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**How to Estimate
Single-Room Airflow**


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**Contractor Spotlight: Training
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SALES:
Keep Score and Drive Performance-Based Sales
Contractor Jim Ball shares his experiences helping customers bridge what he calls, "The Comfort Gap."

Electronics Entertainment center or home office add 15%	15	%
High Ceilings Add 5% for every 2 feet above typical	-	%
Occupancy Add 5% for each additional person	-	%
Total percent to add to base room airflow	+30	%
Deduct Room Airflow		Deduct Percent
Internal Room No wall exposure to outdoors, deduct 20% to 35%	-	%
Basement Earth insulating below grade walls, deduct 30% to 50%	-	%
Shading Roof overhang and window shading, deduct 10% to 20%	10	%
Total percent to deduct from base room airflow	-10	%
Estimate Room Airflow		Room Airflow
Base Room Airflow	141	cfm
Add Room Airflow 30 % x Base Room Airflow 141 =	+ 42	cfm

TECHNICAL:
Estimating Room Airflow
NCI's Rob Falke provides a method to estimate a single room's airflow and explains its importance for diagnosing and fixing customer comfort issues.

DEPARTMENTS

Today's Word	5
High-Performance Products.....	6
Contractor Spotlight: Campbell and Company	8
Photo of the Month	19



TRAINING:
Why You Should Have an Annual Training Plan
Training doesn't just happen. At Basnett Plumbing and Heating, training planning is a real process. Here's how it works.

Member Update	20
HVAC Smart Mart.....	21
Ad Index.....	21
One More Thing	22



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TODAY'S WORD

By Mike Weil

Looking in the Rearview Mirror: 2019 In Review

The weather outside soon will be frightful, and world news is less than delightful. But the holiday season is here, so let us cheer, let us cheer, let us cheer.

As I write this, Thanksgiving is just around the corner and Christmas and Hanukah are fast on its heels. It's a time for reflection as we begin to close the books on 2019 and get ready for whatever awaits us in 2020.

So here is a look back through the 'eyes' of my 2019 *Today's Word* columns as well as through the lens of events that impacted all aspects of the HVAC Industry.

IN A NUTSHELL

This time last year we began living with the results of a midterm election that created the scenerio for a lame-duck Congress. It set the stage for 2019 to be a year of the **good, the bad, and the ugly**.

It's enough to make your hair turn gray. Speaking of which, the technician shortage continues to be a big issue as the **gray tsunami (of baby boomer retirement) is upon us**. What are you doing to attract young people into your companies and into this industry?

In 2018, economists made predictions of a looming recession. In early 2019 HVAC manufacturers were far more optimistic, as reported by a study conducted by the AHR Exposition Company in January.

Of course, the 2019 U.S. and China trade war went gangbusters and its impact on the HVAC industry is still being assessed.

GOOD NEWS

On the bright side, the new tax laws went into effect and helped small businesses around the country. Plus, 2019 was a year of great advanc-

es in science, especially in stem cell research and the first ever image of a real black hole in space. Let's not forget the 50th Anniversary of Neil Armstrong's **taking one small step**.

With the onset of 2019, there were at least **14 reasons to celebrate** and Performance-Based contractors around the country set the pace for **actively working on the dream**. That includes the Performance-Based Contracting concept of measuring and not guessing. The dream calls for a lot of training, not only on ductwork and equipment, but also on the tools needed to get the job done right.

It was a year to **determine priorities** — things like balancing tech safety with the need for the big summer payday. That also includes thinking about **CO (carbon monoxide) and its impact on the High-Performance HVAC contractor**. Are you ready to handle these situations? Are you and your people trained and certified?

So, **let's keep the learning going** and hopefully attract more people into the industry. You will always improve your abilities to test, measure, and diagnose airflow issues if you follow the idea of **training by the rule of one degree**.

Furthermore, we all know that the need for comfort will never go away. But 2019 showed us that Performance-Based contractors also need to focus more on **branding** their High-Performance businesses as well as maintaining strong, positive **online business reputations** to grab a bigger share of the comfort business pie.

SETTING THE TONE

With all this in mind, now is the time to look forward to 2020. From the team at **High-Performance HVAC Today** and National Comfort Institute, we wish you — our readers — a safe, healthy, and productive year!



Mike Weil is editor-in-chief and director of communications at National Comfort Institute, Inc. You can reach him at MikeW@ncihvac.com

Written By HVAC Professionals for HVAC Professionals

TSI / ALNOR 801 ROTATING VANE ANEMOMETER

Both the [National Balancing Council \(NBC\)](#) and [National Comfort Institute \(NCI\)](#), strongly recommend technicians own and use a [Rotating Vane Anemometer \(RVA\)](#).

In fact, this instrument is required for both the **NBC TAB Supervisor** and the **NCI Commercial Air Balance Certifications**. The reason is our "Right Tool for the Right Job" (<https://hvactoday.com/right-tool-for-job/>) approach.

The **TSI/Alnor 801 RVA** is perfect for reading small sidewall grilles, registers, and diffusers that are not accessible by the standard airflow capture hood.



However, the RVA is NOT a good choice for low-velocity readings because it requires sufficient velocity for the blades to spin at a consistent rate. That being said, the RVA is one of the best instruments for a direct read of outside air intakes on rooftop units, as it is the most tolerant of exterior wind conditions.

Also, if you're like me and you only want to take ONE tool bag to the roof, the 801 conveniently fits in one of the side pouches of any back-pack tool bag.

The TSI / Alnor 801 RVA comes with a 4" head, allowing a greater read area. It also has a timed average feature that allows the reading of the complete surface area to be averaged to a single value.

All RVAs are directional. If you buy one that claims it is not, get rid of it. Odds are, it can't

be calibrated. The head of the 801 swivels so that supply and return/exhaust air can be read equally.

You can program this instrument to directly read CFM. This includes using field derived correction factors.

The RVA 801 comes with an optional cone kit that is perfect for small supply or exhaust up to 200 CFM. Finally, not only does the RVA 801 come with a NIST Traceable Calibration certificate, Alnor makes similar models that are detachable and work with the **TSI/Alnor Velocity Calc**, providing additional flexibility.

I personally own three RVAs and consider the TSI / Alnor my go-to device.

For more information, visit the TSI/Alnor website at ncilink.com/801RVA.

— by Scott Fielder, Director of National Balancing Council.

DIGITAL POWER METERS

Have you been looking to increase the accuracy of your power measurements and move beyond volt amps? The **Mastech MS2203** is a true RMS three-phase intelligent digital power meter offering power factor correction at an affordable price.

Quickly gather voltage, current, active power, apparent power, reactive power, power factor, frequency, and Power factor corrected wattage.

