliver an innovative, cost-effective solution.

At just 6 inches in diameter and overall dimensions of 6.375 x 6.5625 x 3.25, this project would require Alan Manufacturing to heavily modify one of their standard products and manufacture a number of custom components, all assembled to very tight tolerances.

It would also have to provide robust performance and deliver a long service life while complying with stringent budgetary requirements.

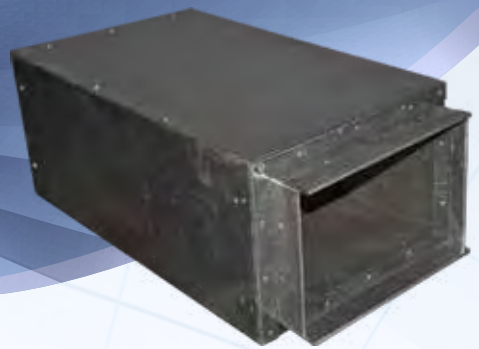
Alan Manufacturing engineered a design with power open and spring close operation, utilizing a 24 VAC synchronous motor to drive the damper actuation. The damper blades were precision laser cut from a larger unit and mounted on a central hub. The unit is composed of high-quality 24 gauge galvanized steel,which provides an elevated level of corrosion resistance as well as high



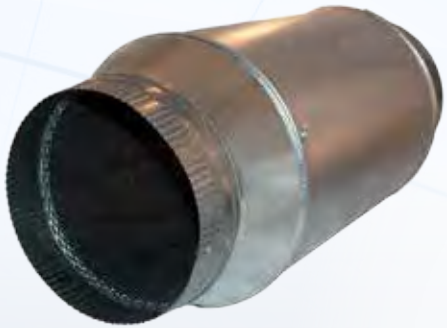

strength. Through the efforts of their skilled staff, and equipment, such as tubular riveters and various types of precision fabrication systems, the company was able to meet all of the design criteria.

After only 10 days of extensive testing and validation, the first units were delivered to the customer's Orlando, Florida, location, where they were successfully integrated into a larger assembly. In the end, the customer was very pleased with their ability to provide them with an economical solution for this project.

# ALAN
## Manufacturing Inc.



Duct Silencer



NEW!! Fresh Air Intake

Wireless Damper System

Aire Grill Control System

Alan Manufacturing has been designing HVAC dampers, duct supports, and zone control systems for over 25 years. We specialize in providing **CUSTOM** products, and in helping **OUR** customers, help **THEIR** customers - be more efficient, save money, and improve indoor air quality

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**3927 East Lincoln Way, Wooster, OH**
**800-435-2526 www.alanmfg.com**

SMACNA HARDI ACCA

# Why Should You Recommend the Installation of a 5-2-1 Compressor Saver?

## WHEN THE A/C STARTS...

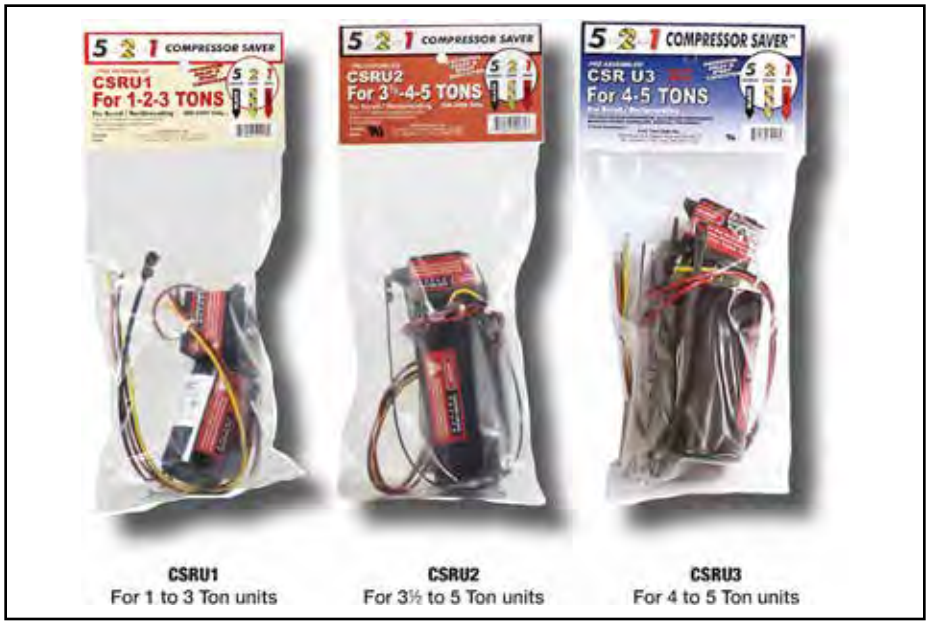
- Do lights dim or flicker?
- Does the equipment sound labored to start or are there strange noises coming from the A/C unit?

If the answer is yes, then a 5-2-1® Compressor Saver® can be used to eliminate these problems. The logic behind these devices is quite simple; they significantly reduce the time the compressor draws high amperage at startup. This is accomplished by combining a powerful multilayer starting capacitor with a smart switch and the 5-2-1 technology to safely give the compressor the precise "boost" during the critical startup period. As a result, the compressor stabilizes faster, length of exposure to damaging electrical heat is reduced, and all the while it's drawing less power. Less power means less money on energy bills, too.

Over 50 years ago, all A/C systems came from the factory with a 5-2-1 method start component already installed. However, to cut costs, A/C companies chose to leave these components out, leaving the consumer uneducated and all the worse. As a result, most technicians only installed (hard) start kits after customers


had already begun to experience trouble with the A/C. But now, the full benefit that a 5-2-1 Compressor Saver has on a residential air conditioning system is realized. A 5-2-1 Compressor Saver should be installed for every residential A/C system to protect and extend the life of customers' equipment. The 5-2-1 Compressor Saver is an aftermarket item that should be offered to every client because it extends the life of the compressor, it extends the life of the A/C unit, it saves the consumer money, and it allows the A/C to run more efficiently.

The compressor on your air conditioner consumes more power on startup than any other device in your home. A compressor may consume 45,000 watts of power while the motor is trying to start, which is 10 times more energy than it uses after its stabilized and running. To put this in perspective, a large burner on an electric stove only




consumes 2,000 watts on high power. In a single cooling season, the A/C compressor may start up more than 6,000 times. Each time cycling on and off and being exposed to electrical heat that can damage the compressor's motor. The compressor is truly the hardest working component in any residential HVAC system.

For this reason, it is extremely important that the compressor spend as little time as possible in the startup period. Even though the compressor is exposed to this high amount of heat for only a short period of time, these extremes cause wear and fatigue that reduce the longevity of the entire system. The 5-2-1 Compressor Saver solves this problem by shortening the startup period. The Compressor Saver will reduce the inrush period by 50 percent. This will extend the life of the compressor and


add years to the life of the A/C system. After learning how to check inrush amperage readings before and after a 5-2-1 Compressor Saver installation, technicians and customers are astounded by the results. The result is overall customer satisfaction.

For optimum system performance, we also suggest the technician check the run capacitor when installing a Compressor Saver. If the run capacitor is weak, the system will operate at higher amperage, and this will also shorten the compressor's life.

We are proud to be the first company to make available the 5-2-1 technology in three different models that will service most air conditioning compressors. Technicians can install this valuable solution for homeowners in less than five minutes. A 5-2-1 Compressor Saver should be installed for every residential A/C system to protect and extend the life of customers' equipment. Save a compressor, save a customer.

