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INDOOR AIR QUALITY

**State of the Residential and
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ALSO IN THIS ISSUE:

Lessons From the Texas CO Crisis

Commercial Building Pressure Impact on IAQ

Contractor Spotlight: T.E. Spall & Son





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It's 2021 And Comfort Is More Important than Ever!



Mike Weil is editor-in-chief and director of communications and publications at National Comfort Institute, Inc. Contact him at [**O**nce upon a time on a different trade publication on which I served as chief editor, I wrote a column that talked about the vital importance of comfort in the overall HVAC Industry. I discussed how the industry changed, moving away from the idea that people were more productive when they were comfortable, and more toward the need to seal up buildings and homes to increase energy efficiency at all costs.](http://ncilink.com>ContactMe.</p></div><div data-bbox=)

Indoor Air Quality (IAQ) was one of several focal points of that change, and yet, the overall HVAC industry really didn't pay it much attention. Not until that fateful event in the summer of 1976. I am talking about the first major outbreak of Legionella pneumophila (ncilink.com/Legionellosis) during an American Legion convention at the Belview Stratford Hotel in Philadelphia, PA. That changed our world.

It led to a national push for IAQ legislation and ultimately, in the 1980s, to the quality revolution which served to take the industry back on the road toward comfort.

Perhaps a true turning point happened around the time of an editorial written by NCI CEO Dominick Guarino. In another trade magazine, Guarino wrote, "After a 20-year derailment triggered by the energy crisis, the HVAC industry is showing strong signs of getting back on the comfort track."

Comfort began the long trek back to the reason why the HVAC business exists. Comfort no longer took a back seat to energy efficiency, but regained its position as the embodiment of how buildings and homes should be designed, built, commissioned, and serviced.

BUILDINGS STILL NEED HELP

Fast forward to 2020 and 2021. The world continues battling COVID-19. This pandemic has

forced most people to shelter at home where they discovered the air quality isn't what it should be.

In fact, Dominick Guarino addressed this issue in his August 2021 **High-Performance HVAC Today** column, just a few months ago (ncilink.com/0821-OMT).

He talked about how changes to HVAC systems can negatively impact their operation, hurt indoor air quality, and even reduce efficiencies without proper testing and diagnosis.

IN THIS ISSUE

In this issue, IAQ Specialist John Ellis writes about the current state of affairs (ncilink.com/IAQaffairs) and provides six fundamentals to follow to properly address IAQ issues. He points out the importance of process for addressing issues and the need to **not** view "gadgets" as silver bullets.

Our IAQ coverage continues with an article by David Richardson. He takes on the educational failure that contributed greatly to the number of carbon monoxide injuries and deaths in Texas this past February (ncilink.com/COCrisis). Richardson points out the lessons we can take away from that disaster so that we can continue providing comfortable and safe environments, even in the face of a disaster.

Finally, on the commercial front, Contractor Darl Works discusses the impact of commercial building imbalances on IAQ (ncilink.com/CommIAQ) and how his company works toward correcting such issues.

Yes, this month our focus is on IAQ. But ultimately IAQ leads to comfort and comfort isn't a luxury -- especially today. It's the basis for productivity, health, and safety. We should never lose sight of that importance or our industry's role in it. 

Written by HVAC Professionals for HVAC Professionals

Combustion Equipment Caution Alert Tags

Combustion red tags are a huge statement when dealing with unsafe gas-fired equipment. But what do you do when you've modified a piece of equipment to operate safely and efficiently? What do you leave behind to let any other service provider know not to tamper with the system?

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wire to help attach it to the equipment repaired. You use the yellow tag after you modify the system and deem it to be safe.

These tags serve several purposes. One, it's your stamp of approval. Two, it allows the customer to have peace of mind. The third is the most important. It warns others who may come after you not to make life-threatening adjustments to the equipment you've already adjusted and deemed safe.

We all know and agree that only a trained professional should adjust a gas-fired system. Most of the industry looks at themselves as trained professionals. Unfortunately, we know that's not always the case.

Oh, and there is one more thing: only NCI Carbon Monoxide certified contractors can buy these tags.



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For more information, visit ncilink.com/YellowTag or reach out to your customer care representative at 800/633-7058. 

— Casey Contreras, NCI Field Coach, and Trainer



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T.E. Spall & Son: On A Quest for High Performance

Carbondale, PA, is located 15 miles northeast of Scranton. It got its name in 1851 as the anthracite coal industry was on the rise. In fact, Carbondale was the site of the first deep vein anthracite coal mine in the U.S. and, most notably, where the Carbondale coal mine fire burned for more than 25 years.

Like the entire area, the city has suffered economically with the demise of the coal mining industry. But it is an area on the rise. And it is where High-Performance HVAC Contractor T.E. Spall and Son call home.

Tom Spall says, "my dad was an electrician, so I grew up pulling wires with him and being around construction for my entire life since the time I was probably around seven years old. My family is all very mechanically oriented. During my high school years, my dad asked me to consider going to school for air conditioning and refrigeration, which I did.

"I was in a two-year associate degree program and worked every single weekend and summer while I was in college. We started the company upon my graduation in June of 1985."

SEEKING ANSWERS AND RESOURCES

Spall explains that the company had few resources in the beginning, and Tom had to seek answers to any HVAC questions he had on his own.

