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THE WEST'S LEADING MONTHLY NEWSMAGAZINE FOR THE AIR CONDITIONING, HEATING, REFRIGERATION, SHEET METAL AND VENTILATING INDUSTRIES

Happy Holidays

Legislative Update

2021 Legislation Review

CSLB can increase fees for licenses, bonds, fines.

By Ted Rieger
Northern California
Correspondent

October 10 was the last day for Governor Gavin Newsom to sign or veto bills passed by the California Legislature during the 2021 regular session. *Indoor Comfort News* presents this year-end review of new California laws with potential impacts on HVAC contractors and the construction industry. Bills were signed into law related to Contractors State License Board (CSLB) operations that will enable the CSLB to increase contractor license fees and contractor bond amounts, increase civil penalty fine amounts, and expand the issuance of Letters of Admonishment to contractors for minor violations.

CSLB-Related Legislation

The following four bills affecting CSLB operations and contractors were signed by the governor and some of their provisions will begin

to take effect in 2022.

SB 607 Roth (D-Riverside) – License Fees/Bond Amount Increases. Allows the CSLB to increase the statutory minimum and maximum ranges for license fees by about 25 percent with an effective date of January 1, 2022. Initial license fees and renewal fees for active and inactive licenses would be higher for larger corporate licensees than for sole/individual owner licensees. Also increases the contractor's license bond from \$15,000 to \$25,000 effective January 1, 2023, and when applicable, a qualifying individual's bond will increase from \$12,500 to \$25,000.

As a state special fund agency, CSLB relies entirely on fees set by statute or regulation and collected from licensed contractors and applicants. CSLB's main revenue source is license renewal fees that are nearly 70 percent of total revenue. CSLB faces a projected structural budget imbalance due to insufficient revenues from current fee

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Inside

Features

Lennox Industries Partners with HVAC Dealers to Install 130 Units Across the U.S. and Canada

Selected homeowners to receive free units as part of company's Feel The Love Program.

Lennox Industries proudly partnered with HVAC dealers across the U.S. and Canada to install 130 HVAC units in 37 U.S. states and 5 Canadian provinces as part of the company's Feel The Love program. Selected homeowners received heating and cooling equipment free of charge throughout the second week of October in Lennox' first, week-long installation event.

Lennox Feel The Love Program

Each Feel The Love recipient is an unsung hero who may be going through hardship, facing adversity or in need of community support. Recipients were nominated by their neighbors, friends and family members as



a way of bringing hope and support to homes across North America. In 2021, Lennox continued to expand the Feel The Love program to honor essential and frontline workers who went above and beyond to keep their communities safe during the COVID-19 pandemic.

"We greatly appreciate Lennox for choosing us to be a part of this wonderful program," said Courtney Johnson, Dallas Hope Center's housing manager and 2021 Feel The Love recipient. "The installation definitely put a lot of smiles on our board members faces, our CEO's and on mine as the housing manager. There are a lot of things that are needed in the community, and having the organization see those needs and act is very impera-

tive and exciting. I'm very grateful to be a part of it."

The Feel The Love program is made possible through the ongoing partnership of the Lennox dealer network across North America. Since the inaugural Feel The Love program in 2009, Lennox and its dealers have completed over 1,600 free installations, with 130 installations occurring in 2021 alone. Every donated unit comes complete with 3-year Comfort Shield Labor Protection Plans, and Feel The Love dealers donate their time and labor to make the program a success.

"At Lennox, we believe

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IHACI

2021 Training Classes

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for more information.



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Text Product or Program Questions to our Knowledgeable Staff

Send a text directly to our product experts at the participating locations highlighted below. Monday – Friday, 7:00 a.m. – 4:00 p.m.

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**W. Phoenix number applies to all Arizona locations | Gilbert and W. Phoenix are open on Saturday.*

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Industry News



CALIFORNIA



Fieldpiece Wins '21 Innovation Award

Orange, Calif. – Fieldpiece Instruments received a Pro Tool Innovation Award for the Infrared Refrigerant Leak Detector DR82. The Fieldpiece Infrared Refrigerant Leak Detector DR82 won in the Test and Measurement Category.

According to the judges, “Detecting refrigeration leaks comes with different challenges than water and moisture leaks. A couple of things really stood out to our voters on the Fieldpiece Infrared Refrigerant Leak Detector DR82 to help deal with those challenges. First, it doesn’t trigger a false positive thanks to soap or oil. Plus, it’s more than 20 times more sensitive than soap bubbles with a sensitivity level of <0.03 oz/yr. Wrap it

all up in a compact handheld unit with an easy-to-read screen and your refrigerant leak detection is faster and easier than ever before.”

“The Infrared Refrigerant Leak Detector, DR82 brings a higher level of performance and offers a new, bright blue backlit LCD screen that is easy to read,” said Rachel Newport, Director of Marketing. “To understand more details about the leak, our Infrared Refrigerant Leak Detector has a numerical leak size indicator, bar graph and features a lighted tip, so you can see the location of the leak. We are honored to have been voted one of the best in the Test and Measurement category by this expert panel of judges.”

Sacramento, Sutter, Placer, El Dorado, Amador, Calaveras, San Joaquin, Solano and Yolo.

“Boyd Plumbing is at the top of their game and by merging, we have assembled the best plumbing team in the Sacramento region and will continue to provide superior customer service to the communities we serve,” said Jeremy Macdonald, Chief Executive Officer of Bonney. “Boyd has an excellent reputation and this purchase aligns with Bonney’s long-term goal of building the best home services company in Northern California.”

“As the need for talented technicians is on the rise, a partnership with Bonney is ideal to continue to serve this community and focus on employee growth and success.” said Michael Boyd, CEO of Boyd Plumbing. “Our companies are not only a great cultural fit, but also have both long delivered excellent results to our clients here in the Sacramento area.”

Bonney plans to invest in several founder-owned companies over the next few years to build a regional leader in home services. To that end, in September Bonney acquired Concord-based Big Air Heating & Air Conditioning, expanding their territory into the Bay Area.

Bonney Acquires Boyd Plumbing Inc.

Sacramento, Calif. – Bonney Plumbing, Electrical, Heating and Air (Bonney), a home services company headquartered in Rancho Cordova, Calif., announced it has acquired Sacramento-based Boyd Plumbing, Inc.

Under the partnership, Boyd Plumbing will fold in with Bonney, expanding the plumbing team to service nine counties including

Find the GOLD KEY and UNLOCK a PRIZE!

Somewhere hidden inside the pages of Indoor Comfort News lies a golden key ! If you’ve discovered it, please email us the page number and location (e.g., page 4, inside USACD advertisement). The first correct email will receive a prize, courtesy of Indoor Comfort News!

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Number of HERS Rated Homes Grows in 2021

Oceanside, Calif. – Despite the continued disruptions caused by the COVID-19 pandemic, supply shortages, and labor shortages, the demand for HERS grew steadily in the first half of 2021.

In the first six months of 2021, there were 150,894 homes rated and entered into the RESNET registry. This compares with the 145,961 homes that were rated during the same period in 2020. The year 2020 broke the record for the number of homes that were HERS rated in the U.S.

The increase in HERS Rating activity can in part be explained by:

• Homebuilding having been designated an essential activity

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Industry News

Continued from Page 4

by most states during the pandemic.

- The growing demand for housing, due in part to lifestyle changes, low mortgage interest rates, etc.

“The growth of the demand for HERS ratings in the first half of 2021 reflects the continued resiliency of the HERS community and the demand for healthy, energy-efficient homes,” said RESNET Executive Director Steve Baden.

Difference Between 2020 and 2021 Number of Homes Entered into the Registry:

- January 2020: 26,916
- January 2021: 24,142
- February 2020: 20,823
- February 2021: 24,779
- March 2020: 28,210
- March 2021: 25,421
- April 2020: 22,907

- April 2021: 24,330
- May 2020: 23,397
- May 2021: 24,452
- June 2020: 23,708
- June 2021: 27,770
- July 2020: 24,159
- July 2021: 24,231
- August 2020: 24,527
- August 2021: 29,668
- Sept 2020: 24,252
- Sept 2021: 26,749

Total Difference in Number of Homes Entered into the Registry Between 2020 and 2021: 12,643.

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Alliance Acquires Thermatech

Azusa, Calif. – Alliance Environmental Group, LLC is pleased to announce the acquisition of Thermatech Northwest Inc. and the

continuation of the expansion of the Group on the West Coast.

“Acquiring a company or opening a division in the State of Washington has been on our radar for the past year. We believe that Thermatech Northwest Inc. is the correct strategic alignment for our latest acquisition, allowing us to further expand across the West Coast,” said co-founder and Chief Executive Officer of Alliance Environmental Group Jeff McLean. Thermatech Northwest Inc. provides similar services to Alliance Environmental, and thus we are excited to add them to our ever-growing portfolio of brands and companies.

“Alliance Environmental Group has grown exponentially, especially with a few strategic acquisitions in recent years. Thermatech Northwest Inc. was the right choice for our

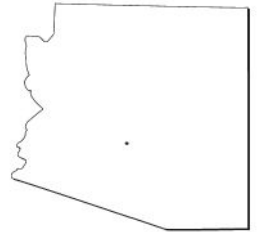
Group, we look forward to a continued working relationship with a company that has similar values and goals,” said co-founder Joe McLean.

“Our company is excited to join the ranks of Alliance Environmental Group,” said Bob Guiley, co-founder of Thermatech Northwest Inc. “We believe that a group such as Alliance Environmental understands our services and has the necessary experience and track record in environmental remediation and abatement that makes them the natural choice for our company’s evolution.”

Alliance Environmental Group has more than 100 years of experience as an environmental remediation and indoor air quality (IAQ) services contractor across California, Nevada, and Arizona. The company has completed more than 200,000 remediation projects,

including asbestos abatement, mold remediation, lead paint removal, bed bug eradication, attic insulation removal and replacement, trauma/biohazard cleanup, demolition and Indoor Air Quality services. Learn more about Alliance Environmental Group at www.alliance-enviro.com.

ARIZONA



New Electricity, Wiring Diagrams Training Package for Technicians

Tucson, Ariz. – Technical Training Associates, a Tucson-based company that specializes in training materials for HVACR and facility maintenance technicians, has announced a new training package, “HVACR Troubleshooting Fundamentals: Electricity & Wiring Diagrams.”