# 5-2-1® COMPRESSOR SAVER®

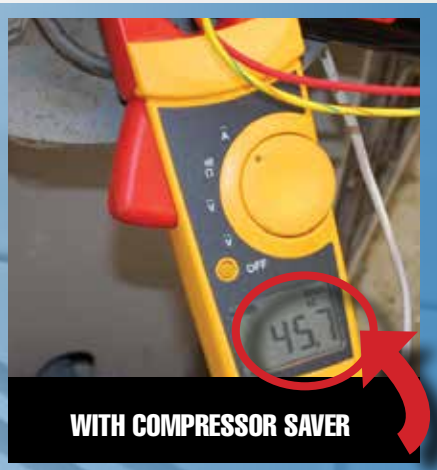
## REDUCES DAMAGING IN-RUSH CURRENT UP TO 50%!

## Are your customers protected?


**CSRU1**
For 1 to 3 Ton units

**CSRU2**
For 3½ to 5 Ton units

**CSRU3**
For 4 to 5 Ton units




WITH COMPRESSOR SAVER


WITHOUT COMPRESSOR SAVER

### 5-2-1® Compressor Saver®

*Significantly reduces* the time the compressor draws high amperage at start-up by combining a powerful multi-layer starting capacitor with a smart switch to safely give the compressor the burst it needs to start up quickly and reliably, while drawing less power.

- ☑ Extend the life of your compressor
- ☑ Reduce damaging in-rush current by **up to 50%**
- ☑ Save homeowners money by using less energy
- ☑ Start air conditioners that are breaking down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# VRF Saves Energy at People's Petroleum Building

## CHALLENGE:

The outdated and inefficient chiller system requires complete replacement. Additionally, a floor-by-floor installation schedule is required to lessen the disruption for tenants, as well as spread the cost over multiple years. A highly efficient, modern heating and air conditioning system will replace the old chiller system without any modifications to the historical architecture or structural integrity of the building.

## SOLUTION:

A unique team effort between the manufacturer's representative, general contractor, owner, and architect was required to coordinate the floor-by-floor installation that would not modify the existing architecture. A Daikin Variable Refrigerant Volume (VRV) heat pump system was installed, primarily with ceiling-mounted cassettes to provide a state-of-the-art HVAC system.

## CONTENT:

Centrally located in Tyler, Texas, at the west end of the downtown square, the People's Petroleum Building first opened its doors Nov. 5, 1932, as the tallest high-rise building in East Texas. Originally named People's National Bank after its largest tenant, the 1930's era art-deco office building is a prominent historical landmark that included several oil companies and related businesses that thrived during the East Texas oil boom. Prominent oil businessmen H.L. Hunt and D.K. Caldwell were some of the original tenants. At the time, the 15-story, 85,000-square-foot structure was

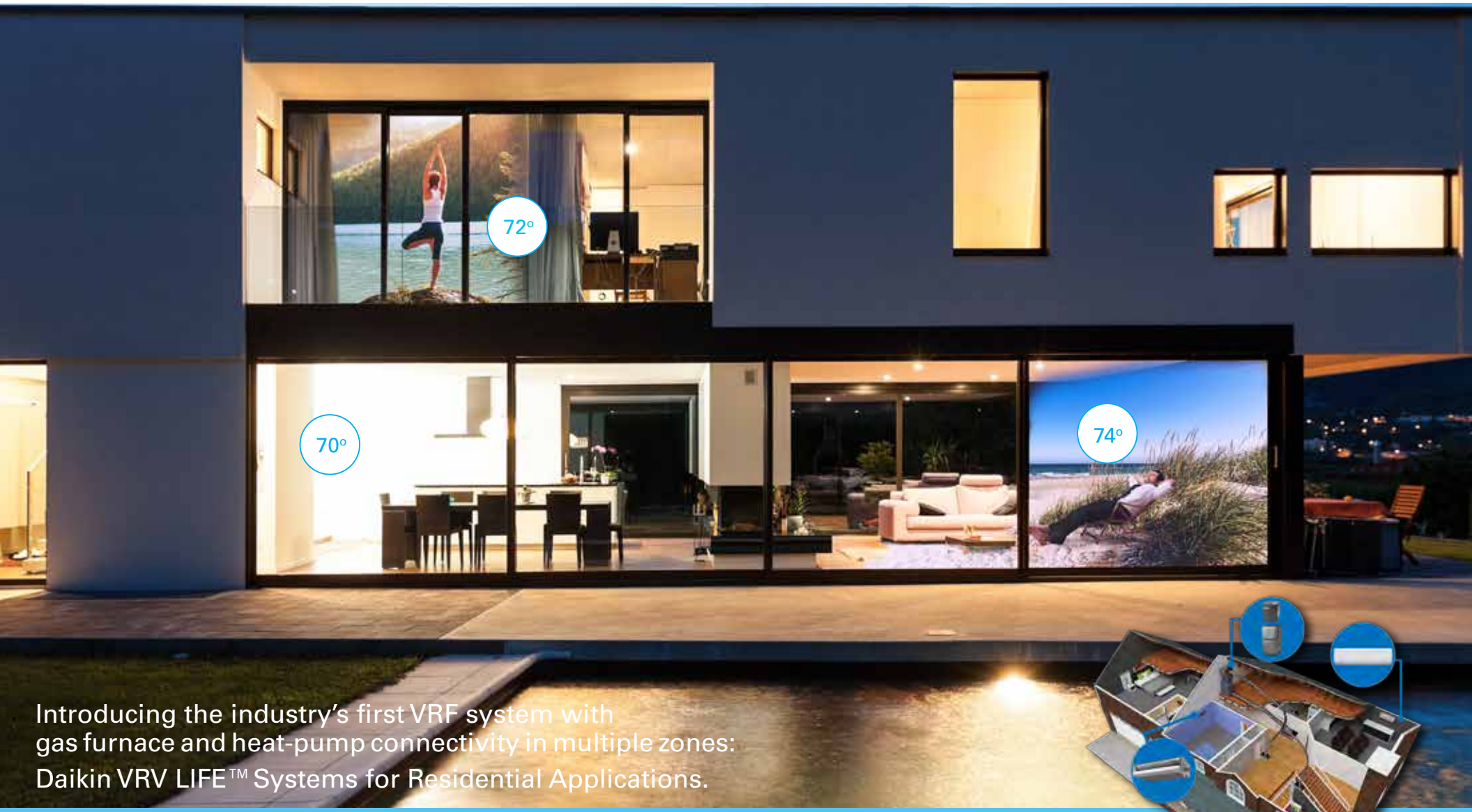
considered one of the largest construction projects west of Mississippi. In 2012, the People's Petroleum Building was honored with the National Register of Historical Places and also recognized as a Tyler Historical Landmark.

After 70 years, the owners of the historic People's Petroleum Building were ready to renovate and modernize the structure while maintaining the existing historical art-deco architecture and design. Outside, the original buff brick was restored along with the street level facades of polished black granite that frame the entry. Inside, the building retains the original grand marble and limestone entrance, a grand art-deco banking lobby, marble-faced elevator entrances, polished aluminum handrails, and timeless limestone and terrazzo floors. To minimize disruption to the tenants, renovations were completed one floor at a time beginning in 2012. The renovation included a state-of-the-art heating and air-conditioning system. The outdated chilled-water system, installed in 1969, was replaced with an efficient, reliable, and quiet Daikin VRV system that will provide many years of controllable comfort for the building's tenants. From the owner's perspective, they were looking for a highly efficient system to reduce utility expenses, integrate with their existing building management system, save space, maintain the historical architecture, save on annual maintenance expenses, and spread the installation cost over several years as they completed the renovations one floor at a time.

All 15 floors of the historical, mixed-use building, including a restaurant, retail, and office space, were completed in 2017. Energy savings between 20-30 percent and annual maintenance savings of 50 percent is estimated with the Daikin VRV system when compared to the existing chilled-water system. Unobtrusive, ceiling-mounted cassette units were installed flush with the ceiling throughout most of the building. Several ducted concealed and floor standing concealed units were also fitted to hide above ceilings and behind walls as necessary to maintain the original historical interior architecture. A few wall-mounted units were also used for individual, unique spot cooling applications. A Daikin i-Touch Manager control system was installed to integrate the Daikin VRV heat pump system with the building management system and individual Navigation Remote Controllers were used to control each zone.