"It was very frustrating," he says, "but in retrospect, it caused me to become more resourceful and develop a network of people who could help me."

Spall says that network began with him diligently calling companies like Carrier, Trane, and York until he found someone who could help with "quality answers."

He also joined several industry trade associations, including the Central Eastern Pennsylvania Heat Pump Association, sponsored by the local



utility. He also joined RSES in 1986.

"I would go to all the meetings because I was on a quest for knowledge, information, and understanding of what it is that I was supposed to be doing. Even more importantly, I wanted to do things right."

'AH HA' MOMENT NUMBER ONE

Spall says that two big things came out of his Central Eastern Pennsylvania Heat Pump Association membership. He says one was perhaps the most impactful and important event of his career.

"They sponsored a three-day Manual

D training program taught by Hank Rutkowski. So, the guy who wrote the book was my instructor, and he helped me immensely.

"This was the best thing that could have happened to me so early in my career. I began to understand airflow and its importance. Over the next 36 years, I learned that airflow is the most overlooked aspect of comfort and efficiency in our industry. I would venture to say that less than 10%, maybe even less than 5%, of the industry gives airflow the attention that it deserves," he says.

He adds that over the years, through the efforts of National Comfort Institute (NCI), more contractors today are paying attention to airflow, but there is a long way to go.

"After all, it took me 15 years to realize air flow's value," he says with a chuckle. "I learned how to conduct manual D calculations and started to understand better the impact of the components that we install on airflow and comfort."

'AH HA' MOMENT NUMBER TWO AND THREE

Spall's second major 'aha' moment in his education occurred after learning about a company called NCI while reading the trade magazines, particularly Contracting Business.

"I was always on a quest for information. Contracting Business maga-

zine was the first one I subscribed to in the mid-1980s. Until the late 1990s, I completely focused on technical mastery, how to do my job properly, and how to do the right thing for my customers and myself."

He says he eventually knew he had to work on the business and not in the business. His educational quest led him to implement flat rate pricing in 1999. He says NCI hit his "radar" in the 1990s, and then he went to an NCI training program in 2003. That is when he had what he calls his third epiphany.

"We spent three days in this class. We realized that quantifying airflow performance was the piece that's been missing for us. Sure, we were designing duct systems using Manual D. We were also doing best practices by installing local total equivalent length fittings. But we didn't know about verifying that work.

"Within a month of taking that class, we had an in-house meeting and trained every single one of our technicians on airflow and CO/Combustion safety with NCI.

"The proverbial light bulb went off, and we totally immersed ourselves in the performance-based culture beginning in 2003. We've been students ever since."

HIGH-PERFORMANCE HVAC CONTRACTING CULTURE

At T.E. Spall and Son, the performance culture began with implementing measurement and testing practices in the field. But it also meant educating potential and existing customers on the difference between their approach to contracting and that of their competitors.

"When we began working with consumers who never used our services before, the challenge was overcoming the misinformation they received from other HVAC companies. Some people don't want to hear anything about what we do, and others want all the details, facts, and information we can provide.

"Customers often tell us that our competitors say we over-price our work, and sometimes that can make closing a sale more difficult. But I don't care what my competitors say. We perform to a certain standard to deliver the highest level of service, and we stand behind that work.

"We will never be the least expensive HVAC company in our marketplace. Why? Because we deliver a much higher value, and we're not going to apologize for it."

Spall adds that early on in their process, they faced the issue of when to tell a customer their duct system's blood pressure was too high.

"If the standard static pressure reading should be 0.5-in. W.C., at what point is the pressure high enough to warrant further examination," Tom says his team asked themselves. We eventually settled on .7-in as the point where we make the customer aware and explore their options together."

He says that if his technicians discover the static pressure is extreme, they will recommend an air diagnostic where Spall sends out an "expert tech with all of their instruments to deter-

mine exactly what is happening with the customer's system. They also do a Manual J load analysis on the building to determine the room-by-room requirements.

"We will measure system performance to quantify airflow, and then we'll determine what they have, what they need, and what we need to do to get them to a better place. We'll give them a menu of options, then explore that with them."

OPTIONS ARE THE KEY

Spall says the company is what he calls 'options-based.'

"There's not a service we provide where we don't give the customer multiple options," Spall explains. "Our belief is we're invited to their house as professionals to help solve a problem that they can't solve themselves. We need to give them options, and they need to tell us what they want to do."

He says some people choose the band-aid fix, and others choose the total system replacement. Options run the gamut from duct renovations, air upgrades, to equipment replacement, or some combination of them.

"Approximately 75% of our replacement jobs have some duct system upgrade attached to them, where we are enhancing return air, or modifying duct fittings to lower total equivalent length and improve static pressure.

This is just part of our regular daily routine."

MAKE THE RIGHT TRAINING INVESTMENTS

According to Spall, the High-Performance HVAC delivery method has changed his business. He says that success starts at the top of a company



Tom Spall

and works its way down.

"I believe the leader sets the tone for the entire team. I have been a believer in this approach since the first day I learned about it. It's not easy because high performance deals with invisible issues. The lessons I learned showed me how to quantify this, and that's re-

ally where it all came together for me.

"Our continued success means we must continue training and moving forward."