This meter comes with four clamp-on power leads, which are connected to three legs of power and ground. The current clamp is progressed from leg to leg, measuring and storing the data. It then calculates wattage

at the push of a button.

If you desire to log data, the unit does have a function where it draws power from the system it's measuring for long monitoring periods. For technicians focused on customers who have high energy consumption, more accurate wattage measurements can aid in the analysis of potential energy savings and EER calculations.

For contractors, whose focus is primarily in the residential single-phase market; the **Amprobe ACDC-52NAV** is an excellent meter for power factor correction.



Mastech MS2203



Amprobe ACDC-52NAV

Gather power factor, volts, amps watts, and phase verification. Change settings and the reading viewed with the onboard joystick.

It's ease of operation and single-step wattage reading is quick by measuring voltage and current simultaneously.

For more information on the Mastech MS2203, visit their website at ncilink.com/MS2203.

You can get more information on the Amprobe instrument at ncilink.com/52NAV.

— by Justin Bright, Field Coach and Instructor, National Comfort Institute

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Trane 155 ton Air Cooled Chiller 2007 year with R134 with Coated Coil \$24,000 loaded fob Atlanta

New Carrier 800 Ton Water Cooled Chiller \$88,000 Loaded on Truck

New Arrivals 50 ton Trane Roof Top 460 volt with Gas Heat \$18,000 fob Las Vegas used 1 year

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In Southeastern Washington, in the shadow of the mighty Cascade Mountain Range, lies the city of Pasco. The area where Pasco is located was the site where the Lewis and Clark Expedition camped in 1805 and was a major stop for fur trappers and gold traders in the 1880s.

Today it is home to the Hanford nuclear facility, Boise Cascade, Tyson Foods, Bechtel National, Inc., the Pacific Northwest National Laboratory, and a major HVAC contracting firm known as Campbell and Company, Inc.

This 37-year-old firm started out as a refrigeration service company owned by three partners – one of whom was Mike Campbell. Over the years, the company established itself as a go-to company for refrigeration system issues and grew at a fairly steady pace.

Campbell eventually bought out his partners and began moving the company into the residential and light commercial HVAC Service and Installation business.

Later in the company's history, they got involved in the area's wine industry. Pasco is located in what is known as the rain shadow of the Cascades – meaning most rain systems are stopped by the

mountains and the city environs is part of a windswept desert with hot summers, warm springs, and cold winters.

It is perfect for growing grapes. Campbell's company became adept at process piping and working with any systems that involve the use of glycol.

"In the early days," Campbell says, "the company serviced a lot of convenient stores and grocery store racks. We worked in the big chains – Albertsons, Safeway, and so on. It was a brutal business to be in.

Over the years Campbell says he and his team were asked by friends, family, and neighbors to help them with their heating and air conditioning issues. As Mike says, "We had to eat, so, we started working our way into that. We were pretty good at it. We developed a reputation for showing up, which in those days, was half the battle for consumers."

A RECESSION THAT CHANGED EVERYTHING

During the early 1980s, when Campbell was just getting started, two major trends impacted the HVAC

Industry in the U.S.

First was the development of efficient heat pump equipment that provided a new alternative for heating and air conditioning. In areas like the Pacific Northwest, because of the mild temperatures, heat pumps gained popularity pretty quickly.

The second trend was a little something known as the Great Recession – an economic change that forced many companies out of business and created the need to find new ways to manage a company, keep it alive, and make it successful. These two 'events' changed everything.

According to Campbell they began to see issues with heat pumps. "They were just becoming popular in our area and were unique in that airflow, especially in heating mode, was critical. Issues popped up but we couldn't really articulate what they were. In those days no one focused on performance-based duct design. We tried to work through it using our slide rules,



Mike Campbell

but the answers weren't apparent, and we were mostly guessing. It was a little bit of a wild west kind of thing."

In the late 1970s the West Coast experienced a building boom. A lot of low-end HVAC equipment was being installed to keep costs low.

The recession in the early 1980s put the brakes on new construction and for a year or two virtually no homes were being built.

"We formed our company right in the middle of both these issues," Campbell adds. "It was a pretty important time – we went from boom-

town to bust. There were little to no building permits being issued for an entire year.

"It was a time of great lessons learned early in our company history. It set the stage for us to create a culture and process to survive such downturns and thrive in upturns in the economy. This stuff all comes in waves and we had to learn to ride those waves."

CAMPBELL AND COMPANY TODAY

And ride those waves they did. Today Campbell and Company brings in around \$31 million annually with 65% of that in residential and 35% in commercial work.

Besides residential HVAC retrofit and replacement, the company does indoor plumbing, indoor air quality, as well as their own electrical work. Campbell does everything in-house with around 200 employees.

How did they get here? He says a lot had to do with figuring out better ways to manage processes and learning how to diagnose airflow issues in duct systems.

"When it comes to airflow, I had a come-to-Jesus moment years ago while I was attending an HVAC Comfortech event. There I met the people from National Comfort Institute (NCI) who demonstrated how measuring static pressures and airflow through testing makes all the sense in the world!"

Campbell explains that this was some 10 years ago and at the time, his company was experiencing a tremendous uptick in warranty work which was getting in the way of them doing more profitable projects. NCI helped him realize this was the missing component that he and his team needed to achieve service excellence.

"When I got back to Pasco, we had a big management meeting and put it on the table to think about testing everything we install. Some of my managers were not thrilled with the prospect, others were. A core group of our leadership team bought into the Performance approach and proceeded to change our company culture dang near overnight," Campbell says.

"We shut the company down for a full week and hired NCI to come in and retrain everybody. Once we did this, the warranty situation nearly vaporize, seemingly overnight. The result: we actually had techs available when the weather turned cold or hot, to fix equipment and charge for the work. We had more opportunities than when bogged down with warranty work.

"We saw our profits soar. It was one of the most important 'moments' in our company's history. It changed the company trajectory in a big and positive way."

SYSTEM RENOVATION AND AIR UPGRADES

With the advent of a new culture surrounded by measuring system performance, Campbell and Company began focusing on duct system renovations and air upgrade work.

"It's really hard to do the right thing all the time," says Mike Campbell. "My dad told me that years ago and — dang it — he was right. If you are a Performance-Based Contracting™ firm, you cannot charge what your competitors charge. You must charge more because you are providing so much more in the way of service.

"You can't even sell the same way they do. You must figure out what the differences are between your offerings

and theirs, what the value is, and price accordingly. Once priced right, the value of our offerings must be at the core of our sales message."

Campbell says, "the performance culture isn't about symbolism. It developed slowly over time and is very powerful when you can test and show the customer what is happening in their ductwork that is impacting their wallets and their comfort. It is also powerful to be able to make the repairs, measure again, and show the customer how much improvement was actually made.

