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Conquering COVID ...

**... in the Commercial
Restaurant Industry**

ALSO IN THIS ISSUE:

- **Do You Believe in Science?**
- **Master Airflow Diagnostics**
- **Partner Spotlight: CI Web Group**



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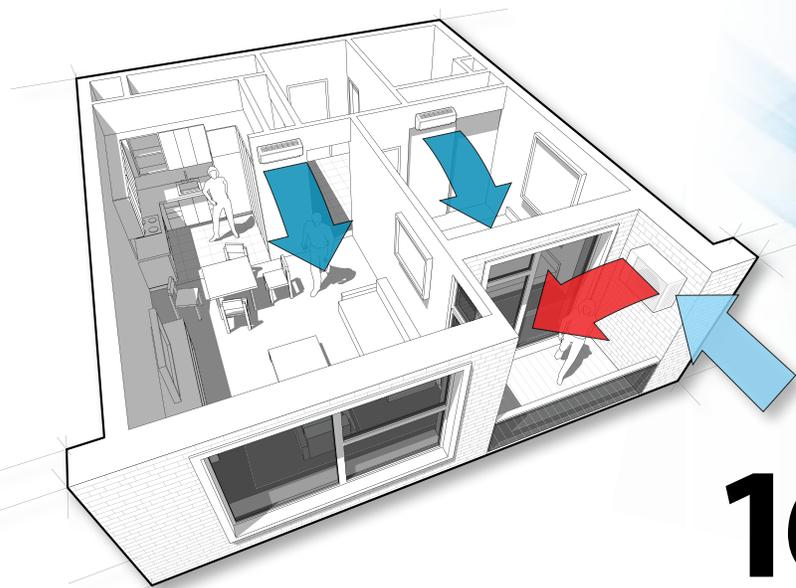


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COVER STORY:

Conquering COVID in the Commercial Restaurant Industry

Don Langston of Aire Rite® Air Conditioning and Refrigeration highlights how pandemic shutdowns impacted his commercial refrigeration business and clients during the shutdown.



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The Key to Mastering Airflow Diagnostics

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Do You Believe in Science?

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Be Thankful for the Industry You Serve and Set the Goal for a Prosperous 2022



Mike Weil is editor-in-chief and director of communications and publications at National Comfort Institute, Inc. Contact him at ncilink.com/ContactMe.

They say that change is always difficult, and that those who can't adapt to changes get rolled over by them. OK, I made that up, but I think you get my point.

Now that 2021 is in the rear-view mirror, it's time to step away from the negativity of the pandemic and take a look at all the things for which we, the HVAC Industry, should be thankful.

First on my list is the HVAC contracting industry itself. Contracting is perhaps the only industry that can never be outsourced to another country! It is national in scope but focused locally. Contractors are unique in that each job you do is a custom project where your creativity IS the product and service. That creativity directly results from your training and your ability to sleuth out issues that impact comfort.

The industry should also be thankful that HVAC contracting is finally recognized as essential. Comfort is directly related to productivity, health, and safety at work and more than ever at home, thanks to the changes wrought by the pandemic. That means Indoor Air Quality (IAQ) has become an even bigger part of the comfort lexicon in the 21st century. That is great news.

If you're not sure about the importance of IAQ, especially in commercial HVAC and refrigeration, just read Don Langston's article on page 16.

One hold-out issue from 2021 that will continue impacting Americans is the supply chain. Shortages of goods are helping to drive up prices on everything from gasoline to food to household appliances. Think about what it costs today to fuel up one of your service trucks.

It would be advantageous to reflect cost increases in your pricing. That means your prices should increase too. Think of it this way – your costs are rising because it's harder for you to get equipment, tools, and parts. Plus, if you spend more training

your technicians to keep up with technology, account for those costs in your prices as well.

Don't worry about customers balking at that. They know prices are rising. It's currently unavoidable. They will, for the most part, be more than willing to spend the cash for improving their home's comfort and efficiency.

Another thing to be thankful for and proud of is the ability of the HVAC Industry to be nimble. So many contractors were able to pivot as the world panicked and closed down. As an industry, we adapted to that new normal and found ways to accommodate customer needs, keep employees on the job, and serve the community.

You did this by getting creative in the services you offered or in the ways you approached sales calls. You put customer and employee safety first. You made the stay-at-home environment better. Your work will pay dividends far into the future.

And be thankful that you are entrepreneurs, masters of your fate. You understand that adversity is part of the game. Sure, inflation is rampant right now. But you have the ability and resources through your trade associations, membership organizations, distributors, and manufacturers for turning the corner.

These industry entities can help you with marketing - standard and digital. Yes, you'll need to spend more on that front, but that is how you grow leads. That is how you increase business. And that is how you thrive in the new normal.

Finally, be thankful that the world is beginning to open back up. Think about attending industry events like NCI's High-Performance Summit (gotosummit.com) to add the peer factor back into your knowledge equation.

As an industry, we are in this together. As contractors, you've got this. Be thankful and set your sights on a winning year in 2022. 

Written by HVAC Professionals for HVAC Professionals

**FIELDPIECE® STA2 IN-DUCT
HOT-WIRE ANEMOMETER**

Airflow can be one of the most challenging measurements a high-performance HVAC contractor must take. The Fieldpiece® STA2 Hot-Wire Anemometer is an affordable test instrument that offers an accurate and simple way to assist with this challenge.

The instrument measures velocity, temperature, and airflow quickly inside a duct system so you can tell how much air is moving through a duct.

The STA2 has a backlit dual display allowing you to measure velocity in fpm (feet per minute) and calculate airflow in cfm (cubic feet per minute) with the duct dimensions entered on the display. The instrument also displays the dry bulb (db) temperature in the duct.

- The Fieldpiece STA2 includes:
- 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**. You take a series of readings with the anemometer probe in a grid pattern inside the duct to determine average velocity and airflow.

The STA2 offers timed or point-by-point traverse options. Personally, I prefer a point-by-point traverse for simplicity and so I can see the different air speeds in a duct.

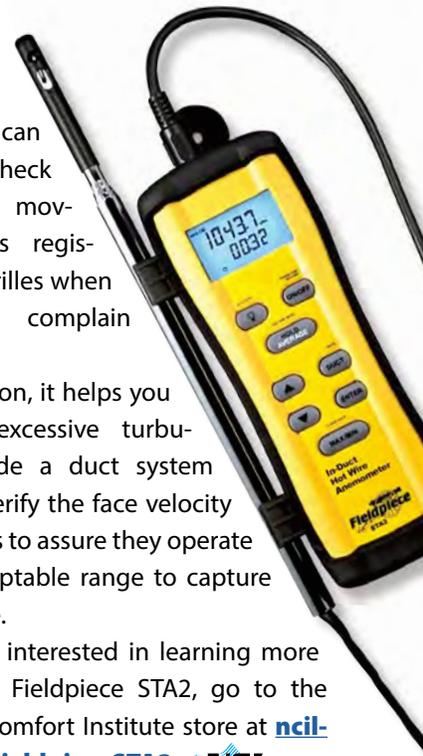
This anemometer is a great way to verify fan airflow when a blower wheel is dirty, and you need an accurate measure-

ment. You can use it to check air speed moving across registers and grilles when customers complain of noise.