For Spall, that training includes a \$150,000 investment in what he calls their T.E. University. The company always had a small live-fire lab and training/meeting room, but Spall says they outgrew it. So he took an 1800 sq. ft. section of their building (it used to be a garage), completely renovated it, and fitted it out.

"Today, we have a fundamentals lab, a Live-Fire lab, and a classroom with a Smart T.V., and we do both live and virtual meetings from there. NCI can even conduct a training class for

our team remotely. We use this space every week -- typically three to four training days per week," he explains.

The live-fire lab is set up with newer modern equipment that includes two basic HVAC systems, a geothermal system, a combi boiler system, and an inverter system.

"Our success today stems from our adoption of the High-Performance approach to the HVAC business, to our investment in training and continuing education, and for being able to adapt to the changes these things bring to the business." Tom concludes.

For these and many other reasons, **High-Performance HVAC Today** magazine has chosen **T.E. Spall and Son** to be the subject of this month's Spotlight. 



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Indoor Air Quality: *Current State of Affairs*

I am often asked how I would rate the HVAC community's level of preparedness to handle the COVID-19 pandemic. My answer is this: The HVAC industry is ill-prepared.

Everyone is looking for a quick fix, plug-and-play, and cookie-cutter solution, but no one wants to do the actual work. Indoor Air Quality (IAQ) is not a "one size fits all" process, but rather, it requires a multi-discipline approach.

Plus, every client, every home, every building is unique.

IAQ IS COMPLEX

The HVAC community struggles to understand IAQ complexity. There needs to be a paradigm shift in the way we think and approach IAQ. This shift should include more training, not just in HVAC mechanical science but also in building science and building forensics.

If HVAC companies genuinely want to offer their clients the best IAQ solutions, they need

to have a process to address each situation on a case-by-case basis.

There always seems to be a debate about whether IAQ services are warranted and necessary. The main reason for this debate is the lack of real knowledge. Many companies use IAQ as a catchphrase. They offer it but don't understand it.

I think the HVAC community has some of the smartest people and the best group of professionals to go after the IAQ market. We control humidity, filtration, air exchanges per hour, and much more. HVAC has the biggest impact on a building or home. Even as a contractor in California, I based my whole business model around IAQ.

IAQ REQUIRES A PROCESS

Having a solid working knowledge of IAQ will better prepare contractors to serve their clients' needs. Pandemics will come and go. But I think now, more than ever, people have become more aware of the importance of IAQ and having a clean, healthy, home environment.

It's been said that we spend 90% of our time indoors. With the current events and the stay-at-home orders, that number is much higher. Our homes are supposed to be our sanctuary, our haven. Offering solid IAQ solutions can help homeowners achieve that goal.

IAQ is not just a single service but a process. A contractor must be able to go into a project and **Investigate, Analyze, and Quote**. The investigation process consists of your technicians gathering evidence and data, then analyzing that data. From there, you present a quote based on the information collected.

HVAC technician using a vane anemometer to test room airflow at the grille.



SIX FUNDAMENTALS

There are six fundamental principles to offering a solid IAQ solution. These are six areas that we should already be addressing in our everyday HVAC business. By understanding and controlling these principles, you can be well on your way to providing a substantial IAQ solution for your clients.

These six principles are:

- Thermal Comfort
- Humidity Control
- Filtration
- Building Pressures
- Ventilation
- Pollutant Source Control.

Remember, "Prescription without diagnosis is malpractice." Using the six previously mentioned principles, we, as an industry, need to look at the whole house or building as a system.

As an HVAC contractor, you must consider how the building performs; how the mechanical systems perform; and how the occupants interact with the two. Then and only then can we start to understand the dynamics of IAQ and all it entails.

GADGETS ARE NOT THE ANSWER

Stop the gadget upselling. Contractors tend to have the misconception that certain products are silver-bullet solutions based on manufacturer claims. They think these products are like bug-zappers: zapping pollutants, bacteria, microbes, and viruses in midair.

This is often not the case. In fact, in many instances, the byproducts these devices produce are more harmful than the actual pollutants they are meant to treat. Contractors need to offer real solutions.

DUCT CLEANING AND UV TECH MANDATES

Because of the pandemic, another hot IAQ topic right now is whether a governing body (local, state, or federal) should mandate duct cleaning or require all ducts to include UV technology to kill germs. Let me take you through how such a process or directive could change the HVAC industry.

If states mandated duct cleaning, the results would be inconsistent at best because most duct-cleaning tech-

niques do not address the sterilization of microbes, viruses, or bacteria. In some instances, if not done properly, duct cleaning can make IAQ worse.

With regard to UV technology, UV lights purify by attacking contaminants and microbes at their basic molecular level and then damage them enough so that they may no longer reproduce. However, this process is directly



related to three essential factors: the intensity of the UV light spectrum, the amount of time the organism is exposed, and the distance the light is to the organism.

This technology works very well on wet surfaces, such as a coil or pan. But even though there have been advances in UVC technology, they don't work well in an airstream. So, mandating duct cleaning, or ducts with UV technology, without clear performance results would be overkill.

PREScriptive MANDATES ACHIEVE LITTLE

Mandates and directives are often prescriptive. For instance, in 2005, the California Energy Commission introduced their prescriptive mandates

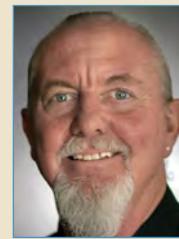
that included: duct leakage, fan watt draw, and refrigerant charge requirements. Each system had to meet a certain standard.

