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TECHNICAL:

Carbon Monoxide: The Real Truth

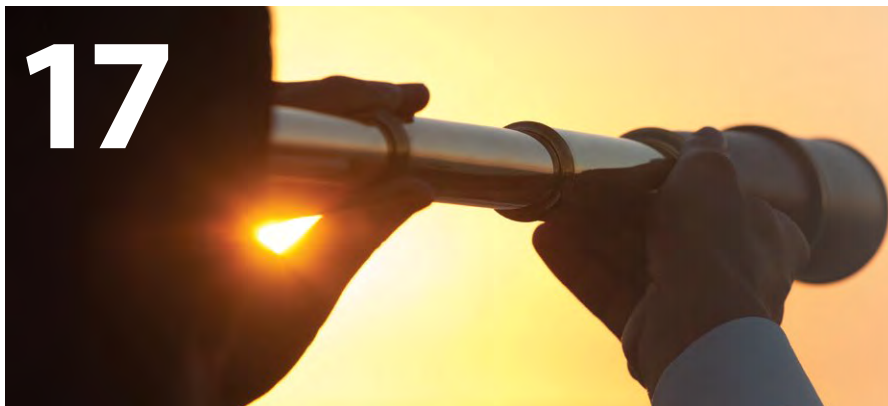
Contractor Tom Johnson dispels seven pervading consumer myths about carbon monoxide.



MANAGEMENT:

CO: Get Past Not Knowing What You Don't Know

Contractor Steve Miles says you should "become the expert in your area. It is good for your customers, your community, and your business."



LEADERSHIP:

Perspectives on Performance: The Contractor Experience

We spoke to four HVAC contractors who are committed to High-Performance and asked them why and what it means to them, their companies, and their customers.

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TODAY'S WORD

By Mike Weil

Carbon Monoxide and the High-Performance HVAC Contractor

Today's Word is actually two words: Carbon Monoxide. These are two words that no one wants to hear, especially when it involves harm to consumers and to technicians.

Let's face it, we know that CO-related incidents occur during the fall and winter months when gas-fired appliances run at longer intervals and homes are closed tightly against the cold weather. But CO issues also happen ALL YEAR long.

For example, in July of this year, Fox News reported that 46 people were hospitalized with 15 in critical condition after being exposed to carbon monoxide at a motel in Winnipeg, Manitoba, Canada. The local fire and paramedic chief told reporters that a CO alarm went off in the motel's boiler room and levels in some areas of the building were as high as 385 parts per million. The article reports the chief comparing that to what he called a safe level of between 20 and 30 parts per million (PPM).

A safe level? Really?

It is painfully obvious that even today, knowledge about this deadly gas is still woefully lacking, even among safety professionals. The World Health Organization says that 15 to 20 PPM can cause ill effects on human health. At 27 PPM there is a 21% increase in cardio-respiratory complaints. At 30% you'll see the earliest onset of angina.

In the world of High-Performance Contracting, HVAC contractors are well trained in how to analyze and understand the combustion process and what happens that can lead to creating CO.

ALL HVAC contractors should be so trained.

Furthermore, ALL public safety officials should be so trained.

When you search the Internet for CO-related news stories, the number you find are over-

whelming and the "facts" presented in them are all over the place. Here is the most important fact: NO level of CO from vented combustion appliances is acceptable in the living space.

But we know that CO happens. That's why knowing how to test for the issue, diagnose the cause, and find the right solutions is so very important.

That begins with education.

In this issue, Tom Johnson of TM Johnson Brothers in Cambridge, MN, dispels **seven common consumer myths** about carbon monoxide and what it takes to address this potential deadly issue. You can find his article on page 11 or online at ncilink.com/CO-Myths.

In addition, Steve Miles, president of Jerry Kelly Heating in St. Charles, MO, shares how his company has **become one of the go-to experts in his marketplace when it comes to**




Mike Weil is editor-in-chief and associate publisher of HVAC Today as well as the director of communications for NCI. He can be reached at MikeW@ncihvac.com.

THE TERM 'CARBON MONOXIDE' IS JUST TWO WORDS. BUT THEY ARE TWO VERY POWERFUL WORDS. ARE YOU PREPARED TO DEFEND YOUR CUSTOMERS AGAINST THEM?

carbon monoxide. Read about it on page 14 or online at ncilink.com/KnowCO.

Finally, this month we examine two CO instruments. David Richardson reviews the Fieldpiece STA2 In-Duct Hot-Wire Anemometer (page 6) and Jim Davis shares his thoughts on Bacharach's InTech combustion analyzers (page 7). Online they are at ncilink.com/1019Reviews.

Yes, the term carbon monoxide is just two words. But they may be the most important two words that can impact your customers.

The question is, are you prepared to defend your customers against them? Are you properly trained? 

Written By HVAC Professionals for HVAC Professionals

FIELDPIECE STA2 IN-DUCT HOT-WIRE ANEMOMETER

If you have ever questioned how much air is moving through a duct, the Fieldpiece STA2 Hot-Wire Anemometer can help you figure it out. It is an inexpensive test instrument that allows you to quickly and accurately measure velocity, temperature, and airflow inside a duct system.

The Fieldpiece STA2 has a backlit dual display that allows you to measure velocity in fpm (feet per minute) and calculate airflow in cfm (cubic feet per minute) with the appropriate duct dimensions entered on the same screen.

With the push of a button, it also shows the dry bulb (db) temperature in the duct. The Fieldpiece STA2 includes the following:

- Fieldpiece STA2 Hot-Wire Anemometer and a 9V battery
- Replaceable probe with protective shroud
- Magnetic rubber boot with hanging strap.

The most common use for this instrument is in a duct traverse. Before measuring, install your test ports in the proper location of the duct you plan on testing. You take readings in a grid pattern inside the duct to determine average velocity and airflow.

You can use a timed or point-by-point traverse. I recommend a point-by-point traverse for simplicity.



This anemometer is a great way to verify fan airflow when a blower wheel is dirty and you need an accurate measurement. You can also use it to check the air speed moving across registers and grilles when customers complain of noise.

Furthermore, it helps you discover turbulence inside a duct system and verify face velocity of air filters to assure they capture particulate.

If you're interested in learning more about the Fieldpiece STA2, go to the

National Comfort Institute store at ncilink.com/FieldpieceSTA2.