In addition, it helps you discover excessive turbulence inside a duct system and can verify the face velocity of air filters to assure they operate in an acceptable range to 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, Director of Technical Curriculum



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CI Web Group: *Digital Marketing and Beyond*

Did you know that more than 75% of Americans go online daily? Not only that, but 43% go on more than once a day, and 26% are online “almost constantly.” This is why so many marketers have taken to the Internet.

As an HVAC business, contractors should also take advantage of the digital world. They should have a digital strategy that helps their online presence build their brand by providing a great customer experience that also attracts more potential customers.

THE MARKETING CHALLENGE

Building a brand can be challenging because so many contractors feel like they don’t have the time or know-how to market.



Jennifer Bagley, founder of CI Web Group, Inc.

To add to their challenge, today there are so many digital marketing and advertising agencies out there and not all of them are helpful.

Sure, almost any online marketing organization can help contractors bring sales leads in, but for how long and at what cost?

Then, in 2011, a company called CI Web Group began making its mark in the HVAC Industry. Its founder is Jennifer Bagley, and she came to this

industry from a completely different universe.

Her professional career began in the global supply chain sector of the retail industry.

SOME HISTORY

At 29, she went into business for herself by launching a mortgage and real estate company that grew to have more than 200 agents and loan officers. That led to starting two additional companies, one of which was called Compliments International, LLC — a referral rewards business. Within that company, Bagley started a web and marketing group.

The third company was called Business Blitz, a marketing and business training organization.

Bagley says, “Our internal web and marketing team took on many side projects. We began designing websites, marketing for clients, referral partners, and more. We started handpicking our highest referral partners, and whoever referred us the most business, we’d take on their website and marketing.”

“It wasn’t a formal business,” she says. “It was an internal ‘special projects’ group within our Compliments International, known as the CI Web Group.”

Bagley closed the mortgage business after the 2008 mortgage industry collapse but stayed with the marketing approach. She took that internal special projects group, and changed its name

from Compliments International, LLC to CI Web Group, Inc. At first, it was not a company, just a team.

LET’S GO HVAC

Bagley was introduced to the HVAC Industry in 2011 when she was asked to be a speaker for a Mitsubishi Diamond Dealer conference. She met a lot of contractors and began picking up a lot of clients from the HVAC industry.

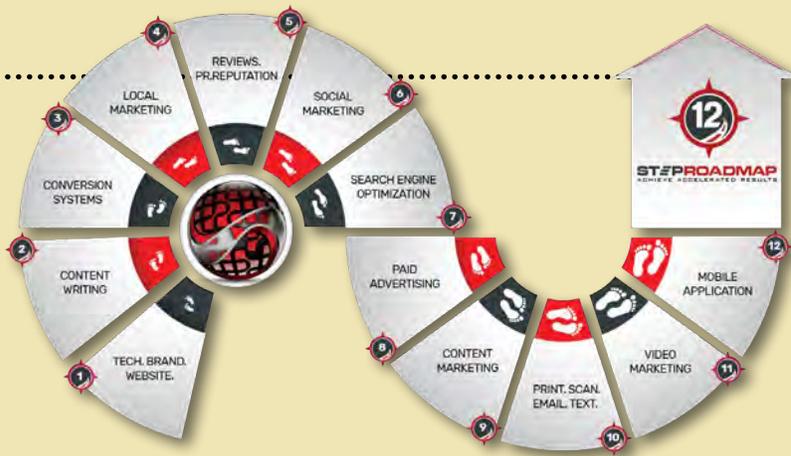
Since then, CI Web Group has become the preferred digital marketing agency for the most prominent distributors in North America, including Ferguson, Standard Supply, Thermal Supply, Geary Pacific, and more.

Bagley says. “We fell in love with every person we came in contact with. People in the HVAC Industry are so real, so transparent. Contractors are true entrepreneurs down in the trenches, taking care of business. It’s real. And that is exciting.

“However,” she adds, “we also saw an industry severely behind from a technology, marketing, operations, ERP, eCommerce, and customer experience standpoint. Every part of this industry, other than HVAC equipment, was severely behind the curve. It was mind-boggling.”

She says that her team at CI Web Group saw many opportunities to help contractors be more successful through marketing and advertising. Despite the business technology backwardness, she says they came to

CI Web Group, Inc.'s 12-Step Roadmap program



understand that the HVAC Industry cannot be outsourced.

“It is never going overseas. It’s never going to be automated. HVAC is a brilliant industry that consumers will need forever!”

CI WEB GROUP TODAY

Bagley says that today, 95% of their growth is in the heating and air conditioning, plumbing, electrical, and solar space.

“Sure, we still have amazing legacy clients who have been with us since 2006. But the contracting world is our world.”

CI Web Group currently has 121 full-time team members across the U.S. and overseas. Their goal is to provide continual world class service by leveraging technology to be efficient and cost conscious. They pass savings along to their clients allowing any size contractor an opportunity to work with them.

“Our contractors love the fact that we have a love-us-or-leave-us philosophy (we don’t believe in long-term contracts). They are very vocal about how different we are from our industry competitors.

“We just ask our dealers to show up, suit up, and participate.”

CI Web Group takes a comprehensive and holistic approach to digital marketing. It’s not just about lead generation and website design. Here are some of the key holistic points they help clients with:

- Doing the right things, in the right order, at the right time to create a strong and profitable business with sustainable growth.
- Leveraging technology to accelerate permanent results vs. burning through cash on temporary ad’s.

- Truly understanding the end consumer now and in the future — relationship marketing, integrated marketing, internal marketing, and societal marketing.
- Understanding the goal of the entrepreneur who started the business and helping them accomplish their personal goals of attaining more time, money, and freedom.

TRAINING AND REFERRALS

“The difference between contractors who are well trained and certified and those who aren’t is drastic,” she says. “We know this because we manage our contractor customers’ reputations,” she explains.

“In fact, we manage reviews across more than 120 voice, directory, and review sites. We find that it’s a battle when we’re trying to help bring contractors new prospects, but they have negative reviews coming in because of performance issues, sales issues, CSR issues, technical issues, etc.