CULTURE OF EXCELLENCE

Mike Campbell concludes that in his opinion, Performance-Based Contracting™ creates a culture of excellence. "I think that when you can measure, diagnose, and resolve customer comfort and other issues, you are absolutely providing the best service for your customers.

"I just wish it didn't take me so long to discover the truth about measuring and also wish we started doing this much earlier in our history.

"Performance-Based Contracting gave us the tools to really measure what we do. When you can measure it, you can predict success. It is incumbent on all contractors to test."

Campbell concludes by saying, "You don't walk away until a job is done right. By doing these things, employee and customer engagement, plus positive referrals will grow in a positive way. We are the company that is the absolute best option for a substantial HVAC investment. Positive word-of-mouth reputation is the best reward."

Congratulations to Mike Campbell and his team, our **December 2019 Contractor Spotlight**.

Keep Score and Drive Performance-Based Sales

MEASUREMENTS
HELP US
IDENTIFY AREAS
WHERE WE CAN
IMPROVE AND
BRIDGE THE
COMFORT GAP

Calling ourselves High-Performance Contractors, unfortunately, doesn't make it so. I believe the key to becoming a High-Performance service company is by measuring. David Holt, my National Comfort Institute coach, once said to me, "How do you know if you are winning if you don't keep score?" Once you have all the data from measuring (the score), then you must dig in and see what actions you need to change that score.

The problem is defining what those actions are. In other words, what 'lead indicators' can we use in our business to tell us what route to follow to change the score and get the win.

In my business, a win is an interaction with a customer that exceeds their expectations by providing them the safest, healthiest, and most comfortable environment at the most efficient use of the customer's resources. To have our customers win, we must identify the areas of their home or system that fall short and find ways to change them.

WHAT DOES JACK SPARROW HAVE TO DO WITH PERFORMANCE?

So for fun, let's compare this goal to this scene from the *Pirates of the Caribbean: Dead Man's Chest*: ncilink.com/CliffScene.

Imagine every home your technicians visit has a system that is on one side of a cliff. The system may be old, new, expensive, or cheap, but it just doesn't meet the customer's expectations.

In our **YouTube** clip, this system is on the side of the cliff where the cannibals are. The cannibals, in this case, are air leakage, wrongly sized returns, the lack of outdoor air, and more. The cannibals eat away at the system making the customer feel less safe, sick, and uncomfortable. And all of that costs the customer extra dollars in utility bills.

On the other cliff, across what I call the Com-

fort Gap, is freedom from the cannibals. Freedom for Jack Sparrow and the pirates in the form of their ship, The Black Pearl. So how do they cross that gap and escape?

First, we must define the elements of our *premium customer experience* and our *premium comfort system*. Each customer deserves to have the safest, healthiest, most comfortable, most efficient system we can provide. We must identify system shortcomings to cross the Comfort Gap.

Then we must find a way for the customer to move from one side of the cliff across the Comfort Gap to their Black Pearl. We need to build bridges (investment packages) for customers to cross the gap and move closer to the premium comfort system experience.

DATA AS A BRIDGE

Measurements help us identify the best areas to build a bridge and help customers get closer to a premium comfort system. Last year I started paying close attention to the number of ceilings we were repairing because of condensate drain issues.

I found that in 2017 I spent close to \$30,000 for repairs to ceilings, walls, and floors that were damaged because of condensate. In my market, condensate is a huge issue. We jokingly say that to live in Mississippi you almost need gills.

I was warranting drain issues for my maintenance customers because I let the maintenance agreement be the bridge for condensate issues. When that turned out not to be the fix, the issue became mine. Once I began measuring HVAC systems and ductwork operating factors, I learned what was causing the problems that led to leaking condensate. I could then define the actual issues and bridge the comfort gap by building a drain system that we could warranty.

What are some other bridges that you must build? What pain points are there for your customers that you need to find a solution and build a bridge.

KEEPING SCORE

All HVAC contractors provide equipment replacement services. For Ball Heating and Air Conditioning, we have criteria to help us make sure new systems are installed properly. This helps us create what we call a Premium Comfort System.

We do this by measuring and verifying system performance before and after we do our work.

As Nick Saban (head football coach at the University of Alabama) says, "the story of the game is told by the score." We need to be able to say the same thing. We need to have a clear definition of what makes up that score.

Part of that score could include pictures of the components in your premium comfort system. Furthermore, each component included should have



a story (data) as to why it's included in your installation. Your score should also include standards based on the data you have

and can share with your customer.

These are some tools to help you build bridges between your company and your customer. Every experience with a customer is an opportunity to move them one step closer to a Premium System.

Every service technician should be measuring and if they find issues, they should ask permission to have a consultant have a look and provide that customer with solution options.

Another bridge we provide, if they sign up for our Premium System installation, is a return visit six months later to conduct maintenance.

MAINTENANCE PROGRAMS

We started our planned maintenance program, which we call an ESA, in the early 1990s. We grew that program over the first five years or so. We began to realize that many existing customers were declining it. As a result, our maintenance program plateaued somewhat. We didn't lose too many ESAs each year but didn't gain too many either.

We kept score by tracking how many ESAs renewed each day, how many are sold during service calls, and how many are sold during a one-time tune-up special.

Yet we only used this data to see who our best techs were. We ignored the overall trends. For example, we didn't examine what time of year we did the most tune-up specials or what type of repairs converted to an ESA from a service call. We have all this really valuable information but didn't take the time to understand what it means.

MAKING CHANGES

For example, in the past I spent money on postcards twice a year and was happy to get one or two customers to call me from each card. In other words, I spent money with no actual results. Our score wasn't changing, and I don't believe we were helping people get across the comfort gap. We had a great maintenance program but no defined bridge to help customers cross the gap.

I am a strong supporter of continuing education and consider myself a student of HVAC guru Ron Smith. Some years ago I read his book, "HVAC Spells Wealth" and it contained marketing ideas that I decided to revisit.

It had some great ideas for improving results from direct

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mail marketing. One called for creating and using a personalized letter and having a consistent message. In my postcard mailings, I had neither.

So I created a consistent message and personalized approach. In the first year our company ran 1,000 letters a week to addresses that weren't already agreement customers. We measured how many customers called each week. Then we sent a letter every week of the year. From that I learned how many customers would call for a one-time tune-up special (5).

Then I monitored how many of those converted to ESA agreements (2). It became obvious which techs converted the one-time tune-ups to ESA agreements. Next I started scaling the mailout. The percentages pretty

much held true for that particular direct mail piece. The trick is having a consistent message.