— by David Richardson, NCI Curriculum Developer and Instructor



BACHARACH COMBUSTION ANALYZERS

When performing combustion testing in the field, it is important that you can depend on your combustion analyzer. I have found that the Bacharach **Intech** and **Insight Plus** combustion analyzers are the leaders in these areas.

Let's look at both devices' specifications and compare them.

These specs are for **Intech Analyzer**:

- **O₂ Range:** 0% - 20.9%

- **CO Range:** 0 - 2000 ppm
- **Stack T:** - 4 to +1202 degrees
- **Comb Air T:** - 4 to + 212 degrees
- **Draft P:** N/A
- **Ambient Use:** 23 to 113 degrees
- **Reporting App:** Yes
- **Warranty:** 2 years
- **Built-in Diagnostics:** N/A.

These specs are for the **Insight Plus**:

- **O₂ Range:** 0% - 20.9%
- **CO Range:** 0 - 4000 ppm
- **Stack T:** - 4 to +1202 degrees
- **Comb Air T:** - 4 to + 600 degrees
- **Draft P:** +/- 40-in.w.c.
- **Ambient Use:** 23 to 113 degrees
- **Reporting App:** Yes
- **Warranty:** 2 years
- **Built-in Diagnostics:** Yes.

Field serviceability is a major factor in the overall operating expense of com-

bustion analyzers. Bacharach is the easiest to verify sensor operation. Changing both sensors when necessary is easy.

The CO sensor can be field-calibrated, or you can buy calibrated CO sensors. CO sensors normally last more than five to eight years.

Based on 30-plus years of using Bacharach analyzers, I found that most CO sensors rarely need to be calibrated more than every two years. They can always be checked by comparing their CO reading with another analyzer.

Learn more about the **Intech Analyzer** or to purchase it, go to ncilink.com/IntechPlus.

For more information or to buy the **Insight**, go to ncilink.com/InsightPlus.

— by Jim Davis, National Comfort Institute Senior Instructor

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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

2 New Daiken 50 ton roof tops VAV with Gas Heat \$28,000 each

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The Performance Advantage: Seeing What Others Cannot

Athens is a small city in Southeastern Ohio, nestled snugly at the foot of the Appalachian foothills along the Hocking River. It is home to 115-year-old Ohio University, once known as *Harvard on the Hocking*. It is also home to a small upstart HVAC firm known as Dean Heating and Air Conditioning.

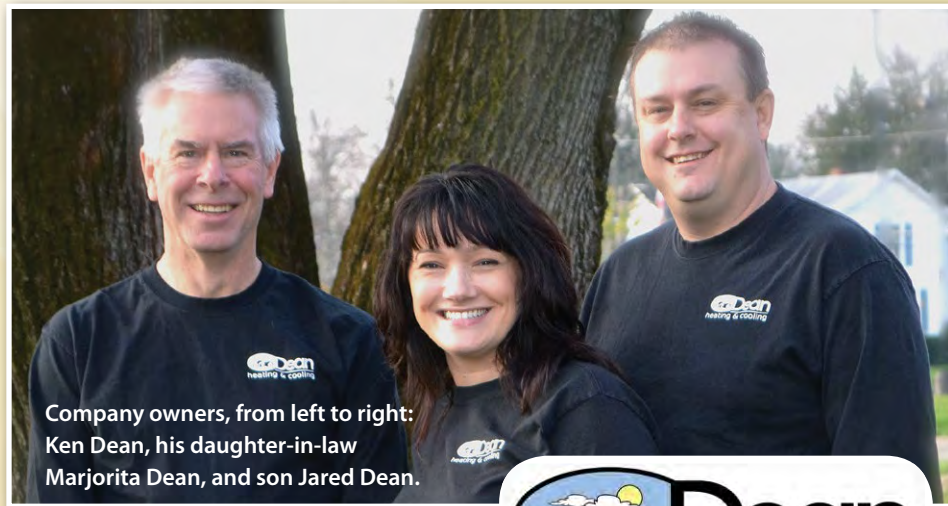
The company was formed in 1996 by Ken Dean, a local tradesman whose experience – from the time he was in high school – was in carpentry and residential electrical work.

“I started in the field in 1981,” Dean says, “first as an installer, then as a service technician. I worked for two companies for 15 years when I decided it was time to set up my own shop.”

In 1996, Bill Clinton was president, Great Britain discovered Mad Cow disease, and Israel just elected Benjamin Netanyahu as prime minister for the first time. It was also the year that the first sheep was cloned from adult cells (Hello Dolly)!

Meanwhile in Athens, Dean Heating was off to a fast start. Ken Dean says they had so much business that he soon realized he needed a helper and so hired his son. Jared Dean became Ken’s business partner in 2010.

“The business grew partly from establishing a reputation of doing our work right the first time (I hate callbacks) and my son’s efforts to promote and advertise,” Ken Dean says.



Company owners, from left to right: Ken Dean, his daughter-in-law Marjorita Dean, and son Jared Dean.



DOING IT RIGHT

Dean Heating focuses on residential retrofits. Ken says that from the beginning he understood the importance of doing things right the first time as well as how airflow is key to the successful and efficient operation of HVAC systems.

This attitude, combined with his very positive and outgoing personality, helped his small company build a great reputation in his marketplace.

As a result, he found himself in the position of going into homes serviced by other firms and fixing problems that the competitors didn’t even know existed.

Dean says, “The manager at my supply house told me after we’d been in business for a while that in his 20 years he’d seen many men go out on their own, but I was the only one who had work every day of every week.

Dean says the Athens community has a population of about 30,000

people and it wasn’t long before rental property owners saw the value in having his company service their systems.

“We began working for a couple of the larger ones in town. Then building owners sought our services for their small commercial properties.

“Our reputation and word-of-mouth drove more business to our doorstep.”

In 2012, Ken Dean was introduced to National Comfort Institute and he began taking classes. He learned that his airflow ideas were mostly right, but he also realized that he had much more to learn.

IT IS ALL ABOUT AIR

Ken Dean has a vision, one where his company becomes THE de facto expert in his market in the operation and maintenance of “systems.”

“To do that,” he says, “to view the

entire system – both the ducts AND the equipment – my guys need to be trained on the air delivery side. After all, air is the first word in air conditioning. If you can’t move the air through the delivery system, it doesn’t matter what the equipment is. The system just won’t perform.”