“There is a point where we can’t win that battle,” she continues. “We can bring 100 new unique visitors because they’re looking for heating and air conditioner problem resolutions, and they won’t convert because of negative reviews and visible reputation issues.”

She says that it’s at that point CI Web account managers tell the contractor to get trained and certified to improve their overall performance and reputation online, or else what’s

the point of bringing them leads?

THE NEW NORMAL

CI Web Group has been a leader in helping manufacturers, distributors, franchises, and dealers thrive in the new normal.

As consumer demand continues to increase, manufacturers struggle with equipment and supply chain issues, contractors are facing increased challenges with human resources.

CI Web Group has driven accelerated change by implementing virtual dealer meeting solutions for distributors, interactive platforms for distributor and dealer learning management systems, virtual reality training environments, and eCommerce solutions for contractors and consumers.

They have been featured in the *HVAC Accelerated Success Program* and *Thriving in the New Normal* series on YouTube.

Furthermore, CI Web Group has gone the extra mile by working with industry partners to help contractors get the training and certifications they need to help improve performance and turn around negative online reviews.

Some of these partners include National Comfort Institute, Amana Brand Academy, Goodman Business Toolbox training, Fyxify, Power Selling Pros, EGIA, Ruth King, and others. Bagley says this referral group addresses the contractor as a whole simultaneously.

“As we build their websites and launch their marketing strategy, we refer them to groups who can help train their team in other areas or implement needed infrastructure technology. For example, their technicians get high-performance training and certification with NCI.

“While that’s happening, we reduce the contractor’s technology stack, simplify home service management, maximize profitability, and deliver a consistent, high-converting sales experience by integrating **Fyxify**.”

She adds that Ruth King helps contractors keep their finances on point and track the right KPIs. Power Selling Pros works with the contractor’s CSR’s to help them with their call conversion and customer service skills.

“When you address all of those things,” Bagley continues, “it will positively impact the business. But it takes a certain mindset to take all of that on simultaneously. It isn’t easy.”

This holistic approach is key to helping contractors become successful, build solid reputations, create sustainable growth, and take advantage of the referrals that will come in as a result.

“As partners,” Bagley explains, “our job is to understand our clients’ different communication styles. We track every ounce of it. We meet our clients where they are.

“Our logo says, “CI Web Group: Technology, Strategy, Network, Mindset.’ This says everything about our methodology and what we believe in.”

She defines this as follows:

Technology is the infrastructure behind everything a contractor does. **Strategy** is about helping contractors to plan and be forward-thinking. **Networking** revolves around who contractors surround themselves with and what information they get from that peer group. **Mindset** is how you think.

“Once you look at marketing as an investment in the growth of your business,” Bagley concludes, “it becomes permanent. It has compounding interest. The dollar you invest today is worth more two years from now, 10 years from now, and so on.”

For these and many other reasons, **High-Performance HVAC Today** magazine shines its spotlight on NCI Partner *CI Web Group, Inc.* Congratulations to the entire team. 

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Conquering COVID in the Commercial Refrigeration Industry

Back in 1972, when my parents started their commercial refrigeration services company, nobody could imagine that 50 years later, Aire Rite®, our California-based company would be swept up in a worldwide pandemic that impacted everything we do. As we prepare to celebrate our 50th Anniversary in February, it's interesting to note that today our company is a \$22 million commercial HVAC and refrigeration service provider with 148 employees.



We specialize in proactive maintenance, service, and installation of HVAC, refrigeration, and cooking equipment. Our customer base includes commercial real estate, data processing, restaurant, and the foodservice industries across Southern California. We also lease refrigeration equipment, are in the new construction market, and perform commercial system optimization.

In the United States, the COVID-19 virus first showed up in mid-January 2020, and by March, the country (and the world) began shutting down. California shut down fast, first, and the hardest.

SHUTDOWN AND SURVIVAL

The hardest-hit part of our customer base was in the refrigeration and restaurant sector. When the governor shut California down, my first thought was how that would impact my team, customers, vendors, etc. Our entire business plan

for 2020 was just blown up.

Step one was to communicate to the team that our business was an essential service, and we were NOT shutting down. **Step two** was to meet with our managers and assess the impact within our different customer segments. We do a lot of work within the entire spectrum of restaurants — from fine dining to fast food. We analyzed our customer base to determine who would be impacted the most and how that would impact our workload across Southern California. We cover an area of 23.8 million people in 50,000 square miles.

Step three was to analyze our strengths, weaknesses, opportunities, and threats (SWOT) in each department.

Next came our cash flow. We do well with our collections, so we knew cash would continue to come in for a few weeks. Most of our customers are on a 30-day net, and most pay within 35 to 40 days. By comparing cash flow by segment and customer, we began working with our managers on the short and long-term impact on labor and what layoffs would be necessary for our survival.

Aire Rite is very tied to customers through maintenance or service contracts. Of the nine departments at the company, service is the largest because they work on both HVAC and refrigeration systems. Based on the reduced workload, I had each manager handle the first round of layoffs in their departments.

OPPORTUNITIES AND PLANS

It was at this point that we pivoted. We knew that Indoor Air Quality (IAQ) was where everything was pointing. No one understood how the virus was transmitted. So, we put ourselves through a crash course on handling IAQ when it comes to viruses. Much of the info was already available.

Commercial restaurant kitchens are a vital part of Aire Rite's customer base. Pictured here is a tech disinfecting a customer's kitchen.

We knew we had to go to a higher level of MERV-rated filters, bring in more outside air, make sure economizers work, ramp up duct cleaning, etc. We also looked at UV lights and bi-polar ionization from a commercial perspective.



IAQ'S IMPORTANCE

At Aire Rite, we have a special projects department through which we do commercial air balance and optimization as well as building control. With COVID raging, we added IAQ to its mix. This includes services and sales for ionizers, UV lights, air duct cleaning, economizer retrofitting, and adding CO2 sensors.

We added a new service for disinfecting ductwork and the inside of rooftop units. This took off with people wanting their AC units disinfected. Though used for some time to fight mold, it also helps kill COVID-19 viruses. Aire Rite goes to market with it under the trade name "Marked Safe." We introduced it to our customers in April 2021.

During the second half of 2021, we generated more than \$350,000 in sales. This much-needed cash inflow continued to grow and remains a bright spot.

Indoor air quality is so essential that we had to find a way to help explain it so our commercial customers "get it." Because everyone from ASHRAE and the CDC preaches the need to bring in more outdoor air to fight COVID-19 and other pathogens in the indoor air, we came up with the following phrase to reflect that:

"Air dilution is the solution to indoor air pollution®."