THE RESULTS

Today we do 3000 to 4000 letters each week. I invest a certain dollar amount per customer and I now know what that investment will yield our company in 10 years. Our ESA program is growing again and is one of our best bridges for helping customers across the comfort gap.

Each bridge we build for crossing should be as thoroughly investigated and proven. Combustion analysis, static pressure, system performance, airflow measurement, and more can help you construct bridges for your customers. If you take care of the cus-

tomers, build those bridges, and keep score, customers will see you as a partner in their comfort and will be more loyal to your company.

They will have successfully escaped the cannibals and made it to their Black Pearl of comfort.

The even better news? I still have more data to analyze. Who knows how that will change the score in the future? Do you gather data and keep score?



Jim Ball is the general manager of Ball Heating and Air Conditioning, Biloxi, MS. He was National Comfort Institute's **2017 Medium Contractor of the Year** and is a strong believer in Performance-Based Contracting.

How to Estimate a Single Room's Required Airflow

Low airflow is the primary cause of the most unsolved complaint in the HVAC industry - hot or cold rooms. To diagnose this problem, you can measure the room's airflow with an air balance hood and compare the results to the required room airflow. The difference between the two numbers reveals the problem and points you towards a solution. Let's take a look at the missing link you need to diagnose this problem.

WHAT CAUSES HOT AND COLD ROOMS?

A typical hot or cold room may require 150 cfm (cubic feet per minute) of supply airflow to keep it comfortable. NCI contractors report the typical hot or cold room's airflow is about 33% of what's required.

This means the typical room that needs 150 cfm only receives 50 cfm ($150 \text{ cfm} \times .33 = 50 \text{ cfm}$). It's no surprise the room is uncomfortable!

ROOM AIRFLOW DIAGNOSTICS

Room airflow diagnostics combine quick and easy testing with a report to produce an unforgettable customer experience.

Here's how it works. Let's say that you and your customer estimate the uncomfortable room needs airflow of 180 cfm for them to be comfortable. You show your customer how to measure airflow with a balancing hood. They expect the measurement to show that 180, but discover their supply register only delivers 40 cfm!

If needed, use a little math to clarify the problem in up to three separate ways. First, the room is 140 cfm low on airflow ($180 \text{ cfm} - 40 \text{ cfm} = 140 \text{ cfm}$).

Second, the room only has 22% of the airflow it needs to be comfortable ($40 \text{ cfm} / 180 \text{ cfm} = 22\%$). Third, the room is 78% low on airflow (100%

$-22\% = 78\%$).

Don't forget, airflow is difficult for your customers to understand. We use cfm as an acronym to describe a volume and time measurement (let that sink in).

To make airflow easy to understand, you may explain how a 7" beach ball holds one cubic foot of air. Then tell the customer how the room needs 180 beach balls of air per minute but is only getting 40 beach balls per minute.

This diagnostic method and explanation are straightforward and easy to understand. Everyone instantly recognizes the problem and wants to find a solution. Help them understand when airflow is increased to the required amount, the room will become comfortable.

Before you can use this diagnostic method, you'll need to estimate required room airflow.

ESTIMATE ROOM AIRFLOW

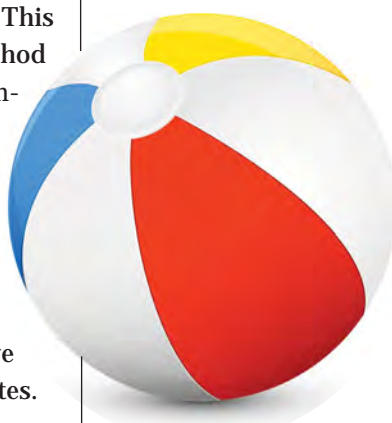
Purists will assess the wall insulation R-value, window U-value, and roofing material to complete a load calculation. Granted, there is a time and a place for this, but this isn't the time. This is simple air diagnostics using the NCI method of room airflow estimation with your customer participating.

Traditional load calculations estimate airflow using calculations based on a wide variety of engineered variables. This room airflow estimating method compares only against similar features built into this home.

Your customers usually live there and have the most knowledge of how the home operates. Be sure to invite their input into the decision.

There are six steps to estimate room airflow in the field. As each step is described, please refer to **Figure 1**, the completed *Estimate and Measure Room Airflow Report*, to see how it works.

To help describe airflow, describe it as beach balls per minute. A 7" beach ball contains one cubic foot of air.



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Estimate and Measure Room Airflow Report

Compared to typical conditions in this home, adjust room airflow within the suggested percent ranges to assure comfort. Room airflow is measured in 7" beach balls per minute. Or, Cubic Feet Per Minute (CFM).

STEP 1

Room Name Magnus

Customer Name Houx

Address 2137 Hillside Drive

Valley City, IL

Tested by D. DeRose

Date 10-14-19

STEP 2

Average Airflow Per Square Foot:

System tons 3

System cfm 1200

÷ Square feet 1880

= Avg cfm/sf .64

STEP 3

Base Room Airflow:

Room sq. ft. 221

x Avg cfm/sq. ft. .64

= Base room cfm 141

Measured Airflow:

Measured Airflow 50 cfm

÷ Estimated Airflow 170 cfm

Percent of Airflow 30 %

Add Room Airflow		Add Percent
Window size	If window(s) are larger than typical, add 5% to 30%	<u>5</u> %
Window direction	South or West facing window(s) add 15%-25%	<u>-</u> %
Exterior Walls	South or West facing walls, add 10% to 20%	<u>10</u> %
Kitchen	Add 15% for small, 30% for medium and 45% for large	<u>-</u> %
Electronics	Entertainment center or home office add 15%	<u>15</u> %
High Ceilings	Add 5% for every 2 feet above typical	<u>-</u> %
Occupancy	Add 5% for each additional person	<u>-</u> %
Total percent to add to base room airflow		<u>+30</u> %
Deduct Room Airflow		Deduct Percent
Internal Room	No wall exposure to outdoors, deduct 20% to 35%	<u>-</u> %
Basement	Earth insulating below grade walls, deduct 30% to 50%	<u>-</u> %
Shading	Room wall and window shading, deduct 10% to 20%	<u>10</u> %
Total percent to deduct from base room airflow		<u>-10</u> %
Estimate Room Airflow		Room Airflow
Base Room Airflow		<u>141</u> cfm
Add Room Airflow <u>30</u> % x Base Room Airflow <u>141</u> =		<u>+ 42</u> cfm
Deduct Room Airflow <u>10</u> % x Base Room Airflow <u>141</u> =		<u>- 14</u> cfm
Equals Estimated Room Airflow		<u>169</u> cfm

STEP 4

STEP 5

STEP 6

Figure1: This is a sample report your technicians can use in the field to help them with their estimates and measures room airflow measurements.