The energy savings were minimal after the state spent millions of dollars on incentive programs and completed thousands of houses. So, you can imagine that trying to put a prescriptive mandate on IAQ would be next to impossible.

Whether the HVAC industry could handle the issue of IAQ by themselves, without mandates, depends largely on the working knowledge and education of the contractors. IAQ often requires a team approach. It is also multi-discipline. A contractor may need to team up with a certified industrial hygienist, a mold remediation company,

an asbestos abatement company, an air-sealing and insulation company, or a building science professional.

By taking on IAQ investigative processes, we can not only serve our customers better, but we can also avoid the mandated solution mistakes of the past. 



John Ellis not only owns Dynamic Air Consulting, but he also teaches a NATE-approved course on Indoor Air Quality Principles through Daikin/Amana/Goodman. You can find this course at ncilink.com/AQP. He is also a business coach and field service trainer for The New Flat Rate. In addition, John is an author (ncilink.com/IAQ-SP) and speaker. Email John at ncilink.com>ContactMe.

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What Can You Learn from the Texas Carbon Monoxide Crisis

This past February, carbon monoxide (CO) incidents hit Texas families hard during severe winter storms. Sub-zero temperatures and statewide power outages that lasted many days lead to heartbreaking stories of families using unsafe heating methods to stay warm. The aftermath left 11 people dead, 1,400 emergency room visits, and other unknown long-term health issues.

Most people are unaware of CO poisoning. They don't know what causes it, the sources, or what to look for in their home. They occasionally hear about CO poisonings on the news, but don't think it will happen to them. Those who ARE aware think a store-bought CO alarm is the only protection they need.

People need to know the facts about CO. As a trained and certified High-Performance HVAC contractor, you are in the perfect position to raise awareness. So let's look at how you can help your customers and community become more aware of CO dangers.

YOU ARE THE CO SAFETY EXPERT



If you were to poll your customers, most would rank safety as their number one HVAC priority. When you raise CO awareness in your community, you become the local HVAC safety expert and "go-to" company.

Performance-Based HVAC professionals certified in Carbon

Monoxide (CO) and Combustion Safety are the first line of defense against CO poisoning. No service provider is in the homes of the public more than HVAC contractors.

How many of your competitors even discuss safety? Unfortunately, most don't. So, you can use the CO safety difference to distinguish your company from the rest. Let competitors keep doing what they do while you innovate and promote unique solutions that no one else considers.

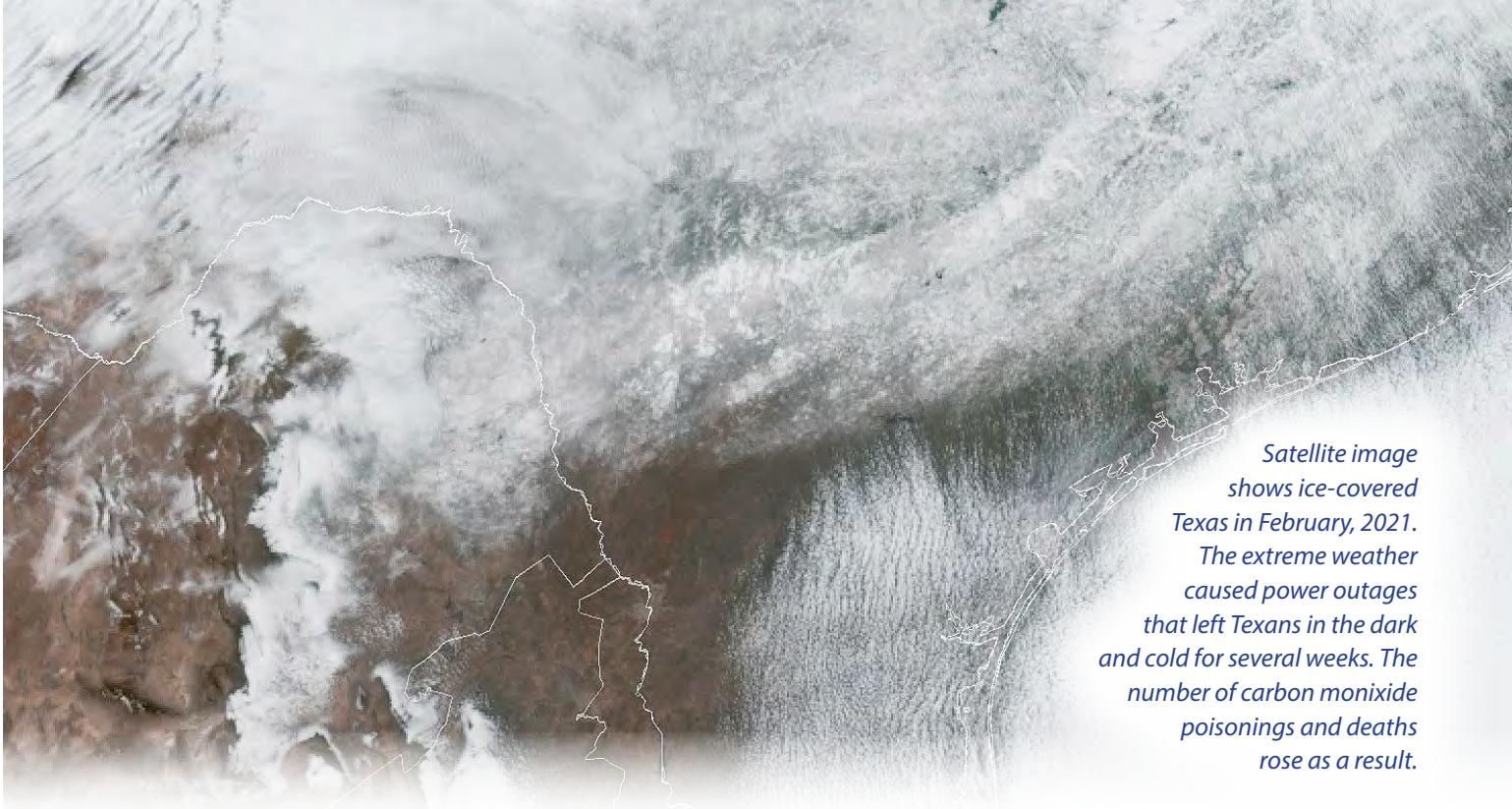
In addition, you'll feel better about yourself, your work, your contribution, and sleep great at night knowing you're doing the right thing.