The training package consists of a student text, a detailed facilitator guide, supplemental videos, PowerPoint presentations, and a course final exam that provides a step-by-step plan and instructions for a 12-session training program.

“You don’t need instructor or educator credentials to facilitate this program,” TTA representative Jim Johnson said. “The resources in this package are designed specifically for service company owners, service managers, and lead technicians who want to implement electrical troubleshooting training for new hires, or to facilitate the promotion of installation techs to service.”

For information, visit <http://techtrainassoc.com> or call (520) 625-6847.

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Forrest Anderson Surprises Vet with Free A/C

Glendale, Ariz. – Forrest Anderson Plumbing and Air Conditioning (Forrest Anderson), a family-owned business in the Phoenix area since 1961, is pleased to announce the

Continued on Page 8



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This program is funded by California utility customers and administered by Southern California Gas Company under the auspices of the California Public Utilities Commission. Program funds, including any funds utilized for rebates or incentives, will be allocated on a first-come, first-served basis until December 31, 2021 or until such funds are no longer available. This program may be modified or terminated without prior notice. The selection, purchase, and ownership of goods are the sole responsibility of customer. SoCalGas makes no warranty, whether express or implied, including the warranty of merchantability or fitness for a particular purpose, of goods selected by customer. Customers who choose to participate in this program not obligated to purchase any additional goods offered by manufacturer, vendor, service provider, or any other third party. Eligibility requirements apply; see the program conditions for details.



Continued from Page 6

winner of the 6th Annual Military Hero A/C Giveaway. Olga Tucker, a Peoria resident and U.S. Army Veteran, secured the most public votes to win a free air conditioning unit in this local event that honors the sacrifices of Veterans, active duty service members, and their families.

“Thank you, Forrest Anderson. I am beyond humbled and truly blessed by the support from friends and strangers,” said Olga Tucker. “It’s going to make such a huge difference for my kids and myself.”

Tucker served in the Army from 2004 to 2012 as a Sergeant and 88M-Motor Transport Operator, providing transportation and logistical support for the 3rd Brigade Combat Team “Rakkasans” with the 101st Airborne Division. Today, Tucker is medically retired and a single mother of three children. Tucker continues to give back to her community by serving as the Veteran’s Resource Coordinator and Advisor for Operation Enduring Gratitude and volunteers to several nonprofits including Mission 22, 22 Until None, and the PTSD Foundation of America. Tucker is also actively involved in her community as a member of the Peoria Military Affairs Committee and as a community leader within Peoria’s Pine District.

A friend nominated Tucker, citing her perseverance and dedication to help others in the Veteran community. Forrest Anderson selected Tucker to be one of three finalists in this year’s Military Hero A/C Giveaway and the community selected her as the winner of a new air conditioning unit during a 10-day public voting period.

Forrest Anderson will replace Tucker’s failing, 27-year-old A/C



FORREST ANDERSON PLUMBING AND AIR CONDITIONING REPRESENTATIVES PRESENT OLGA TUCKER (FAR RIGHT) WITH A NEW A/C UNIT.

unit with a brand new unit, fully installed with the help of industry partners, MORSCO HVAC/Bush Supply and Smiley Crane Service. In addition, Cameron Davis, President of Razor Thin Media, presented her with a \$500 gift card.

“The Forrest Anderson team is proud to honor Olga. It is a small thank you for her service to our country and her community involvement,” said Audrey Monell, President of Forrest Anderson.

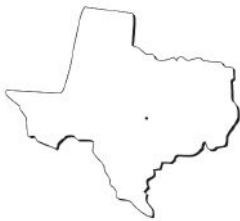
“We are so thankful to all of our finalists this year. We hope that sharing their stories we have started conversations about the importance of supporting military members, many who return home with conditions that impact their physical and mental health.”

To recognize the two runners-up, Monell is giving Mark Denman of Litchfield Park and Andrez Romero of Mesa a free A/C Tune Up for one unit valued at \$84.95.

Since 2016, Forrest Anderson has worked with local partners to sponsor the Military Hero A/C Giveaway each year around

Veterans Day because they see the health risks of living without air conditioning in Arizona.

TEXAS



Service Fusion, Trane Form Product Partnership

Irving, Texas – Service Fusion, an EverCommerce solution (NASDAQ: EVCM) and leading provider of field service management (FSM) software, announced its product integration with Trane® Residential and American Standard® Heating and Air Conditioning, leading global providers of indoor comfort solutions and services. This phase of the multi-step integration allows contractors to receive, manage, and provide updates on leads and jobs originating from Trane and American Standard, eliminating multiple manual entry processes and saving contractors’ valuable time.

“As more of our dealers are investing in field service management software, we wanted to make the process as seamless as possible,” said Katherine Shin, VP of Customer Experience, “Integrating with Service Fusion enables those on the platform to simplify how they run their entire business, from acquiring a new customer to when that customer needs after-sales service.”

“We are delighted to deliver this first phase of the integration to our customers just a few short months after announcing the expansion of our partnership with Trane and American Standard,” said Jose Moreira, SVP of Partnerships and Operations at Service Fusion,

“These features will provide valuable, time-saving benefits, and we’re excited to begin work on the next phases.”

Service Fusion is the first field service management software provider to complete and launch the integration after announcing the partnership earlier this year. The next phase of the integration, expected in 2022, will enable dealers to streamline workflows relating to product catalogs and inventory availability.

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U.S. LBM Acquires Arrowhead Stairs & Trim, Inc.

Dallas, Texas – U.S. LBM, a distributor of specialty building materials in the United States, has acquired Arrowhead Stairs & Trim, a producer and installer of millwork, hardware and exterior cedar products in the Dallas-Ft. Worth Metroplex.

“Joining the expansive network U.S. LBM has built both nationally and here in Texas provides greater opportunities for Arrowhead and our team to grow and continue to deliver the best stairs, millwork products and turn-key solutions to customers,” said Arrowhead Stairs & Trim President and General Manager Dave Harrison, who will continue to lead Arrowhead’s day-to-day operations.

Arrowhead Stairs & Trim is U.S. LBM’s fourth acquisition in Texas this year. Last month, the company acquired Oldham Lumber, which operates two locations in the Dallas area. The company’s other operating divisions in the state include Parker’s Building Supply, Higginbotham Brothers and J.P. Hart Lumber, a building products distributor and manufacturer of trusses and wall panels that serves all the major markets in Texas.

NATIONAL



A.O. Smith Buys Giant Factories Inc.

Milwaukee, Wisc. – A. O. Smith Corporation announced that it has acquired Giant Factories Inc. The purchase price is approximately USD \$192 million in cash, subject to customary adjustments.

“The addition of Giant strengthens our leadership position as a global supplier of residential and commercial water heaters,” said Kevin J. Wheeler, chairman and chief executive officer. “The acquisition also supports our corporate strategy by increasing our North America market penetration, creating additional capacity and enhancing our distribution capabilities. Along with its rich history, established relationships and talented team, Giant’s values and business approach align with ours, and we look forward to welcoming Giant’s employees to the A. O. Smith family.”

“We are extremely excited about the benefits of a powerful combination with a world leader in global water technology,” said Claude Lesage, Giant Factories Inc. president. “This natural and logical partnership with A. O. Smith will enhance prospects for our customers, employees, and suppliers.”

The addition of Giant to A. O. Smith’s existing water heater operations enlarges the company’s presence in the Canada water heater market.

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Danfoss Breaks Ground on New Turbocor Facility

Baltimore, Md. – Danfoss announced the groundbreaking on its new manufacturing facility in Tallahassee, Florida, on September 21. The 167,000 square-foot building, scheduled for completion in early 2023, will host manufacturing for the VTX line and two TT/TG lines for Danfoss’ Turbocor compressors. The new facility will triple current manufacturing capacity to meet growing demand from the American, European, and Asian Pacific markets for cooling and heating high efficiency compressors.

Once manufacturing operations are moved to the new building, the existing 70,000 square-foot building will be converted to an Oil-Free Technology Center, housing R&D activities including pilot productions of new cooling technologies and services.

“We are excited about increasing our manufacturing capacity,” said Ricardo Schneider, president of Danfoss Turbocor. “We’re at an inflection point with our technology as we see significant growth year-over-year. The technology is moving toward mainstream, and this new facility will help us continue to innovate and develop new technologies to remain a market

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Continued on Page 10

The YORK® HMM7 Horizontal Discharge Heat Pump:

2-5 Ton • Standard 24 Volt Controls • Works With Conventional Air Handling Units and Evaporator Coils • Price Competitive With Standard Heat Pumps



- Up to 18 SEER/10.5 HSPF
- 40% smaller footprint compared to traditional vertical discharge units
- 36% quieter operating sound; as low as 54 dBA
- Capable of dual-fuel operation when paired with an existing or new furnace, using a Venstar thermostat
- Inverter system and modulating technology
- Modulating technology maintains exact temperatures by operating from 35-100% capacity
- 40% more compact than standard heat pump units and can be installed in tighter spaces – ideal for high-density areas
- No unique installation procedures required
- Long line set length (up to 246 ft)
- Designed to work with standard ECM indoor air handlers
- Includes a standard 10-year Compressor Limited Warranty and 10-year Parts Limited Warranty; extended warranties available for a full system replacement (product registration required)

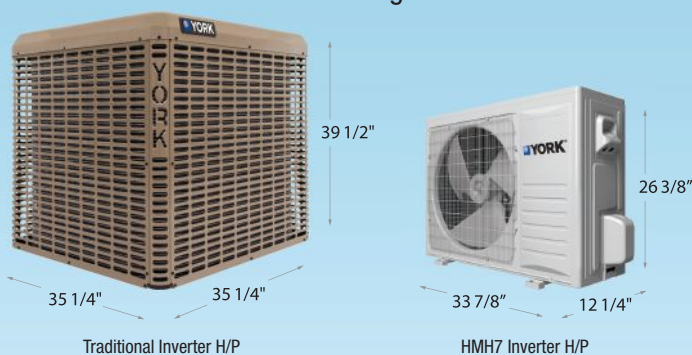
The YORK® HMM7 Heat Pump is designed to provide all the comfort and technology of a high efficiency unit at the cost of a base-tier vertical unit for residential customers. It's an ideal solution for homes that require a compact design and comes in several models and tonnages with flexible installation options and innovative features.