This motto resonates well with customers, and we decided to register it as a trademark.

SELLING IN A COVID-19 WORLD

With everything shut down, we had to develop new creative ways to sell our products and services. When things first shut down, the team at Aire Rite began using Microsoft Teams to communicate with everyone remotely. At first, such communications were in the form of a Town Hall-type of update.

At first, I started doing this every Friday for staff, and then it went from weekly to monthly, and we began doing it for customers as well. We video-chatted using Teams or Zoom depending on what the customer wanted to use.

During these meetings, I would explain our new service offerings and how they benefited customers. As this advanced to video chat sales calls, it was a means for us to hear our customers' concerns, to see how we could help them based on their budgets.

Our team also does some digital marketing. We use LinkedIn and other social platforms to post articles, talk about IAQ, or even address the importance of operational economizers.

The key is to reach customers where they want to be reached.

TRAINING AND MAINTAINING

We didn't have enough work to keep our field technicians busy during those first few months, so we focused on training them and getting them certified in various disciplines. I'm talking about up to 16 hours per week of training depending on the person, their department, and what training was available.

The high-performance training made a real difference for our techs who were out there during the shutdowns. They not only test and diagnose systems but can then use that data to help alleviate the fears of our restaurant customers.

TODAY AND TOMORROW

The good news is that despite the challenges of the past two years, Aire Rite has been able to keep the lights on. The lessons learned from all of this include the following positives:

- We kept our team
- We trained our team
- They stuck it out with us
- We learned to be more flexible for those who needed to work remotely
- We became a stronger work family.

One of our most significant opportunities was born from the shutdowns in the new norm -- the opportunity to expand Aire Rite's reach to another state.

Because California is so strict on so many levels, it is unfriendly to businesses and families. Many people are leaving the state, and unfortunately, several of our top technicians decided to go as well. Two of them relocated to Phoenix, AZ, where several of our large clients had operations.

Though they left, they still wanted to work for Aire Rite, and I thought the time was ripe for spreading my wings a bit. I obtained my Arizona contractor license and began operating there using these two technicians.

Right now, this isn't a branch of Aire Rite. It's what we call a Virtual Outpost. It focuses on system performance at the HVAC building controls level. Later we'll move into total system performance, and from there,

offer maintenance. Service will come after that.

LESSONS LEARNED

By attacking issues incrementally, we've grown the company and managed to outperform the pandemic. When we circle back to restaurants in general, what have they learned? In a word, "Predictive Maintenance."

We've been working with more customers on how to become more predictive on maintenance by putting in controls and sensors both for their refrigeration and for airflow. Plus, we talk about installing building pressure sensors so they can measure static pressure to make sure the buildings are positively pressurized. The pandemic has helped us make significant

inroads with our restaurant customers. They are beginning to understand the importance of fixing economizers like never before.

We must provide custom solutions for everybody. For contractors, every customer is different, and helping them get through crisis times must include an educational process based on the facility or property manager's level of understanding and comfort with you. And, of course, their budgets. **NCI**



Don Langston is President and CEO of Aire Rite® Air Conditioning & Refrigeration. His company has worked on economizers for more than 40 years. He also works on emerging technology projects with funding from DOE, California, and state utilities.



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The Key to Mastering Airflow Diagnostics

When it comes to pinpointing HVAC system issues impacting the comfort and safety of your customers, there are basic steps you can take to test, diagnose, and repair the problem. These steps are known as airflow diagnostics.

When you master these principles in your daily service practices, you can provide your customers the comfort that they want and deserve.

FIRST, TEST THE SYSTEM

Without testing, you cannot confidently recom-

mend the right duct repairs. You also won't know where to start or what to do to complete them successfully. Testing requires knowing what instruments to use and how to use them. So, step one is first to test static pressure, then airflow.

Testing begins with gathering information from both the indoor and outdoor equipment. Why? This data helps you establish static pressure and airflow targets **before** you measure. Here is the data you'll need:

- Equipment type and location
- Indoor model number(s)
- Fan speed settings
- Maximum rated total external static pressure (TESP)
- Outdoor model number
- Outdoor unit tonnage.

High-Performance HVAC system testing requires having the right instruments and knowing how to use them. You also need report forms to record your findings (**Figure 1**). Once you have this information in hand, you're ready to test the system.

You can also use a free app called **AirMaxx Lite** (airmaxxlite.com) to help you start your static pressure and airflow diagnostics.

These items are the foundation for diagnosing system issues. Without them, well, you're just guessing.

To measure static pressure, you will need a pressure testing kit that includes the following:

- Manometer – analog or digital
- Static pressure tips and tubing – neoprene or silicone
- 3/8-in. test port plugs
- Small drill/impact gun with a unibit and 3/8-in. drill bit with a sheath/stop
- Thin screwdriver – for cleaning out and

Air Upgrade Report External Coil

Name _____ Address _____ Phone _____ Date _____ System _____ Appointment _____

Required Fan Airflow _____ Plotted Fan Airflow _____ Fan Speed _____ Fan Rated Pressure _____ Fan Type Constant Variable Outdoor Unit Tonnage Rating _____ Fan Tonnage Rating _____ Percent of Required Fan Airflow

Pressure (A) _____ Pressure (B) _____ Pressure (C) _____ Pressure (D) _____

Pressure Budgets - Residential Air Moving Equipment with an External Coil					
	System Component	Measured Pressure	.30 Fan Rated Pressure	.50 Fan Rated Pressure	.80 Fan Rated Pressure
A	Return Duct		.06	.10	.16
B-A	Filter ΔP		.06	.10	.16
C-D	Coil ΔP		.12	.20	.32
D	Supply Duct		.06	.10	.16
B+C	Total External Static		.30	.50	.80

Typical Equipment Improvements

- Filter upgrades to reduce resistance
- Adjust fan speed setting
- Blower or Coil Cleaning
- Verify improved fan airflow

Typical Duct System Improvements

- Increase return duct capacity
- Increase supply duct capacity
- Basic duct modifications
- Reduce duct airflow loss

Comments _____

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Figure 1. Sample report form for recording your measurements and taking notes.

removing internal duct insulation.

Then you need to take four pressure readings to diagnose any HVAC system properly:

- Total external static pressure
- Filter pressure drop (Δp)
- Coil pressure drop (Δp)
- Supply and return duct pressures.

Before obtaining these measurements, do a visual inspection of the blower wheel to make sure it is clean and rotates properly. If all is well, then make sure the fan speed settings are correct for the type of fan installed. And finally, it's time to plot the system fan airflow.

PLOT FAN AIRFLOW

Fan airflow points you in the right direction to correct excessive TESP. You might have too much or not enough airflow depending on system needs. The solution to each problem is different.