OPENLY PROMOTE CO SAFETY AND EDUCATION

To be the local safety expert, you need to promote CO safety and education in your newsletter, on your website, and in your marketing. You can offer links to industry resources and provide general tips. The goal is to educate, not to frighten. Awareness could have prevented many of the CO poisonings in Texas.

Some try to take advantage of people's fear of the unknown, like an invisible gas that can harm them. Look at the COVID-19 media coverage to see the backlash from this type of awareness. Negative awareness equals negative responses. People go on the defensive, put up their guard, and won't trust you.

Instead, share advice such as CO sources that many don't consider including running cars in a garage, burning charcoal and wood indoors, heating with a gas oven, or using a generator indoors. Your advice should be simple and in list form. For ideas, Google "winter travel safety tips." You can also download and offer NCI's Home Comfort Report, "Why Should I Demand a CO Test



Satellite image shows ice-covered Texas in February, 2021. The extreme weather caused power outages that left Texans in the dark and cold for several weeks. The number of carbon monoxide poisonings and deaths rose as a result.

[\(ncilink.com/WhyTestCO\)?"](http://ncilink.com/WhyTestCO)

Besides helping people understand potential CO sources, they need to know about CO poisoning symptoms. You could provide a list of the symptoms or links to industry resources to increase awareness. However, if you've been to the CO class, you know such articles are often peppered with poor advice. So choose wisely.

Since most of the public doesn't know what to do when a CO alarm goes off, they just disconnect it. Why not start there? Focus on action steps people can take and what they should do when their alarm sounds.

Once you've increased awareness and suggested practical, easy-to-follow advice, it's time to offer services and solutions that take your customer's protection one step further.

OFFER LOW-LEVEL CO MONITORS

One simple step is to offer customers low-level CO monitors. Many HVAC contractors and their customers don't know the difference between a store-bought CO alarm and a low-level CO monitor.

Jim Davis taught me a simple way to help customers understand the differences using a home security system comparison.

Low-level CO monitors are the type of home security system that alerts a homeowner to danger once an intruder steps foot on their property. The homeowner isn't in immediate danger, but they know they should act now before the situation escalates.

Store-bought CO alarms are the security system that delays letting the homeowner know the early warning signs. Instead, they alert the homeowner to danger once an intruder is in the home.

PROVIDE CO TESTING AND SAFETY CHECKS

Besides low-level monitors, offer your customers something that no one else does. Add CO testing to your service and maintenance calls. It's quicker than ripping a furnace apart to inspect for a cracked heat exchanger and provides a lot more information.

You need the right test instruments, but you also must know what

readings and ranges to look for to verify safe operation. You won't know if the equipment is safe without them. Here's an abbreviated list of measurements and ranges you'll want to know for gas equipment:

- Flue gas CO readings – typically, less than 100 ppm and stable during the run cycle
- Flue draft pressure – typically -.01 to -.02 inches of water column
- Flue temperatures within range based on equipment type.

You can take many more measurements and ranges, but these three are a start in the right direction. When these measurements are out of range, they provide clues about where a problem exists. Being able to interpret these clues determines if you catch or miss a dangerous condition.

Remember, to be the CO safety expert in your market, you need the proper training. There's more to CO than cracked heat exchangers. It takes knowledge of combustion, equipment operation, airflow, and building science to understand the factors influencing CO production.

DELIVER RESULTS THAT SOLVE THE PROBLEM

Test results lead to solutions when you diagnose them correctly. Without the proper diagnosis, you're guessing. For example, a cracked heat exchanger is rarely the source of a CO problem, so find the actual cause to provide the right solution.

Some common repairs NCI-certified combustion analysts make after testing and measuring include:

- Makeup air systems
- Fan-powered combustion air
- Double-acting barometric dampers with spill switches
- Duct renovation
- New equipment.

Your measurements will guide you to the proper corrections. Once the re-

pairs are complete, confirm your work corrects the problem and performs as intended with appropriate test-out procedures that verify safe operation.