DAIKIN
AIR INTELLIGENCE™

NEW VRV LIFE




## Introducing the industry's first VRF system with gas furnace and heat-pump connectivity in multiple zones: Daikin VRV LIFE™ Systems for Residential Applications.

Daikin's next generation VRV LIFE systems offer a unique approach to comfort with a wide variety of whole home solutions: multi-zone heating and cooling, dual-fuel heating, compact footprint, flexibility to mix and match ducted and duct-free indoor units, and long piping lengths! Available from 2 to 5-Ton models.

Learn more at daikincomfort.com

***At Daikin, "Air Intelligence" is delivering indoor comfort – whatever the conditions.***

# Engineering Tomorrow Builds Sustainable Heating System for Pennsylvania Forest Bureau

For Pennsylvania's Buchanan State Forest, which occupies roughly 70,000 acres, critical staff, like rangers, foresters, and entomologists, need to operate out of a central hub. But, faced with challenges in its previous office space that left forest district employees scattered in various buildings, the state's Bureau of Forestry decided to construct a brand-new Resource Management Center in McConnellsburg, Pennsylvania.

The new center, built in 2016, comprises two structures: a 9,700-square-foot main building, which provides administrative space, and a 6,000-square-foot storage building that houses equipment and supplies.

## CONSCIENTIOUS CONSTRUCTION

For construction, the Bureau of Forestry worked with the Department of Conservation and Natural Resources (DCNR), whose vision is to conserve and maintain the state's natural resources. Thus, the Resource Management Center was constructed under the USGBC's LEED system — meaning sustainable low-energy, high-comfort solutions were the standard for every aspect of the new center, including the heating system.

"The main heat source for both buildings is radiant slab heat, which is PEX tubing in concrete," said Jason Adams, a Pennsylvania DCNR mechanical engineer.

Hydronic, or radiant, heat is achieved by running hot water

through loops of plastic tubes in concrete floors, allowing heat to radiate evenly across the entire floor surface. Pumps work to constantly circulate newly heated water into the plastic tubing, while the concrete absorbs the heat, and the cooler water is returned to the boiler to begin its journey again.

Ranking high on energy efficiency, hydronic heat is more effective because it utilizes conduction and radiation to heat the floor and other objects in the space rather than heating the air, allowing occupants to feel comfortable while optimizing energy performance.

But, to further improve energy efficiency and reduce the system's environmental impact, DCNR opted to design a system that used a biomass boiler in lieu of a gas- or oil-fired boiler. The boiler utilizes locally produced wood pellets as fuel, has a rated heat output of 102,000-341,000 BTU/hour, and can modulate its output based on the building's heating demand. The biomass boiler is connected to a 750-gallon insulated buffer tank, which

Carl Longenecker, founder of ATI Systems who worked with Adams on the system, explained is because "the boiler itself is so efficient that it cannot tolerate being cycled on and off like a traditional fossil fuel boiler." Biomass systems need time to ramp up and begin burning the fuel, which doesn't coincide with varying day-to-day temperature needs.

While the boiler is running at a consistent pace, the temperature to which it will heat the buffer tank is determined by an outdoor reset controller, allowing the outdoor temperature to determine the temperature of the tank, avoiding unnecessary heating and improving overall efficiency.

## PRECISE CONTROL, COMFORT, AND SAFETY

The outdoor reset also determines the water temperature at any given point before it can circulate through the 15,000 feet of plastic tubing laid throughout the center's floor.

"The cooler it is outside, the warmer you want the floor to be," explained William Boss, Danfoss sales manager. "Since the system isn't being turned on and off, the water temperature in the concrete slab has to be continuously adjusted in real time."

To achieve a responsive water temperature, the hydronic system relies on ESBE VRG130 three-way valves and ESBE ARA600 motorized valve actuators from Danfoss. The VRG three-way valves take two streams of water — one at a higher temperature from the buffer tank and the cooler water returning from the tubing in the floor — and mixes them at the right ratio to create the optimal fluid temperature, according to the ARA600 motorized valve actuator, which is electronically connected to the outdoor reset feature.

"The outdoor reset and Danfoss valves are critical for creating the correct water temperature, so the space isn't over-


or under-heated," Longenecker said.

The Danfoss valves are made of corrosion-resistant brass for the highest performance and longevity and offer multiple benefits, including precise control, easy installation, optimal comfort, and tangible energy savings.

"ESBE valves are engineered to provide highly accurate flow control for precise control over the mixed water temperature — which can directly translate into energy efficiency," Boss continued.

## CONSISTENT AND EFFICIENT

Resource Management Center staff moved into the new facility in January 2017.

"According to the maintenance staff at the district, the system provides a nice, comfortable heat, and they've had no issues with the boiler," said Adams.

Thanks to high-quality and reliable technology provided by Danfoss, the hydronic heating system can perform consistently, effectively and efficiently. What's more, district staff reported burning 20 tons of wood pellets to heat both buildings, which converts to 15.2 BTU/hour per square foot.

"The hydronic heating solution is a great complement to our overall focus on sustainability," said Adams.

# Listen to the Voice of the Customer

So many times, products are developed and brought to the market based on engineering ideas. Likewise, many times marketing and customer needs get overlooked, and while the product may meet many needs, it fails to really perform the ideal needs of the customer.

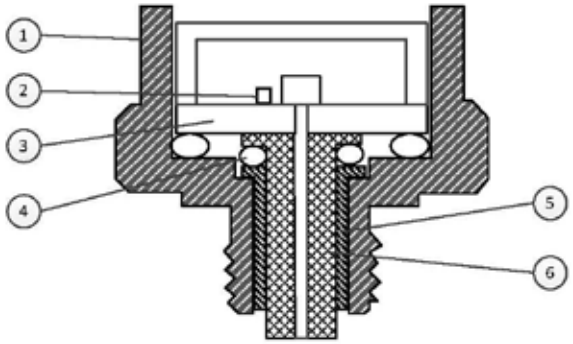
DunAn Sensing, a relatively new startup company for pressure transducers, set out to make the most accurate, reliable, and affordable pressure transducer on the market. Targeting the HVACR market, the company talked with its customers and learned that they were using the pressure measurement of the refrigerant to calculate superheat.

Superheat refers to the number of degrees a vapor is above its saturation temperature (boiling point) at a particular pressure. Superheat gives an indication if the amount of refrigerant flowing into the evaporator is appropriate for the load. If the superheat is too high, then not enough refrigerant is being fed, resulting in poor refrigeration and excess energy use. If the superheat is too low, then too much refrigerant is being fed, possibly resulting in liquid getting back to the compressor and causing compressor damage.

With increasing energy costs and growing demands for more efficient cooling systems, the need for accurate superheat measurements has become more important for more accurate control.

Part of the calculation for superheat is a need to measure the temperature of the refrigerant. At this point, the normal instinct would be to focus back on the pressure measurement. But, in an effort to really understand the customer needs and application of the pressure transducer, DunAn Sensing pushed further.