To plot this, you need a fan table. Most manufacturers provide fan tables in the installation instructions or on the blower door. You can also do a web search for the brand and model number of the fan to find the right table.

Don't spend too much time searching. National Comfort Institute (NCI) has developed generic tables that will work (See **Figure 2**). For more info on NCI's fan table, go to ncilink.com/SP-FanG. You plot fan airflow using the operating fan speed and the measured TESP.

If you have the manufacturer's table, locate the air-handling equipment's model number, then locate the

fan speed in use and lightly circle it. Next, find the column closest to your measured total external static pres-

mercial and residential HVAC systems for many.

A traverse is a series of measurements to determine the average velocity or airspeed moving through an opening. Air velocity is measured in a grid pattern through a variety of openings. These openings typically include ducts, registers, grilles, filters, economizers, and grease filters.

Average air velocity, by itself, doesn't provide a lot of information about ducts or the mechanical system. But once you combine it with a simple formula, you can determine airflow.

The formula is **Area x Velocity = CFM**. This formula uses the following components.

- **Area** = the inside dimensions of the duct measured in square feet
- **Velocity** = the average speed of air, measured in feet per minute (FPM) through the duct
- **CFM** = the calculated airflow moving through the duct. Also known as cubic feet per minute.

So, once you determine the average velocity reading, multiply that by the inside area of the duct, and you have the calculated airflow. The good news: you don't have to do the math. Thanks to the advances in test instruments today, they perform the math as you measure.

For more information on the right tools needed to do a duct traverse, see ncilink.com/TraverseTools.

BALANCING HOODS

Airflow tests will help you narrow down problematic areas in a building.

In the absence of manufacturer's fan performance engineering information that matches the equipment you are testing, the following chart may be used to help interpret fan airflow if the airflow for the CONSTANT SPEED equipment is rated at 50" w.c. Actual manufacturer's data is always preferred. This chart will be inaccurate for some poorly performing equipment.

.50"

GENERIC FAN PERFORMANCE DATA												
MODEL	SPEED TAP	.10"	.20"	.30"	.40"	.50"	.60"	.70"	.80"	.90"	1.0"	1.10"
2 TON	HIGH	1043	922	930	885	812	740	647	518	157	-	-
	MED-HIGH	840	895	841	791	726	650	559	420	90	-	-
	MEDIUM	837	768	752	705	649	560	438	305	79	-	-
2.5 TON	LOW	729	694	667	600	545	478	376	220	78	-	-
	HIGH	1234	1172	1122	1062	1022	930	881	789	740	680	-
	MED-HIGH	1109	1084	1062	1002	914	897	724	675	632	605	-
3 TON	MEDIUM	1061	981	948	920	848	772	682	610	561	524	-
	LOW	932	905	876	750	723	680	642	567	504	426	-
	HIGH	1394	1359	1314	1260	1202	1122	1038	945	843	738	653
3.5 TON	MED-HIGH	1250	1223	1202	1162	1106	1040	962	873	771	668	562
	MEDIUM	1102	1092	1069	1034	986	925	852	786	668	562	474
	LOW	957	944	922	891	853	806	750	686	614	565	464
4 TON	HIGH	1748	1683	1615	1544	1470	1393	1314	1232	1147	1059	966
	MED-HIGH	1375	1307	1247	1174	1088	1210	1139	1056	960	879	832
	MEDIUM	1178	1167	1147	1119	1082	1036	982	909	847	793	723
4.5 TON	LOW	997	973	951	922	905	884	837	802	734	665	634
	HIGH	2067	1997	1923	1844	1760	1672	1579	1481	1379	1332	1241
	MED-HIGH	1604	1651	1605	1584	1549	1467	1372	1289	1192	1134	1091
5 TON	MEDIUM	1471	1432	1386	1358	1323	1250	1168	1077	978	904	832
	LOW	1296	1261	1220	1186	1147	1089	1024	950	868	735	654
	HIGH	2313	2230	2150	2072	2008	1927	1858	1792	1730	1673	1601
5.5 TON	MED-HIGH	2123	2075	2019	1956	1884	1804	1717	1622	1518	1423	1312
	MEDIUM	1854	1833	1802	1762	1711	1650	1580	1500	1409	1331	1242
	LOW	1579	1565	1544	1516	1481	1430	1390	1334	1271	1210	1132

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Figure 2. NCI Generic Fan Table

sure and lightly circle it. You should have two points circled on the fan table at this point.

Line up your measured total external static pressure and the fan speed being used. The point where they intersect is the airflow amount the fan is moving. Record this reading to diagnose the system and compare it to your required airflow.

This process may seem like a lot of testing steps, but it's more intimidating on paper than it is to do the test. You can measure static pressure and plot fan airflow in less than five minutes with a bit of practice.

DUCT TRAVERSES

Sometimes it may be necessary to do a duct traverse when plotting fan airflow is questionable. This test offers a very accurate means for determining airflow and has been used by air balancers for decades. It is the gold standard of airflow measurement in com-

You can further pinpoint issues by using balancing hoods to show which rooms are not receiving the proper airflow. You measure airflow coming out of the registers and compare that to the estimated airflow for that room.

Read more about how to estimate room airflow at ncilink.com/beachballs.

The good news is that using balancing hoods gives you the opportunity to involve your customer. Their participation allows customers to “see” what is happening in the room and gives them a better idea of why that room is uncomfortable. This can help when it is time for you to make suggestions for repairs.

By the way, you can read all about using balancing hoods in an article written by David Richardson for the *ACHR News* magazine here: ncilink.com/BalancingHoods.

ASK THE CUSTOMER QUESTIONS

Mastering airflow diagnostics requires one more key skill – communication. This is very important. Once you complete testing and diagnostics, it’s time to talk with the customer and ask questions. Your test results are the foundation for that conversation.

Some of you will want to talk first and measure later. That is a mistake. Using test results as the basis for your questions lets you show customers “why” you are asking them. Then you must listen to their responses. It would help if you also wrote their answers down. This action shows them that you hear them and value what they say.

NCI has Home Comfort Analysis forms which are ideal for capturing customer answers. These are one of many benefits of becoming a member.

Once they’ve answered your questions, the next step is to put together options that address their concerns. Start by sharing the numbers you’ve measured and explaining what they mean. Now is a great time to use analogies and not jargon. At NCI, we often put things in terms of a medical exam (blood pressure).

RECOMMENDATIONS AND SOLUTIONS

One of the absolute strengths of the high-performance approach is that test measurements provide you with data. As Quality Improvement Guru W. Edwards Deming said, **“Without data, you’re just another person with an opinion.”**

Don’t be the guy with an opinion. By mastering airflow diagnostics, you can help customers understand what is happening with their system and why. Simply translate the test results – avoid being technical.