STEP ONE. The top left corner of the report is where you put the Room Name and customer information. Include your name and the test date.

STEP TWO. Calculate the Average Airflow per Square Foot of the home (see far left column of Figure 1). If the home has more than one system, use the square footage each system serves. This step produces an average cfm per square foot. It equally divides system airflow throughout the home.

Enter the system cooling tonnage and multiply by 400 cfm per ton to find system airflow. Figure 1 shows a 3-ton system x 400 cfm per ton = 1200 cfm of required system airflow.

Divide the system cfm by the square feet (sq. ft.) of the home or zone served by the system. This equals the home's average cfm per square foot of floor space. In this case, 1200 cfm divided by 1880 sq. ft. = .64 cfm per sq. ft.

STEP THREE. Calculate the Base Room Airflow. Measure the square feet of floor space in the problem room. Next, multiply it by the cfm per square foot. This gives you the room's base airflow.

You'll see on the report (far left column of Figure 1), the home's cfm per square foot is .64. The customer's room (which is named Magnus in Figure 1) has 221 sq. ft. So, 221 sq. ft. times .64 cfm per sq. ft. equals 141 cfm of Base Room Airflow for the room.

Remember, this number is the average and does not include other factors that may add to or subtract from the room's needed airflow.

STEP FOUR. Add Room Airflow (top middle column of Figure 1). To address the other factors, add a percentage, within the ranges shown, to how much additional airflow is needed for each room feature. For exam-

ple, 5% was added for the room's window. Notice the percent range to add for larger windows is 5% to 30%. The question is; why only 5%?

This room's window is slightly larger when compared to other rooms' typical window size in this home. You need to use your professional judgment, just like when doing a load calculation, to estimate certain values.

During a load calculation, you estimate a wall's R-Value, roof's reflectivity, window U-Value, etc. You also use default factors for appliances and other features.

So, in our example, you judge the customer's window to require 5% more room airflow. If the window was 6 feet x 15 feet, it most likely would require a 30% increase in room airflow.

Room airflow of 5% or 7 cfm was added for this window, where 42 cfm would be added for a very large window.

You and your customer make the call while looking at the window. You'll be surprised how easily most customers assess the percent to add or subtract when estimating room airflow. The decision is quite natural.

Remember, if the estimate is 5% or 10%, the difference between the two estimates is only 7 cfm in the room. Don't overcomplicate the process. Make participation fun for your customers.

Add together the percentages to include in the base room airflow. In the report, you'll see 30% is added to this room's estimated airflow.

STEP FIVE. Subtract Room Airflow. Some factors require we subtract a percentage, within the percent ranges shown, to deduct airflow for each room feature that will decrease required room airflow. The customer's room has a large tree shading one outside wall from the summer heat. We reduce airflow by 10% because the tree decreases the room's heat gain.

Add together the percentages to be deducted from base room airflow. 10% of room airflow is deducted in this example.

STEP SIX. Estimate Room Airflow by taking the base room airflow calculated in Step Three, then add or subtract the other factors based on your estimates.

Multiply 141 cfm of base room airflow times 30% to add 42 cfm. Multiply the base room airflow times 10% to deduct 14 cfm from the base room airflow.

The estimated room airflow is 169 cfm. Round up to the nearest 0 or 5 cfm to find the customer's room needs 170 cfm.

MEASURE ROOM AIRFLOW

Now that you both know room airflow should be 170 cfm, or 170 beachballs per minute, you're ready to measure the room actual airflow and diagnose it.

Invite your customer to use an air balance hood and measure airflow from the room's supply register. In this example, the hood reads 50 cfm. Say nothing. Let your customer consider the new information about this room's comfort.


When a customer participates in this process, they can't help but contribute to the diagnostics. They may begin to diagnose the problem themselves!!

Finally, complete the report by entering the measured room airflow and calculating the percent of airflow. Divide the measured room airflow of 50 cfm by the room estimated airflow of 170 cfm to find only 30% of the needed airflow is deliv-

ered (50 cfm ÷ 170 cfm = 30%).

As with any new diagnostic method, it will take practice to master it. You'll learn better to engage your customers with experience also.

Estimating room airflow is a key element to diagnosing and fixing customer's hot and cold room problems. Successfully resolving customer comfort issues in this manner sets you apart from the rest of your competitors, builds strong customer relationships, and really contributes toward improving your diagnostic skills.

Most new diagnostic tests require practice. First, estimate room airflow using this method at home or at the shop. Then go live with your customer. I'm confident you'll be pleasantly surprised with the results. 



Rob Falke co-founded National Comfort Institute in the early 1990's and leads the technical training and curriculum development teams of the company. Rob's vision is that the performance of an HVAC system can be effectively measured and diagnosed under live operating conditions in the field. He can be reached at RobF@ncihvac.com



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Why You Should Plan Your Training Each Year

Training is vital to the success of any company. It helps prevent costly callbacks, poor HVAC system performance, and lackluster efficiency. Training also promotes a good work environment, better communication between the company and its clients and, most importantly, it gives our employees a path to grow their careers.

It doesn't just happen. To effectively train your people requires real planning. Here at Basnett Plumbing and Heating, we feel that training is integral to our success and growth. We take it seriously. To be frank, it is a consistent daily thought for me and my managers. It is part of our overall mission statement, our culture, and our brand.

We all know that nothing is free and that is why you must have a budget allocated to training. For us, we set aside two to three percent of our annual gross revenues just to keep our field service and installation technicians at the top of their game.

BEFORE CREATING A PLAN

First some background: About 20 years ago we set up a second entity for training with a June year-end. We allocate a certain amount of dollars per month and post those dollars to the training company. We typically deplete those funds prior to our June year-end. This allows us more funds for training employees without having to send the taxed profits to the government.

With that in mind, once our budget is set, I set a meeting agenda with my management team where we go over the needs for the career advancement of our entire team. Planning for the next year's training usually begins in October and ties into the company business plan for the following year.

Scheduling begins with analysis. Just like gathering data on static pressures, airflow, pressures, and so on, we gather data on co-worker performance. The key is

to simply take the time to analyze it and then manage toward the results that you would like to see.

We've found that just sending technicians to training is meaningless. They need to apply what they learn and if they don't you need to know why. That helps you make other decisions down the line.

In that effort, we keep track of the number of callbacks for each tech as well as how long it takes them to diagnose something.

TRACKING AND GOALS

Other key things we track:

- Revenue per tech
- Number and type of leads each tech shared with a salesperson or office (these are broken down by system performance, service, service agreement leads, and so on)
- Online training hours/courses completed.