Where do you get the temperature input? Turns out that the temperature is measured from the outside of the refrigerant pipe and several inches away from the point of the pressure measurement. With some research, DunAn Sensing learned that when calculating superheat, it is ideal




Medium

1- Housing (Brass/Aluminum/Stainless Steel

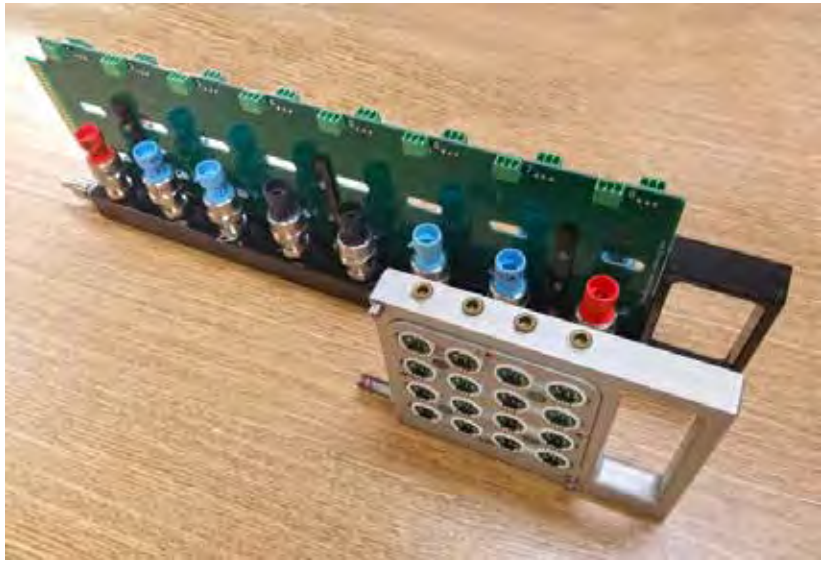
2- Thermistor NTC or PTC, surface mount

3- Ceramic Alumina

4- O-ring

5- High Temperature plastic bushing

6- Copper or Silver busing



to measure the temperature at the same point as the pressure measurement.

Their pressure transducers where already designed to included DURAsense®, which means the design incorporates accuracy, reliability, and affordability. So, how do they now include temperature and still maintain the DURAsense design of accuracy, reliability, and affordability?

The initial attempts didn't provide the results they wanted, so the company went back to the drawing board and developed the DURAsense Core. The Core really helped on many fronts. The ceramic core package allows for isolation of the temperature sensor, as well as good thermal conductivity via a copper tube that extends down into the media being measured. With the improvements, they are now able to get better results when compared to the temperature sensor strapped to the outside of the refrigerant pipe.

The DURAsense Core also now incorporates the electronics, thereby allowing the company to test the DURAsense Core without a pressure port or housing, keeping the test fixture mass to a minimum and removing the need to wrench each device to the test fixture. This allows for high volume manufacturing and affordability while maintaining accuracy and reliability.


# DUNAN SENSING

## MEASURING PRESSURE MAKE SENSE WITH DURAsense®

- accuracy
- reliability
- affordability

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# Gettysburg Hospital Overhauls Cooling System

Originally constructed in 1921, WellSpan Gettysburg Hospital needed to improve facility operations to ensure critical patient care functions.

"The key need was to modernize mechanical systems to assure reliability of critical patient care," said Joe Lehigh, a 27-year member of the hospital's engineering team. "High on the list was cooling equipment."

The WellSpan engineering team worked with Baltimore-based engineers, Leach Wallace Associates, and Manchester, Pennsylvania-based mechanical contractors James Craft & Son Inc.

With cooling towers at the top of the list, their replacement was a five-year effort. The old cooling towers, with 900 tons of cooling capacity, were nearing their serviceable end. But new motivation emerged, propelling an effort to replace the towers: a longer-range expectation of the hospital's expansion.

## DESIGN SOLUTION

The challenge: The existing cooling towers were constrained on all sides by brick walls. This defined the footprint — immovably.

The WellSpan engineering staff worked with multiple manufacturers to review turnkey replacement solutions for the failing evaporative coolers. The engineering managers deployed their design experts and Leach Wallace. Together, they formulated a plan to replace the failing equipment in the same footprint and provide additional capacity for N+1 redundancy.

The firmly defined space for the evaporative coolers, and the need for 1,200 tons of evaporative cooling equipment, negated all but one manufacturer — EVAPCO.

According to Kurt Juergensen, mechanical engineer at Leach Wallace, the existing cooling towers were connected to three 300-ton centrifugal chillers.

"Clearly, the new coolers would need to meet their need for evaporative cooling and have the additional

capacity for a new, 300-ton chiller needed for the hospital's anticipated expansion."

## EVAPORATIVE SOLUTION

Specified for the hospital were two EVAPCO AT induced-draft, counterflow cooling towers. With the smallest footprint in the industry for coolers of their size, the AT towers provide external access to fully enclosed motors and belts and are rated for 2,063 max gallons per

minute, each with two modular, 300-ton cells, for a total of 1,200 tons of evaporative cooling capacity.

The cooling towers also have galvanized steel access ladders and platforms, ideal for service and maintenance work and easy access to fan motors and water distribution components.

"With EVAPCO, the ease of service and maintenance is a big improvement over our previous system. Before, we had to crawl into our old units to maintain them. Now, everything's available from the exterior," Lehigh said.

The new towers are more energy efficient, and there is less wear on motors, belts, and bearings.

"Now we know that our ultimate mandate — no downtime — is as close to a full guarantee as we can make it," Lehigh said.

**Haier** Ductless

Higher Comfort, Haier Living

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# Haier's MRV-S


MRV-S bridges the gap between the 2~4 zone multi-split residential applications to three phase VRF light commercial needs. Haier's MRV-S can have up to 9 indoor units with 9 zones of temperature control and comfort. With a 984 ft. refrigerant line length, multi-story applications and large building application are now possible.

- **208/230V, 1-phase • Outdoor capacity 3/4/5 Tons • Connect up to 9 indoors**
- **Refrigerant pipe length Up to 984ft • DC inverter compressor and fan**

# Haier Ductless

Higher Comfort, Haier Living


Haier Heat

## Heat or Cool Any Space in your Home

**Industry Leading Performance. Arctic Series keeps 100% heating capacity at 5°F and toasty warm air at -22°F.**

**World-Class Quality and Design, Built and Manufactured by Haier**

**Easy installation USB Wi-Fi module Connects to Smart Air App**

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BACK TO CONTENTS

# Upgrade Cooling System Support Following Re-roof

This project involved the installation of Green Link KnuckleHead Rooftop Supports to improve the support structure of a rooftop cooling system during a commercial re-roofing job. The building was an approximately 28,000-square-foot facility housing a large internet service provider located in Southfield, Michigan.

The cooling system included three large chillers as well as associated pipes and conduit that were originally supported in some areas with wood sleepers sitting on top of polypropylene bases and in other areas with galvanized steel curbs. In places, the chiller feet were cantilevered on the steel curbs. EPDM membrane was used to replace the original coal tar roof. The chillers and piping were gently lifted during tear-off and membrane installation, then reset using two types of Green Link KnuckleHeads.

To support the chiller feet, paver KnuckleHeads were selected. But, because chillers are sensitive to leveling — fans operating in units that are not level will burn out their bearings more quickly — the paver supports were modified. Green Link specializes in custom engineering, so the standard 7-inch paver head was re-engineered to 12 inches to comfortably accommodate the full footprint of the chillers, eliminating any cantilevering.

Chem Link M-1® adhesive/sealant was used to bond KnuckleHeads to polyester risers, which were loose laid onto EPDM slip sheets. Because KnuckleHeads are height adjustable, a level, evenly distributed load was achieved. In addition to the modified paver KnuckleHeads, strut KnuckleHeads were installed to support Unistrut steel channel for elevating piping and conduit. Each KnuckleHead, molded from reinforced nylon, is able to support 600 pounds. The reinstallation of the cooling system was completed in a day.

# Easy Up.

KnuckleHeads are engineered to elevate and secure pipes, conduit, channel, solar arrays, cable trays, ductwork and more.


Easy-to-install KnuckleHeads can be loose laid, mechanically fastened or adhered to a single ply membrane with GREEN LINK Adhesive/Sealant. Molded from rugged glass-reinforced nylon, each Knucklehead can carry up to 600 lbs. of weight and provide elevations up to 18". KnuckleHeads are much lower cost than most pipe support systems on the market and easy installation keeps labor costs down.

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# KeepRite Refrigeration Quiet Unit Technology Behind Cooler On Wheels

KeepRite Refrigeration Quiet Condensing Units are designed for refrigeration duty and are ideally suited for applications where space limitations, energy efficiency, or sound levels are of concern.