The static-pressure-to-blood-pres-

sure comparison is easy to understand and works wonders in bridging technical lingo to simple words. Also, if you include your customer in the testing process (especially with balancing hoods), they will be more likely to accept the options you present to resolve the issues.

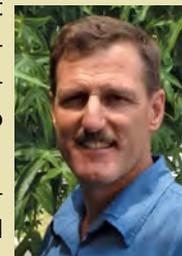
When it comes to HVAC system diagnostics, our industry has been using rules of thumb far too long. These practices continue to cause misleading diagnosis and improper repairs – not to mention occupant discomfort, unhealthy homes, safety issues, and needless energy waste.

You can only achieve proper equipment and system diagnostics through airflow testing.

Recommending air upgrades and duct renovations is the fruit of all that testing. As Weldon Long once said, **“Your job is to diagnose problems and recommend solutions. Period. Your customer’s job is to buy or not to buy.”** 

Meet Jeff Sturgeon at NCI Summit 2022

Airflow diagnostics done right will help solve customer comfort and energy issues and set your company ahead of your competition. Join us in Scottsdale this coming March during National Comfort Institute’s (NCI) Annual **High-Performance HVAC Summit** to see how to perform airflow diagnostics.



Jeff is NCI’s Southern California Training Center Manager and Instructor. He will demonstrate how testing works live on March 30 at 1:30 PM.

There is still time to take advantage of Early bird registration. It ends on February 1, 2022. Don’t wait another minute!

You can still save hundreds on your registration costs. And don’t forget to book your hotel. Go to ncilink.com/WeKoPa22 to reserve your rooms today. **Learn more about at gotosummit.com.**

Or call 800-633-7058.





Cutting-edge Training

from the Industry leader in High-Performance HVAC 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 and 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 2022 NCI TRAINING SCHEDULE

PUBLIC LIVE TRAINING

Hydronic Testing, Adjusting, and Balancing
Jan 11-12: Sheffield Lake, OH

Commercial Air Balancing Certification Program
Jan 25-27: Glen Burnie, MD
Feb 8-10: Tampa, FL

Combustion Performance and Carbon Monoxide Safety Certification Program
Jan 25-27: Bloomington, MN
Feb 8-10: Monroeville, PA
Feb 15-17: Richmond, VA
Feb 22-24: St. Louis, MO

Duct System Optimization and Residential Air Balancing Certification Program
Feb 8-10: Centennial, CO
Feb 14-16: Orlando, FL
Feb 15-17: Lansing, MI

Residential HVAC System Performance and Air Balancing Certification Bundle

Jan 18-20: Austin, TX
Feb 1-3: Phoenix, AZ
Feb 22-24: Sheffield Lake, OH

PUBLIC ONLINE TRAINING

Commercial Air-side Online Recertification
Jan 18-19: ONLINE

Airflow Testing & Diagnostics
Jan 20-21: ONLINE

Residential Air-side Online Recertification
Jan 25-26: ONLINE

*SCE SPONSORED LIVE TRAINING

Commercial Air Balancing Certification Program (SOLD OUT)
Jan 11-13: Los Alamitos, CA

Residential HVAC System Performance and Air Balancing Certification Bundle

Jan 18-20: Los Alamitos, CA

Commercial System Performance
Feb 8-9: Los Alamitos, CA

Combustion Performance and Carbon Monoxide Safety Certification Program
Feb 15-17: Los Alamitos, CA

Airflow Testing & Diagnostics
Feb 28: Los Alamitos, CA

**TECH CLEAN CALIFORNIA TRAINING <http://ncilink.com/TECHCleanCA>

Airflow Testing & Diagnostics
Jan 17: Los Alamitos, CA
Jan 27: Sacramento, CA

Refrigerant-Side Performance Certification Program
Feb 8-9: Sacramento, CA
Feb 24-25: Los Alamitos, CA

*NCI training sponsored/subsidized by Southern California Edison (SCE) for qualified local contractors

**NCI training sponsored by TECH Clean California for qualified local contractors



Visit NCIlink.com/ClassSchedule to view the latest schedule of NCI Training events

Do You Believe In Science?

For the past year or so, the world has been consumed with the battle to beat COVID-19. Experts tell us to follow the science. Experts and politicians tell us to get vaccinated or don't, wear a mask or not! No one knows if this is science or just someone's opinion.

In the HVAC industry, we should believe in science. Our industry has quite an effect on people's lives and health.

There are studies on which we base the procedures we follow, but we know that as technology and science change, those procedures may not be as correct, functional, or safe as originally thought.

In the beginning, many directions or instructions we followed were based on opinion rather than verification through testing and measuring. The difference from the pandemic is that we are supposed to wear blinders rather than wear masks.

GETTING PAST LABORATORY-BASED GUIDELINES

Over the last 30 plus years, there have been many professional studies on different beliefs or guidelines in the HVAC industry. These studies,

measuring conditions in the field rather than in a lab, were conducted to determine if certain theories or opinions were factual.

We know at NCI that "If you don't measure, you are just guessing."

It is a fact that these studies have disproven specific industry recommendations or standards concerning national building codes and/or manufacturer requirements.

So why has nothing changed? Are the disclaimers or listed precautions listed in the codes or manufacturers' instructions enough to tell us to be careful?

THE STUDIES

In 1995, ASHRAE (American Society of Heating, Refrigerating & Air-Conditioning Engineers) released a study from Canada addressing combustion air in cold climates, such as Alaska.

The study concluded that unprotected passive combustion air could deliver up to 15 times more ventilation than required for combustion. This would lead to cold mechanical rooms and broken water pipes.

Even when sheltering combustion air openings, they allowed up to five times more ventilation than needed. Making the openings smaller had much less effect than expected.

The study did show that mechanical or fan-powered combustion air would perform properly

The science behind airflow measurement is exact and enables technicians to determine causes of many comfort and safety issues in homes and businesses.



under almost all conditions.

Furthermore, the 1995 combustion air study stated that bringing cold outside air directly into burners is not a good idea. Cold outdoor air can create unstable combustion.

If you study combustion, you understand that you get better combustion with hotter air, warmer fuel, and a hotter flame. From purely a science standpoint, combustion is the process of oxidation, regardless of the fuel.

Oxidation is the rapid movement of molecules that produces heat. I believe cold outside air does not conform to this scientific fact! So why is it still recommended?