National Comfort Institute is a key provider of training for the company. This \$1.2 million company fields two service technicians, four installers, and has one person in the office. But Dean budgets a sizable amount of dollars into training and focuses on combustion analysis and certification.

CUSTOMERS UNDERSTAND COMFORT, NOT TECH TALK

Ken Dean says he talks up the importance of airflow with his customers. He talks to them in terms of what he calls, *Comfort Delivery Systems*.

He says they seem to get that.

“It turns on a light bulb for them. They often think in terms of price, not air. This helps them understand why a bigger box won’t make their bonus room more comfortable. This is how we get over the price differential between our services and those of our competition.

“We offer them options,” Dean continues. “We can simply replace equipment, or we can fix their delivery system, or both. We help them understand the delivery system is often the root cause of their comfort problems.”

Fixing comfort delivery systems can include installing turning vanes, replacing sections of ducts, fixing air leakage issues, correct for turbulence, and more.



Dean Heating and Cooling has enjoyed steady success over the years and found itself outgrowing the small offices they are currently housed in. They are in the process of building a new headquarters, which is due for completion sometime in 2020.

“We get great feedback from this type of work,” he adds. “Customers say rooms that never were comfortable are so comfortable now.”

Dean Heating isn’t the biggest or flashiest HVAC contractor serving the Athens area. But they talk plainly, they help customers understand the issues, and they deliver. That is the basis for the company’s growth.

Ken explains that their biggest competitor spends a lot of money on publicity and really push super high-efficiency product installations.

“When customers buy from them, often we find ourselves coming in after the fact to fix comfort issues that bigger, more efficient boxes didn’t address,” he says.

Could this be a contributor to Dean Heating’s amazing referrals and positive reviews? Ken Dean thinks so. He also says that because the Internet now plays such a huge role in consumer product and service research, his customers are much more savvy than when he first started the business.

“That plays nicely with our approach to business,” he says.

CHALLENGES AND SUCCESSES

The biggest challenges Dean Heating faces are the misconceptions customers have about comfort conditioning. This is not unique to the Athens market as it is an issue we’ve written about for years with examples across the U.S.

In a nutshell: consumers often tie comfort and efficiency into the type of equipment they have. Dean says his customers believe that if they change out an 80 AFUE furnace for a 95 AFUE furnace, they will be more comfortable and more energy efficient. They think they need to go from a 13 SEER air conditioner to a 17 SEER unit.

“This means I spend a lot of time explaining about air and air delivery. I have to show them how without the delivery system, it doesn’t matter how efficient the equipment is.”

Dean continues, “Many times I can demonstrate it to them using a manometer. I have no problems asking a customer to come look at something with me. And frankly, I find the digital phone is my best friend. I can take a picture of the manometer on a unit in their attic and show them.

“And they get it. They can visualize it. For the first time they can see what no one else can: The vital importance of air.”

Another potential challenge was after Dean took combustion and air classes, he needed to introduce the concept of doing static pressure testing into the company. To avoid complications and resistance, Ken Dean says he began that introduction by simply showing his techs how static pressure testing benefits them while they are in the field.

“I want them to know why it’s good

for them to use these processes and tools. The advantages it gives them. They really got on board with it, especially when I could demonstrate it to them in the field.

"The service guys took to it quickly, but I really want to impart more of this knowledge to our installers, so they see what their efforts at installing have yielded in terms of airflow."

Ken goes out after most installs to commission the systems. He says he does about 80% of them.

THE ULTIMATE IMPACT

Ken emphatically says the performance approach directly impacts his company's success and growth.

"Our reputation is what drives our business and growth," he says. "Not

WE ARE NOT JUST MECHANICS. WE ARE NOT JUST PART SWAPPERS. WE CAN ACTUALLY GO OUT AND MAKE A REAL DIFFERENCE IN OUR CUSTOMERS' LIVES.

every customer wants us to spend time for testing, at least not upfront, so I try to give them what they want with options that can make things much better for them.


"People like that. Few of my other competitors do that. Then, when we solve the "unsolvable" problems, customers do talk about it. Other trades talk about it.

"We couldn't do any of that if we weren't testing and diagnosing comfort delivery performance."

"Air diagnostics and combustion analysis are the base of our success and that base depends on training from NCI,

the training we do in-house, and training provided by our vendor partners.

"The biggest internal impact of that is satisfaction. We are not just mechanics. We are not just part swappers. We can actually go out and make a real difference in our customers' lives. Knowing how to do all this helps us feel really good about the work we do and inspires us to be the best," concludes Ken Dean.

For this and so many more reasons, **High-Performance HVAC Today** magazine has selected Dean Heating and Air as this month's Contractor Spotlight. 

Carbon Monoxide: *The Real Truth!*

Recently when at the doctor's office the admitting nurse asked me, "Do you feel safe in your home?" I immediately answered, "yes." This question really got me to thinking... As a certified Combustion and Carbon Monoxide Safety Analyst, my question to a customer should be, "Are you safe in your home from carbon monoxide?"

Unfortunately for many buildings and homes in North America, the answer is 'NO!' The problem is, most people do not really know if their home is safe from carbon monoxide (CO). In the following article, I hope to help debunk several myths and tell you some of the facts regarding CO.

CONSUMER MYTH 1:

"I have a CO detector, so I have nothing to worry about"

Fact: It is part of the building code in several states that "all residential dwellings shall have a working CO detector that complies with UL2034 within 10 feet of every bedroom."

This is an excellent code and it has saved many lives. But the UL2034 standard allows 69 ppm (parts per million) continuous CO prior to the alarm sounding. Thus, a typical CO detector notifies occupants of deadly amounts of CO but does NOT protect them from continuous CO, or lower-level CO poisoning.

Many medical studies show that low-level CO poisoning can be the root of dozens of serious diseases including Parkinson's, heart and circulatory problems, many respiratory diseases, nerve and brain damage, and SIDS (sudden infant death syndrome) — just to name a few.

Every home should have at least one low-level CO monitor to protect all occupants from any level of CO poisoning. I encourage you to tell your customers they need one on each level of the home and always near bedrooms.