The Quiet Unit is part of KeepRite Refrigeration's Smart3 family of products — an innovative approach to offering solutions to meet clients' needs for commercial refrigeration systems, products, and services. This suite of Systems Savings Solutions has been engineered specifically to meet the needs of today's refrigeration professional.

We recently sat down to speak with Steve Lowry from The Master Group and his client, Shawn Robinson of Shawn Robinson Refrigeration, to talk about a unique use of KeepRite Refrigeration products — a walk-in mobile freezer/cooler unit that's cold and quiet.

***KeepRite Refrigeration:*** *Steve, How did you hear about this innovative cooler trailer project?*

**Steve:** Shawn already had a ship container that he transformed into a cooler, so the idea is not entirely new. He supplies the shipping container cooler to a few of the local stores whenever they are having specials and need additional cooler capacity.


Shawn is involved in his community, and he volunteers each year to help run the Navan Fair. The shipping container has some drawbacks, and Shawn thought he could improve on the first generation design to create a more efficient and effective cooler/freezer for the local fair and other area clients.

***KeepRite Refrigeration:*** *What were the design challenges for this project?*

**Steve:** We had to find a solution for the condensing unit. The evaporator and the cooler box were pretty straightforward, but we needed to find a condenser solution that

traveled well — one that didn't bang around going down the road. Our timing was good, as KeepRite Refrigeration had recently announced the little scroll KQ Condensing Unit, the ultra-quiet model. We felt the scroll compressor would travel well on the road, and the new, quieter condenser would be perfect for our needs.

***KeepRite Refrigeration:*** *How important is having a Quiet Unit in this application?*

**Steve:** It was very important. In fact, it was the main reason we went with the KQ unit. When we have the cooler trailer on a noisy job site, it's not a big issue because noise is irrelevant. But in other settings, like the Navan Fair for instance, the noise level is a big issue.

***KeepRite Refrigeration:*** *Are you satisfied that this is a decent solution with positive results?*

**Shawn:** I'm very happy with the results for two reasons. The first reason is that we were able to mount the pump on the front of the trailer because it's so quiet. The second reason is the size; it's nice and compact. If you look at a normal KEHA or KEZA, the comparable physical size of the KQ is about half, which made it that much easier to mount on the tongue of the trailer.

***KeepRite Refrigeration:*** *How does the unit switch from cooler to freezer?*

**Shawn:** It's wired up as a 419 with a bi-switch in it, so it can run as a cooler or a freezer with the flick of a switch.

***KeepRite Refrigeration:*** *How is the unit powered, can it run off a generator?*

**Steve:** Yes, there's a twist lock generator plug, so if you have a generator with an extension cord, you can plug it in. If you have a regular plug, that plug will feed a breaker box. We have circuit breakers for the compressor, the evaporator, the lights, and the drain line heater, everything is fused. It's already pre-wired and ESA approved — 30 amps, 220 with a neutral. You can run it off a generator or run it off power.

***KeepRite Refrigeration:*** *And finally, a question to both of you, why choose KeepRite Refrigeration components for this project?*

**Shawn:** "We've been dealing with Steve since the mid-'90s and we have a good track record with KeepRite Refrigeration. We use their products on a regular basis. We use the standard series KEHA, KESA, or the KEZA Series. We've never had an issue with them. They have a very good track record, and that's the biggest thing for us. When we do rent it out for a weekend or a month, we don't want any breakdowns.

Any problems we have had have been dealt with right away. KeepRite Refrigeration is very good for that. Our after-sales service is good. They look after us very well and we have had very few issues, so it's easy to promote a product like that.

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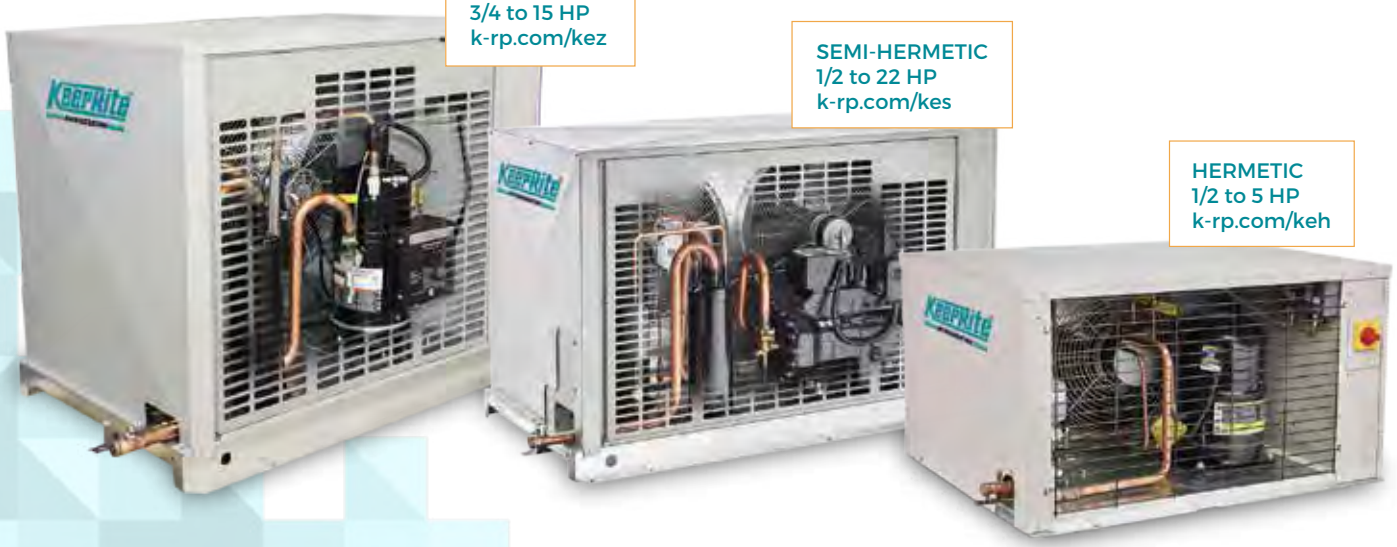


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# Mixed-use Hollywood Property Renovation Garners Coveted LEED® Gold Certification

## CHALLENGE:

Originally built in 1938 as the home of CBS's Hollywood headquarters, Columbia Square previously housed the CBS Radio Network's West Coast facilities, as well as CBS's original Los Angeles television and radio stations. Throughout the years, the complex grew famous in its own right and in 2009 was designated as a Los Angeles Historic-Cultural Monument. Thus, when Kilroy Realty embarked on the renovation of the complex, their goal was to create a modern interpretation of the iconic 4.7-acre studio lot. The new LEED® Gold, mixed-use development would revamp the Hollywood classic to become an urban oasis complete with workspaces, restaurants, walkable shopping, and residential living.

## CRITERIA:

As part of the large-scale 685,000-square-foot project, the team desired to not only modernize the look and functionality of the complex but also improve its sustainability and certify it as a LEED project. This meant that the new HVAC system needed to not only effectively condition the spaces but also be highly efficient and contribute points towards achieving LEED certification. In


addition to superior efficiency, Kilroy wanted a solution that had an advantageous total cost of ownership. Lastly, the system had to have the design flexibility to accommodate the shell and core fit-out so that as tenants leased space within the property, they could be incrementally built out and configured to meet their various needs.

## SOLUTION:

The project initially called for a water source heat pump and package unit system, but it was determined this was not going to meet the needs of the design or have the necessary

energy efficiency. As a result, the Columbia Square team, working with LG's Applied Rep DMG Corporation, chose to switch to LG Variable Refrigerant Flow (VRF) technology to deliver on all their requirements. The solution was comprised of 1244 tons of VRF using 44 Multi V™ IV outdoor units. LG VRF was selected because its energy-efficient operation could support the buildings' numerous glass windows and open spaces while still delivering high energy efficiencies that contributed points toward achieving the esteemed LEED Gold designation.