These items are recorded in spreadsheets and we discuss overall trends based on them during weekly team meetings. Our managers sit down with techs individually each month to go over their specific numbers and goals (both personal and professional goals).

I've found that a lot of people just don't know how to set goals. So, I'm working harder with my managers on how they can better coach employees and help them set realistic goals, overcome obstacles, and be more successful.

I've learned that training success must actually be based on each person's *personal* goals. Once we drill down to what really motivates them, we can then use that to develop career plans and subsequent training to help them achieve those goals. Whether it's to buy a house, send their kids to college, help aging parents, whatever — their personal goals are really the drivers for their work goals. Our job is to help them achieve those things.

Figure 1: An example of how Basnett assembles a training calendar for the installation department.

CREATING THE PLAN

When it's time to put an actual annual plan together, I look

at how training went the previous year, what the current needs are for the entire team, and consider the input from my managers. Then I create an outline that I have to revisit and fill in once outside training schedules are published and available.

Plus, I'm always on the lookout for last-minute training that might come up as well as programs that provide our technicians certifications and certification renewals.

We start with general needs such as customer service rep, technician, and sales training, then break that down to individual employees. We focus on the employees who really want to go above and beyond on their own.

The initial plan is set at a higher level — a 30,000-ft. view. We use this to sketch out the more costly and necessary training and/or most needed training for budgeting purposes.

Then we look at the industry calendars of all the HVAC training organizations — National Comfort Institute, Air Conditioning Contractors of America, and most of the others — to match what they are offering to our technicians' needs.

OTHER CONSIDERATIONS

Of course, many things play into our ability to plan out an annual strategy. Obviously, if the training we need isn't available, we have to postpone until it is. Other factors include employee

Basnett Plumbing, Heating & AC			INSTALL DPT.									
Enter Class Name	\$	\$			Enter # of Attendees per quarter					Enter Name		
	Estimated Course Cost	Estimated Travel Costs	Total Estimated Cost/ Attendee	Estimated Total Training Cost	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total # of Attendees	Attendee Name or Position (if known) Ex: Dispatcher	Total cost	
Course Description												
Top Gun: Installer Excellence - BDR	\$775.00		\$775.00	\$2,325.00		3			3	Paul, Rob B. Ryan	\$2,325.00	
Duct Design for Profit – BDR												
	\$1,100.00	\$850.00	\$1,950.00	\$1,950.00	1				1	Paul Lizotte	\$1,950.00	
CO & Combustion Certification - NCI												
	\$795.00	\$600.00	\$1,395.00	\$5,580.00	4				4	Paul, Rob B. Ryan, Kyle, Luke	\$5,580.00	
Basic Apprentice Start Up and Installation - Carrier	\$1,200.00	\$900.00	\$2,100.00	\$4,200.00	2				2	Luke #1	\$4,200.00	
Heat Pump Installation & Service - Carrier	\$900.00	\$600.00	\$1,500.00	\$1,500.00	1				1	Luke	\$1,500.00	
Gas Heat Installation & Service – Carrier	\$900.00	\$600.00	\$1,500.00	\$3,000.00			2		2	Luke #1	\$3,000.00	
HVAC Electrical Pro Troubleshooting	\$1,200.00	\$900.00	\$2,100.00	\$4,200.00	2				2	Paul & Ryan	\$4,200.00	
HVACRedu.com												
	\$375.00	\$0.00	\$375.00	\$3,375.00	2	2	2	3	9	Yearly Online Training Subscription	\$3,375.00	
Firedragon Boston STEAM Course	\$325.00		\$325.00	\$650.00		2			2	Paul & Ryan	\$650.00	
Firedragon NORA Basic Oil Course	\$2,300.00	\$0.00	\$2,300.00	\$4,600.00		2			2	Paul & Ryan	\$4,600.00	
Firedragon NORA Basic Oil Course	\$2,300.00	\$0.00	\$2,300.00	\$4,600.00		2			2	Paul & Ryan	\$4,600.00	
NCI Online Training	\$0.00		\$0.00	\$0.00					0	All Techs	\$0.00	
Bryant HVACpartners Learning Center	\$0.00		\$0.00	\$0.00					0	All Techs	\$0.00	
Aeroseal & CI Online Videos	\$0.00		\$0.00	\$0.00					0	All Techs	\$0.00	
			\$0.00	\$0.00					0		\$0.00	
		\$4,450.00	\$16,620.00	\$35,980.00					30		\$35,980.00	

turnover, conflicts of the outside training organizations, busy times, whether our techs are taking advantage of available online training programs we provide, and more.

We also consider the needs of new hires and the initial training they may need. Over the years, we have become wiser when it comes to training new hires — we've been burned too many times. So, we invest in their training, but don't invest too heavily until they prove themselves.

Our high-level schedule is a guideline. My rule-of-thumb on creating a training plan is to think of it as a living document — it must be as flexible as possible. Our plan is annual, but I re-

visit it monthly and modify it as necessary throughout the year.

Then the final draft of our training plan is shared with our training manager, Paul Lizotte. Each month, Paul and I will discuss who (on the technical side) needs what training as well as what local training comes up from vendors that we feel are important to attend.

ONLINE TRAINING

One of the smartest things I did was invest in an online training program that allows our technicians to take classes on their own schedule and at their own pace. There are a number of resources out there that look very ex-

Employee	Course Description	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	Total cost
WAYNE	Top Gun Technician Excellence - BDR		1			\$595.00
	HVACRedu.com	1	X	X	X	\$375.00
	NATE Certification			1		\$380.00
	CO & Combustion Cert - NCI	1				\$1,250.00
	Firedragon NORA Basic Oil Course		1			\$2,300.00
	Firedragon Boston STEAM Course				1	\$325.00
	Firedragon Riello Workshop			1		\$325.00
	HVAC Electrical Pro - Carrier	1				\$2,100.00
	Heat Pump Installation & Service - Carrier	1				\$1,425.00
	Bryant HVACpartners Learning Center					\$0.00
	Classic Hydronic Heating by Dan Holohan	1				\$99.00
	Dead Men's Steam School by Dan Holohan	1				\$99.00
	NCI Online Training					\$0.00
	Aeroseal & CI Online Videos					\$0.00
DOLLAR PER HOUR VALUE						\$4.46
						\$9,273.00
TAYLOR	Top Gun Technician Excellence - BDR		1			\$595.00
	HVACRedu.com	1	X	X	X	\$375.00
	NATE Certification			1		\$380.00
	CO & Combustion Cert - NCI	1				\$1,250.00
	Firedragon NORA Basic Oil Course		1			\$2,300.00
	Firedragon Boston STEAM Course				1	\$325.00
	Firedragon Riello Workshop			1		\$325.00
	HVAC Electrical Pro - Carrier	1				\$2,100.00
	Heat Pump Installation & Service - Carrier	1				\$1,425.00
	Gas Heat Installation & Service - Carrier			1		\$1,425.00
	Bryant HVACpartners Learning Center					\$0.00
	NCI Online Training					\$0.00
	Classic Hydronic Heating by Dan Holohan	1				\$99.00
	Dead Men's Steam School by Dan Holohan	1				\$99.00
	Aeroseal & CI Online Videos					\$0.00
DOLLAR PER HOUR VALUE						\$5.14
						\$10,698.00