BE PROACTIVE INSTEAD OF REACTIVE

Talking to customers about CO isn't easy. Don't get discouraged when people ignore you. Ignore those competitors who call you *Chicken Little*. Remember this: if one customer hears what you share, or you help to save one life because of what you teach, all the effort is worthwhile.

Imagine how many lives could have been saved, how many injuries could have been avoided, had consumers living in Texas been well-informed and protected prior to that bitter deep

freeze last year.

It's unfortunate that CO poisoning only becomes a priority after a tragedy. It's time we took a proactive stance instead of a reactive one. You can help bridge the communication gap between the public and our industry when you look out for your customer's best interests. 



David Richardson is the newly appointed director of technical curriculum at National Comfort Institute (NCI). His technical knowledge fuels much of NCI's course and materials development and his organization, writing, and editing skills continue to advance the message of High-Performance HVAC Contracting across the entire Industry. You can contact him at [## When it Comes to DUCT SUPPORT It's Time to REINVENT the WHEEL](http://ncilink.com>ContactMe.</p>
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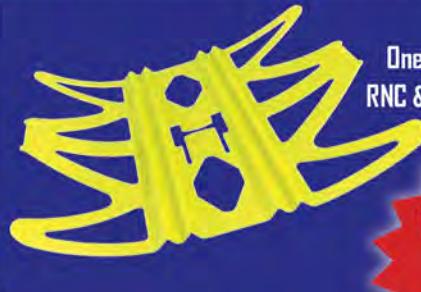
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Commercial Pressure Imbalance Impact on Indoor Air Quality

Can a neighbor affect your building pressure when you are only separated by a two-hour firewall? The short answer is "YES"!

Remember, truth can be stranger than fiction.

Here's the story: A few years ago, we were called out to a microbrewery experiencing a building pressure issue. The client explained that after the tenant moved in next door, the brewery began having issues with their equipment. The biggest issue was with a cooker used to brew beer.

So we conducted an onsite survey of the building and equipment and everything seemed to be in working order. We also inspected the firewall between the brewery and their tenant and found no issues there, either.

The microbrewery had 30 tons of cooling and one 12-foot kitchen hood with makeup air. There were different types of brewery processing equipment using either exhaust or makeup air or a combination of both. We tested out all the equipment. Everything was working fine. We could not find anything wrong with the brewery's cooling units. This was not the outcome anyone wanted.

A few weeks later we received another call from the brewery. A power-exhaust burner back drafted and caused the control wiring to melt. I made a trip out to see what was going on and again, had no more success than before.

I placed data loggers onsite for seven days and once again found no major issues.

This was driving all of us crazy. After nearly four months, we couldn't recreate what was

going on.

THE NEXT DOOR NEIGHBOR

Six months later we received a call from an Atlanta-based company that needed a functional performance test done on their equipment in their Tampa server facility. They said the electric company was having an issue with the amount of power they were using.

When I pulled into the parking, I saw that our brewery client was next door! How is that for a small world!

We walked through the server farm facility and got to the area next to the brewery. You could smell beer coming through the firewall. That is when it dawned on me that the server farm was somehow the culprit of the issues at the microbrewery.

The server farm used three 65,000 CFM exhaust fans, four 25-ton and one 70-ton rooftop units (RTUs). They planned to install three more fans on the loading dock. The client said they operated the RTUs 24/7. However, the fans were designed to operate only when it was necessary to remove excess heat.

NEXT STEPS

To tackle this unique situation, we took it one unit at a time, traversing with a pitot tube, and vel-grid. When we finished our testing, we could still smell the brewery through the firewall.

By the way, the firewall is a 6-in. frame with fire-resistant insulation and two layers of 5/8-in. fire-rated sheetrock on both sides. At the front door of the server farm the pressure was at 0.21 in. with all the fans and RTUs operating.

The dry bulb in the server farm space ranged between 80 to 85F. The humidity ranged from 55



to 60%. The space was around 85,000 sq. ft., and the building was built in the early 1980s. After performing our testing, adjusting, and balancing measurements (TAB), we told them they needed additional make-up air. The server farm general manager decided to use the bay doors as make-up air for the back part of the building!

Yes, I'm talking about the bay doors on the loading dock. Each of the four 25-ton and the 70-ton units were set to operate $\pm 10\%$. However, they were not reducing the heat load as they were designed. The humidity and temperature were still high in the server area.

Several weeks later the general manager of the server farm wanted to meet and go over the TAB report. He said they planned to add another 50-tons of cooling and two more 65,000 CFM exhaust fans. However, they couldn't do any of this work without upgrading the transformer.

They had a request into the landlord but had to wait to have the transformer changed out. The GM then wanted testing and balancing done on this additional equipment.

FROM BAD TO WORSE

Unfortunately, the landlord said they could not increase the transformer size. That meant the server farm owners needed to buy or rent generators to operate the new RTUs, and exhaust fans.

I didn't believe this would work, but the customer is always right. They had the equipment installed and started it up. Here is what then happened:

After they installed these units and fans, they had 220 tons of cooling (88,000 CFM) on an 85,000 sq.ft. building. However there was no out-

side air coming through the units.

Now they had five 65,000 CFM exhaust fans providing 325,000 CFM total exhaust. The fans were not used constantly. Walking around the facility was like walking inside a vacuum cleaner in some places and a hurricane in others. The units were set and operating $\pm 10\%$.