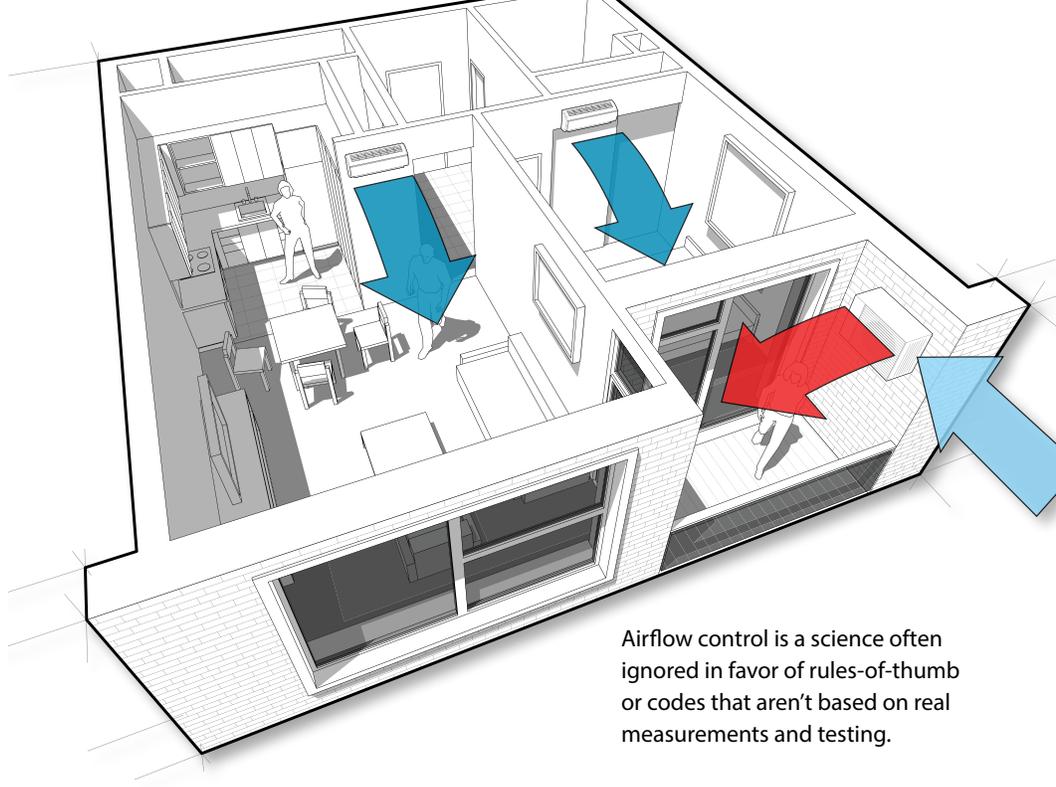
One question you might ask is what makes a cold climate cold? I would assume “cold” would be when temperatures drop below 32 degrees. Is that right? Another question might be, why hasn’t anything been changed or updated.

ANOTHER STUDY BY ASHRAE

In 2000, ASHRAE published a general study on combustion air, not specific to cold climates. This study found that the amount of passive combustion air required by national building codes does not work under many environmental conditions. However, mechanical or fan-powered combustion air was effective under almost all conditions.

The report also stated that national building codes don’t allow for professionally installed systems. Twenty-one years later, we are still using undependable combustion air standards. When asked why, authorities only say it is better than nothing! Why hasn’t anything changed?

Don’t we believe in science?



Airflow control is a science often ignored in favor of rules-of-thumb or codes that aren’t based on real measurements and testing.

THE COMMON FACTOR

When it comes to HVAC system test procedures for checking combustion air, there are many out there. Yet almost none confirm that combustion air is getting to the equipment. Maybe, without testing, we know there is plenty of air in the room because we are breathing.

This is why National Comfort Institute (NCI) stresses and teaches the best method to determine combustion air performance, and then how to control or correct it!

ALTITUDE’S IMPACT ON COMBUSTION

Some studies deal with derating new furnaces at higher altitudes. The first known study was in 1933. That study was performed in altitude chambers in a lab, using a fuel rated for sea level.

This led to the rule for derating 4% for every 1000 feet above sea level.

Fuel Btus at sea level are about 1000 Btus per cubic foot or slightly higher. It is possible in 1933 that this was the same Btu formula used at high altitudes. However, this case study doesn’t mention that.

How about a new study at the actu-

al altitudes?

In 2007, there was a published report on the derating of mainly gas-fired induced draft furnaces at higher altitudes. The study’s goal was to determine if it was still necessary to derate equipment 4% for every 1000 feet of altitude above 2000 feet.

Five identical furnaces were tested at three altitudes: sea level, 2230 feet, and 6700 feet. Nothing in the report shows they tested at any higher altitude. The furnaces were tested with natural gas and propane fuel.

Although the report says they used the same amount of gas Btus on all equipment, they didn’t mention the number of Btus used. Assuming it was gas normally used at sea level, the natural gas was about 1000 Btus per cu.ft. and the propane was 90,000 Btus per gallon.

The furnaces were operated at their normal rating, then overfired and underfired. In all cases, when fired at normal sea level settings, the furnaces operated safely up to 6700 feet. Interestingly, most furnaces operated with higher carbon monoxide output when underfired. There could be more conversation about the testing, but this is

enough for now.

So, based on the above study, why do manufacturers still require furnaces derated at the listed altitudes? In most cases, the gas used has less Btus than this test, making derating even worse.

Don't we believe in science?

DISBELIEVERS AND NAYSAYERS

There are additional warnings and disclaimers about other procedures we are required to follow that have never been tested or verified. Sadly, would testing even make a difference? Over the years, as we uncover new information that disagrees with the way things always have been done, that information is dismissed by naysayers. In addition, I believe that today any time you



disagree with someone in authority, you are labeled a troublemaker.

Two of my favorite quotes are from Albert Einstein, who said, "Unthinking respect for authority is the greatest enemy of truth!" He also said, "Great spir-

its have always encountered violent opposition from mediocre minds!"

In the HVAC Industry, there is a saying that no matter what someone tells you to do, if it doesn't work, it is your fault. However, how can we correct things that don't work if we don't know the truth? The truth will always lay in science. The question is, "Do you believe in science?" **NCI**



Jim Davis is the senior instructor for National Comfort Institute (NCI). He has a long and storied career in the HVAC Industry. Today he is considered one of the foremost authorities on airflow's impact on combustion and carbon

monoxide safety. Contact him, at ncilink.com/ContactMe.

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Summit 2022 Is Coming. Are You Ready?

This year it's personal. It's the first Summit in two years where the High-Perfor-



mance HVAC Industry can gather in person, to learn, share, and network.