CONSUMER MYTH 2:

"I had my furnace checked so I have no worries regarding CO poisoning"

Fact: Every furnace manufacturer recommends yearly maintenance on furnaces. But, less than

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Carbon Monoxide

MYTH

5% of furnace technicians are trained and certified in combustion and CO analysis. Unless a technician has such training and certification, there is no certainty that a furnace is safe.

Also, every combustion appliance in a home or building is a potential CO producer, so all water heaters, boilers, dryers, stoves, fireplaces, wood stoves, and kitchen ranges should be checked as well. In fact, more CO poisonings are caused by kitchen ranges and water heaters than by furnaces.

CONSUMER MYTH 3:

“If I suspect CO, I should call the fire department, gas company, or any heating contractor”

Fact: It is true that most fire departments, gas companies, and many heating contractors are buying the proper tools to detect low levels of CO in buildings. But again, less than 5% (actually less than 1%) of them have ever completed a training course and are certified in the proper repairs to prevent the problem from re-occurring.

That is why it is incumbent on you to explain to your customers that your technicians are trained in Combustion and CO safety, and are therefore well equipped to handle any combustion situation.

With that in mind, your techs should always carry their current wallet card to show customers they, in fact, have been properly trained.

CONSUMER MYTH 4:

“CO poisonings only happen in really cold weather”

Fact: CO does not care about the weather. We tend to hear about more poisonings in the middle of winter,

but poisonings can take place any time of year.

For example, gravity-vent water heaters tend to have venting problems in mild weather, especially if they have marginal levels of combustion air



in the mechanical area. Gas ranges are installed all over North America without proper range hoods that ventilate to the outside.

Even if they have a hood, rarely do people actually run the ventilation fan when they are cooking.

Baking and broiling are the most dangerous. Home centers sell vent-free heaters that ignorant consumers use in their homes, potentially making deadly levels of CO in just minutes of operation.

CONSUMER MYTH 5:

“Public buildings are safer than private homes”

Fact: Actually, there is NO Federal guideline for Carbon Monoxide monitoring in schools, apartment buildings, hotels, nursing homes, assisted living facilities, and churches among all other public buildings with the exception of public parking garages.

They are currently the only building type with specified maximum levels of carbon monoxide allowed. Deaths and

poisonings actually happen in public buildings as much or more than private homes.

CONSUMER MYTH 6:

“At Thanksgiving and Christmas it is the turkey that makes you sleepy”

Fact: Residential gas ovens by law can produce up to 800 ppm of CO during typical operation. In many homes that don't have a vented range hood or don't run the fan even if they do have a vented hood. An oven running continuously for several hours can produce danger-

ously high levels of CO in a space. This combined with many people in that space using up the oxygen and producing CO₂ can exasperate this issue.

So the next time you are at a holiday gathering, pay attention to this and ventilate the space if there is a gas oven running for an extended period of time.

CONSUMER MYTH 7:

“I don't hear much about poisonings, so it must not be a problem”

Fact: A huge majority of CO poisonings are never detected as such. Google reports that there are 72,000+ CO poisonings reported in the U.S. each year. An educated guess — after testing for CO in homes for over 10 years and talking to trained and certified CO analysts from all over the U.S. and Canada — is that as much as 20% of ALL buildings suffer from some degree of CO poisoning in a given year. Also, our medical profession does NOT test for CO poisoning in patients who exhibit flu-like symptoms. In fact many thousands of these patients

actually experience symptoms of low-level CO poisoning.

CO POISONINGS ARE PREVENTABLE

It just baffles me that here we are in 2019 and our industry and our society are absolutely ignorant of the dangers of CO in our buildings and preventions available to us to alleviate the issue.

For example, we still build water heaters and heating appliances that are engineered specifically to hurt people if they are not installed and monitored properly (ie: the draft hood and the vent-free heater). So what is the answer? In two words: proper training!

Are you aware that National Comfort Institute (NCI) is the ONLY organization in North America that has

a complete training and certification course that is recognized by the HVAC industry as proper and complete Carbon Monoxide certification training?


CO TRAINING: A MUST

It's time to look into attending one of these classes. Another little known fact is that NCI will actually bring an instructor right to your business to do this training for your people in-house.

If you have eight or more people needing this training, it is often cost-effective to bring the training right into your facility. You have no transportation costs, you can train all your people, and keep your business operating.

Plus, you can attend the class with your people to re-enforce the value of the training.

There have been several successful companies that have completely paid for their entire training investment in just a few weeks after class with the increased sales from finding all the existing problems in their customers' homes.

Trained and certified technicians are the most qualified to debunk these and other myths that permeate the HVAC Industry. 



Tom Johnson is a Plumbing and HVAC contractor from Cambridge, MN. He is one of six nationally certified Carbon Monoxide and Combustion trainers teaching for NCI. He has 40+ years of industry experience and 10+ years of experience in testing and repairing CO problems in the field. He can be reached at tom@tmjohnsonbros.com.



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Carbon Monoxide: Get Past Not Knowing *What You Don't Know*

We became involved with carbon monoxide (CO) testing and repair (at least the part where we understood its cause, symptoms, and repair) around 14 years ago after a series of conversations with Dominick Guarino and Jim Davis of National Comfort Institute (NCI). During those conversations, I learned that I really didn't know anything about CO – how it was produced, what caused it, or how to fix it.

When it came to CO, we were operating not knowing what we didn't know. We used industry anecdotes like cracked heat exchangers as the likely culprit creating CO. We also believed that if the flame burned blue, it burned clean. If it burned orange, it burned dirty.

I decided that, as a company, we needed to re-

gerous situations. When things go wrong, they go wrong in a catastrophic way. As contractors, we must prevent that from happening at all costs.

BECOME EDUCATED

During my conversations with NCI, I learned about classes on the combustion process and CO safety that Jim Davis taught all across the country. I decided our first step to becoming knowledgeable was through education.

So we contracted with NCI to bring Jim Davis into our company. At the time we had 8 to 12 technicians, so Jim provided a two-day training class just for our people.

During that class, which we held in our training room, Davis hooked up his combustion analyzer to our test furnaces and we watched as the CO levels climbed and climbed. It went exponential on us.

He told us he believed the cause was a dirty inducer motor. Everyone in the room was aghast in disbelief. So we opened the unit up and found the inducer motor was full of rust.

This was a furnace that we serviced regularly, kept clean. How could this happen without our knowing about it? Jim Davis' class showed us.