The modularity of the LG VRF solution provided the needed flexibility for a two phased, core and shell approach to installation. In the first phase, the outdoor condensing units were set on the roof and piped down to the floor. In the second phase, the heat recovery boxes were installed, and the tenants selected their indoor units. High static ducted units were used in the commercial spaces. In the residential tower, air handlers were installed so that they could be accessed from the hallway, making maintenance easier by allowing them to be serviced without disturbing the residents.

The combined modularity and efficiency gave Columbia Square the cost-effective solution they desired.

With the ability to operate the system incrementally, Kilroy Realty was not paying to condition unoccupied spaces. Additionally, they could use the heat recovery technology of LG's VRF system to balance the demands across the spaces to achieve even greater operational efficiency, which further reduced operating costs.

## RESULTS:

The renovation was completed without diminishing the iconic structure, and in 2017, Columbia Square received the Conservancy Preservation Award.

The energy-efficient LG Multi V VRF system met all of Columbia Square's criteria with flawless performance and competitive all-in costs when compared to a traditional system. Kilroy Realty is pleased with the results of the system and are looking at ways to incorporate LG VRF in future projects.

"LG became a partner and really helped with our air conditioning solution," said Richard Mount, SVP of Construction Services, Kilroy Realty Corporation. They worked with us hand-in-hand as we developed the drawings for the project and as we worked on the engineering. They said they would support us and help us understand how it would all fit together, and they stepped up and got it done. I'm very satisfied — so much so that I'm working on two additional projects now where LG has become the spec for the project. We're using their performance as the guideline as we design these other buildings."

Jason Lord, Sales Engineer at DMG Corporation added, "LG is great, they are a strategic and very valuable partner for DMG. Any building owner looking to take advantage of the most state-of-the-art and efficient heating and cooling equipment on the market should take a strong look at LG VRF." N

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# Heat Pump Establishes New Standard of Efficiency

The Comfort-Aire/Century line of VMH-Series single-zone and multi-zone mini-split heat pumps establishes a new standard of efficiency and comfort for the growing ductless market, as well as offering a low-cost entry for the competitive contractor and less SKU's for corresponding distributor. Available with a wide variety of indoor air handlers (high-wall, ceiling cassette, floor/ceiling console, floor/wall console, and ducted), the VMH-Series is well suited to both residential and light commercial applications. Sunrooms, cabins, conference rooms, guest rooms, residential additions, park-models or tiny-houses, and offices to large open areas — or tiny vestibules — the VMH-Series can serve with distinction.

Performance at low temperatures is where the Comfort-Aire/Century products really shine; with operating ranges in cooling from minus 22° to 122°F, and in heating from minus 22° to 86°. In the multi-zone family, the systems will maintain 100 percent of rated heating to 5°, while the single-zone systems will maintain 100 percent of rated heating to 0° — and still offer extended-range operation to minus 22°. With incredible low-temperature operational performance, the VMH-Series is ideal for applications requiring year-round air conditioning or more aggressive heating applications in Northern climates.

The VMH-Series maintains a wealth of standard features (Varies per indoor Air Handler chosen):

- Auto-Swing — Oscillates air movement for a breeze-like effect;
- Multiple Modes of Operation — Heating, Cooling, Fan-Only, Dehumidification-Only;
- Multiple Modes of Operation — Sleep, 24-Hour Timer, Turbo, Auto;
- Intelligent Pre-Heating — Eliminates the discomfort of an initial cold-air blast;
- "Follow" Function — Senses temperature at the remote to adjust for optimum comfort and efficiency;
- Superior Filtration — Air filters enhance indoor air quality;
- Auto Defrost — Eliminates unnecessary defrost cycles to save energy and reduce downtime;
- Self-clean Mode — Dries indoor unit when not in use to prevent mold growth;
- Low-Ambient Operation;
- "InverterFlex" inverter-driven compressor to provide precise cooling, continuous dehumidification, better comfort, and the ultimate in energy efficiency;
- Self-Diagnostics; and
- Wireless remote or wired wall thermostat.

The Comfort-Aire/Century VMH-Series is currently available in 1.5-ton, 2.5-ton, and 3-ton nominal sizes, with up to four separate zones available. Despite the high-performance operation, the line maintains stellar efficiency ratings — up to 25 SEER — and extremely quiet operation — both indoors and out. In comparison to many other systems — such as typical ducted central-air, boiler, and/or furnace, the reduction in energy usage of an installed VMH-Series would be very attractive to the end user. Additionally, the indoor units of the VMH-Series are interchangeable with both the single-zone and multi-zone systems. Interchangeability means less SKU's and stocking efforts for distributors.

The Comfort-Aire/Century brand has a well-deserved reputation for quality products — with excellent warranty (7 years on compressor, 2 years on parts), a comprehensive and intuitive website with supportive resources, and a fully staffed professional Technical Service Department. Products are readily available — from both OEM and distributor stocks.

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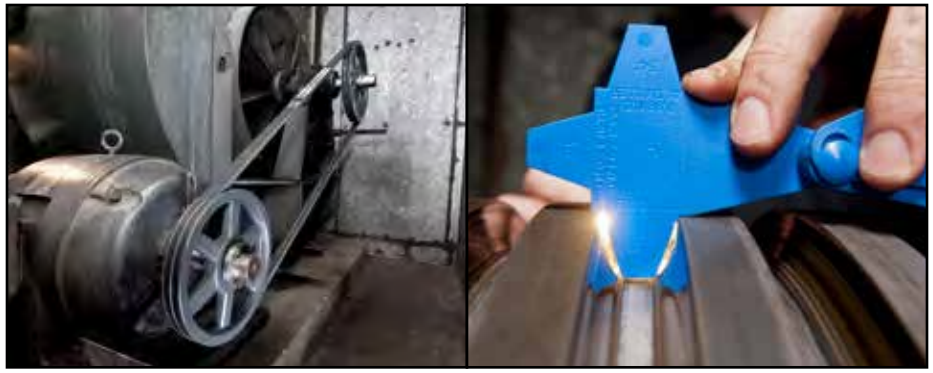
# Lifecycle® Services Provide Diagnostic Testing to Validate HVAC Energy Savings

## PROBLEM

A prominent health care facility in Los Angeles had an aging fleet of HVAC systems in their facility. The equipment had worn sheaves, worn belts, and under-tensioned belts that indicated the HVAC systems were operating well below expected efficiency levels. The facility owners were interested in the Browning "Save the Green/Sustain the Green" program and were considering a mass retrofit of all belt drives. However, they required proof of energy savings to justify the cost of the retrofit project.

## SOLUTION

The Regal HVAC industry specialist and Application Engineering used Lifecycle Services to provide a two-step solution. First, an HVAC unit was selected as a test unit, and the existing belt was analyzed. Application Engineering selected an "optimized" drive using notched v-belts. This allowed for a reduction in the number of belts required for the drive. Second, the Lifecycle Services team installed a monitoring system on the drive and collected energy consumption data during typical operation. Parameters, such as real energy, real power, motor speed, and fan speed,



were measured, recorded, and analyzed. This data, along with the bill of materials for the optimized belt drive, was summarized in a report and presented to the customer.

## ESTIMATED BENEFIT

The retrofit project had several positive benefits. First, there was an immediate reduction of 50 percent in the cost of the drive components due to the reduction in the number of belts and the number of grooves in the sheave. Second, due to the drive quality, the maintenance requirements will decrease. Finally, due to the gain in efficiency, the customer will spend less in energy costs ($7,700 annually). The total payback period for this project was 16 months.