We return to the We-Ko-Pa Resort and Casino in Scottsdale, AZ from March 27-31, and are focused on helping you personalize what you learn there. In fact, you have the power to choose which knowledge level you want when you attend a breakout session. Each breakout has three levels: Novice, Practitioner, and Mastery. There are a total of 18 sessions to choose from.

Novice is for those who are just learning the high-performance discipline. **Practitioner** is for those who've been practicing their skills but want to take it up a notch. **Mastery** is for those who are proficient in the specific area but are ready to go to the next level.

You can design your teams' learning experience on where they are in their careers. For example, when it comes to *carbon monoxide and combustion*, your choices are:

- **Novice:** Two Must-Do Combustion Safety Tests, taught by Tom Johnson
- **Practitioner:** Vision Beyond Sight with Combustion Testing, taught by Jeff Sturgeon
- **Mastery:** Advanced Venting & Combustion Air Solutions taught by Jim Davis.

To help make decisions easier, we're offering special discounts when you

bring three or more people from the same company.

Plus, there's early bird pricing (available through Feb.1, 2022), NCI membership discounts, and more. Space is limited, the sooner you register, the sooner you'll be locked into attend this game-changing HVAC event!

Summit 2022 is coming. Are you ready? For more information and to register, visit gotosummit.com.

If you have any questions or need help, call our Customer Care line at 800-633-7058.

The January 2022 PowerPack Is Online

Happy New Year and welcome to the January 2022 PowerPack exclusively for NCI Members. This month, we feature the following:

- **Achieve Your Goals Through Delegation – Webinar**
- **Six Steps to Achieving Your Goals – Online Training**



- **The HVAC Industry Needs a Return to Craftsmanship – Article**
- **Strategic Planning & SWOT Analysis with Worksheet – Download**
- **Estimating R-Value Chart – Download.**

Some of the tools included each month **may not normally be accessible with your membership subscription package**. However, you can access these tools through this PowerPack portal during the current month. So get started today: 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.

NSI 6000: Become a Reseller Today

The NSI 6000 Low-Level Carbon Monoxide (CO) Monitor (ncilink.com/NSI-6000Review) is more sensitive and accurate than a typical store-bought detector. You can offer real protection to your customers by bringing this life-changing monitor to every service call.



To do this, you first must become a **reseller**. This exclusive program is only for HVAC, plumbing and weatherization contractors. Homeowners, facility managers and property management personnel must purchase the NSI 6000 through an authorized reseller.

National Comfort Institute, Inc. (NCI) has stringent requirements in place for any company desiring to sell and install the NSI 6000 monitor.

This process requires candidates to either be currently NCI Combustion/CO certified or they must complete the Combustion/CO certification class. There is a five-step process for becoming a reseller. Go to ncilink.com/NSI6000 to learn more.

Once you become a reseller, NCI has prepared a video to walk you through the process of setting up your customers. The video is at ncilink.com/NSI6000Vid1.

If you have questions, or need more information anywhere in the process, you can call 800-633-7058. 

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A Time to Reconnect...

A Time to Celebrate!



Dominick Guarino
is publisher of
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HVAC Today* magazine
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He can be reached at
[ncilink.com/
ContactMe](http://ncilink.com/ContactMe)

Despite all the gloom and doom from Washington and the media, there are indications the latest Omicron variant should help us achieve the herd immunity needed to transform it from Pandemic to Endemic. If it does, COVID 19 will take its place alongside the other flu viruses as just part of life.

One thing is for sure, most Americans are ready to move on, and will not support further lockdowns. Most of us feel the need to get together in communities both locally and beyond.

NCI'S SUMMIT 2022: TIME TO RECONNECT AND CELEBRATE!

Nearly two years has passed since High-Performance HVAC contractors last met in person. We are beyond ready to spend time with our brothers and sisters, break bread, share war stories, and focus on the future as we grow and evolve in the High-Performance corner of our industry.

NCI is ready to help you celebrate your toughness and steadfastness navigating your businesses through the past few years to become stronger and better than ever! **This year's Summit in Scottsdale, Arizona on March 27-31, is the perfect place to do that.**

I could go over all the great sessions, breakout workshops, and social events, but you can read all about that at GoToSummit.com.

Instead, I want to take this time to remind us about the spirit of this annual meeting.

Nearly 19 years ago we launched Summit to give High-Performance HVAC contractors their own unique place to gather with fellow like-minded professionals.

At Summit we learn from each other and from NCI instructors and coaches. We freely share our knowledge and experiences with old friends as well as those just entering this new industry.

A UNIQUE INDUSTRY EVENT

Summit is much more than just another industry conference. It's become the place where we celebrate excellence among contractors who strive to do the right thing. High-Performance Contractors don't just promise performance, they prove it through measured, delivered results.

These contractors are not satisfied with the status quo. They believe every customer deserves the safest, healthiest, most comfortable, and energy efficient indoor environment possible.

As I think back to Summits past, the most valuable conversations I was privy to happened in informal gatherings during meals, breaks, and after hours. It's hard to describe the spirit of kinship and sharing that occurs during these impromptu gatherings and often spirited debates.

I've never experienced such a mixture of sincerity, pride, and humility at any other industry event. It's common to witness folks baring their souls and sharing frustrations as well as successes in these informal conversations.

Summit has always been more than advanced learning. It's truly defined by the contractors who attend and immerse themselves in the overall experience. Over the years we've seen much camaraderie, laughter, joy, tears of sadness and happiness, as well as new lifetime friendships forged, and long-time friendships renewed.

When we ask attendees what they like the most about Summit, the most common response is the sense of community, even family.

Have you registered for Summit yet? If not, what are you waiting for? We need you there! Register now and get our early-bird rates. And members, don't forget to use your NCI bucks.

All of us at NCI sincerely wish you a prosperous, healthy, and happy 2022. We can't wait to see you in Scottsdale this March! 



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JAN 31-FEB 2

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HVAC Electrification Challenges That (Almost) Nobody Thinks About

Ben Lipscomb, Director of Engineering and Utility Services, National Comfort Institute, Inc.

**Tuesday, February 1
12:30 -1:30 pm**

Why Most Retrofit Projects Fail to Meet Ventilation Standards

Jeff Sturgeon, SoCal Training Manager & Instructor, National Comfort Institute, Inc.

**Tuesday, February 1
2:00-3:00 pm**

Why HVAC Companies Are Losing Technicians

Speaker: Rob Falke, President, National Comfort Institute, Inc.

**Tuesday, February 1
3:30 -4:30 pm**

Interactive Sales Featuring Hands-on Customer Education

Speaker: Rob Falke, President, National Comfort Institute, Inc.

**Tuesday, February 1
5:00-6:00 pm**



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