The dry bulb ranged from 75 to 85F, however, the humidity was between 45 to 55%. The smell from the brewery was worse after adding the equipment. This was with the exhaust fans running. We had no way to resolve the smell from the brewery coming through the wall.

While working on the server farm,

SOMETIMES the ventilation needs of two commercial spaces within one building are incompatible and nothing you do can fix it. But you can't know that without testing and measuring.

we spoke with the new owners of the brewery next door, to see if they were still having issues with their equipment. They were and didn't know why. I explained to them all the pressurization issues their neighbor was having and that most likely was causing their problems.

Ultimately, the server farm owners decided to relocate this facility and moved out. Soon after, we received a call from the microbrewery and asked to come back and retest their side of the building.

FINALLY, GOOD NEWS

After retesting and measuring the microbrewery, we found their static pressures changed from .15-in. negative to .03-in. positive. We had access to the old server farm, so I went in there to see if you could still smell beer. The smell was still lingering but didn't seem to be coming through the wall.

Here is what we discovered: The ventilation needs of these two spaces were incompatible. The fire wall was not suited as a good barrier between them. When the fans on the server side of the building came on, the amount of outside air was overwhelming. The additional outside air coming from the back of the building also added to the imbalance.

We still talk about this project. I still wonder how air can be pulled through something like a firewall. That doesn't make sense. Nevertheless, the brewery came full circle, and this became the "best worst" job we ever worked on.

Unfortunately, in 2020 the brewery went out of business due to Covid.

The lesson learned from this experience is that even though pressure testing a building may seem unorthodox, it can save your customer big money and eliminate many headaches for them and for you. 



Darl Works is president of Performance Air Balancing, Inc., a 16-year-old Testing, Adjusting, and Balancing (TAB) firm based in Crystal River, FL. He is a National Balancing Council (NBC) Qualified Supervisor who oversees

the daily operations and performs TAB report review and certification. He can be reached at [16 OCTOBER 2021](http://ncilink.com>ContactMe.</p></div><div data-bbox=)



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Nov 16-18: Dallas/Carrollton, TX
Nov 30-Dec 2: Cleve/Sheffield Lake, OH
Dec 7-9: Dayton, OH
Dec 14-16: Lenexa, KS

Duct System Optimization & Residential Air Balancing Certification Program

Oct 12-14: Dayton, OH
Oct 12-14: Cranston, RI
Oct 26-28: Bloomington, MN
Nov 9-11: Houston/Jersey Village, TX
Dec 14-16: Milwaukee/West Allis, WI

Residential HVAC System Performance & Air Balancing Certification Bundle

Oct 19-21: Valley View, OH
Oct 26-28: Seattle, WA
Nov 2-4: Union City/Atlanta, GA
Nov 30-Dec 2: Orlando, FL
Nov 30-Dec 2: St. Louis/Earth City, MO
Dec 7-9: Philadelphia, PA

Commercial Air Balancing Certification Program

Nov 16-18: Cleve/Sheffield Lake, OH

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More Summit News

Ladies and Gents -- as Summit 2022 draws closer we will continue updating you on the latest and greatest news.



As a reminder, Summit is being held at the We-Ko-Pa Resort in the spring of 2022 in Scottsdale, Az.

If you book your rooms now, you can get the NCI group rate of \$189 per night. Just go to ncilink.com/BookNow and get your rooms locked down for this amazing event.

THIS TIME IT'S PERSONAL

This conference is open to the entire industry. Summit is a welcoming gathering of like-minded people who are open and willing to share with their fellow performance-based professionals.

For the 2022 conference, we created a breakout session approach where each topic area will have three options. It's personal in that you can design your own experience using the following:

- **Novice**
- **Practitioner**
- **Mastery**.

For the relative new-comer to the High-Performance approach to contracting, we are offering a Novice class on how to **Use AirMaxx Lite™ to Educate Your Customer**.

In this class, NCI's David Holt explains how a simple app can help customers understand static pres-

sure and airflow.

So be sure to join David in this workshop on how to use AirMaxx Lite. This simple smart device app allows you to quickly calculate TESP and interpret approximate airflow at the equipment. It also provides a very simple visual way to get this information across to your customer.

There are **17** more such classes. Check them out at ncilink.com/2022Sessions.

Visit the Summit Week website at GotoSummit.com to reserve your seats for what is shaping up to be the best Summit ever.

Register for Summit 2022 today at ncilink.com/summitreg. Early bird discounts are available!

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Learn more about these monitors here: ncilink.com/NSI6000Review



These devices are sold exclusively by resellers who are professionals trained and certified by National Comfort Institute (NCI). The NSI 6000 monitors aren't available in retail stores or websites.

If you'd like to learn more about how to become a reseller, visit ncilink.com/NSI6000. Or call your Customer Care representative at 800-633-7058.

Order yours today!

ComfortMaxx™ Updates and Improvements

National Comfort Institute's ComfortMaxx™ cloud-based software has evolved greatly over the years. It's faster, easier to use, and is included as part of any NCI membership.