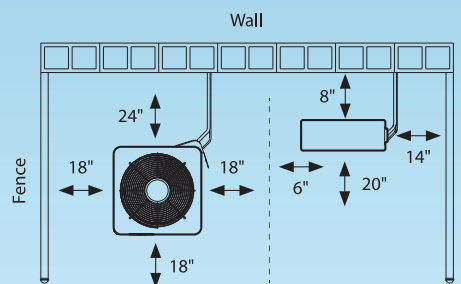
Model	Tons	SEER	HSPF	Height (Inches)	Width (Inches)	Depth (Inches)	Operating Weight (Lbs)	Sound Range (dBA) Low-High*
HMM72B241S	2	17.5	9.0	26 3/8	33 7/8	12 1/4	112	54-65
HMM72B361S	3	18.0	10.5	33	37 3/8	13 3/8	155	56-68
HMM72B481S	4	18.0	9.5	54 5/8	37 3/8	13 3/8	227	62-69
HMM72B601S	5	17.0	10.0	54 5/8	37 3/8	13 3/8	251	62-73

*High sound rated in accordance with AHRI Standard 270.

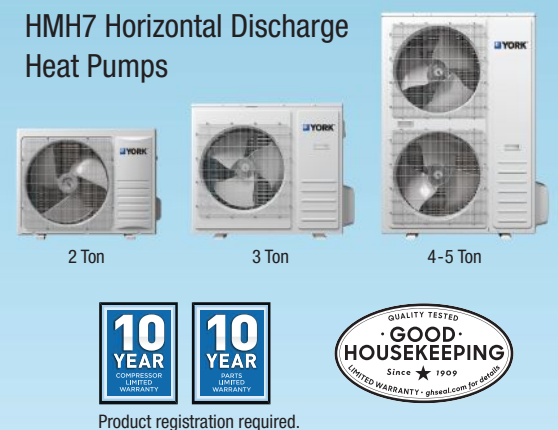
40% smaller footprint compared to traditional vertical discharge units



Traditional, Vertical Unit Minimum Clearances vs. HMM7 Minimum Clearances



HMM7 Horizontal Discharge Heat Pumps



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Continued from Page 8

leader in low-carbon cooling. With the urgent need to reduce our carbon emissions and slow the rate of global warming, Danfoss will continue to be a leader in clean energy technologies.”

HVAC Excellence Grants Ivy Tech Accreditation

Kokomo, Ind. – HVAC Excellence is pleased to announce that the HVACR training program at Ivy Tech Community College in Kokomo, Indiana has been granted accreditation. The Kokomo campus, having recently completed a forty-three million dollar renovation, took an important step to

make certain that its programs keep up with technological changes. To validate that these changes had their intended outcomes, they voluntarily sought to accredit their HVACR program.

Programmatic accreditation is an independent, third-party review of an educational program, comparing it to established, industry-accepted standards. These standards are designed to ensure that the future workforce receives the quality training required for success in the HVACR industry.

To pursue this accreditation, they completed a detailed, comprehensive self-study, that demonstrated compliance with each of the required standards. The self-study was then sent to HVAC Excellence, where an accreditation review board thoroughly assessed the submission.

The accreditation review board,

having approved the self-study, sent a team to conduct an intense, onsite review of the program. The onsite team was tasked with validating compliance with all the established standards and the accuracy of the self-study. The onsite team consists of two members, one who has served as an HVACR instructor, the other as a school administrator. They are seasoned professionals that possess the knowledge, training, and experience to successfully evaluate every aspect of an HVACR program.

Upon a thorough review of all the documentation presented by the administration, faculty, and the onsite accreditation team, the HVAC Excellence accreditation review board unanimously decided to grant accreditation of the program.

Visit www.ivytech.edu for more information.

Johnson Controls Manufacturing Facility Celebrates 50th Anniversary

Milwaukee, Wisc. – Johnson Controls, the global leader for smart, healthy and sustainable buildings, celebrated the 50th anniversary of the company’s commercial HVAC manufacturing plant in Norman, Okla. The 900,000 square-foot facility, known as Johnson Controls Rooftop Center of Excellence, serves as the Company’s flagship location for industry research, manufacturing and testing of commercial rooftop units.

In 1971, the facility shipped its first HVAC system, which was a pivotal milestone for the plant and the beginning of its long history

of HVAC manufacturing and innovation. It was originally owned by Westinghouse from 1971-1981 and subsequently purchased by YORK in 1981, which was acquired by Johnson Controls in 2005.

“Over the last 50 years, there has been continuous improvement at the Norman facility to modernize and expand the plant, automate the manufacturing process, improve safety and ensure our products are built to the highest quality standards possible for our customers,” said Vicki Davis, program management director, West region, Johnson Controls. “These improvements will make it possible for us to ensure all commercial rooftop units meet and exceed DOE 2023 energy efficiency requirements and will utilize the low-GWP refrigerant R-454B by 2025 to minimize our customers’ environmental impact and energy use.”

The most notable expansion the Norman facility underwent was in April 2019. The facility now features nearly 400,000 square feet of incremental laboratory and manufacturing space, which includes a two-story, 52 foot-high testing lab roughly the size of one-and-a-half football fields. The extensive laboratory allows Johnson Controls to conduct on-site development, regulatory compliance, performance, safety, and reliability testing, including the ability to test a 150-ton rooftop unit in climates ranging from -30°F to 130°F. The 2019 expansion also included renovations to more than 150,000 square feet of office and meeting space.

Since the facility has been operated by Johnson Controls, approximately 650,000 HVAC systems have been manufactured for the Johnson Controls, YORK®, TempMaster®, Luxaire®, Coleman®, Champion® and Fraser-Johnston® brands. Today, approximately 1,100 people are employed at the facility.

With a history of making buildings more sustainable for 135 years, Johnson Controls is a worldwide leader in the effort to decarbonize buildings. This includes developing solutions to facilitate the transition to electric-based heating and the development of OpenBlue, a suite of connected solutions that help drive building system efficiencies.

To learn more Johnson Controls rooftop units, visit www.johnsoncontrols.com/hvac-equipment/rooftop-units.

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Dec 2 & 15 | 8:30 a.m. - 10:30 a.m.

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3-Part Series

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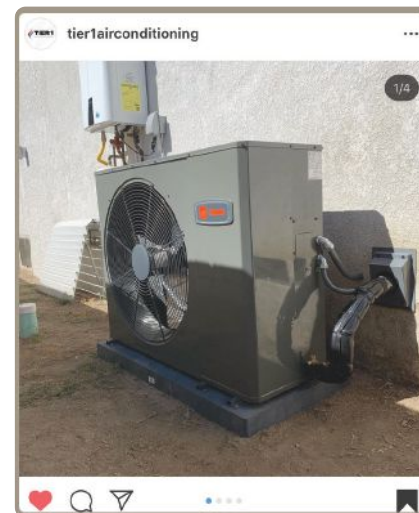
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Industry Events

IHACI Hosts 36th Annual Susie Evans Memorial Golf Tournament at California Country Club

The Institute of Heating and Air Conditioning Industries, Inc. (IHACI) recently celebrated the Annual Susie Evans Memorial Golf Tournament at the California Country Club in Whittier, Calif. In its 36th year, the golf tournament was named in honor of longtime IHACI executive director Susie Evans, who passed away earlier this year.

Members of the HVAC industry were on hand for a shotgun scramble game of 18-hole golf, followed by cocktails and lunch.

IHACI would like to extend its thanks and gratitude to all of the generous sponsors and donors that made the event possible:

Action Duct Cleaning Com-

pany; Goodman / Daikin (North America, LLC); Ferguson HVAC; Mitsubishi Electric Cooling & Heating; Sigler, Inc.; SoCal Gas Co.; U.S. Air Conditioning Distributors; Air Control Systems, Inc.; Aspen Manufacturing; California Hot Water Supply, Inc.; Conner Air Conditioning & Heating Inc.; CDI Curbs, Custom Curb Adapters; Democrat Printing & Lithographing, Co.; Distribution International; ERM Insurance Brokers; JB Warranties; KKAJ, LLP (King, King, Alleman & Jensen); R.E. Michel Company; Royal Truck Body; SoCal P.I.P.E Trades; UC Air Systems Inc; Viking Heating & Air Conditioning, Inc.



1ST PLACE WINNERS – AIR-BREE HEATING & A/C (LEFT TO RIGHT): AUGUIE GONZALEZ, JOE TRUJILLO, MARIO GONZALEZ, VINCE MATAMOROZ.




2ND PLACE – FERGUSON HVAC: MIKE RITTNER, FERGUSON HVAC (ABOVE); (BELOW) TONY LOPEZ, FERGUSON HVAC; STEVE ADAMS, FERGUSON HVAC; RICK YOUNG, FERGUSON HVAC.



3RD PLACE – SIGLER, INC / K & J AIR (LEFT TO RIGHT): BRANDON EMBRY, AIR TECHNICAL SERVICES; MARIO ANTOLIN, K & J AIR; JERRY ANTOLIN, K & J AIR; CHRIS ASPEITIA, SIGLER, INC.



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Legislative Update

Continued from Page 1

levels to fund the Board's programs and services. Increased fees will allow CSLB to maintain financial solvency and restore funding reserves.

AB 569 Grayson (D-Concord) – Civil Penalty Fine Increase, Letters of Admonishment. This CSLB supported bill increases the civil penalty fine limit for specified violations of contractors law from \$5,000 to \$8,000 and increases the enhanced civil penalty fine limit from \$15,000 to \$30,000. Also authorizes CSLB to include additional minor violations in a Letter of Admonishment (LOA) for the same contractor. Existing law allows CSLB to issue a LOA to a contractor for less egregious violations that do not pose health and safety risks or high sums of damage to consumers. This bill now allows CSLB to issue LOAs for more than one violation to the same contractor.