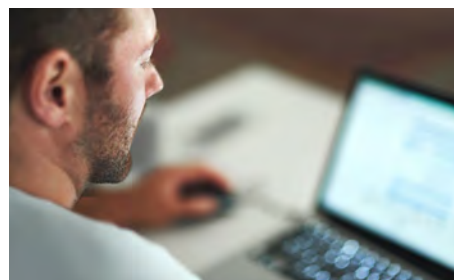
Figure 2: Sample of Basnett's Employee Training plan.

pensive on paper, but I've found they are relatively inexpensive if you make full use of them.

One thing that separates our company from the competition is our five-tier technician career path. Each tier has a number of goals and accomplishments that must be completed to advance to the next tier. Each tier has its own pay range, so the technicians have a lot of control over how quickly they advance and how much they can earn.

Completing online training is key for each technician career tier.

Furthermore, online training is completely in our control. We don't have to wait on schedules or worry about class cancellations. It is always there. We combine online and live training requirements for each of our



five technician career tiers.

As I see it, one fundamental problem in this industry is that most technicians need training, but because they are bad planners, they never seem to have the money for it. Because they don't seem to have the money, they won't do it on their own. They expect their employers or their vendors to provide and pay for it.

There comes a point where I say that "Big Daddy" isn't going to do everything with regard to training. So, as a company, unless we commit to it, and unless our people commit to it, they will be stuck where they are for a lifetime. I like to see a technician

commit to getting training done. That shows me a lot.

Online training is a great tool to help techs improve their skills and learning, as well as a great way for us to monitor their commitment and progress.

MANAGING BY SPREADSHEET

Based on our annual training plan, we put together individual spreadsheets for each employee that shows their preliminary training schedule and how much the company plans to invest in them.

The spreadsheets also show the training we need the tech to have, the timeframe it needs to be completed, the cost, and calculates the dollar/hour we're investing in him or her.

We then share this with the tech so they can see how the company invests in them and hopefully this helps motivate them to commit to taking and completing that training.

TRAINING INTENT LETTER

But hope is not a strategy. We really look for a commitment which is why each month our managers sit down with the individual techs to go over that spreadsheet (which includes assigned online training) and discuss where they are and why.

Once a year, we have each field employee fill out a training intent form with a short description of what they want to accomplish, how much time they plan to spend per week/month studying the online training, and why.

Once they accomplish their training intent, we have them fill out another one. This helps them from staying stagnant.

Each month our techs sit with their

managers and go over what they learned, what additional work they need to finish, and what their plan is. We use the Training Intent letter to monitor and coach the employee's progress.

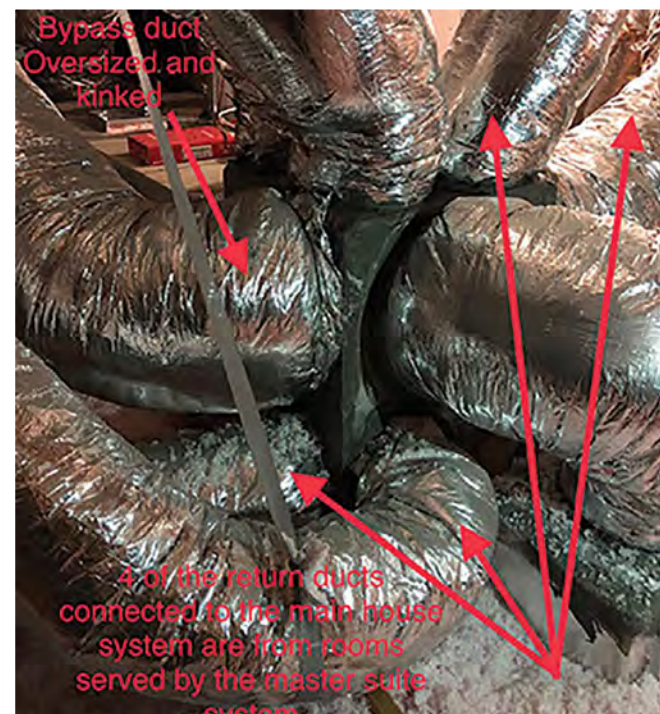
As you can see, we spend a great deal of money and time in training our team. We think this is vital to our employee's success as well as the success of our company. The result is that many of our clients tell us we have a great reputation, which is a major reason they decided to do business with us.

Interestingly, in the past few years, we have had several potential hires say they came to us because they saw our online reviews and/or said we have a great reputation. I'd like to say training has a lot to do with it. Our vision is to be the HVAC company and employer of choice in our area by the end of 2020.

We're getting closer!



Rob Basnett is the president and co-owner of Basnett Plumbing, Heating, and Air Conditioning in Littleton, MA. He and his wife, Lori, started the business in 1987. The company is the recipient of many recognitions from the industry and NCL.



"Return? Supply? Upstairs or Down?"

— David Small, Crossway Mechanical, Tomball, TX

The return plenum is part of the zoned system for the north side of the house. The four other ducts are for another system! Can you guess which is which? Neither could the installer apparently. When the "other" system comes on, the negative pressure in the master suite is so great you can barely close the bedroom door!

Congratulations to David Small of Crossway Mechanical. He is the December 2019 winner of our Photo-of-the-Month contest, as voted on by the subscribers to [High-Performance HVAC Today](#) magazine. He will receive a \$50 gift card.

PHOTO-OF-THE-YEAR CONTEST VOTING OPENS DEC. 9, 2019

The January 2020 contest is a run-off of all the monthly winners from 2019. The winner, as voted on by you, will receive a FREE registration to NCI's Summit 2020. Learn more about the next High-Performance Summit at [gotosummit.com](#).



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HAVE YOU TRIED OUT THE NEW NCI ONLINE TRAINING CLASS?

In November 2019, National Comfort Institute launched its newest Online University training course: **Airflow Testing and Diagnostics**.

This six-module, interactive course is designed for you, your technicians, and your sales team to learn the basics of static pressure and airflow testing.

GREAT NEWS! This online training course normally costs \$299 per student. NCI Members save \$100 off that price.