Would we have otherwise known this was happening? Not without the help of a combustion analyzer, the knowledge of where to place it, and the ability to interpret what its readings meant.

That is one way we learned that everything we thought we knew was mostly wrong. We also learned what really caused CO issues and how to test and fix those issues. That got the team fired up to pursue certification and that is what we did.

Since that first class, 100% of our techs are certified in combustion safety and CO through NCI. We have them on a two-year rotation for renewing those certifications. We also established an annual

schedule for NCI to come in and exclusively train our field team for refreshers and recertification.

We are a company that believes in training and we budget for our guys to get all kinds of it. We do most training in-house, but will send technicians to outside training to fill in the gaps.

BECOMING A CO EXPERT

Like anything else, to really be proficient at combustion analysis and CO detection and repair, you have to put in the time to not only train but also to practice your art. Our culture has combustion testing as a standard part of the process we have in place for maintenance, service, and even installations. Your field team needs to understand the importance of and expectations for doing the monitoring, testing, and diagnosis on every single call.

TOOLS AND INSTRUMENTS

As in any technical profession, technicians can only be successful when they are equipped properly and we are no different.

Combustion analyzers are key instruments we use when it comes to the testing and diagnosis of the combustion process and the amount of CO being produced.

For us, choosing the right analyzers has really been a game of trial and error to find the best ones to use. We look for those that not only hold up best in the field, but have everything our technicians need to make accurate tests and diagnoses.

Right now our analyzers of choice are from TSI and UEI.

Another key, relatively inexpensive instrument we prefer is the Bacharach draft meter. It lets us know how much

draft is in the chimney. Did you know that you can have too much draft in the chimney? This can create an air curtain that prevents combustion gases from going up the flue as they should. It's one of those things that you don't know until you learn about it.

So our process is to not only check the combustion gases and flues of every furnace we come in contact with, but we also check the draft to make sure it is within prescribed limits.

To protect our team, we teach them to turn on their combustion analyzers outside and carry them into the home running to check for CO. This shows consumers how seriously we take combustion safety.

THE MARKET RESPONSE

All the training in the world won't be enough to overcome the reaction of the market. It's hard enough to explain to customers what you're doing and why in terms they can understand and accept. But that gets even more difficult when competitors, who aren't properly trained or certified, tell customers that what we are doing is only a way to charge more money for the service.

It is also difficult because we monitor and test for low-level CO issues when most customers have CO detectors that aren't alarming and everyone feels safe. You have to be able to explain that.

Further complicating things are competitors who come in with Night-hawk CO monitors that don't

register low CO output. They tell the homeowner that the burner flame is blue and they don't detect CO. All is well.

The truth is they don't know what they don't know. They have no idea whether the furnace is producing CO or not.

These scenarios can be hard to overcome. It is a challenge. Luckily, in our market area, we do have several competitors who are also trained and certified by NCI. We can and do refer customers to these companies if they don't believe us.

Obviously, this can mean we lose the customer to that competitor. But we'd rather lose that business to a trained and certified professional than risk something bad happening to the customer because we didn't address the issue.

CUSTOMER EDUCATION

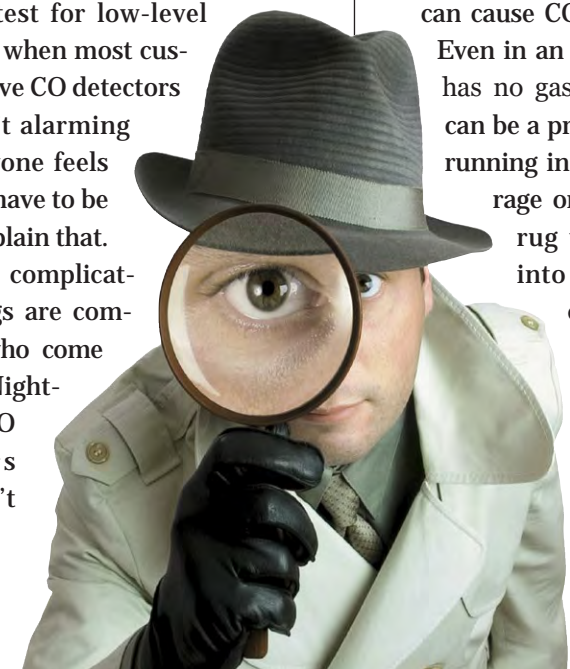
Consumer education is so important. They only know about CO from what they read, hear, or see through the media or what others tell them. They mostly don't know how many things can cause the production of CO that could be happening in their home.

Our techs explain how many things can cause CO besides the furnace. Even in an all-electric house that has no gas-fired appliances, CO can be a problem if the car is left running in an open attached garage or if they put a throw-rug with rubber backing into a dryer (yes, that can produce CO). Electric ovens can produce CO when in self-cleaning mode. Our training and expertise enable our



Combustion analyzers are key instruments for testing and diagnosing issues that can lead to CO production.

ally understand it. It is in the best interest of our customers as well as our technicians. Let's face it, gas appliances themselves are fairly safe – they've been around for more than a hundred years and manufacturers know how to build safe equipment. But anytime combustion is involved, other factors can come into play that can create dan-



technicians to put on their Sherlock Holmes hat and figure out what is causing the problem.

The key is to communicate with customers, listen to what they tell you, and then use your skills and training to work out the problem's cause and find a solution.

Our communication also includes providing brochures we create in-house using information from the NCI website and other places. These brochures explain the hazards and caus-

es of carbon monoxide poisoning. They also explain why we perform CO testing, and what that testing can do.

Furthermore, we always recommend that our customers buy **low-level CO monitors** that read as low as five parts-per-million (ppm) of CO. These monitors should have alarms to let people know they have a pending problem.

BUSINESS IMPACT

The results, for us, have been two-fold: we have grown our company over those 14 years, and our reputation is very strong in our marketplace.

I believe that part of the growth can be directly attributed to the emphasis we place on CO safety for our customers and our methodology for finding issues and resolving them. And the reputation of being the CO experts in our market area is important to that growth as well.

CREATING A SOLID REPUTATION WITHIN YOUR COMMUNITY

Besides the one-on-one with customers, here at Jerry Kelly Heating we

also have an educational approach to our community. I spend time talking with our police and fire department to teach them about the symptomology of CO poisoning.