AB 830 Flora (R-Ripon) – License Qualifier Requirements and Definitions. More clearly defines “responsible managing employee” under the Contractors’ State License Law, defines “a bona fide employee of the applicant” to mean an employee who is permanently employed by the license applicant, and “actively engaged” to mean working 32 hours per week, or 80% of the total hours per week that the applicant’s business is in operation, whichever is less. Also makes the person qualifying on behalf of an individual or firm responsible for

exercising supervision and control of their employer’s or principal’s construction operations as necessary to secure full compliance with the Contractors’ State License Law and the rules and regulations of the CSLB. Requires the applicant or licensee submit an employment or license statement prepared by the qualifier’s employer or principal with detailed information on the qualifying individual’s duties and responsibilities for supervision and control of the applicant’s construction operations. Failure to provide information on the qualifying individual’s duties and responsibilities would be cause for disciplinary action and punishable as a misdemeanor.

AB 246 Quirk (D-Hayward) – Disciplinary Actions, Illegal Dumping. Under existing law, willful or deliberate disregard by a licensed contractor of various state building, labor and safety laws constitutes a cause for disciplinary action by the CSLB. This law adds illegal dumping of construction and contractor-related materials and debris to the list of violations that constitute cause for disciplinary action.

Mercury Thermostat Collection Program Revisions

The following bill was signed as an attempt to improve the program to collect, recycle and dispose of mercury-added thermostats sold in the state before January 1,

2006. According to the author, the success of the existing program has been inadequate and collection efforts have failed to meet targets.

AB 707 Quirk (D-Hayward) – Mercury Thermostat Collection Act of 2021. Recasts and modifies the program started under the Mercury Thermostat Collection Act of 2008 to require each manufacturer of mercury-added thermostats, or group of manufacturers, by March 1, 2022 to contract with or retain a qualified third-party to develop and implement a convenient, cost-effective and efficient program for the collection, transportation, recycling, and disposal of out-of-service mercury-added thermostats. Requires the third-party to make available to consumers and service technicians incentives of no less than \$30 per out-of-service mercury-added thermostat collected. Requires by June 1, 2022, the qualified third-party to submit for review and approval a written plan for the program to the state Department of Toxic Substances that will oversee the program plan and implementation. Requires each manufacturer, or group of manufacturers, to pay the department an aggregate total of up to \$400,000 annually through 2028 into the Mercury Thermostat Collection Program Fund to cover reasonable regulatory costs for the department to administer, implement and

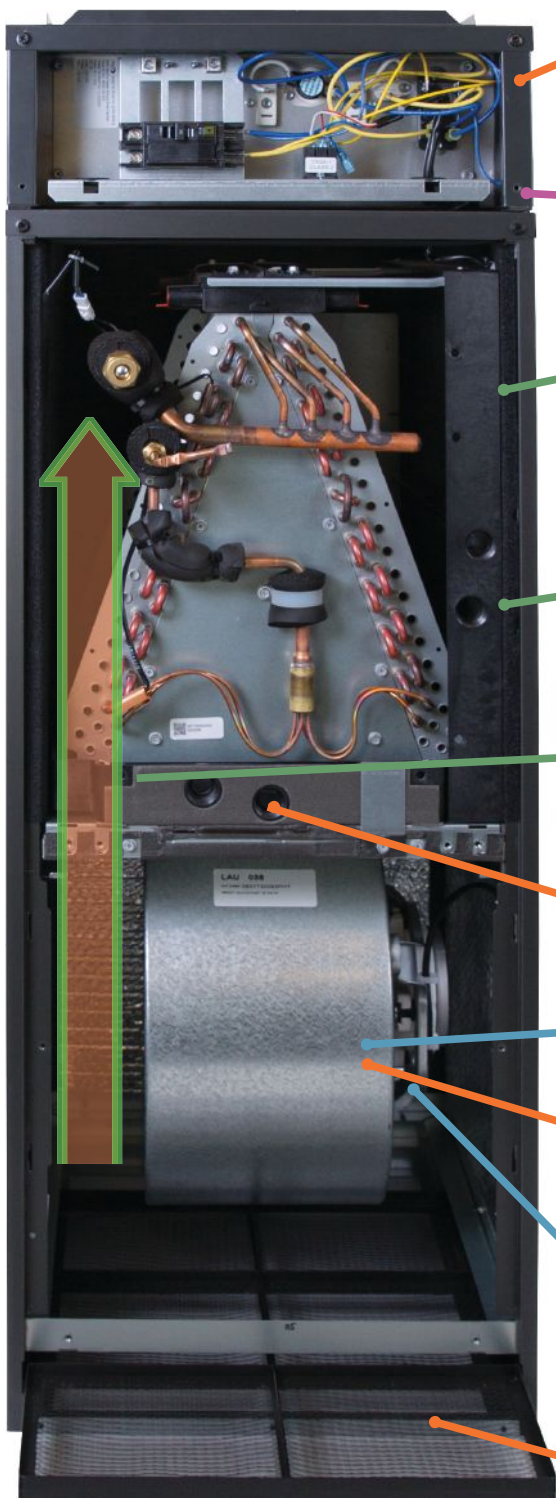
Continued on Page 22

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Industry Events

2022 AHR Innovation Award Winners Announced Across 10 Categories

The AHR Expo (International Air-Conditioning, Heating, Refrigerating Exposition) announced the winners of the 2022 AHR Expo Innovation Awards.

“This past year was a challenge for everyone, and in unique ways, the HVACR industry,” said Show Manager Mark Stevens. “Our industry was called to the front lines to put our very best products and technologies to the test. The Innovation Awards purpose is to honor those that are pushing the bar to create innovative solutions to difficult problems. We are thrilled to celebrate this year’s winners and what they bring to the industry, as well as to continue to champion innovation among our professionals.”

The Innovation Awards program serves as a metric to see the year-to-year growth in the industry.

“AHR Show Management would like to formally congratulate each of our 2022 AHR Expo Innovation Award winners, as well as finalists and all our entrants, for their continued leadership and contribution to HVACR,” said Stevens. “We look forward to seeing these innovators in the marketplace in the coming year, and in-person on the Show floor in 2022.”

The 2022 AHR Expo Innovation Award Winners and finalists were selected in ten industry categories, including building automation, cooling, heating, indoor air quality, plumbing, refrigeration, software, sustainable solutions (formerly



green building), tools and instruments, and ventilation.

Building Automation

iSMA CONTROLLI S.p.A. / iSMA-B-MAC36NL Hybrid IoT Controller powered by Niagara Framework

The iSMA-B-MAC36NL master application controller family

provides an all-in-one solution for mini-BMS. Created visualization can be displayed and controlled via HDMI output and 2 USB ports that enable connection of a mouse/ keyboard or dedicated touch for the HMI panel. No PC, additional licenses, or additional costs are required. As MAC controllers are based on the Niagara Framework, it enables the integration of almost any existing protocol on the building network. The onboard M-Bus port, 2 ethernet ports, and the RS485 port can be integrated with just one device. Finally, the controller has an onboard dip and rotary switches that can be used as a part of the application. All of the features of the controller are managed by dedicated modules in

Niagara Framework to accelerate the installation process and thus reduce labor costs.

Finalists: BrainBox AI, BrainBox AI; CUBE USA, CUBE Edge IOT

Cooling

Danfoss / Danfoss Turbocor® VTCA400 Compressor

The new VTCA400 from Danfoss offers improvements on traditional centrifugal compressor designs that are large in physical size and footprint, which ultimately lead to higher cost and space constraints for the end user. The VTCA400 solves this problem by using a patent-pending hybrid compression design that uses a combination of mixed flow and radial impellers enabling both high-performance and a compact footprint. In this design, the first stage impeller uses a mixed flow impeller with both axial and radial components while the second stage impeller uses a radial design. The hybrid compression design allows for a compressor footprint that is half the physical size and weight of a conventional radial-only design. It also maintains high efficiency levels – a 10% improvement in full load efficiency and 30% improvement in IPLV above ASHRAE 90.1-2019 minimums when considering a three (3) compressor, 1200-Ton system.

Finalists: Copeland Compressors and Condensing Units / Emerson, Copeland™ oil-free centrifugal compressor; Teqtoniq GmbH, Teqtoniq TRC150 Oil-Free Centrifugal Compressor

Heating

Carrier / Infinity® 24 Heat Pump with Greenspeed® Intelligence

The Infinity® 24 Heat Pump with Greenspeed® Intelligence is Carrier’s highest-efficiency and most advanced heat pump with up to 24 SEER and 13 HSPF for premium energy savings, extremely quiet performance and premium comfort features. The unique, variable speed compressor of this unit allows it to adapt its output to the needs of the home with infinite adjustments between 25 - 100% capacity. The heat pump offers excellent humidity control and is capable of removing up to 400% more

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Quiet operation, optimal performance from -22°F to 129°F
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Up to 20 SEER/10.5 HSPF
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Industry Events

Innovation Awards

Continued from Page 14

moisture than standard systems. Based on Carrier testing, all data was run with the systems cycling once they met the assumed home load. The assumed load at AHAM conditions (80/70, 80) is the capacity of the variable-speed running continuously in dehumidification mode. The difficult conditions load was determined by a Wrightsoft® load calculation for a home in Florida at 69 OD 72/63 ID. This condition was provided by a customer in Florida as “worst case.”

Finalists: HVAC Manufacturing and Technology Inc., SpaceGain Air Handling Units; Addison, FrostShield Defrost-Free Heat

Pumps

Indoor Air Quality

Antrum / AntrumX™ IAQ Facilities Monitoring System

AntrumX is a patented centralized sensing technology. AntrumX monitors IAQ for 32 spaces from a single location, using one sensor for every 16 rooms. Consolidating one centralized sensor for multiple spaces increases sensor accessibility while ensuring better overall control. Centralized sensing ensures better overall control because the data from 16 spaces comes from a single source, allowing building managers to optimize their ventilation strategy, and save energy without sacrificing IAQ. Additionally, the AntrumX has the ability to transport air without moving parts. Leveraging the building's

pressure differential between supply and exhaust, AntrumX is able to move air samples from each space to the Sensor Pack without adding energy to the system.

The Sensor Pack also monitors multiple data points across multiple rooms. Using over-the-air software updates and a state-of-the-art hardware design, the Sensor Pack can be customized to sense what's required today and be easily exchanged or updated as requirements change over the life of the building.