Furthermore, if you're an **NCI Learn-**

ing Excellence Online or **NCI Premium Level** member, the course is available for all your employees at no additional cost!

So what do you get? In addition to static pressure and airflow testing basics, the course addresses how to diagnose common air-related issues found on most residential HVAC systems in the U.S. It then provides the right solutions to make a significant impact on your customers' homes and businesses.

Airflow Testing and Diagnostics consists of more than eight hours of on-



line technical and sales instruction and includes the following modules:

- ☐ The Air Upgrade Approach
- ☐ Introduction to Static Pressure
- ☐ Measure and Interpret Static Pressure
- ☐ Fundamentals of Fan Airflow
- ☐ Plotting Fan Airflow
- ☐ Completing an Air Upgrade.

Just log into your account on NationalComfortInstitute.com, then click on this link: ncilink.com/ATDOnline.

If you have any questions or experience any problems, be sure to contact your representative at 800-633-7058.

COACHING YOUR TEAM TO HIGH PERFORMANCE

Are you ready for the NCI High-Performance HVAC Summit 2020? Do you want to reconnect with Performance-Based contractors from across North America? **National Comfort Institute's (NCI) High-Performance HVAC Summit** (gotosummit.com) event returns to Scottsdale, Arizona April 6-8, 2020 where you can join your peers to learn, share, build relationships, and explore new opportunities.



This is the only event of its kind completely focused on marketing, selling, and delivering High-Performance HVAC systems.

A COACHING FOCUS: This year the conference focuses on coaching your entire team to the High Performance approach to HVAC contracting. From the opening session through every workshop, you will learn how to coach team members on specific

topics as you integrate performance into your company.

An additional High-Performance Town workshop, consisting of three hands-on labs, will also be held so you can experience advanced tests and calculations to diagnose and offer highly profitable system upgrades, just as your teams do in the field.

Summit sessions include:

Coaching Your Entire Team: *What Is High-Performance Contracting and Why Are We Doing It?* – led by NCI's David Richardson

Coaching Your Managers: *How We Will Integrate High Performance into Our Business* – led by Dave DeRose

Coaching Your Technical Team: *How We Will Integrate Performance Testing into Service and Installation* – led by NCI's Casey Contreras

Coaching Your Sales Team: *How We Will Market and Sell High Performance* – led by NCI's David Holt

SPECIAL: High-Performance Town 2020 – *Hands-on Testing & Diagnostics Labs* – taught by Rob Falke, Jeff Sturgeon, and Justin Bright.

Get all the details at gotosummit.com or call your customer care representative at 800-633-7058.



DECEMBER 2019 POWERPACK — IT'S NEW, EXCITING, AND READY FOR DOWNLOAD

Welcome to the latest PowerPack exclusively for NCI Members.

For December 2019, we feature the following:

■ **How to Perform a ComfortMaxx Air Test** (Online Training)

■ **ComfortMaxx Field Data Collection Report for a Residential Package System** (Download)

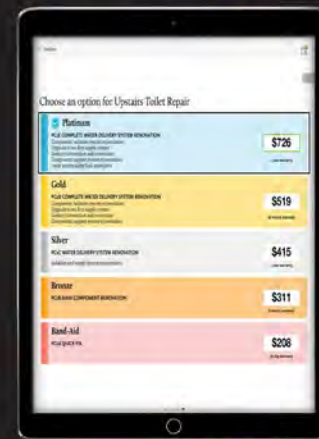
■ **ComfortMaxx Field Data Collection Report for a Residential Split System** (Download)

■ **Master HVAC Pressure Diagnostics with NCI Static Pressure Budgets** (Download).

Don't forget to share this PowerPack with your entire team.

Access it at ncilink.com/PwrPak.

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Goodman Manufacturing www.GoodmanMfg.com	4
Jackson Systems www.JacksonSystems.com	11
Lazco Corp. www.LazcoCorp.com	7
R.E. Michel Company www.REMichel.com	12
The New Flat Rate www.TheNewFlatRate.com	21
To Your Success ToYourSuccess.com	21
TSI, Inc. www.TSI.com/comfort	6
United Refrigeration Inc. www.uri.com	19

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Email us at contactus@hvactoday.com with your comments and questions.

THE TECH WHO SAVED CHRISTMAS



Dominick Guarino
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'Twas the day before Christmas, and all through the shop,
The phones were all ringing, the calls were non-stop.
Our service trucks were stocked up, all ready to go,
Every tech was braced for the ice and the snow.

Our dispatchers were busily planning away,
With hopes to satisfy each customer today.
And mamma in the office, and I in the back,
Were busy keeping our inventory on track.

Our marketing dollars this fall we invested,
With plans of making our holidays festive.
With plenty of service agreements stashed away,
We can buy lots of toys for our children to play.

As nightfall approached, the phone calls were dropping,
We might even get in some last-minute shopping!
We gathered our techs for some holiday cheer,
And wished them all well, and a Happy New Year.

When out in the office there arose such a clatter,
I ran in from the shop to see what was the matter.
A call had come in from the Jones' home just then,
They cried, "Our CO alarm's gone off in the den!"

"Get out of that house right now," we instructed,
"There's a good chance your chimney flue is obstructed."
Away to the Jones' house we flew in a flash,
We ran eight red lights, barely avoiding a crash.

The moon on the breast of the new fallen snow,
Gave the luster of mid-day to objects below.
When there on the Jones' rooftop was a wondrous sight,
Santa stuck fast in the chimney – he had it plugged tight!

He picked the wrong flue to make his descent,
And blocked off the furnace and water heater vent.
His reindeer were helpless, they hadn't a clue,
"I'm a contractor," I shouted, "I know what to do!"

I called in for backup, unsure of my plan,
To unstuck from the chimney this jolly old man.
As I pondered on whether to push, pull, or tug,
It suddenly hit me, I had to call Doug.

"Doug's Crane," said a familiar voice on the phone,
"No one's here now, just speak at the tone."
In the meantime my backup arrived on the scene,
In drove David, Henry, Harry, and Gene.

Right behind them were George, Joe, Larry, and Lou,
All our techs on the street knew of Santa's snafu.
We pondered, debated, without any luck,
"I know," exclaimed Lou, "I'll get Santa unstuck."

He spoke not a word, but he knew what to do,
He hooked up a compressor to the furnace pipe flue.
And laying a finger aside of his nose,
He threw the main switch and the pressure gauge rose.

First a loud hiss and then a blast blew the grate,
Through the air sailed Santa, bells and all – at Mach 8.
But I heard him scream out, ere out of sight he flew,

**"HAPPY CHRISTMAS TO ALL,
ESPECIALLY TO LOU!"**

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