They, in turn, have asked for and received my contact information in case there is a situation and they need to call out an expert.

Each Fall we send out public service announcement press releases to our local media – television, radio, and newspaper – to make CO awareness

top-of-mind for homeowners.

To do that, I set up Google Alerts to ping me whenever there is a CO poisoning in the U.S. I gather those articles for use in press releases

and public service announcements.

Because of the training and our practices, our reputation has grown. It is a trifecta – educating our technicians, our customers, and the overall community. All our promotion and sales materials also describe our credentials, our certifications.

In fact our sales literature, particularly the pieces that talk about CO monitors, explain the benefits of low-level monitoring and the drawbacks of store-bought, UL-Listed CO alarms.

SOCIAL MEDIA COORDINATION

Social Media plays a role as well. Remember, the mission is top-of-mind awareness and your message needs to be in every media your marketplace consumes content. So we do maintain social media accounts on Facebook,

Twitter, and others. We coordinate messaging with our PSAs.


There is a really fine line when it comes to this kind of messaging. You don't want to overdo it and make customers think you're trying to frighten them into buying your services. The trick is to find the middle ground between educating them and still creating an environment where they want to do business with you.

WHAT ELSE YOU SHOULD KNOW

When it comes to combustion issues and CO, be aware there are more causes than you know. I find that what I think I know, is often wrong. So you need to always be learning. Training is not a one-and-done situation. It should be continuous. And the same goes for your customers. You have to talk about this stuff and be prepared to address their concerns and any issue you find in their homes.

It is more than just using the tools and instruments. You need to understand what readings mean and the importance of combustion air.

So don't wait. If your technicians aren't trained and certified in combustion safety and carbon monoxide, look into changing that today. Get involved in combustion training and certification. Become the expert in your area.

It is good for your customers, your community, and your business. 



Steve Miles is the vice president and CEO of Jerry Kelly Heating and Air Conditioning in St. Charles, MO. He has been with the company since 1994. He and his entire cadre of field technicians have maintained their CO training and certifications since 2005.

Perspectives on Performance: The Contractor Experience

The High-Performance HVAC Contracting approach to delivering comfort and energy efficiency to customers is a movement that began more than 25 years ago and represents a small, but growing percentage of the overall HVAC Industry. It is a delivery method that differs from traditional HVAC methods because it involves exact measurements, testing, diagnosing, and repair solutions.

Furthermore, it requires a commitment to continuous education, process improvements, and a do-it-right attitude. So, we spoke to four HVAC contractors who have made that commitment and asked them why and what it means to them, their companies, and their customers.

The contractors are:

- **Jim Ball**, general manager, Ball Heating and Air Conditioning, Biloxi, MS
- **Mike Greany**, service manager, All Pro Plumbing, Heating, Air, and Electrical, Ontario, CA
- **Greg Vickers**, president, GV's Heating and Cooling, Inc., Glenview, IL
- **Kevin Walsh**, president, Schaafsma Heating and Cooling Co., Grand Rapids, MI.

WHAT DOES HIGH-PERFORMANCE MEAN?

Says All Pro's **Mike Greany**, "Performance-based contracting means having the training and ability to perform magic. This is done by testing and measuring the actual results of the system and comparing those numbers to what the system should actually be delivering.

"This unlocks the secrets to engineering or improving the total system performance, which absolutely improves the health, safety, comfort, and

energy efficiency all customers want and deserve."

It also reinforces the idea that contractors are providing the best work they can. So says **Kevin Walsh** of Schaafsma Heating. "I chose this path for our company not only because we want to be the best, but because doing things in this manner helps to separate us from everyone else.

"There are honest contractors out there who only want to swap out equipment. But I am convinced that is not in the best interest of customers."

Jim Ball of Ball Heating concurs. He says, "I like being certain that we are providing systems and repairs that perform at peak efficiency. Period. Few of my competitors can say that. Being a Performance-Based Contracting™ firm enables us to not only claim this, but we can prove it with numbers as well."

Greg Vickers of GV's Heating says that since implementing Performance-Based Contracting, "we have seen and heard responses from our clients about how we helped them overcome many obstacles with their HVAC systems.

"For our customers, this is honest, no-BS work. We show them what needs to be done based on measurements, then prove we accomplished what we set out to do based on measurements.

"We can diagnose their system issues and engineer real-world solutions to enhance comfort in their homes. I get jacked up knowing that we solve real comfort problems that so few others in our industry can," Vickers adds.



Walsh



Ball



Vickers

THE IMPACT ON BUSINESS

All four contractors have had to work through the difficulties of implementing Performance-Based Contracting and say there have been some amazing benefits to their investment in it. In fact, **Vickers** says his company is experiencing more work as a direct result.

"Implementing and sticking with the program is the hardest thing to do, but the benefits are priceless," he explains. "We are experiencing more work and profits as a direct result of creating extremely happy customers."

"Sure, the High-Performance approach constantly challenges us to improve, to up our game. I find that the entire team works with me to achieve a higher level of service."

Likewise, one immediate impact on Schaafsma Heating, according to **Kevin Walsh**, is happier customers. Another benefit: employee retention.

"The performance approach inspires our employees," he says. "They believe in what we are doing. This creates a stronger bond and we have very little employee turnover as a result."

However, Walsh says Performance-Based Contracting™ is harder to sell. "Our price is typically higher and other contractors aren't even discussing the same items. Homeowners get confused between what we tell them and what the 'me-too' crowd says."

Mike Greany says that change is hard. It creates doubt of the unknown. "Plus, we saw increased training expenses, higher-cost tools and instruments. Our initial struggle was convincing the guys and ourselves this process really works," he explains.

"Once we overcame those hurdles it brought 'instant' satisfaction that per-

formance works. We got better at adjusting systems, design, and installations with measurable results that we were very proud of," Greany says.

CHANGES NEVER STOP

HVAC Consultant Charlie Greer of HVAC Profit Boosters says change never stops so you must evolve or die. Charlie was never one to mince words.

One way **Jim Ball** does this is to focus on measuring how his team is doing. "If you don't know the score, how do you know if you are winning?"

He uses scoreboards to measure everything from sales and leads, to training status.

"We have a moral obligation to customers to provide the safest and most comfortable system possible. We can't do that without measuring."

Greg Vickers also says their biggest change is the adaptation of consistent training.