Finalists: LG Electronics USA, Inc., LG Split Rooftop DOAS (Dedicated Outdoor Air System) with Energy Recovery Wheel; TZOA, HAVEN IAQ

Plumbing

Franklin Electric / Little Giant,

Inline SpecPAK, Multi-Pump Pressure Boosting System

With only 14.5 inches deep, its unique smaller footprint makes the Franklin Electric Inline 1100 SpecPAK Pressure Boosting System small enough to be hung in a small utility closet or wall hung to preserve critical floor space. The system's Inline 1100 constant pressure pumps are quiet, compact, self-contained, and versatile. Powered by water-cooled motors, it delivers quieter operation versus traditional air-cooled motors.

The self-contained design delivers a “plug and play” solution that is part of a complete package centered around easy installation, operation, and durability. The ability to expand is a foundational and distinctive benefit. Both the suction and discharge headers are sized to accommodate the flow rate from the maximum speed

of four pumps. Quick and easy disconnects to the main panel allow customers to disconnect each pump individually with minimal system disruption.

Finalists: Lochinvar, LLC, Lochinvar Commercial Heat Pump Water Heaters; Towle Whitney LLC, GEN-5 Platform

Refrigeration

ebm-papst Inc. / AxiEco 630-910 Axial Fan

The AxiEco 630-910 incorporates new impeller geometry with a rotating diffuser and optimized blade design in order to reach a low noise level and high-efficiency. The steep air performance curve provides a pressure increase of more than 700 Pa, which is extraordinary for axial fans. With a maximum air flow of up to 30,000 m³/h the AxiEco 630-910 covers a wide range of different applications, especially those where high-efficiency and high back pressure are key. The integrated commutation electronics with an active PFC (power factor correction) as an option enables the fan to be used in applications with low harmonics requirements, without any external filtering measures.

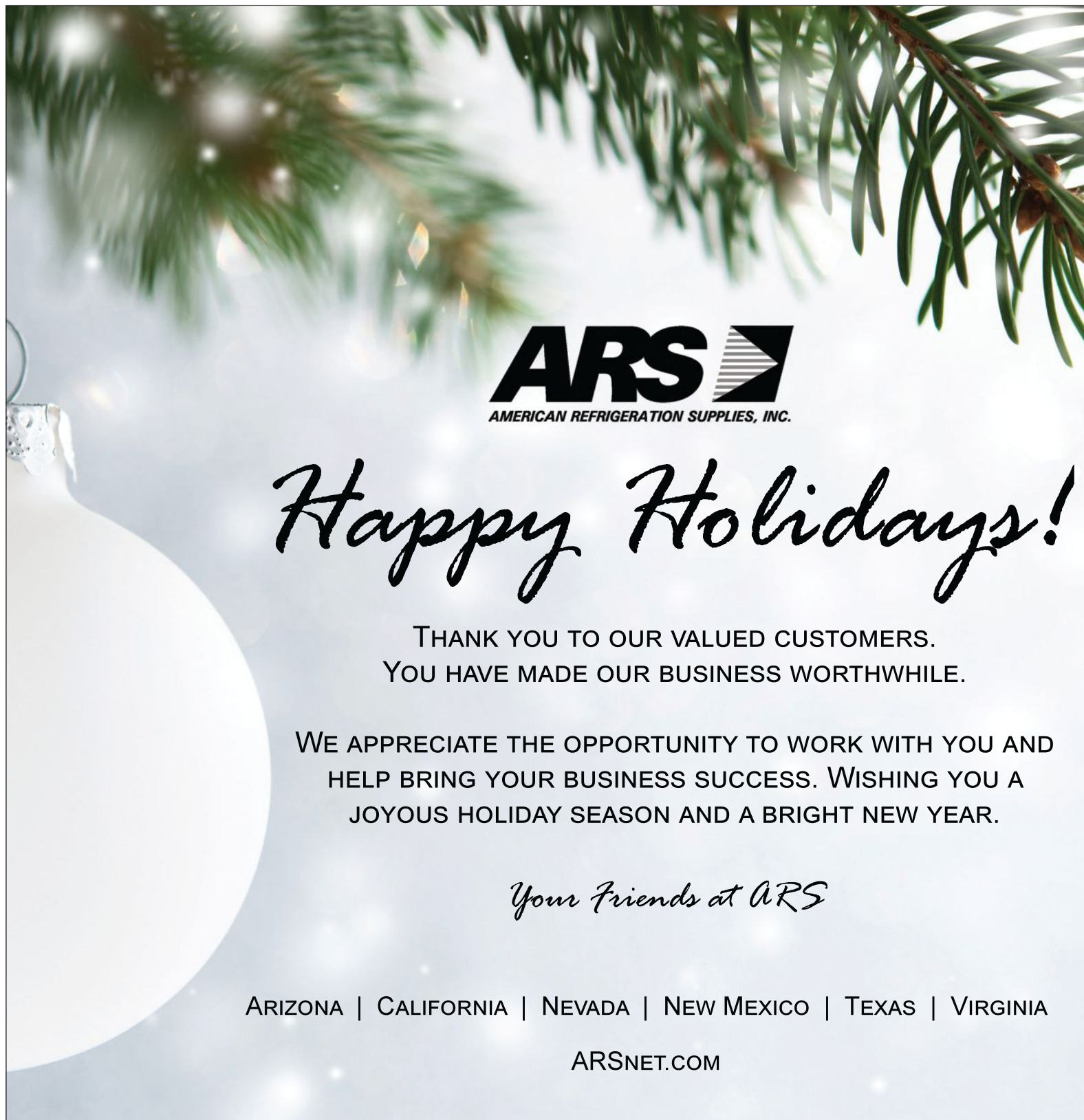
Finalists: Copeland Compressors and Condensing Units / Emerson, Copeland™ horizontal variable speed scroll compressor for refrigeration (1 to 4 HP); Johnson Controls, Inc., ZS series horizontal scroll compressors with R290 and variable speed compatibility

Software

Bluon, Inc. / Bluon Support Platform

The Bluon Support Platform is a mobile application that becomes a centralized hub for HVAC technicians. Bluon was built for technicians, by technicians, and provides detailed system information, just-in-time training, best practices and 24/7 live tech support. The app's most important function is its ability to make the lives of technicians easier by providing a single, trustworthy source of detailed HVAC system information, along with live tech support when needed in the field. The main features of the free app include:

- a comprehensive unit database of 40,000 HVAC model numbers spanning 75+ brands, with 75,000+ original manuals, troubleshooting guides, wiring



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ARSNET.COM

Continued on Page 18

Heating Products and Tools & Test Instruments

ADEY MagnaClean Professional2XP



The MagnaClean Professional2XP™ from ADEY comes with 1" copper and 1¼" NPT iron pipework, perfect for protecting 150,000 – 300,000 BTU boiler ranges from damaging black sludge i.e., magnetite. The magnetic filter features a rare-earth magnetic core and two non-magnetic capture zones for capturing both magnetic and non-magnetic debris. Installed on the return pipe to the boiler/circulator, the filter contains no moving parts. It has bi-directional, 360-degree isolation valves meaning the filter valves can be rotated to adapt to pipework at any angle. The system can remain switched on while the filter is being serviced.

More information: www.adey.com/us.

Bosch Thermotechnology QV Series



Bosch Thermotechnology announced the availability of its new, ultra-quiet heat pumps, the QV Series, for commercial spaces in multiple sizes and both horizontal and vertical configurations.

The commercial grade QV Series, a Florida Heat Pump (FHP) geothermal system, is an industry leader in sound reduction and represents one of the most comprehensive sound performance offerings on the market. In addition to the lower sound levels, the QV Series also delivers a compact cabinet, in a very competitive package, making it ideal to fit into small spaces in commercial buildings.

The QV Series includes a highly efficient, Constant

Airflow ECM DEC Star® Blower that produces the same CFM (cubic-feet-per-minute) of airflow as the Bosch LV model, but at a lower RPM (revolutions-per-minute), resulting in decreased power consumption and sound. The QV heat pump also features Bosch's patented compressor encapsulation, which includes high density mass loaded vinyl insulation material wrapped around the blower and also installed in the lower compartment, dampening the sound it emits. Additionally, encapsulation parts are installed around the compressor and assembled with heavy gage sheet metal and a double layer of vinyl material on both sides. The access panels and the unit's divider use the same type of sound

attenuation material, making the panels substantially heavier, thus highly reducing the sound radiating from the unit. As a final measure, the compressor is installed on an isolated and elevated base plate that dampens vibrations during operating cycles.

The overall lowest sound rating for the commercial QV Series heat pumps is 53dB, making it an industry benchmark, and an excellent solution for designers to improve NC ratings in commercial spaces e.g. school classrooms and office spaces.

The commercial QV Series heat pumps were developed with patented technology to replace the limited sound reduction solutions on the market.

More information: www.bosch-thermotechnology.us/us/en/commercial/home/.

Fieldpiece Instruments MG44

Fieldpiece Instruments introduces a new wireless vacuum gauge, model MG44. Stepping in to replace the SVG3 vacuum gauge, the MG44 wireless vacuum gauge features a large LCD screen with three user-selectable data views as well as hi and low alarms, all housed in a durable no-slip grip case. With the addition of wireless capability, the new vacuum gauge allows HVACR professionals to view vacuum readings with the Fieldpiece Job Link® System App, or on the SMAN™



Refrigerant Manifold. "We strive to continuously improve as we engineer new products, and that improvement is reflected in the user's experience with this new wireless vacuum gauge," said Charlotte Loomis, Sr. Marketing Manager, Fieldpiece.

Continued on Page 18



Education for Your Future

Energy Efficiency Starts Here



Pacific Gas and Electric Company is pleased to offer the following HVAC/R training courses specifically designed to advance the skills of HVAC/R professionals.

JANUARY 2022



Webinar Gas Heating Module

Instructors: Mitch Bailey / Jeff Painter
Wed., January 26 – Part 1
Thurs., January 27 – Part 2

FEBRUARY 2022



Webinar NATE HVAC/R New Hire Module

Instructors: Mitch Bailey / Jeff Painter
Wed., February 16 – Part 1
Thurs., February 17 – Part 2
Wed., February 23 – Part 3
Thurs., February 24 – Part 4

MARCH 2022



Webinar NATE HVAC/R Support Training

Instructors: Mitch Bailey / Jeff Painter
Wed., March 2 – Part 1
Thurs., March 3 – Part 2
Wed., March 9 – Part 3
Thurs., March 10 – Part 4

All classes are currently scheduled as Webinars held 6:00 pm to 8:00 pm

Webinars are FREE of charge and online registration is required. You can register online by visiting: pge.com/hvactraining. Attendees must register for each night separately and registration is on a first-come, first-served basis.