# Preschool Sees Sickness Decline

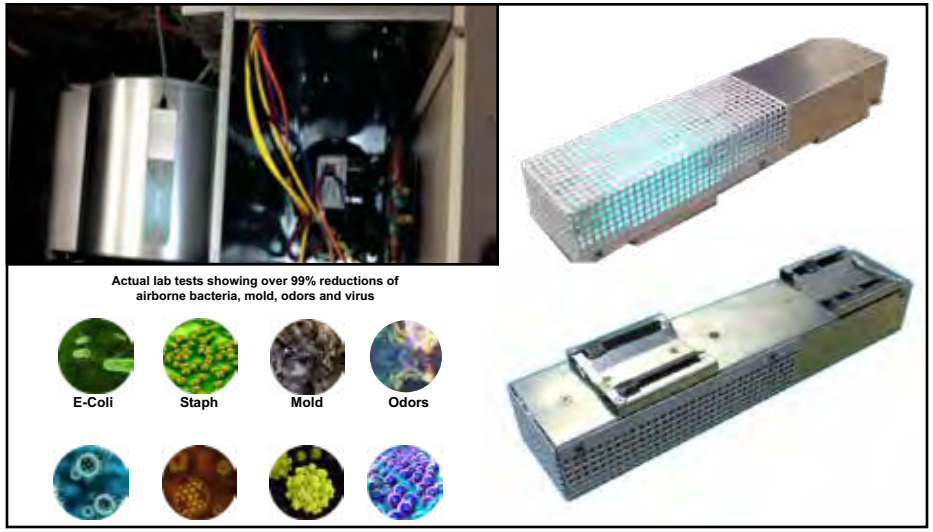
James Rupple owns an 8,000-square-foot preschool in Snohomish, Washington. The school children continuously pass colds and flus to each other. With 180 families attending the school, it can be a huge problem in the winter months. Prior to owning the school, Rupple had a 30-year career in facility management, so he knows his way around an HVAC system.

"When I first heard about the UV sanitization systems, I was intrigued, but they were being sold by a home-based distribution company, and the bulb life was short," Rupple said.

Rupple was eventually introduced to the RGF Environmental Guardian Air Technology by his HVAC representative and decided to give it a try, since it was backed by a reputable firm, and the bulb life was twice as long as the other model.

"I have three rooftop units, and I chose the magnetic mount, which is powered by the units control system to keep the installation costs down. It was installed in December, and I did not tell the teachers or parents what I had done to keep from having a placebo effect occur," Rupple said.

Over the next four months, Rupple felt it had a dramatic effect on illnesses, but he could not substantiate the results because the whole school was being covered, so there was no base to compare. There are four other schools within a 20 mile radius of the preschool that are part of the same franchise that have the same procedures for cleaning. Rupple asked them for their illness logs to compare. The preschool had 40 percent fewer call outs due to illness than the other schools.




"I am more than happy with the results and my only regret is I did not choose the model that was independently powered so that there was continual cleaning even when the fan unit was not operating. I have recommended the Guardian Air technology to the other schools, and they are having them installed as well."

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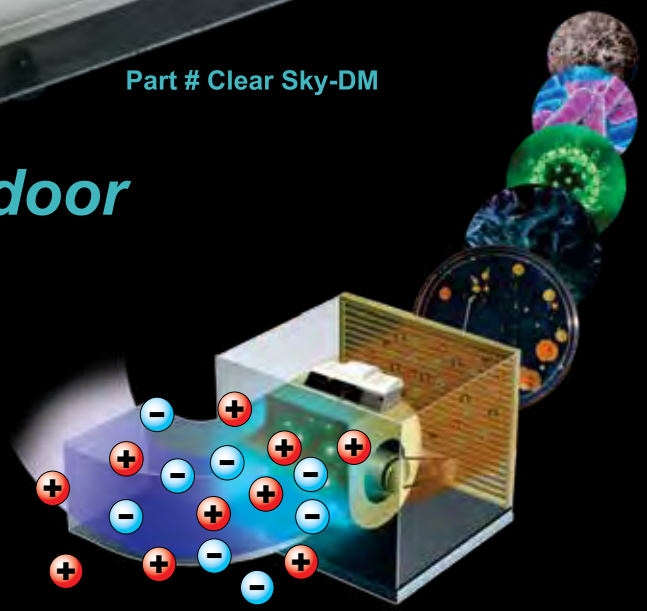

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# Boost Your Productivity with a Remote Receptionist

Walker Info anticipates by 2020, customer service will overtake price and product as the key differentiator for businesses. For a successful business, the phone is a critical customer touch point: 80 percent of callers are likely to become repeat customers after a positive phone experience, and 74 percent are likely to choose another vendor after just one bad experience, according to Invoca.

As a contractor, good customer service sets you apart from the competition — but being available every time a customer calls is challenging. Here's how a remote receptionist service can help you deliver exceptional service while increasing your productivity:

**Make great first impressions.** According to Consumer Reports, 72 percent of callers who reach an automated answer will hang up without leaving a message — and potentially call a competitor. A remote receptionist service provides the coverage you need when you need it, so potential customers don't fall through the cracks. Every caller is greeted by a live, professional person prepared to follow your custom instructions.

**Keep current customers happy.** When you're on the go all day, you're not always able (or in the mood) to answer the phone. But a remote receptionist service gives you a team of talented people dedicated to being friendly; professional; and, above all, helpful — so you build trust with your callers.

**Get more done, earn more money.** Little interruptions can add up to a lot of lost (billable) hours. A remote receptionist connects only the calls you want and fields the rest, so you can focus your attention where it matters most. Wherever the day takes you, you can update your call handling instructions on the fly, so your remote receptionist team is always informed and equipped to handle calls to your specifications.

**Gain peace of mind.** Whether you're on the road, at a job site, or taking a well-deserved break, rest assured knowing every call is handled by a customer experience expert. Best of all, a remote receptionist service provides that reassurance at a fraction of the cost of hiring an in-house employee.

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You don't get a second chance to make a first impression, and it counts more than ever: 74% of callers are likely to choose another business after they have a bad experience on the phone.*

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# Toughen Up on Tape Practices:

## 5 Common HVAC Tape Mistakes You May be Making

The importance of proper tape use is often overlooked when it comes to HVAC installation and maintenance tasks. When system efficiency is on the line, choosing — and properly applying — a tape that is right for the task at hand can make the difference between an airtight system and costly inefficiency.

Don't wait until you find a failure in the system — here are five common mistakes to avoid:

**1. Failure to use a UL-listed tape**

When working with any component of an HVAC system, using a tape that is UL listed is critical. A UL listing lets you know that the tape has been rigorously tested to meet performance and safety standards — a requirement in order to pass inspections. Most HVAC tapes that are UL listed are constructed with a printed backing, allowing inspectors to quickly see that a job is up to code.

Shurtape offers UL-listed tapes for every job, whether it requires sealing reflective insulation, flex duct, or rigid duct.

**2. Choosing a tape that isn't suited for the environment**

HVAC ductwork is often housed in unconditioned spaces — those that are exposed to extreme temperatures and climate conditions of each season. Some tapes become brittle and lose their holding power in extreme cold, making it essential to choose a cold-temperature grade of HVAC tape in colder regions. Likewise, hot environments can cause a tape's adhesive to become too soft, which can result in the tape falling off. When choosing a tape, consider the environment where it will be used.

For cold temperature applications, try a tape that is constructed specifically to hold up in these conditions, like Shurtape's AF 975. This cold temperature aluminum foil tape is built to withstand temperatures as low as minus 20° and up to 260°F.