"Through training we hone our processes and procedures to help define the path for our staff. There are no gray areas," he says.

Major changes at Schaafsma include conducting static pressure testing on all service calls, maintenance visits, and new equipment commissioning. "Airflow is everything," **Kevin Walsh** says. "Understanding it begins with this."

At All Pro, **Mike Greany** says they changed their entire approach to maintenance and the way they perform systems checks.

"As a result, we use maintenance to collect the necessary data for talking points regarding needed improvements. Furthermore, we now train not only our techs, but our salesmen, in-

stallers, and select office staff to all really understand what it is to test and measure and what it can mean regarding improving any system.

ARE YOU ON THE FENCE?

With regard to advice for fellow contractors who may be on the fence about whether to start down the Performance Path, all four of our participants say that training is the absolute key.


"It is the only way to ensure your team is prepared and capable," says **Jim Ball**.

"Just do it," says Mike Greany. "Yes, it's scary to learn something new and explore the unknown. However, you have at your disposal a brotherhood of Performance-Based contractors who are always there to help and teach at times of need. My only true regret is not starting earlier and waiting so long to open up to the others for coaching, guidance, and peer networking."

Greg Vickers says Performance-Based Contracting has opened up a whole new world and the possibilities to grow are endless.

"This separates you from companies that just change boxes," he says. "Performance-Based Contracting helps you think out of the box."

Kevin Walsh says changing boxes is certainly easier. "If someone's goal is to be a high-volume sales company then I don't know if that is achievable as a Performance-Based company."

"For me it came down to taking the easy road to profits but doing less than great installations, or taking the tougher road selling a higher price, providing higher quality installations, and having happier customers. We chose the path less traveled." 



"Why won't my house cool?"

— Edward Kline, Klines Kustom Heating and Air, Inc., Duarte, CA

The customer liked the way it looked, but didn't like the comfort levels indoors. Wonder why?

Ed Kline of Klines Kustom Heating is the October 2019 winner of our Photo-of-the-Month contest, in the "What-the-Heck" category, as voted on by the subscribers to the High-Performance HVAC Today magazine (ncilink.com/Htoday) and visitors to the website. He will receive a \$50 gift card.

You can too – submissions are always welcome. If you'd like to submit a photo for consideration in our Photo-of-the-Month contest, click here (ncilink.com/POMSubmit) and fill out the information as requested.

THE NOVEMBER CONTEST OPENS ON OCTOBER 11, 2019.

That gives you plenty of time to submit something in any of our three categories: **The Good**, **The Bad**, or **WTH (What-The-Heck)**.



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Welcome New Members!

Membership in an organization like National Comfort Institute (NCI) is a step toward becoming a Performance-Based Contracting™ firm. It is a commitment that has an extraordinary impact on your business and your team. So, it is our pleasure welcome 21 new members, so far, in 2019.

We are pleased you all opted to join our family and look forward to hearing from you and even meeting you in April 2020 at our annual High-Performance Summit, which is being held in Phoenix, AZ.

If anyone has questions about their membership or the Summit event, please call our Customer Care line at 800-633-7058.



The October Power-Pack Is Ready!

We hope you were able to take advantage of all the great tools from your September PowerPack.

As you know, last month we focused on preparing for the Fall. This month we provide you with content and tools focused on heating season tune-ups.

For October 2019 your PowerPack features the following:

- **How to Perform Draft Interference Testing** (Recorded Webinar)
- **Carbon Monoxide Visual**

- **Inspection Form** (Download)
 - **SafeMaxx CO Test Report** (Download)
 - **Heating System Temperature Measurement Procedure** (Download)
 - **Cold Feet? Heating Postcard** (Download).
- We think you'll find these tools and training materials very helpful as you prepare for your heating season tune-ups and continue to grow your High-Performance HVAC business.
- Don't forget to share this month's PowerPack with your entire team!

Each monthly PowerPack is only available for 30 days. So go online and get started today.

The download is located at ncilink.com/PwrPak.

If you have any questions, or if you are unable to access any of the tools in this program, please contact your Customer Care team at 800-633-7058.

Summit 2020 Early-Bird Rates Available Now!

If you haven't already done so, mark your calendars for April 6-9, 2020. That's when the National Comfort Institute (NCI) **High-Performance HVAC Summit 2020** (gotosummit.com) returns to the We-Ko-Pa Resort & Conference Center in Phoenix, AZ.

Summit 2020 is shaping up nicely. Its theme is "Coach Your Team to High Performance." Attendees will learn skills to better communicate with co-workers the expectations and goals of becoming performance-based.

The core NCI conference includes two days of breakout sessions topped off with the annual NCI Awards Ceremony. And the best part – you can register right now for the conference and save hundreds! Plus, as members you can apply your NCI Bucks towards the event and earn Bucks back.

So don't miss out. Simply go to the link (ncilink.com/Summit2020Reg) to take advantage of the Early-Bird rates and get your team set for April 2020. Once pre- and post-con options are available, you'll be the first to know.

Questions? No problem. Call Customer Care at 800-633-7058.



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The High-Performance Sweet Spot



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It's more important than ever to measure and tune performance on HVAC systems with high-efficiency equipment. Getting equipment to achieve its design capacity is highly dependent on two key variables:

1. Airflow across the heat exchanger (in fossil fuel furnaces) or across the indoor coil (in Direct Expansion (DX) air conditioners and heat pumps).
2. Proper fuel/oxygen ratios and venting in gas furnaces, and refrigerant charge in DX air conditioners and heat pumps.

In order to deliver rated capacities from heating and/or cooling equipment, airflow must be correct. Either too much or too little airflow will keep equipment from operating efficiently at design capacity. Essentially, there is a sweet spot at which high efficiency occurs.

OLDER LOWER EFFICIENCY EQUIPMENT

Figure 1 illustrates this "sweet spot" in the form of a bell curve with the y-axis representing efficiency, and the x-axis representing airflow. Older, less efficient equipment has a fairly wide "sweet spot."