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Scan PG&E QR code with your Smartphone



www.pge.com/hvactraining

Heating Products and Tools & Test Instruments

Continued from Page 17

“The new gauge is rugged and accurate and the cylindrical design is easy to hold or to place in optimum locations. With its wireless functionality the user monitors live evacuation directly on the tool or remotely on their Job Link enabled device.”

The new Wireless Vacuum Gauge MG44 can be used three ways: 1) as a standalone vacuum gauge 2) with a Job Link enabled device to monitor up to 1000' away from the gauge or have a Job Link live look-in consultation and 3) monitor the external gauge through the SMAN SM380V/SM480V digital refrigerant manifold. With this up to the minute information, the HVACR professional knows when an extra nitrogen purge is required, a leak is suspected, or if

the process is proceeding normally. Professional Job Link reports can be generated from this data as well.

The large LCD screen on the unit can be easily seen in bright or low light and from a wide angle. The user can select one of three unique views, including a new Rate Meter that shows the real-time change per minute, a Bar Graph that has a range up to atmosphere, or the Rate that shows the rate that shows the change per minute.

The reversible angled coupler as well as the new cylindrical shape, makes it easy to orient the gauge so that it is out of the way and yet easy to see. Built for demanding field use, the patented, over-molded case design resists damage from physical impact and water ingress. The standalone vacuum gauge facilitates a reliable seal and is IP54 rated for water and dust resistance.

The wireless vacuum gauge is available at distributors now.

More information: www.fieldpiece.com/product-category/recovery-and-vacuum/.

.....

Fujitsu General America, Inc. Halcyon

Fujitsu General America, Inc. has expanded its Halcyon single-zone mini-split heat pump lineup with new slim duct and compact cassette indoor unit models.

The new light commercial systems, available in 9,000, 12,000 and 18,000 BTU capacities, have coils made of high corrosion resistance copper (HCRC) to provide great durability. An enhanced controls platform provides multiple control options to optimize comfort and energy savings.

Installation, service and end-user



interface is easier than ever. The systems feature a custom auto function, external input/output connectivity, two-wire remote compatibility, and dual UART communication ports (WiFi, BACnet, External I/O... etc.). Simultaneous connection of wired remote controller, WiFi adapter, and external input/output board is simple. Service monitoring is conducted through a new touch panel controller. Maximum line set lengths have been extended; up

to 98 feet total piping length for 18,000 BTU systems.

The new, compact units offer sound levels as low as 24 dBA. Slim-duct systems feature a modular design that's field configurable for vertical or horizontal installation with bottom or rear return.

Optional accessories include a wired remote controller, thermostat converter, wireless LAN interface, external connect kit, remote sensor, Modbus, BACnet, and KNX converter, and an external switch controller. Available for use with the slim duct are an IR receiver kit and louver grille kit. An IR remote kit, cassette grille and fresh air intake are available for the compact cassette.

The new systems are available to order and ship now.

More information: www.FujitsuGeneral.com.



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Innovation Awards

Continued from Page 16

diagrams, and technical specifications; best practices known as “pro-hacks” for a wide-range of situations; easy to use calculators for SH/SC, airflow, pressure setpoints, TXV sizing, etc.; HVAC training videos and tools that techs can use on the job; a revolutionary HVAC forum that gets techs the info they need when they need it; 24/7 live tech support; and a replacement parts identification tool cross-referenced by model numbers and compatible part numbers.

Finalists: CoolAutomation, Service Provision App; Interplay Learning, SkillMill™

Sustainable Solutions (formerly Green Building)

Engenuity Power Systems Inc / E/ONE Home Power System

Engenuity's E/ONE Home Power System is a modern rethinking of a classic combined heat and power system. Using clean and plentiful natural gas, the E/ONE produces both electricity and heat for homes or businesses. Since the E/ONE is capable of making more power than the home or business requires, the additional power can be sold back to the grid, generating income for the E/ONE's owner. In addition, the E/ONE leverages the reliability of the natural gas distribution network to replace conventional backup generators. E/ONEs easily produce all the electricity needed to operate homes or

businesses, therefore the periodic blackouts such as those recently seen in Texas and California will not affect the product's ability to function.

Finalists: Caleffi Hydronic Solutions, Commercial domestic hot water (DHW) recirculation systems combine energy efficiency and water conservation; Danfoss, Danfoss Turbocor® TGS380 Compressor

Tools & Instruments

Fluke Corporation / Fluke 378 FC Non-Contact Voltage True-rms AC/DC Clamp Meter with iFlex

The Fluke 378 FC true-rms clamp meter uses FieldSense technology to make testing faster and safer, all without contacting a live conductor. The meter measures accurate voltage and current measurements through the clamp jaw. It works by clipping the black test lead to any electrical ground and putting the clamp jaw around the conductor which results in reliable, accurate voltage and current values on the display. The 378 FC clamp meter includes a unique PQ function that senses power quality issues automatically. When making FieldSense measurements, the 378 FC will detect and display power quality issues, relating to current, voltage, power factor or any combination of the three. This allows for quick determination if an upstream supply problem exists, or if there is a downstream equipment problem.

Finalists: Climatech International S.A., F-100 Cordless Stud Welder Machine; RIDGID /

Continued on Page 19

Troubleshooting

A Package Unit Heat Pump That's Not Working

By Jim Johnson
Contributing Editor

In this month's troubleshooting situation, the equipment is a package unit heat pump that employs an indoor X-motor control and outdoor control ECM. This equipment was installed in 2018. The customer is complaining that the unit is "not working at all," however you determine on your arrival that the indoor fan motor is operating and blowing cold air, and the thermostat is properly set.

Upon your initial check of the equipment, you find that while the outdoor fan motor is operating, the compressor is cold and not attempting to start. As your next step, you locate the wiring diagram and legend shown in **Figures One and Two**.

Based on your observations, you make your first voltage check at the Y Out and CC connections of the DFC, and your meter shows 24-volts. Your next voltage check, directly at the CC contactor coil, also shows 24-volts.

With control voltage checks accomplished, you next perform a voltage check at T1 and T3, which shows 0-volts. And your next check at T1 and L3 shows 230-volts.

Your troubleshooting question: *What is your next step in servicing this equipment?*

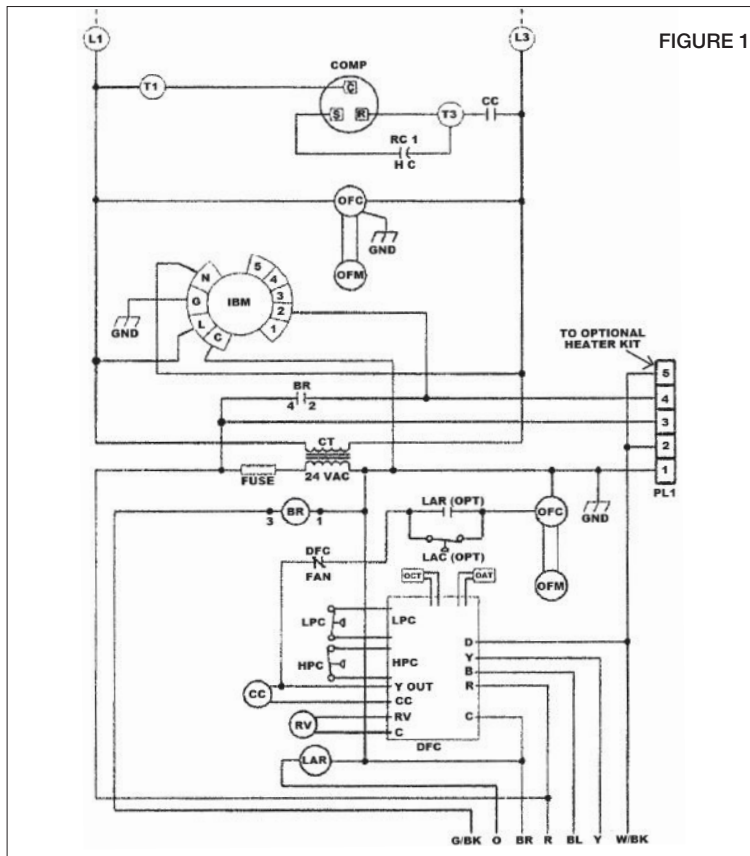
If you believe you have the correct answer to one of Jim Johnson's Troubleshooting Problems, please submit it by email to Jim Johnson at icntroubleshooting@techtrainassoc.com or by U.S. Mail to: Technical Training Associates, PO Box 2259, Green Valley, AZ 85622-2259.

In your email subject line please include "Troubleshooting An-



swer" and indicate which month the question you are responding to was published.

Correct answers will be entered into a drawing and will be eligible to receive a copy of Jim Johnson's video "Evaluating Refrigeration Systems: Troubleshooting & Identifying Problems."



Answer to Last Month's Troubleshooting

We need to replace two of the four elements in this unit. Our tests showed voltage applied to each of them in a parallel circuit, but two of the units were not drawing any current, indicating that they are open.

The winner of last month's problem is:

Sam Taylor

Innovation Awards

Continued from Page 18

Emerson, RIDGID® PCS-500 Pipe Saw

Ventilation

Aldes / InspirAIR® Fresh

The InspirAIR® Fresh contains new innovative design features. A newly developed counterflow enthalpic core and unique fan scrolls ensure 75% sensible recovery efficiency at 32F as tested to the new CSA 439 standard required as of

October 2020. Occupants can also expect to get ample fresh filtered air due to variable speed EC motors that adjust speed to changes in pressure due to stack effect and filter loading. The InspirAIR® Fresh is designed to provide optimal fresh air, regardless of filter type. Currently, ERVs are rated for use with a basic filter, and when using a MERV13 or HEPA filter, the airflow is reduced significantly.