**3. Tape flagging**

This is a sure sign of tape failure. Flagging can indicate that the wrong tape was used for the environment or that the tape was not applied correctly, including not using a squeegee to apply proper wipe-down pressure. In some cases, the tape used may have simply lacked good quality construction or had the wrong type of adhesive for the environment, leading to an inadequate bond. You may notice that most of the tapes that are built for performance

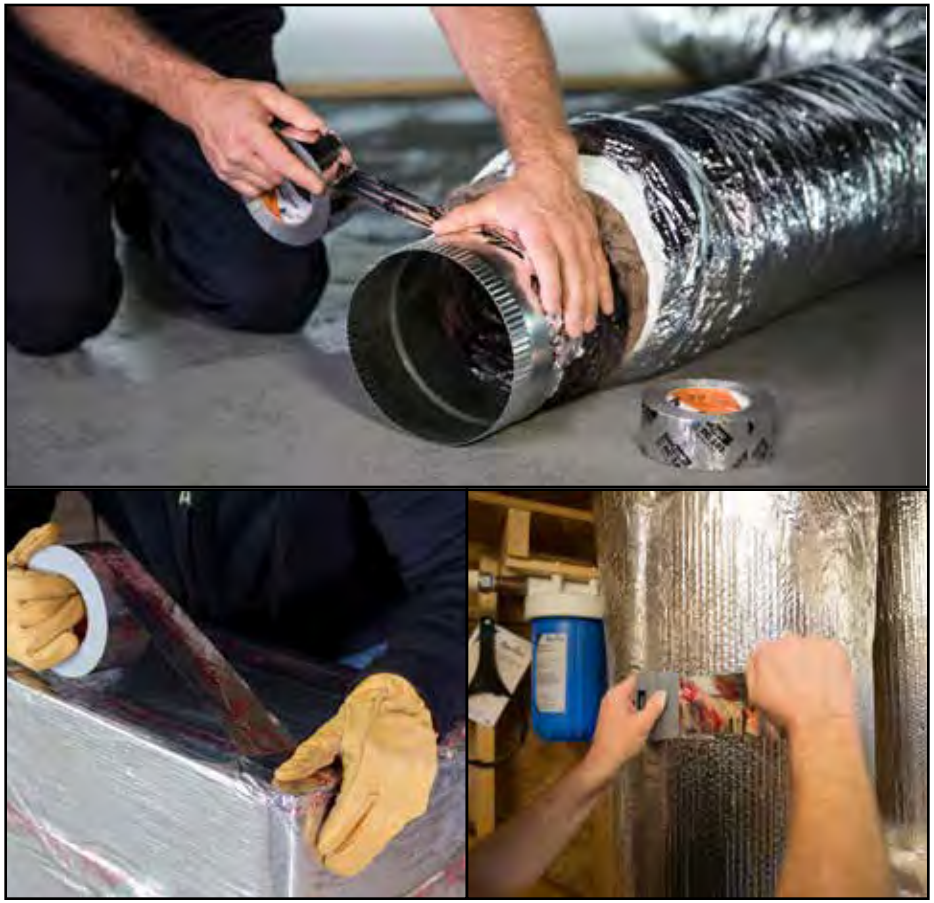
in more challenging environments use acrylic adhesive systems. That's because acrylic adhesives perform well in a broad temperature range ( minus 20° to 400°). Acrylic adhesives are more expensive than rubber adhesives but can be used in hotter and colder temperatures (most rubber adhesives don't perform well once it's colder than 20°, or hotter than 150°). Rubber-based adhesive systems can get brittle in very cold temperatures, increasing the tendency for these tapes to shrink and flag when subjected to prolonged exposure to high temperatures or UV rays.

**4. Improper storage**

Believe it or not, HVAC tapes can actually "go bad." When not in use, the proper way to store a roll of HVAC tape is on its side, with the core facing up. The roll should be kept on a shelf or other storage area away from dirt and debris that could cling to the exposed adhesive on the roll's side. Replace unused tape that has exceeded a year of age to get the best performance for the life of the HVAC system.

**5. Lack of full system closure**

Full system closure — or sealing all air leaks — is the No. 1 goal for HVAC installs and maintenance jobs — but it can't be achieved without the right tape. Air leakage can cause the HVAC system to quickly lose its ability to efficiently heat and cool — adding up to high energy costs. Choose a tape that is designed to deliver full system closure and can stand up against the conditions of the job.



Reflective insulation is one instance in which full system closure is especially important. Any leak in the system that allows air to escape can cause the entire system to lose efficiency, which defeats the purpose of installing reflective insulation in the first place. But, getting tape to bond permanently to reflective insulation is often challenging. That's why Shurtape developed FF 100, a UL 181B-FX-listed film tape designed specifically for seaming and sealing reflective insulation.

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# Twenty-year Old Hotel Improves In Comfort

When the Marriott in West Philadelphia decided to do a major renovation of the rooms, lobby, and conference space, it needed to minimize revenue loss while under construction. It was also time to update the aging HVAC system as hotel management had received numerous complaints of loud HVAC units. Hotel management knew they would lose too much time if they had to replace entire cabinets or systems because each room would be under construction for much longer with the replacement of drywall.

They decided that it would be best to leave the cabinets behind the walls in order to eliminate any drywall work. Marriott decision-makers then had to decide which manufacturer's chassis and internal components would benefit them the most.

The engineering staff at MSS Solutions wanted to find the quietest water-source heat pumps to replace the 20-year-old system. One model room used a Whalen Whisperline® chassis and components inside the existing cabinet. The other room used existing manufacturer's equipment. Engineers found that Whalen's Whisperline unit was undoubtedly quieter in comparison to the

competitor's water-source heat pump. In particular, Whalen's reversing valves and fan motors were noticeably quieter than the competition.

"The Whalen units were significantly quieter than the existing units and the competing manufacturers. This was obvious without even looking at the sound data," said project manager Rhys Farrow of Hardesty Inc., who represented the project's mechanical contractors.

Installation of the Whisperline equipment was quick and easy. Phase one was completed in November 2015, with 96 units on the top five floors retrofitted with Whisperline chassis and components. On average, 20 rooms were retrofitted each week, which was integral to lose as little revenue as possible. Farrow said installing Whalen equipment and not having to remove drywall saved a lot of time and put them ahead of schedule.

"The process to change these out was fairly simple," said Farrow. "This was probably the smoothest retrofit I have ever done. The simplistic and lightweight Whalen components made it very easy to install, and the hotel's engineering staff was also impressed about the prospect of easy repairs and maintenance going forward."

The next two phases are expected to proceed as quickly as the first, as it only takes a half day to replace each room's old components in the existing cabinet. With Whalen's innovative HVAC solutions, the future of this hotel is much more comfortable ... and quiet.

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The Whalen Company

# Reducing Energy Costs in a Retrofit with Zoning

A homeowner was looking to improve the comfort in their home and reduce their energy costs and contacted ZONEFIRST on the best approach. ZONEFIRST President, Dick Foster, suggested a whole house approach by first looking at how to improve the performance of the home and then installing a single HVAC with zoning instead of the existing two units. The following prescriptive improvements were as follows:

- The home's attic has the typical blow-in insulation on the attic floor, leaving the HVAC air handler and duct work in an uninsulated place.

**Action:** Spray foamed the attic roof joists, insulating the attic space, which resulted in a much lower heat loss and gain. This resulted in a much lower capacity HVAC unit and now substantially lowering the attic temperature into which the HVAC unit and duct system is placed.

- The home had 2-3 ton heat pumps in effect, zoning the upstairs, guest, and kids' bedrooms from the downstairs living room, dining room, kitchen, and master bedrooms. Both units combined, when operating, required 60 Amps.

**Action:** With the attic now insulated, this substantially lowered the BTU load for the home from 6 tons to 3.5 tons. A new 3.5-ton, two-speed solar assisted heat pump would now replace both older 3-ton units. Both return duct systems were connected to the new single handler, and the supplies were ducted to add a third zone… the master bedroom.



**The results:**

- Newly foamed attic substantially reduced the heating and cooling load, allowing for the heating/cooling capacity to be reduced by 30 percent.
- Installing one HVAC unit versus two reduces the electrical load from 60 to 30 Amp.
- Adding a third zone for the master bedroom versus a single zone for the whole first floor provided added comfort in the master bedroom at night without compensating the thermostat in the living room just to get the bedroom comfortable.
- A substantial 30 percent reduction in the monthly utility bill.
- A less-than-five-year payback for the homeowner.
- A very comfortable and satisfied homeowner.

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