Recently NCI announced a number of great updates including:

► **Room and Register Setup** — This is no longer required for starting a ComfortMaxx Verify™ test

► **Auto Plot Airflow** — We've added the option to automatically plot fan airflow for applicable system type and blower combinations using NCI Generic Fan Performance Data

► **Auto Equipment-Rated Capacity Under Test Conditions** — All you have to do is enter the *Nominal Capacity* and (optionally for more accuracy) the *Equipment Rated Cooling Capacity at AHRI Conditions* in the System tab. ComfortMaxx then uses ASHRAE Standard 221 compliant methods to accurately estimate expected capacity under your test conditions.

► **Preview Results** — Before finalizing your test, hit *Preview Results*. This lets you view test results before finalizing your test and locking in the values. Preview Results also includes critical diagnostics to help validate the data you collected, and will provide Warning or Error messages if something doesn't seem right.

Learn more about ComfortMaxx and how it can help your techs and your customers. Just call your Customer Care Rep at 800-633-7058. 

The image shows a stack of three cookies on a blue napkin. There are two standard chocolate chip cookies and one dark chocolate cookie. The background is slightly blurred, showing a person's arm and shoulder.

The image shows a tablet screen with a dark background. At the top, the text "Simplify Your Pricing!" is displayed in large, bold, yellow letters. Below the tablet, the words "THE NEW FLAT RATE" are written in large, bold, green letters. The tablet screen displays a menu with the following categories and prices:

Category	Description	Price
Platinum	PLC COMPLETE WATER DELIVERY SYSTEM MODULATOR Complete system including: • PLC • Water delivery system • Pump • Control panel • Components required to modulate water flow	\$726
Gold	PLC COMPLETE WATER DELIVERY SYSTEM MODULATOR Complete system including: • PLC • Water delivery system • Pump • Control panel • Components required to modulate water flow	\$519
Silver	PLC WATER DELIVERY SYSTEM MODULATOR Control and logic components	\$415
Bronze	PLC WATER DELIVERY SYSTEM MODULATOR Control and logic components	\$311
Gold-Sid	PLC WATER DELIVERY SYSTEM MODULATOR Control and logic components	\$208

At the bottom of the tablet screen, there is a red button labeled "Get Started".

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The advertisement features a blue header with the company logo and name. Below the header is a photograph of a training session with several people seated at tables, facing a presentation screen where a man is speaking. The text "Comfort College PLUS" is prominently displayed in large white letters on the left side. To the right, a circular graphic indicates the event dates as November 4th & 5th, 2021, and mentions approval for credit hours. A QR code is located in the bottom right corner.

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Dominick Guarino
is publisher of
High-Performance HVAC Today magazine
and CEO of National Comfort Institute, Inc.
He can be reached at
ncilink.com/
[ContactMe](#)

Thanks to the COVID-19 Pandemic, a huge public spotlight has been shining on our industry. We're now viewed as the people who can make buildings safer by keeping the virus from spreading through their HVAC systems.

This has been a good thing for the industry as it has given professional contractors the opportunity to offer true improvements to both commercial and residential systems. These solutions can improve Indoor Air Quality (IAQ), and greatly reduce the spread of airborne pathogens.

Unfortunately, there's been a large percentage of IAQ snake oil being sold, often unwittingly, by our industry. These types of quick fixes have plagued the HVAC industry for decades.

Most contractors offering band-aid solutions are likely not doing it with malice, they just haven't been taught differently. That's not an excuse, but it is the reality our industry lives with every day.

"IF YOU ARE TRULY SERIOUS ABOUT OFFERING THE RIGHT SOLUTIONS, YOU MUST BECOME A STUDENT OF IAQ."

There are many products that help with preventing and mitigating airborne pollutants. But when applied as band-aid solutions, the building or homeowner is likely being done a huge disservice.

Unfortunately, when applied without full understanding and a real diagnosis of the underlying issues, these quick fixes usually miss the mark. In fact, some misapplied solutions actually make things worse.

As John Ellis mentioned in his article in this issue, "prescription without diagnosis is malpractice." One of the most important diagnostics you can perform is towards identifying the root causes of the problem.

For example, performing duct cleaning without reducing or eliminating the source of the dust and dirt is a band-aid approach. While it does improve air quality for a short period of time, it's just a temporary fix. Without eliminating the source, the ducts will just get dirty again and we're back to square one.

Some might suggest that sealing the ducts and installing better filtration is a good solution, but again, while that could be a good way to reduce infiltration of pollutants into the ducts, it may still miss the mark addressing the root causes.

Maybe the real culprit is a pressure imbalance that causes air to be drawn from a dirty attic or crawl space, or from a dusty drop ceiling in a commercial application. Unless we test, we're just guessing. Where have I heard that before?

The same goes for humidity control. Unless you identify the true source of the humidity problem, whether it's too high or too low, installing dehumidification or humidification devices may be just putting band-aids on the building.

So how do you get educated and learn to diagnose and address the real causes of poor IAQ? One way is to read the IAQ article by John Ellis, and David Richardson's CO Safety in this issue.

There are also great articles on the subject in back issues of this magazine available at HVAC-TODAY.com. The bottom line is if you are truly serious about offering the right solutions, you must become a student of IAQ.

There are many good books on the subject, and great articles published in other industry publications, but beware of advice that touts a one-size-fits-all single-solution fix.

Silver bullets rarely work, and even worse, they can back-fire and possibly create an unhealthy or even dangerous indoor environment.



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