Finalists: Carrier, Carrier Aero® 39M with ECM Direct Drive Plenum Fans; LG Electronics USA, Inc., LG Split Compact DOAS (Dedicated Outdoor Air System)



HERS Rating
Air & Hydronic Balancing
Permit Expediting & Retrieval

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Tues., Jan. 4 – Part 2
Mon., Jan. 10 – Part 3
Tues., Jan. 11 – Part 4

FEBRUARY

Gas Heating Module

(Two-Night Class) Instructors: Mike Griffin / John Dalton
Mon., Feb. 7 – Part 1
Tues., Feb. 8 – Part 2

MARCH

System Diagnostics Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Mon., March 21 – Part 1
Mon., March 28 – Part 2

APRIL

System Diagnostics Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Mon., April 4 – Part 3
Mon., April 11 – Part 4

MAY

System Performance Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Mon., May 2 – Part 1
Tues., May 3 – Part 2
Mon., May 9 – Part 3
Tues., May 10 – Part 4

JUNE

Air Distribution Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Mon., June 6 – Part 1
Tues., June 7 – Part 2
Mon., June 13 – Part 3
Tues., June 14 – Part 4

JULY

Chiller Module

(Two-Night Class) Instructors: Mike Griffin / John Dalton
Tues., July 5 – Part 1
Tues., July 12 – Part 2

AUGUST

Commercial Cooling Tower Module

(Two-Night Class) Instructors: Mike Griffin / John Dalton
Tues., Aug. 2 – Part 1
Tues., Aug. 9 – Part 2

SEPTEMBER

NATE CORE & Gas Heating Training

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Wed., Sept. 7 – Part 1
Thurs., Sept. 8 – Part 2
Wed., Sept. 14 – Part 3
Thurs., Sept. 15 – Part 4

OCTOBER

NATE AC/HP Refrigeration & Air Distribution Training

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Wed., Oct. 5 – Part 1
Thurs., Oct. 6 – Part 2
Wed., Oct. 12 – Part 3
Thurs., Oct. 13 – Part 4
Sat., Oct. 15 - NATE Exam, 7:30 a.m.

SOUTHERN CALIFORNIA EDISON, IRVINDALE

JANUARY

Gas Heating Module

(Two-Night Class) Instructors: Mike Griffin / John Dalton
Wed., Jan. 19 – Part 1
Thurs., Jan. 20 – Part 2

2019 Title 24 Standards Training

(Two-Night Class) Instructors: Mike Griffin / John Dalton
Wed., Jan. 26 – Part 1
Thurs., Jan. 27 – Part 2

FEBRUARY

Electrical Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Wed., Feb. 9 – Part 1
Thurs., Feb. 10 – Part 2
Wed., Feb. 16 – Part 3
Thurs., Feb. 17 – Part 4

MARCH

NATE CORE & Gas Heating Training

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Wed., March 2 – Part 1
Thurs., March 3 – Part 2
Wed., March 9 – Part 3
Thurs., March 10 – Part 4

APRIL

NATE AC/HP Refrigeration & Air Distribution Training

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Wed., April 6 – Part 1
Thurs., April 7 – Part 2
Wed., April 13 – Part 3
Thurs., April 14 – Part 4
Sat., April 16 - NATE Exam, 7:30 a.m.

MAY

Chiller Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Wed., May 4 – Part 1
Thurs., May 5 – Part 2

Commercial Cooling Tower Module

(Two-Night Class) Instructors: Mike Griffin / John Dalton
Wed., May 11 – Part 1
Thurs., May 12 – Part 2

JUNE

System Performance Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Wed., June 1 – Part 1
Thurs., June 2 – Part 2
Wed., June 8 – Part 3
Thurs., June 9 – Part 4

SEPTEMBER

Air Distribution Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Wed., Sept. 21 – Part 1
Thurs., Sept. 22 – Part 2
Wed., Sept. 28 – Part 3
Thurs., Sept. 29 – Part 4

OCTOBER

AC/HP Refrigeration Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Wed., Oct. 19 – Part 1
Thurs., Oct. 20 – Part 2
Wed., Oct. 26 – Part 3
Thurs., Oct. 27 – Part 4

NOVEMBER

System Diagnostics Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton
Wed., Nov. 9 – Part 1
Thurs., Nov. 10 – Part 2
Tues., Nov. 15 – Part 3
Thurs., Nov. 17 – Part 4

SOUTHERN CALIFORNIA EDISON, TULARE

JANUARY

AC/HP Refrigeration Module

(Four-Night Class)
Instructors: Mitch Bailey / TBA
Wed., Jan. 12 – Part 1
Thurs., Jan. 13 – Part 2
Wed., Jan. 19 – Part 3
Thurs., Jan. 20 – Part 4

FEBRUARY

Gas Heating Module

(Two-Night Class) Instructors: Mitch Bailey / TBA
Tues., Feb. 1 – Part 1
Wed., Feb. 2 – Part 2

2019 Title 24 Standards Training

(Two-Night Class) Instructors: Mike Griffin / Jayme Carden
Wed., Feb. 23 – Part 1
Thurs., Feb. 24 – Part 2

MARCH

Air Distribution Module

(Four-Night Class) Instructors: Mike Griffin / Jayme Carden
Wed., March 16 – Part 1
Thurs., March 17 – Part 2
Wed., March 23 – Part 3
Thurs., March 24 – Part 4

APRIL

Boiler Module

(Two-Night Class) Instructors: Mitch Bailey / TBA
Wed., April 20 – Part 1
Thurs., April 21 – Part 2

Chiller Module

(Two-Night Class) Instructors: Mitch Bailey / TBA
Wed., April 27 – Part 1
Thurs., April 28 – Part 2

MAY

System Diagnostics Module

(Four-Night Class) Instructors: Mitch Bailey / TBA
Wed., May 11 – Part 1
Thurs., May 12 – Part 2
Wed., May 18 – Part 3
Thurs., May 19 – Part 4

JUNE

Electrical Module

(Four-Night Class) Instructors: Mitch Bailey / TBA
Tues., June 7 – Part 1
Wed., June 8 – Part 2
Tues., June 14 – Part 3
Wed., June 15 – Part 4

SEPTEMBER

System Performance Module

(Four-Night Class) Instructors: Mitch Bailey / TBA
Tues., Sept. 13 – Part 1
Wed., Sept. 14 – Part 2
Tues., Sept. 20 – Part 3
Wed., Sept. 21 – Part 4

Note: When registering for a training class please make sure you honor that commitment and show up on time and prepared. If you cannot attend, please call (818) 551-1555 and cancel in ample time. Thank you.

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OCTOBER

NATE CORE & Gas Heating Training

(Two-Night Class) Instructors: Mitch Bailey / TBA

Wed., Oct. 12 – Part 1
Thurs., Oct. 13 – Part 2
Wed., Oct. 19 – Part 3
Thurs., Oct. 20 – Part 4

NOVEMBER

NATE AC/HP Refrigeration & Air Distribution Training

(Two-Night Class) Instructors: Mitch Bailey / TBA

Wed., Nov. 2 – Part 1
Thurs., Nov. 3 – Part 2
Wed., Nov. 9 – Part 3
Thurs., Nov. 10 – Part 4
Sat., Nov. 12 - NATE Exam, 7:30 a.m.

**PACIFIC GAS AND ELECTRIC COMPANY,
STOCKTON**

JANUARY

Gas Heating Module

(Two-Night Class) Instructors: Mitch Bailey / Jeff Painter

Wed., Jan. 26 – Part 1
Thurs., Jan. 27 – Part 2

FEBRUARY

NATE HVAC/R New Hire Training

(Four-Night Class) Instructors: Mitch Bailey / Jeff Painter

Wed., Feb. 16 – Part 1
Thurs., Feb. 17 – Part 2
Wed., Feb. 23 – Part 3
Thurs., Feb. 24 – Part 4

MARCH

NATE HVAC/R Support Training

(Four-Night Class) Instructors: Mitch Bailey / Jeff Painter

Wed., March 2 – Part 1
Thurs., March 3 – Part 2
Wed., March 9 – Part 3
Thurs., March 10 – Part 4

APRIL

Electrical Module

(Four-Night Class) Instructors: Mitch Bailey / Jeff Painter

Wed., April 6 – Part 1
Thurs., April 7 – Part 2
Wed., April 13 – Part 3
Thurs., April 14 – Part 4

MAY

AC/HP Refrigeration Module

(Four-Night Class) Instructors: Mitch Bailey / Jeff Painter

Wed., May 25 – Part 1
Thurs., May 26 – Part 2

JUNE

AC/HP Refrigeration Module

(Four-Night Class) Instructors: Mitch Bailey / Jeff Painter

Wed., June 1 – Part 3
Thurs., June 2 – Part 4

Air Distribution Module

(Four-Night Class) Instructors: Mitch Bailey / Jeff Painter

Wed., June 22 – Part 1
Thurs., June 23 – Part 2
Wed., June 29 – Part 3
Thurs., June 30 – Part 4

AUGUST

System Diagnostics Module

(Four-Night Class) Instructors: Mitch Bailey / Jeff Painter

Wed., Aug 31 – Part 1

SEPTEMBER

System Diagnostics Module

(Four-Night Class) Instructors: Mitch Bailey / Jeff Painter

Thurs., Sept. 1 – Part 2
Wed., Sept. 7 – Part 3
Thurs., Sept. 8 – Part 4

OCTOBER

NATE CORE & Gas Heating Training

(Four-Night Class) Instructors: Mitch Bailey / Jeff Painter

Mon., Oct. 10 – Part 1
Tues., Oct. 11 – Part 2
Mon., Oct. 17 – Part 3
Tues., Oct. 18 – Part 4

NOVEMBER

NATE AC/HP Refrigeration & Air Distribution Training

(Four-Night Class) Instructors: Mitch Bailey / Jeff Painter

Mon., Nov. 7 – Part 1
Tues., Nov. 8 – Part 2
Tues., Nov. 15 – Part 3
Wed., Nov. 16 – Part 4
Sat., Nov. 19 - NATE Exam, 7:30 a.m.