What this means is there is a fair amount of for-

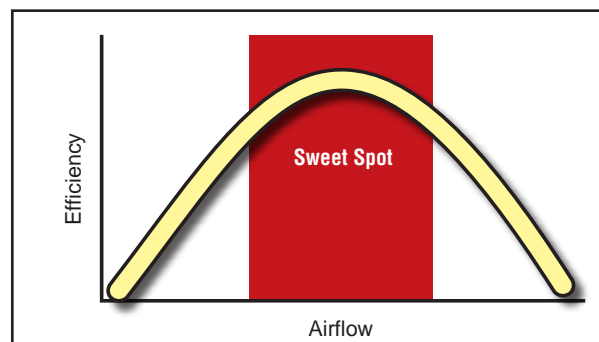


Figure 1. Performance in older equipment.

giveness with 70 to 80% furnaces and 8 to 12 SEER equipment.

On older DX systems, analog gauges were good enough to measure things like superheat and subcooling. On older fossil fuel equipment, there is much more forgiveness in terms of gas pressures and oxygen, as long as CO levels are under 100 ppm and stable.

In other words, on older systems, we had a lot more leeway within that sweet spot. This is not the case with newer, high-efficiency equipment.

HIGH-EFFICIENCY EQUIPMENT

Figure 2 illustrates the bell curve and sweet spot on today's high-efficiency heating and cooling equipment. To achieve higher ratings, this

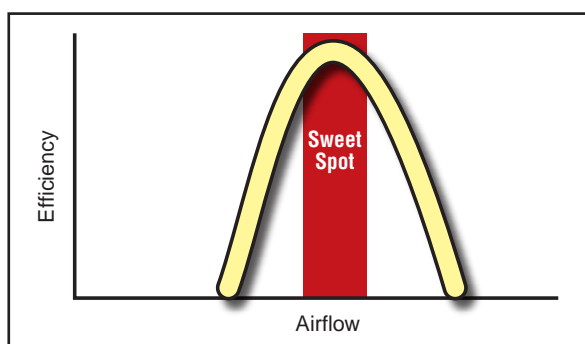



Figure 2. Performance in newer high-efficiency equipment.

equipment must work within a much tighter range. This means airflow needs to be dialed in much more accurately.

On DX systems, refrigerant charge must also be very precise, either weighed in properly, or by hitting exact subcooling and superheat numbers using digital gauges. Precise charge for maximum efficiency can only be achieved when there is proper airflow through the system.

Variable Refrigerant Flow DX systems are somewhat more forgiving when it comes to airflow, but even these systems will never reach design capacities and efficiencies without proper airflow. The same applies to newer high-efficiency furnaces.

These bell curves are not designed to be precise efficiency curves for every system, rather they are meant to illustrate the differences between older equipment and their newer counterparts.

Are your field people using state-of-the-art digital test instruments and modern testing methods to test and adjust today's more "sensitive" equipment? Learn to hit the sweet spot on your installations, and give your customer the comfort and efficiency they deserve. 

Cutting-edge Training from the Industry leader in Performance-Based Contracting™

Think you know airflow? Think you know carbon monoxide safety? Think you know how to solve your customer's comfort issues? Be sure. Don't guess. Find the training and expertise you need from the National Comfort Institute (NCI). Only at NCI will you find certification courses like Duct System Optimization and Combustion & Carbon Monoxide Safety, taught by leaders and innovators in the HVAC industry. Find out why NCI says "If You Don't Measure, You're Just Guessing!™" Visit the link below or call 800-633-7058 to find classes near you.

Upcoming 2019 NCI Training Schedule

Airflow Testing & Diagnostics

Oct 8: San Diego, CA
Oct 22: Los Alamitos, CA*

Refrigerant-Side Performance Certification Program

Oct 9-10: San Diego, CA
Oct 23-24: Los Alamitos, CA*

Airflow Testing & Diagnostics and Refrigerant-Side Performance Bundle

Oct 22-24: Los Alamitos, CA

Duct System Optimization & Residential Air Balancing Certification Program

Oct 8-10: Sheffield Lake, OH
Nov 5-7: Los Alamitos, CA*

Residential HVAC System Performance & Air Balancing Certification Program

Oct 29-31: South Plainfield, NJ
Nov 19-21: Richmond, VA
Nov 19-21: Sheffield Lake, OH
Nov 19-21: Lenexa, KS

Combustion Performance & Carbon Monoxide Safety Certification Program

Oct 8-10: King of Prussia, PA
Oct 16-18: Phoenix, AZ
Oct 22-24: West Allis, WI
Oct 22-24: Austin, TX
Oct 29-31: Omaha, NE
Oct 29-31: Hauppauge, NY
Oct 29-31: Sacramento, CA
Nov 5-7: Howell, MI
Nov 12-14: Florence, KY
Nov 19-21: Glen Burnie, MD

Performance-Based Selling Bootcamp

Oct 15-17: Los Alamitos, CA*

Commercial Air Balancing Certification Program

Oct 22-24: Union City, GA
Oct 29-31: Irwindale, CA*
Nov 5-7: Chantilly, VA
Nov 5-7: New Orleans, LA

Commercial System Performance Certification Program

Oct 8-9: Carrollton, TX
Oct 22-23: White Plains, NY
Nov 12-13: Tampa, FL
Nov 12-13: Los Alamitos, CA*

Introduction to Hydronic Testing, Adjusting, & Balancing

Oct 8-9: Los Alamitos, CA*

Optimize Economizer Performance with Certification

Nov 14: Los Alamitos, CA*

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Visit [NCIlink.com/ClassSchedule](https://www.ncilink.com/ClassSchedule) to view the latest schedule of NCI Training events

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Your key to success in Performance-Based Contracting™ is a strong support network – always there when you need it. NCI helps its members overcome the typical hurdles associated with implementing this measured performance approach.

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Live & Online Training and Conference Discounts	✓	✓	✓
Member Rewards NCI Training Bucks on Purchases	15%	15%	5%
Training Incentive Partner Program (TIPP) Dollars	Maximum	Maximum	✓
NCI Online Store Discounts	✓	✓	✓
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Unlimited Online University Courses	✓	✓	
Unlimited Webinar Access	✓	✓	
Bonus Annual NCI Training Bucks Earned	\$4200	\$1200	
ComfortMaxx Pulse™ - Air & BTU Testing Software	✓	✓	
ComfortMaxx Verify™ - Full System Testing Software	✓		
Free Print Subscription to High-Performance HVAC Today	✓		
One Paid NCI Summit Conference Registration	✓		
EGIA Premium Membership	✓		
Monthly Investment:	\$999	\$450	\$100

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