SAN DIEGO GAS & ELECTRIC

JANUARY

2019 Title 24 Standards Training

(Two-Night Class) Instructors: Mike Griffin / John Dalton

Wed., Jan. 5 – Part 1
Thurs., Jan. 6 – Part 2

Gas Heating Module

(Two-Night Class) Instructors: Mike Griffin / John Dalton

Wed., Jan. 12 – Part 1
Thurs., Jan. 13 – Part 2

FEBRUARY

NATE HVAC/R New Hire Training

(Four-Night Class) Instructors: Mike Griffin / John Dalton

Mon., Jan. 31 – Part 1
Tues., Feb. 1 – Part 2
Wed., Feb. 2 – Part 3
Thurs., Feb. 3 – Part 4

MARCH

Non-Res ATE Training

(Two-Night Class) Instructors: Mike Griffin / John Dalton

Tues., March 1 – Part 1
Tues., March 8 – Part 2

Non-Res MATT Training

(Two-Night Class) Instructors: Mike Griffin / John Dalton

Tues., March 15 – Part 1
Tues., March 22 – Part 2

APRIL

Electrical Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton

Tues., April 5 – Part 1
Tues., April 12 – Part 2
Tues., April 19 – Part 3
Tues., April 26 – Part 4

MAY

AC & HP Refrigeration Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton

Wed., May 18 – Part 1
Thurs., May 19 – Part 2
Wed., May 25 – Part 3
Thurs., May 26 – Part 4

JUNE

Air Distribution Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton

Wed., June 15 – Part 1
Thurs., June 16 – Part 2
Wed., June 22 – Part 3
Thurs., June 23 – Part 4

JULY

System Diagnostics Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton

Wed., July 6 – Part 1
Thurs., July 7 – Part 2
Wed., July 13 – Part 3
Thurs., July 14 – Part 4

AUGUST

System Performance Module

(Four-Night Class) Instructors: Mike Griffin / John Dalton

Wed., Aug. 3 – Part 1
Thurs., Aug. 4 – Part 2
Wed., Aug. 10 – Part 3
Thurs., Aug. 11 – Part 4

SEPTEMBER

Chiller Module

(Two-Night Class) Instructors: Mike Griffin / John Dalton

Tues., Sept. 6 – Part 1
Tues., Sept. 13 – Part 2

Commercial Cooling Tower Module

(Two-Night Class) Instructors: Mike Griffin / John Dalton

Tues., Sept. 20 – Part 1
Tues., Sept. 27 – Part 2

OCTOBER

Boiler Module

(Two-Night Class) Instructors: Mike Griffin / John Dalton

Tues., Oct. 4 – Part 1
Tues., Oct. 11 – Part 2

Commercial Refrigeration Module

(Two-Night Class) Instructors: Mike Griffin / John Dalton

Tues., Oct. 18 – Part 1
Tues., Oct. 25 – Part 2

NOVEMBER

NATE CORE & Gas Heating Training

(Four-Night Class) Instructors: Mike Griffin / John Dalton

Mon., Nov. 21 – Part 1
Tues., Nov. 22 – Part 2
Mon., Nov. 28 – Part 3
Tues., Nov. 29 – Part 4

DECEMBER

NATE AC/HP Refrigeration & Air Distribution Training

(Four-Night Class) Instructors: Mike Griffin / John Dalton

Mon., Dec. 5 – Part 1
Tues., Dec. 6 – Part 2
Mon., Dec. 12 – Part 3
Tues., Dec. 13 – Part 4
Sat., Dec. 17 - NATE Exam, 7:30 a.m.

red as Webinars
format is subject to change
g (Training)

This program is funded by California utility customers under the auspices of the California Public Utilities Commission.



Technical Training

Growing Green Technicians Part 146: Three Phase Imbalance

By Jim Johnson
Contributing Editor

The concept of balance in a three-phase power supply is an important factor in taking a green approach to servicing HVACR. One example of this is that when a technician finds that a three-phase motor has failed, replacing the motor is only the beginning of the repair. A critical thing to consider is whether the three phases of current applied to the motor are in a stage of imbalance, which could be the underlying cause of the motor failure, thereby shortening the life of the new motor. Consulting NEMA (National Electrical Manufacturers Association) Standard MG1-14.35 offers information on this subject. It reads:

Three phase induction motors are designed and manufactured such that all three phases of the winding are carefully balanced with respect to the number of turns, placement of the winding, and winding resistance. When line voltages applied to a poly-phase induction motor are not the same, unbalanced currents will flow in the stator winding, the magnitude depending upon the amount of unbalance. A small amount of voltage unbalance may increase the current an excessive amount. The effect on the motor can be severe and the motor may overheat to the point of burnout.

Yes, this is Engineer-Speak, and from a technician's perspective it means that it's our responsibility to make sure that the voltages applied to each phase are evenly balanced as closely as possible. And the most effective way to determine the condition of the electrical supply

is use a professional grade digital meter to obtain accurate measurements that will provide us with an average.

A convenient method of taking these measurements is in the equipment disconnect box, an example of which is shown in **Figure One**. And in **Figure Two**, we're showing the process of accomplishing a phase-to-phase check of the voltage system.

It is important for technicians to understand that a motor operating with a voltage imbalance of more than 2% will experience a temperature rise that is more than 10% above normal. And, yes, a 10% excess, when it comes to motor operating temperature, is a big deal. To illustrate, we'll consider the following measurements involving a 220-Volt, three-phase motor:

From L1 to L2: 216 Volts
From L2 to L3: 223 Volts
From L1 to L3: 225 Volts

With accurate measurements accomplished, the next step is to find the average of the three readings. We do this by adding the three readings together, then dividing the total by 3:

$$216 + 223 + 225 = 664$$

$$\text{And...} 664 / 3 = 221.33$$

With an average calculated, we're then going to apply that number individually via subtraction to each phase voltage reading to find out how much each individual phase is out of balance.



FIGURE 1

One important factor to keep in mind about this step in the process is that we need to wind up with a positive number when we subtract. So, we need to ask the question: Is our calculated average voltage higher than any of the individual voltage readings we found?

The answer to that question is yes. One of our voltage readings (L1 to L2) was 216 volts, and our average is 221.33 volts, so our subtraction for each individual phase-to-phase reading will look like this:

$$221.33 - 216 = 5.33 \text{ Volts}$$

$$223 - 221.33 = 1.67 \text{ Volts}$$

$$225 - 221.33 = 3.67 \text{ Volts}$$

Now, for those who easily wrap their heads around mathematics and formulas, the one that applies in our next step is:

$$\text{Voltage Imbalance} = 100 \times \frac{\text{Maximum Deviation From Average Voltage}}{\text{Average Voltage}}$$

And, for those who make sense

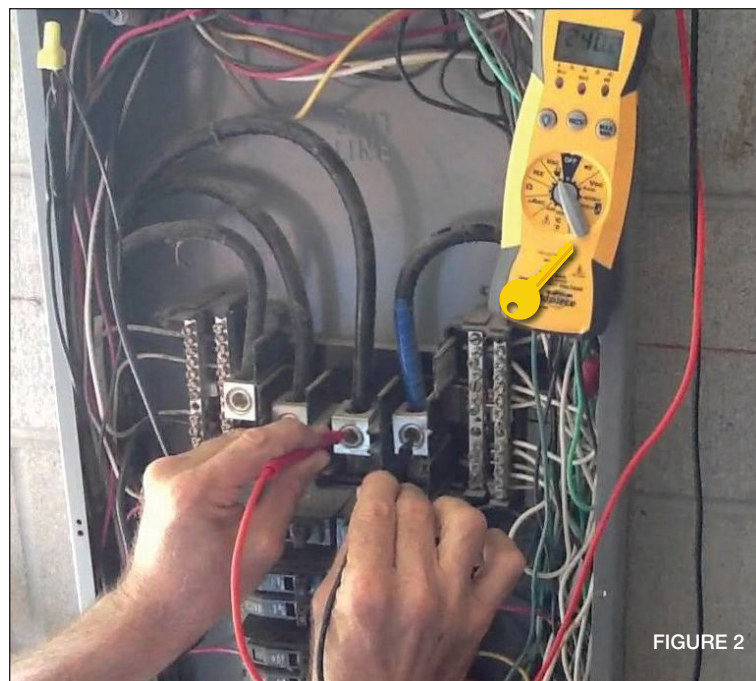


FIGURE 2

of things from a less formulaic perspective, when you look at our calculations above, the largest imbalance is 5.33 volts, so that's the number we'll use in our next step in finding the amount excessive temperature we're experiencing in our motor windings. We accomplish this by dividing 5.33 by our calculated average, multiplied by 100. We're doing this so we'll wind up with a percentage:

$$5.33 / 221.33 \times 100 = 2.4\%$$

What we've determined with our basic arithmetic is that the motor in our example is operating with an imbalance beyond 2%. And plugging that number into our next step is going to tell us what our excessive temperature rise is (in a percentage) regarding this motor. To do this, we'll take our calculated percentage of imbalance (2.4%) and square it:

$$2.4 \times 2.4 = 5.76$$

Which brings us to our last step in calculating the percentage of excessive temperature in our motor windings. We need to plug what we know to be the maximum percentage of imbalance (as we said, 2%) into the actual imbalance percentage we calculated (2.4% squared), which gave us 5.76%, and we find:

$$2 \times 5.76 = 11.52\% \text{ Temperature Rise}$$

An important thing for technicians to understand relative to this subject is that what may seem on the surface to be insignificant, is a critical issue. For example, studies have shown that when a voltage imbalance reaches a level of 3%, it reduces the life of the winding insulation by one-fourth, which means not only is the motor wasting energy, but the equipment owner is also faced with the unnecessary expense of an equipment repair.

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Legislative Update

Continued from Page 12

enforce the act.

Mandatory WC Legislation Stalled Until 2022

Previously introduced legislation supported by CSLB to

make workers' compensation (WC) insurance coverage mandatory for all active licensed contractors was made a "2-year bill" to be considered again during the 2022 legislative session. SB 216 Dodd (D-Napa), as originally written, would initially require three license classifications--C-20 HVAC, C-8 Concrete, and C-49

Tree Service contractors--to obtain and maintain WC insurance even if the contractor has no employees. The bill also proposes, beginning January 1, 2025, that all active licensed contractors and applicants would be required to obtain and maintain WC insurance and CSLB would no longer accept WC exemptions.

Feel The Love

Continued from Page 1

everyone deserves clean, perfect air, and we're dedicated to making sure everyone feels safe and comfortable in their own homes," said Kim McGill, Vice President of Marketing at Lennox Industries. "Through our Feel The Love

program, we honor local heroes in the communities where we work and live and are proud to give those in need the perfect air they deserve, thanks to the collaboration and generosity of our dealer partners."

Since 2009, Feel The Love (formally known as Heat U.P.) has been a key program for Lennox Industries to give back to its communities. Culminating in Feel The

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